Transmission and Distribution Interaction: ENTSO-E

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Regulatory context: the CEP

- Distributed resources
- Local scale
- Value the role of the TSOs, bridge the gap between TSOs and new energy transition actors

CEP – focus on DSOs

- **EU DSO Entity** to give a European voice and weight to the DSOs
- **DSOs empowered** to access **flexibilities services**, **define new products** and **new rules** without TSOs
- DSOs are recognized as legitimate actors for **data management**
- **DSOs** are to hold the pen for future **network codes**

Access to distributed flexibility should be granted for both TSOs and DSOs, in an integrated system approach, avoiding local fragmented markets

JOINT EU TSO-DSO PLATFORM

ENTSO-E, the four European associations representing DSOs and the EC launched a platform for tighter collaboration at the EU level.

PARTICIPANTS	OBSERVERS	MISSIONS
eurelectric – ELECTRICITY FOR EUROPE entsoe EDSO for smart grids CEDEC GEODE	European Commission	• Joint workshops to tackle key issues • Joint project team on data management • Held in Brussels • Associations take turns in hosting

Technology Disruption

Utilities are disrupted by four types of technology – and this disruption has a huge impact on markets and regulators

I. Energy Technology

Distributed Energy Resources

Solar PV

Storage

Wind

Fuel Cells

Microgrids

Electric Vehicles

Energy from Waste

II. Consumer Technology

Smart Appliances

Prosumer Enablement

Convergence of Industries

Energy Efficient Equipment (LED Lights)

Social Networks

Disruption

- New participants driving bottom up change enabled by new technology
- Setting affordable cost & service targets reflecting rise of microgrids
- Designing Regulatory models fit for the future, not based on the past

Automated Demand Response

Embedded Systems

Process Equipment

Smart Grid/Grid Digitization

Situational Awareness

IV. Grid / Operational Technology

Cognitive Computing

Blockchain

Big Data & Analytics

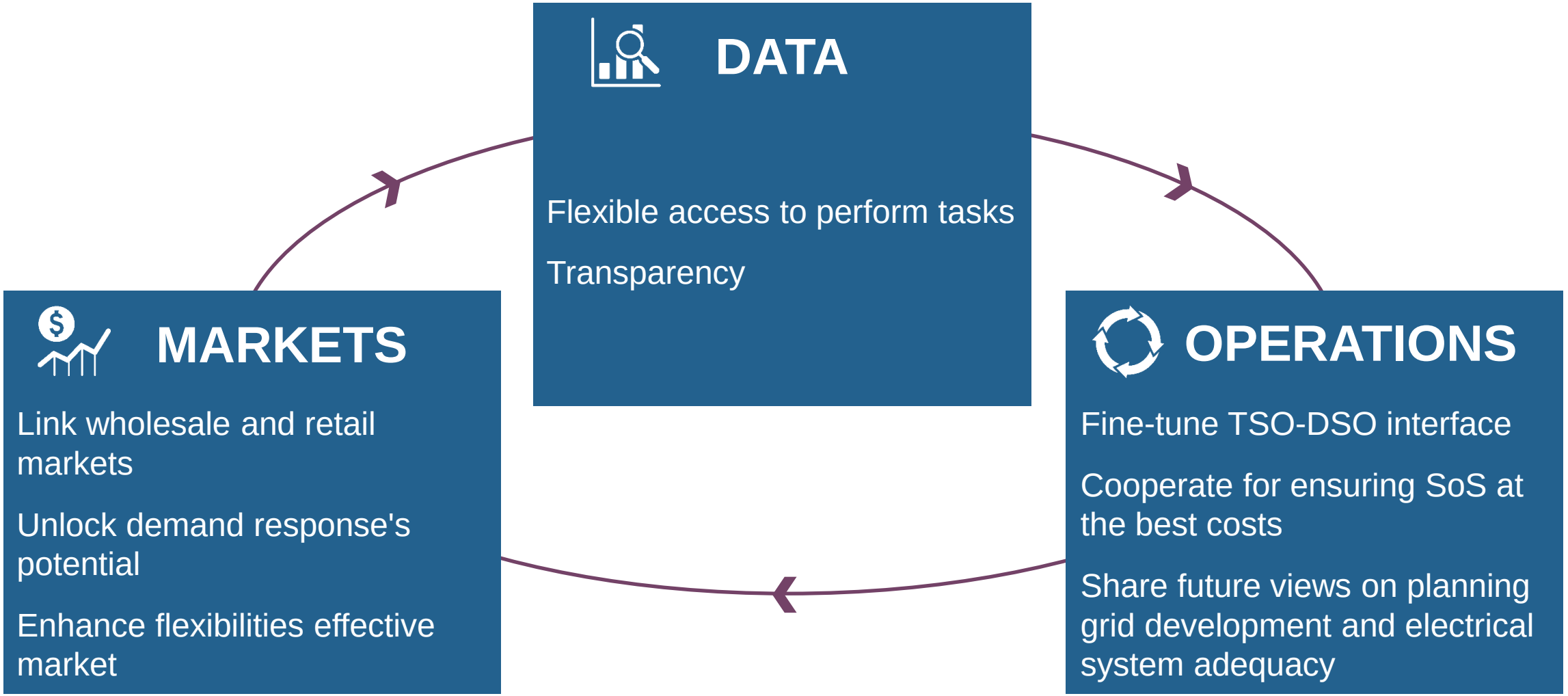
Internet of Things

Mobile

Cloud

III. Information Technology

ONE POWER SYSTEM



A cooperation creating value for the customer

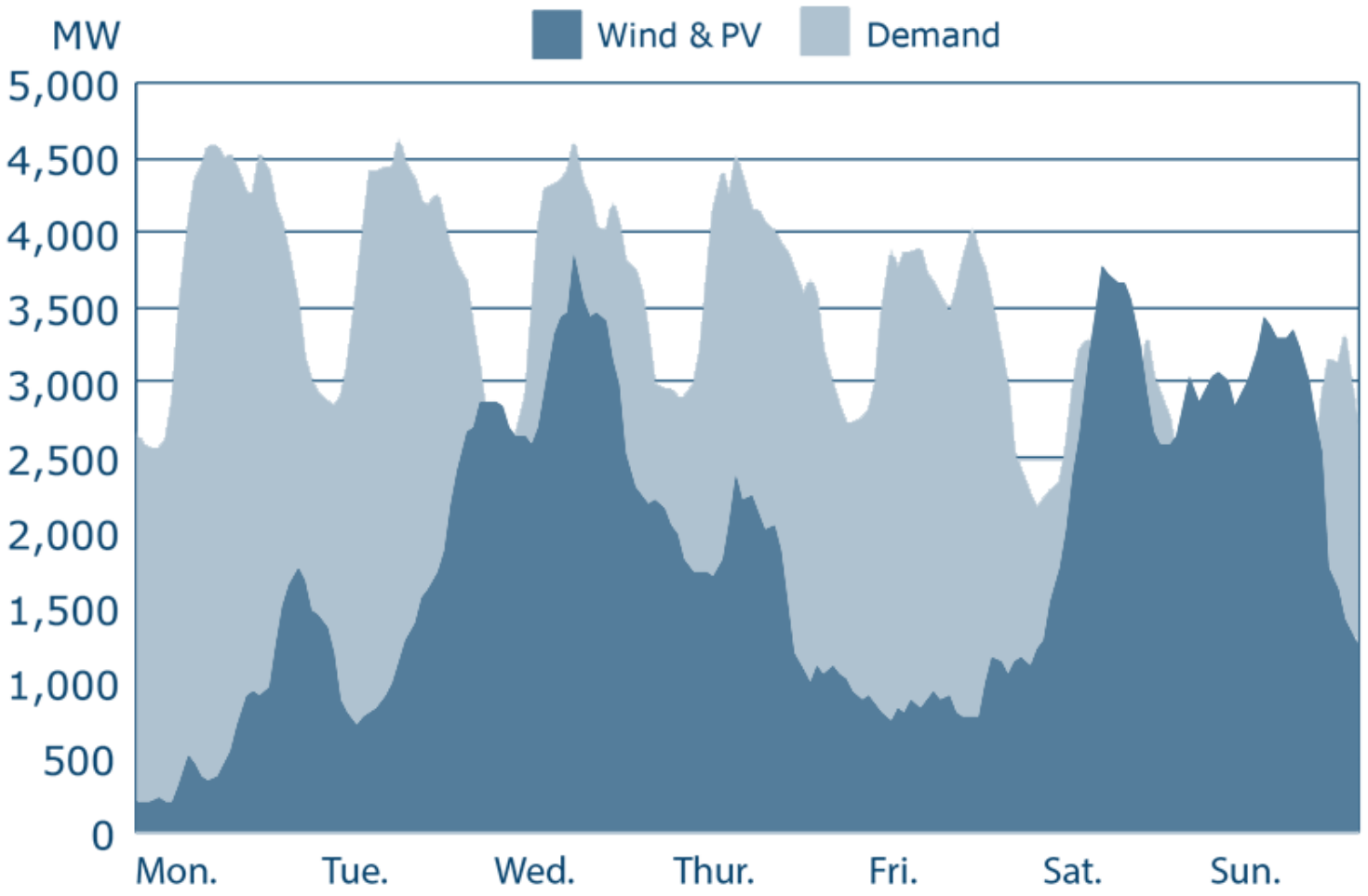
Facilitating markets and designing products for flexibility together with customers, aggregators, suppliers, traders, DSOs, TSOs

Extended **data exchange**, enhanced **observability and controllability**, right level of **transparency**

Enable **efficient use of flexibilities** for **congestion management** on the grids and for **balancing of the power system**

Markets

THE FLEXIBILITY CHALLENGE



EXAMPLE OF ONE WEEK IN SEPTEMBER IN DENMARK

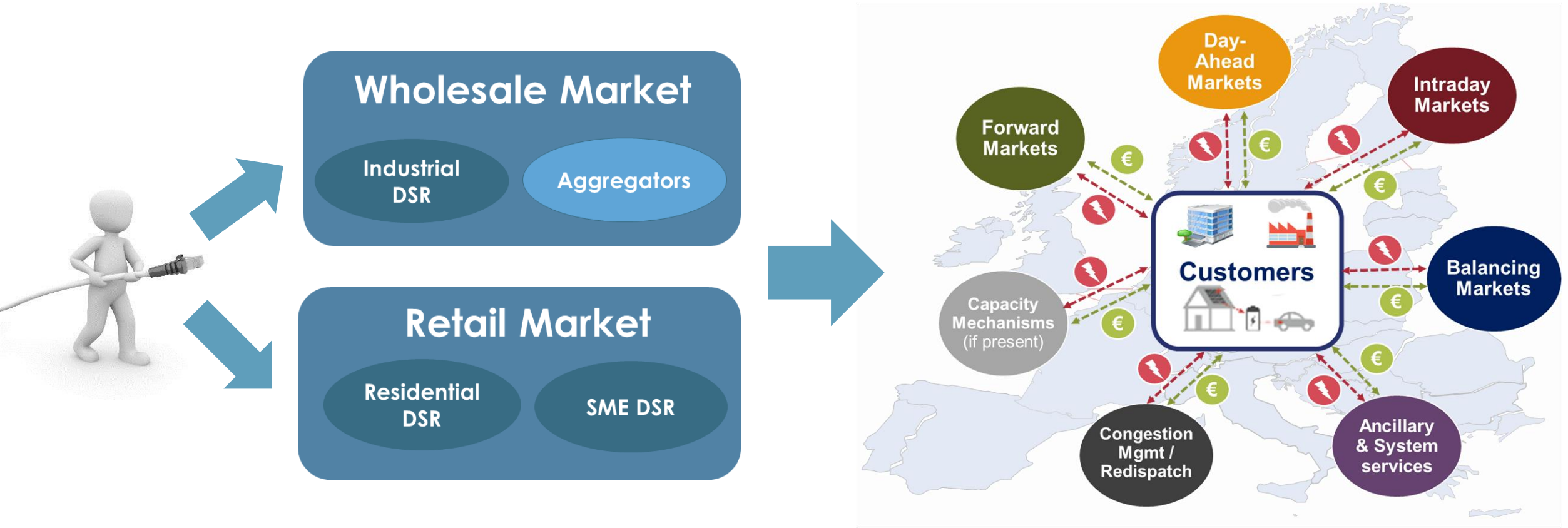
56% wind power

End-consumers play an increasingly important role

Source: Energinet

Bringing together flexibility providers and flexibility users

Integrate wholesale and **retail market, develop new services** and **enhance participation of all actors:** flexibility providers and flexibility users



At different scales: Local / National / European

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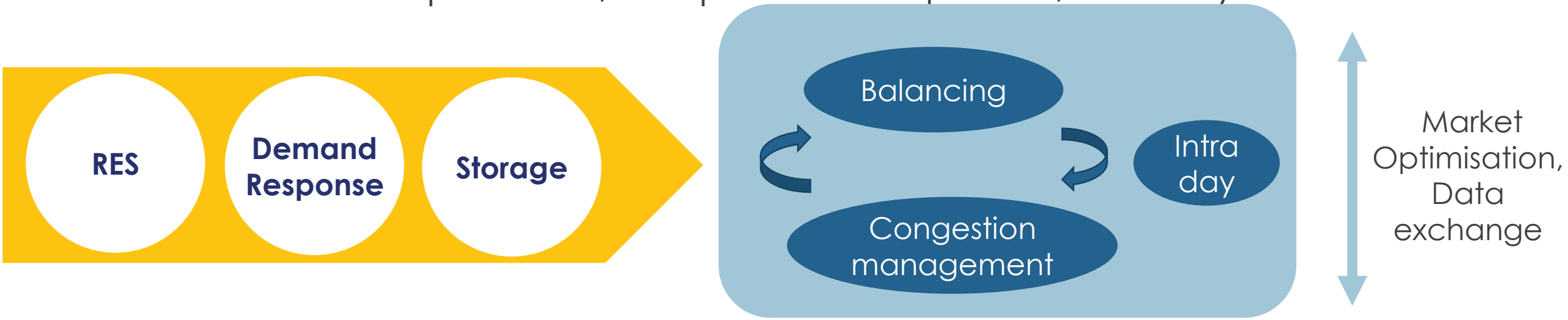
Smart markets to optimise the use of flexibilities

- Distributed flexibilities should access all markets
- For different purposes:

  Congestion management / Balancing / Portfolio optimization
- At different scales: Local / National / Regional / European
- With standard products, in liquid market places, via easy interfaces



TSO-DSO cooperation is fundamental to enable such a framework!

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TSO-DSO common work: a report at EU level

Active System Management

Active System Management (ASM) is a key set of strategies and tools performed and used by DSOs and TSOs for ***the cost-efficient and secure management of the electricity systems****. It involves the use of* ***smart and digital grids*** *and the capacity to modulate, in* ***different timeframes and distinct areas, generation and demand mostly through market-based flexibility instruments*** *to tackle challenges impacting system operation, thus ensuring proper integration of Renewable Energy Sources (RES) and a high share of Distributed Energy Resources (DER), as well as the integration with energy markets.*

Focus of the report

close collaboration of TSOs and DSOs, for congestion management in both distribution and transmission networks and system balancing when such services are provided in a market-based approach by distributed flexibilities owned and operated by third parties.

Services from flexibility sources

Batteries: best profitability in multi use / services

For TSO the most rewarding

- Primary use: Frequency regulation FCR fast response
- Secondary use: a-FRR based on wind forecast, Voltage and Reactive power, flexible balancing and fault reserve
- Congestion management : not suitable through power intensive storage
- Defense Plans – long stand by phases : suitable for power intensive storage

DR : best profitability in multi use / services

For the others the most rewarding : distribution tasks – security supply

For TSO the largest capacities :

- Day Ahead Market and FCR- D
- Manual FRR, Reserve and FCR-N
- Other services: alternative to grid investments for urban areas

eV

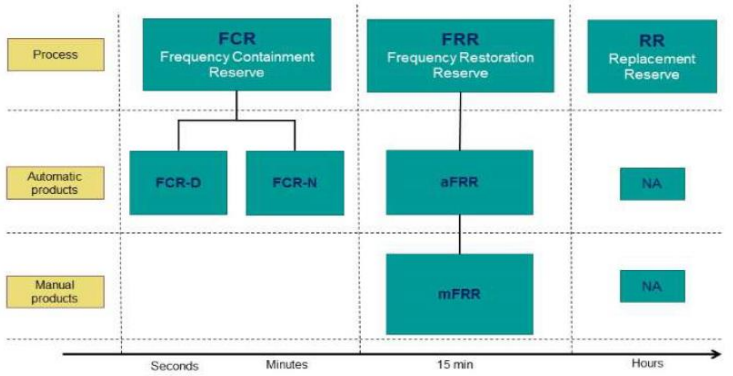
- Fast frequency control

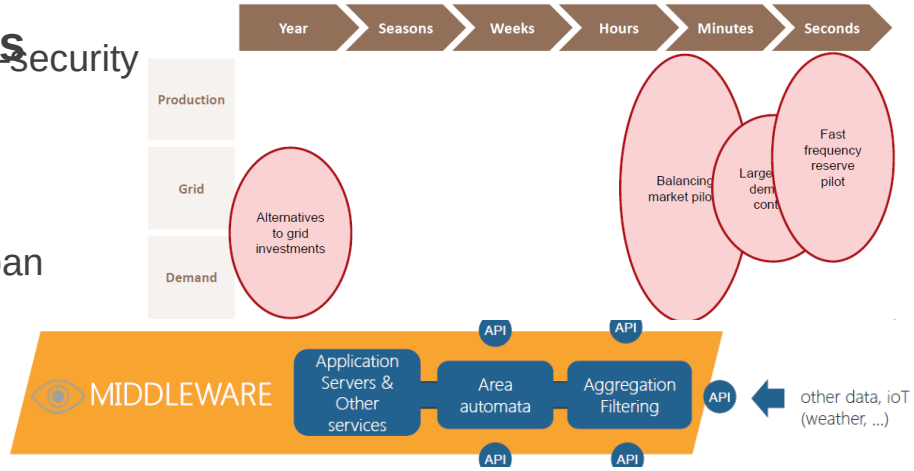
Grid

- Predictive control approach through open source: autonomous areas (substation)

Reserve products:

- **FCR –Frequency Containment Reserve (automatic)**
- **FRR- Frequency Restoration Reserves (automatic and manual)**





Optimization of services between TSOs and DSOs

Link to presentations

- Matthias Hofmann, Statnett
- Flexitranstore, Christos Dikaiakos, IPTO
- Marherita Pallesschi, Terna
- EU-sysFlex , Prezemyslaw Kcprzack, PSE
- Lucas Saludjian, RTE

Link to videos

Need for future developments

Flexibility sources volumes

- Estimate the potential of flexibility sources in general
- Estimate the potential according to the requirements of the services/functionalities

Cost of various flexibility sources

- For existing and new services /From existing and new actors based on developments of technologies and volumes
- Optimization of flexibility sources

Future Services and products

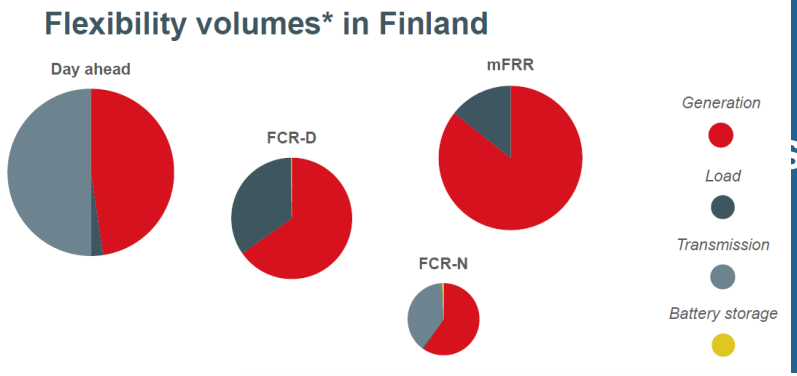
- Services and products brought by evolutions of technology and market design
- Ex: Aggregation of DR flexibility sources (charging rates of eV, back-up batteries, CHP, heating and cooling systems , remuneration mechanisms

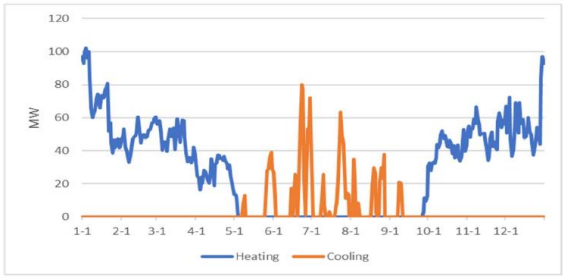
Actors and business cases

- Market mechanisms to unlock DR by using for example aggregators, farmers, big players: Amazo TESLA, ..
- Business cases for VRES

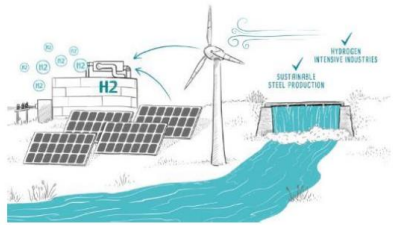
Technologies

- Power to x for seasonal storage and sector integration
- Software and ICT systems , registration of performance and data especially for distributed flexibilities,





High variation during seasons reaching 100 MW (cold period) and 80 MW (warm period)



Volumes of flexibility, Costs, Optimization, business cases and future services and products Actors and echnologies

Link to presentations

- Jussi Matilainen, Fingrid
- Andrius Maneikis, Litgrid
- Norela Constantinescu, ENTSO-E

Link to videos

Data and digital

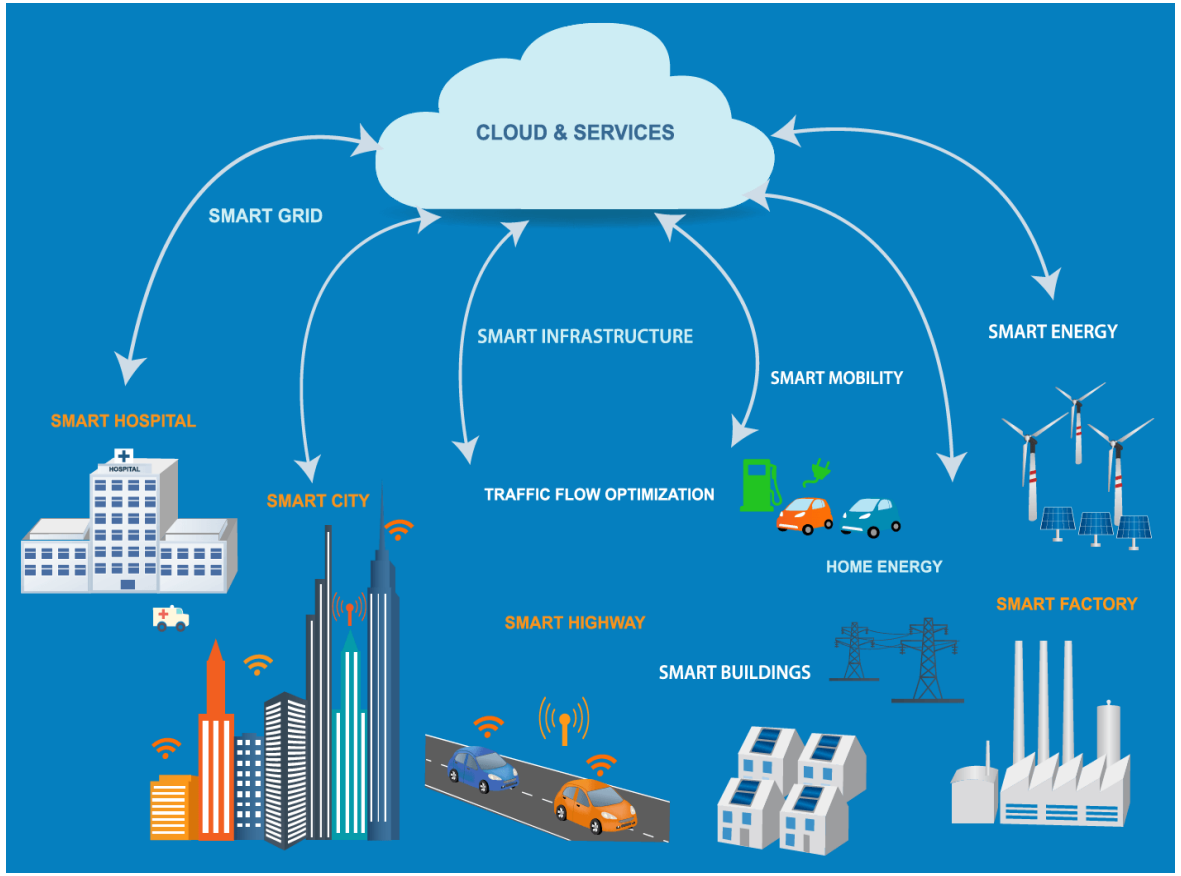
Power to the users

From understanding the core role of data management…

Smartgrids projects

Data exchange platforms

European guidance



…to use it every day

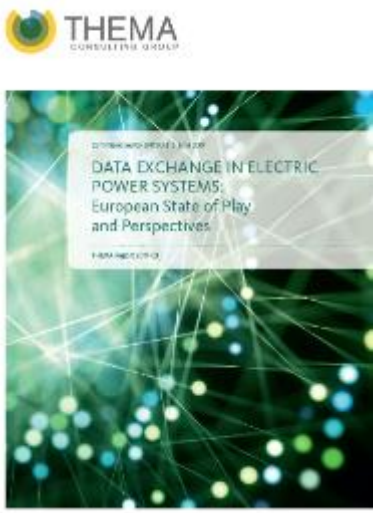
Connected data hubs

Smart apps to empower prosumers

Non-discriminatory access

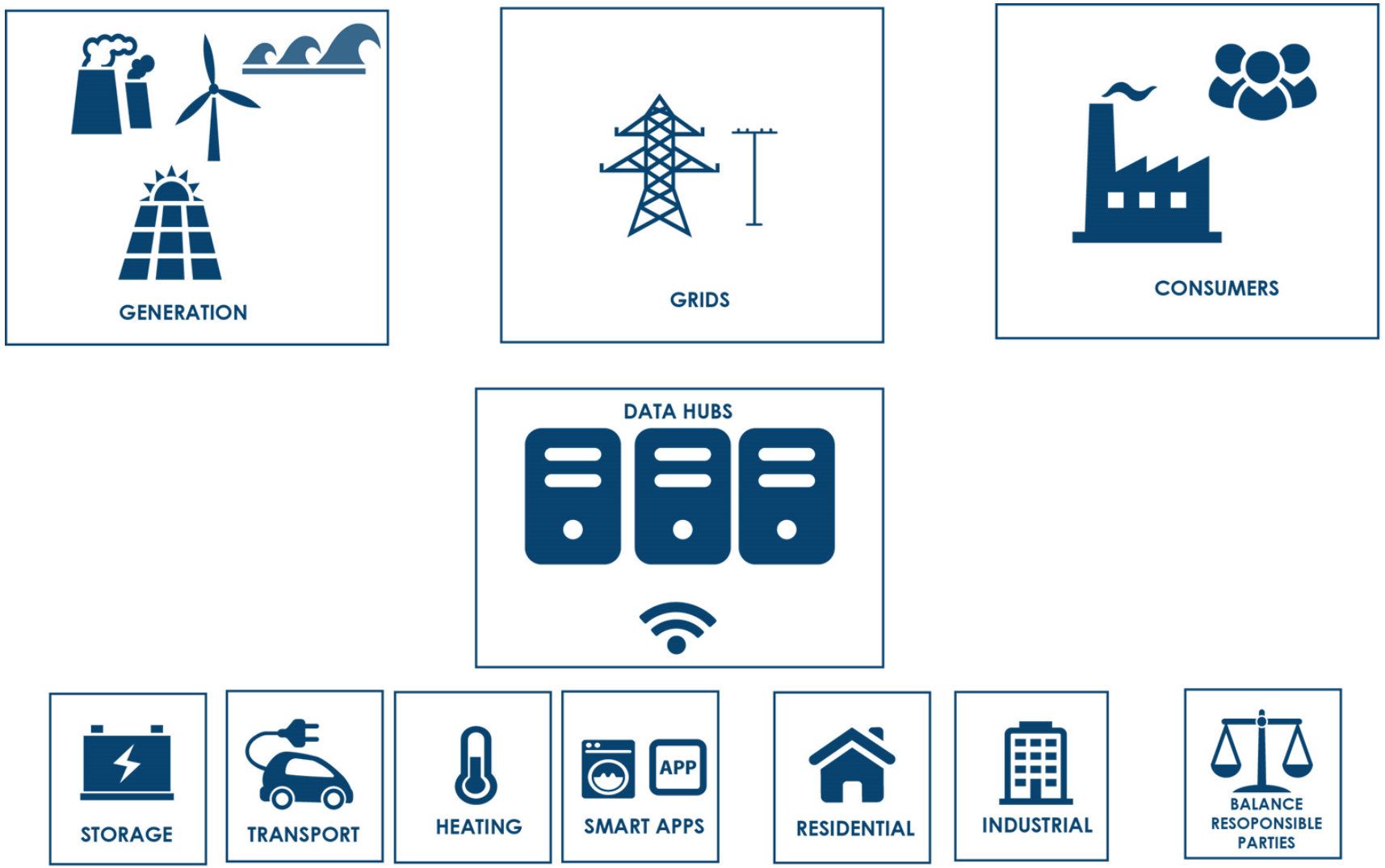
Two reports

Common TSO-DSO report
First common TSO-DSO report
Political weight
General principle
Beyond data management



THEMA report commissioned by ENTSO-E
ENTSO-E follow-up of TSO-DSO report
Practical state of play for data exchange
Focus on meter data
Show data management is not under DSOs leadership only

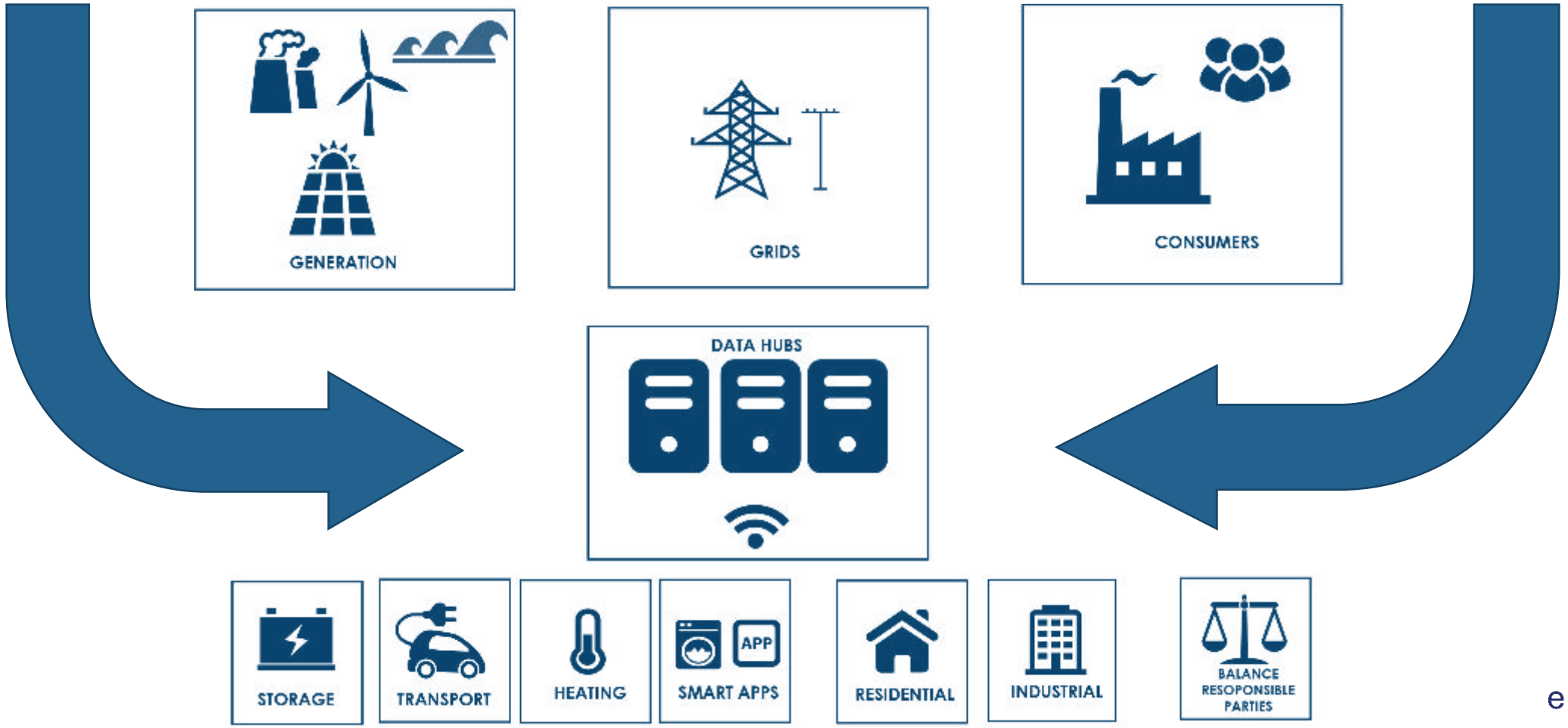
Data, THE key to develop new services



The role of data management and data exchange

Smart & digital Grids
Smart devices

Integrated &
Efficient markets



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Many European countries have adopted DEPs[1], Or plan to do so

- Some countries focus on **standardization of data exchange**, e.g.,
  - Germany, Austria, Portugal
- **Central DEPs** are being implemented or are in place in, e.g.,
  - Denmark, Norway, Sweden, Finland, Estonia, Italy, Iceland
- **Discussion about DEPs** in many more countries, e.g.,
  - France, Latvia, Lithuania, Switzerland

[1] *DEP: Data Exchange Platform*

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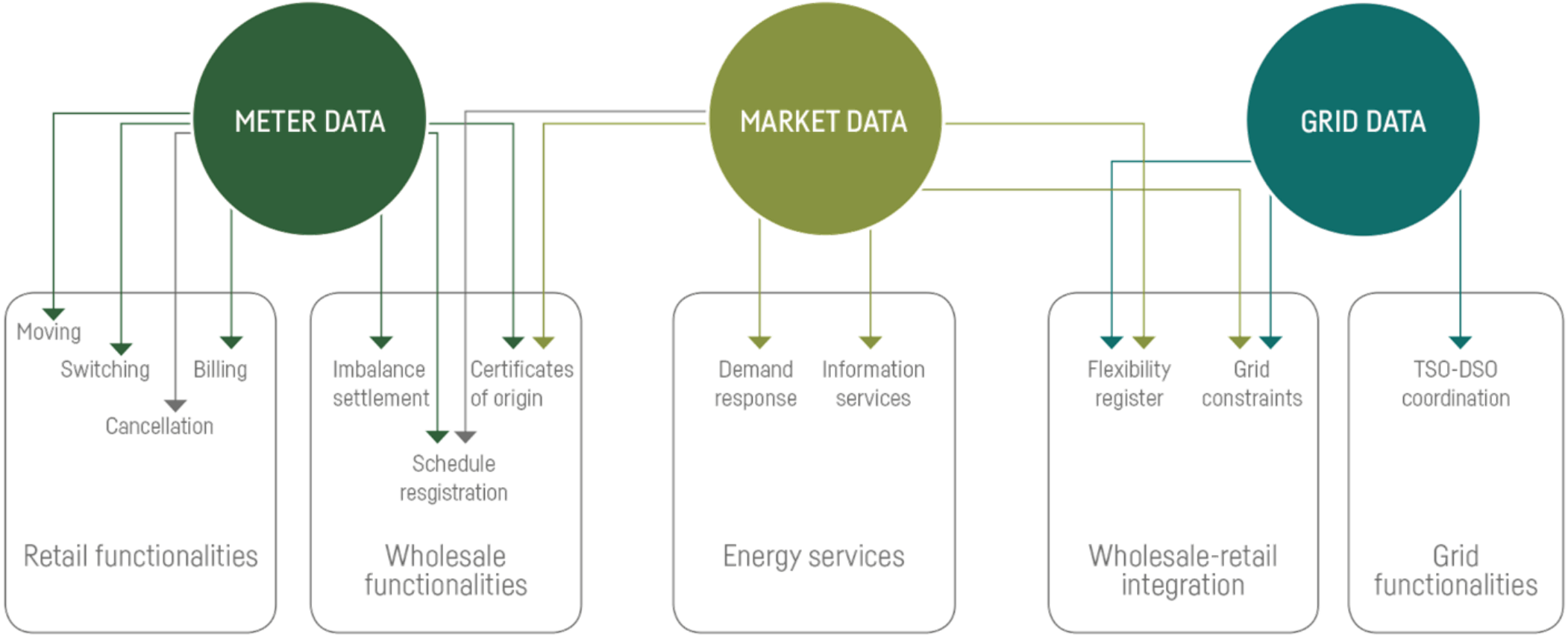
Development towards more functionalities and services on DEPs



Associations representing DSOs and ENTSO-E joint efforts to shape the future data management framework for Europe

TSO-DSO DATA MANAGEMENT PAPER AND ADDENDUM

USE CASES

- CONGESTION MANAGEMENT
- BALANCING
- USE OF FLEXIBILITY
- REAL-TIME CONTROL AND SUPERVISION
- NETWORK PLANNING

Data: an integrated electricity system approach

1. Data exchange has to support efficient market functioning and a level playing field for new entrants

2. Focus on which services should be offered to the market and system operation first, and secondly on how to harmonize their platforms

3. Establish third party access to data, enabling players to access all data relevant for their activity. The level of granularity depends on the tasks to be performed

4. Party responsible for data management must be neutral and subject to regulatory oversight;

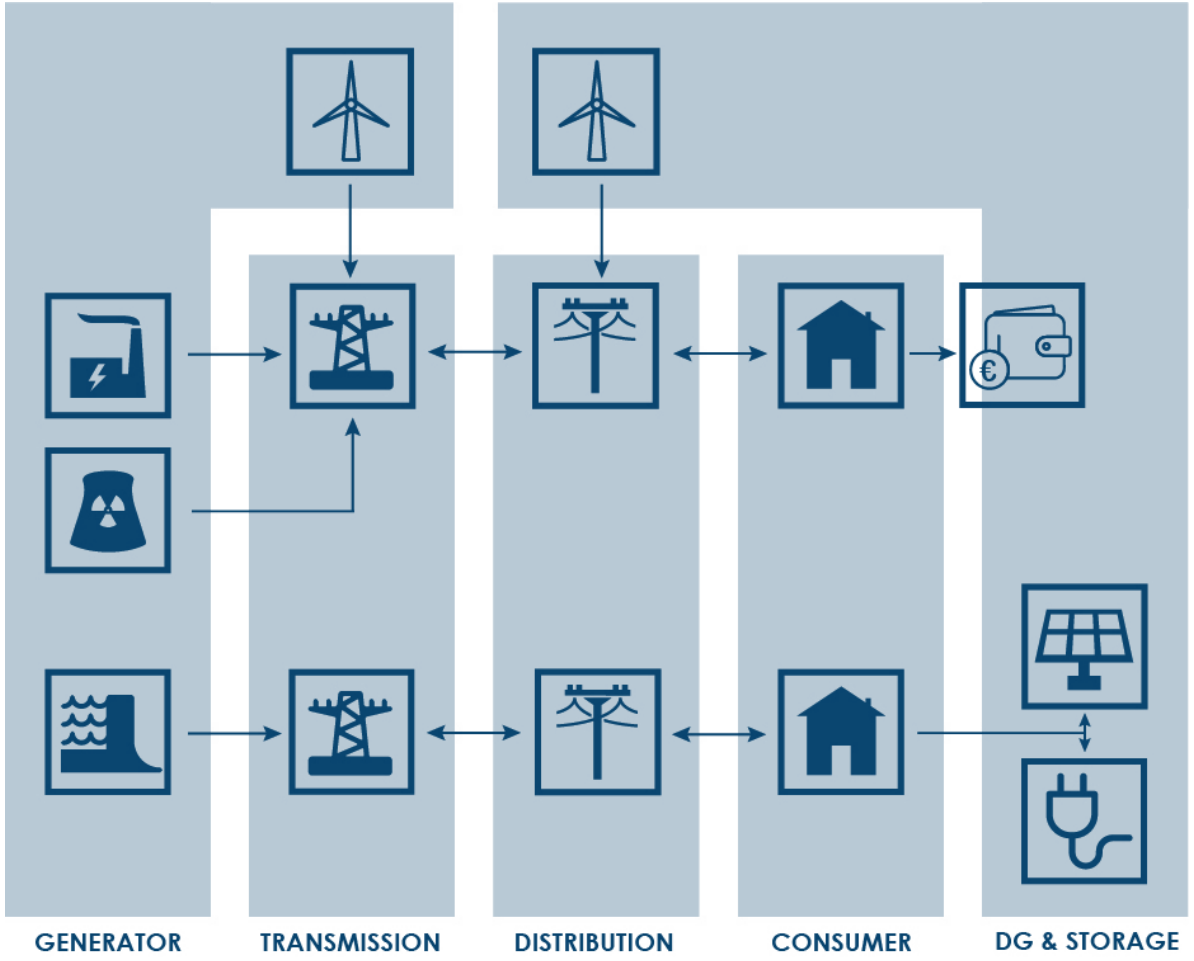
5. Data harmonization and standardization should be taken up when clear benefits have been identified;

6. Ensure data access for TSOs related to users connected to distribution grid. Three options: through aggregators/BSP, through DSOs, direct access

7. Flexibility should be used in a market based approach while singling out system risks and avoid harmful interferences between congestion management and balancing

Operational

RSC AND TSO – DSO INTERACTION –operation



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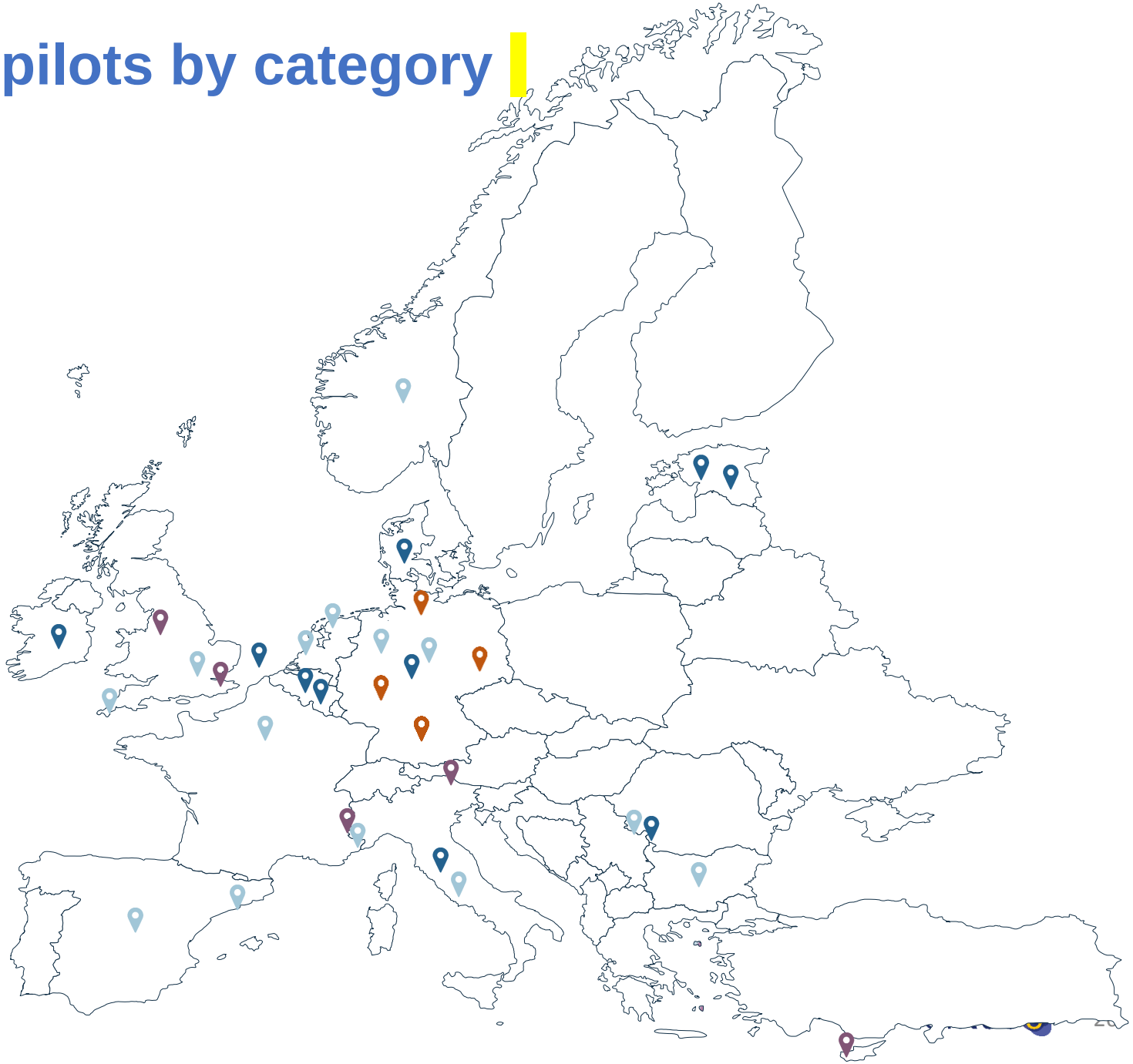
Reliable Sustainable Connected

Projects

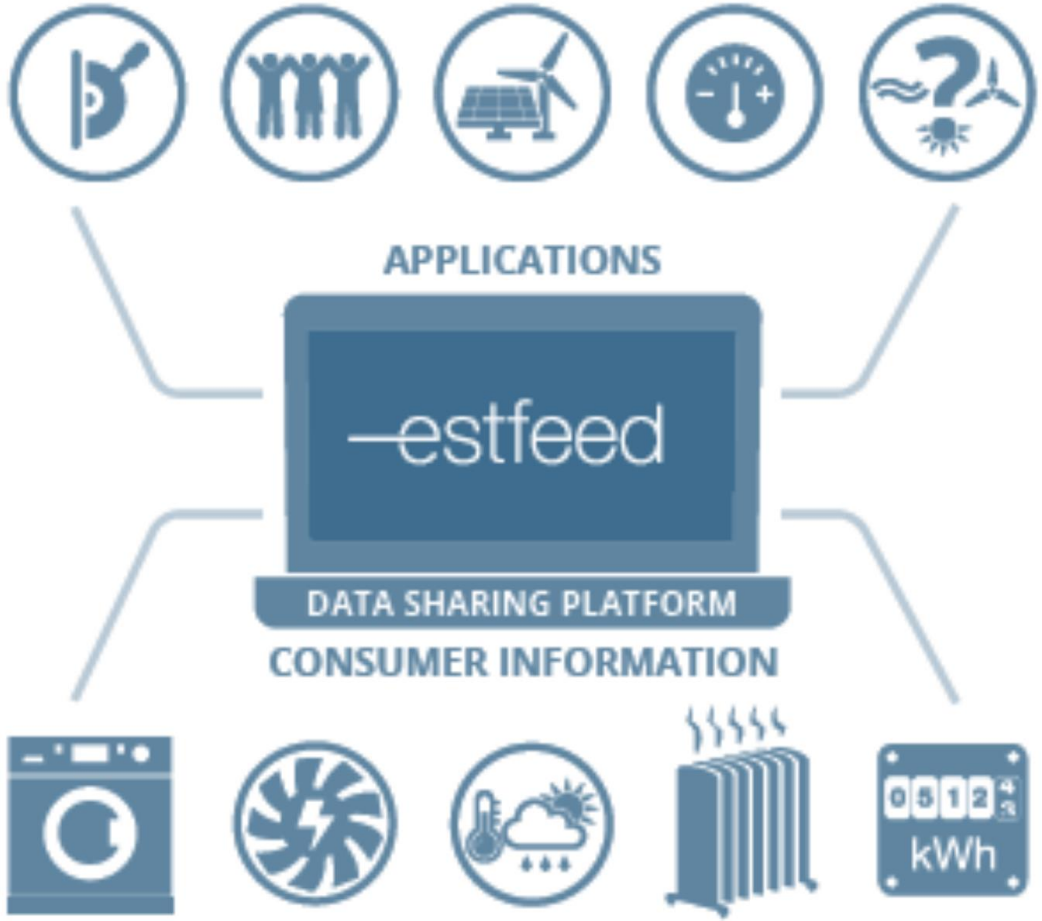
Geographical scope of the pilots by category



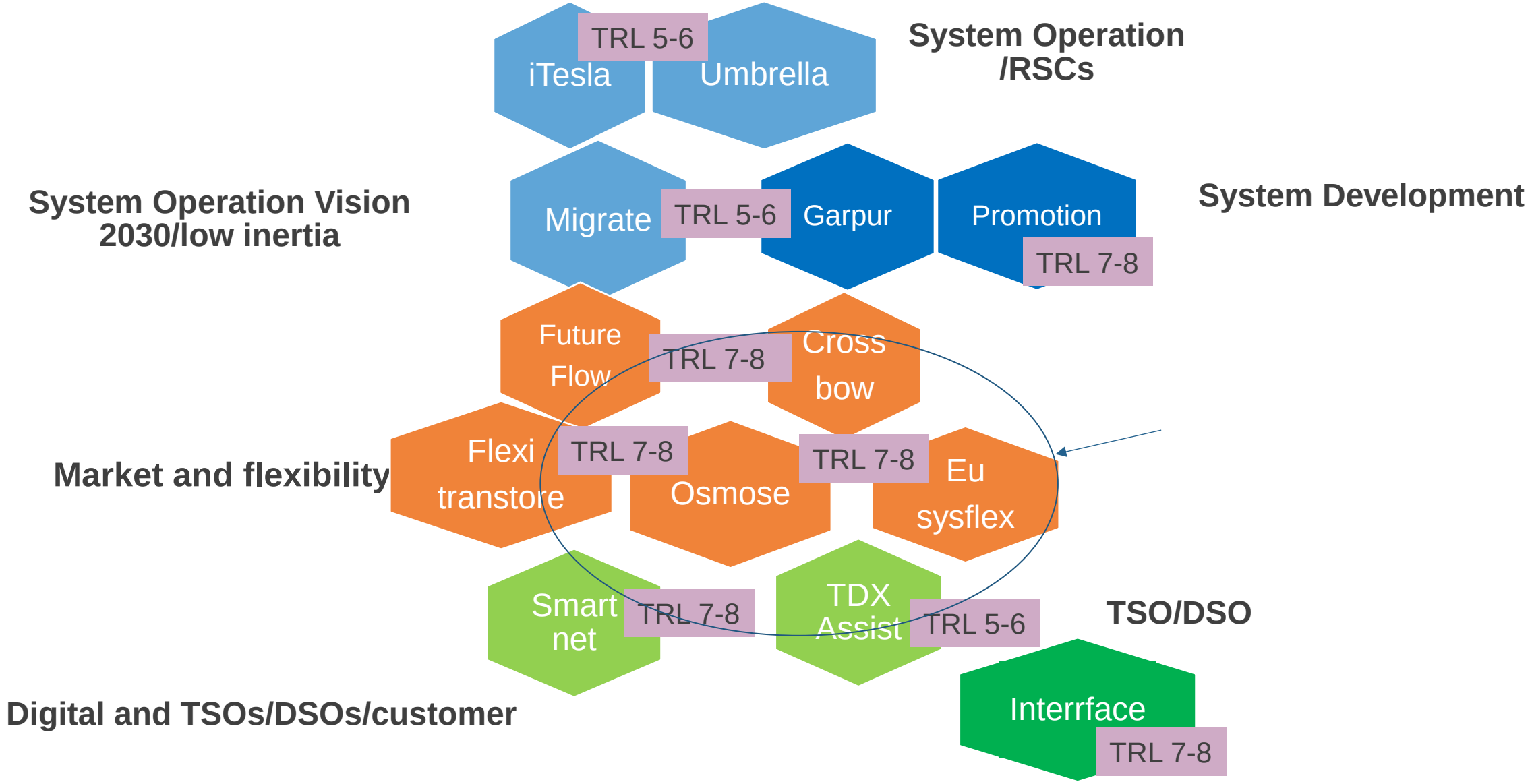
Categories of the pilots:

- Flexibility Market Places
- Data Exchange
- Technical Solutions
- Aggregators (covering well all European countries)

DATA MANAGEMENT: THE KEY FOR FUTURE SMARTGRIDS



EC funded projects



Interrface project

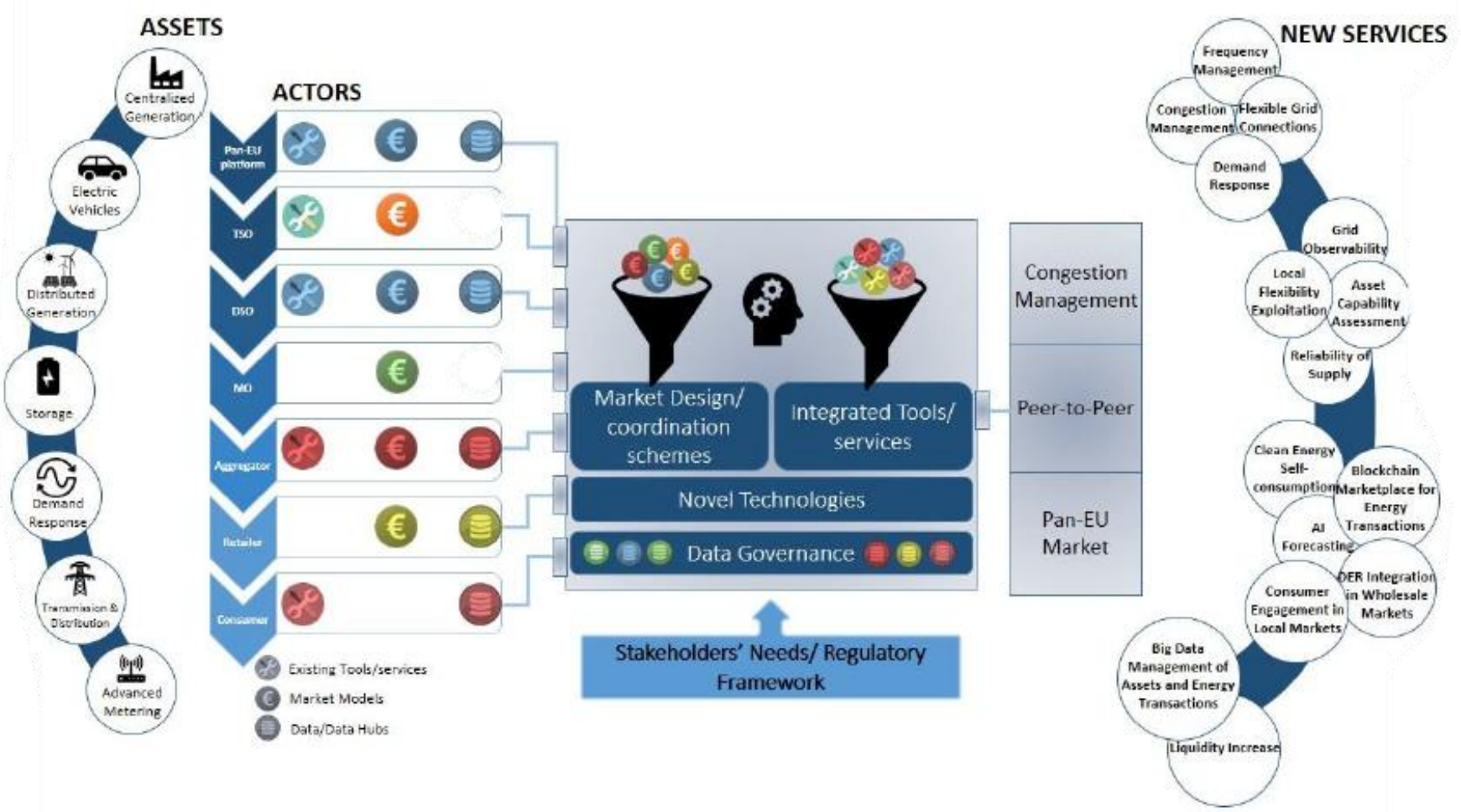


Figure 1 INTERRFACE Concept

Financed by Horizon 2020

Start January 2019

Tools and Demos

Congestion Mg and balancing

Peer to Peer Trading

Pan European clearing market

Centralised Energy Management for microgrids

GSMS

Intelligent Distribution Nodes IDN

ERMS

Single Flexibility Platform

Integrated Asset Condition Management System

Local markets using asset capabilities

Asset – enabled local markets

Blockchain TSO-DSO Flexibility

DER into wholesale market

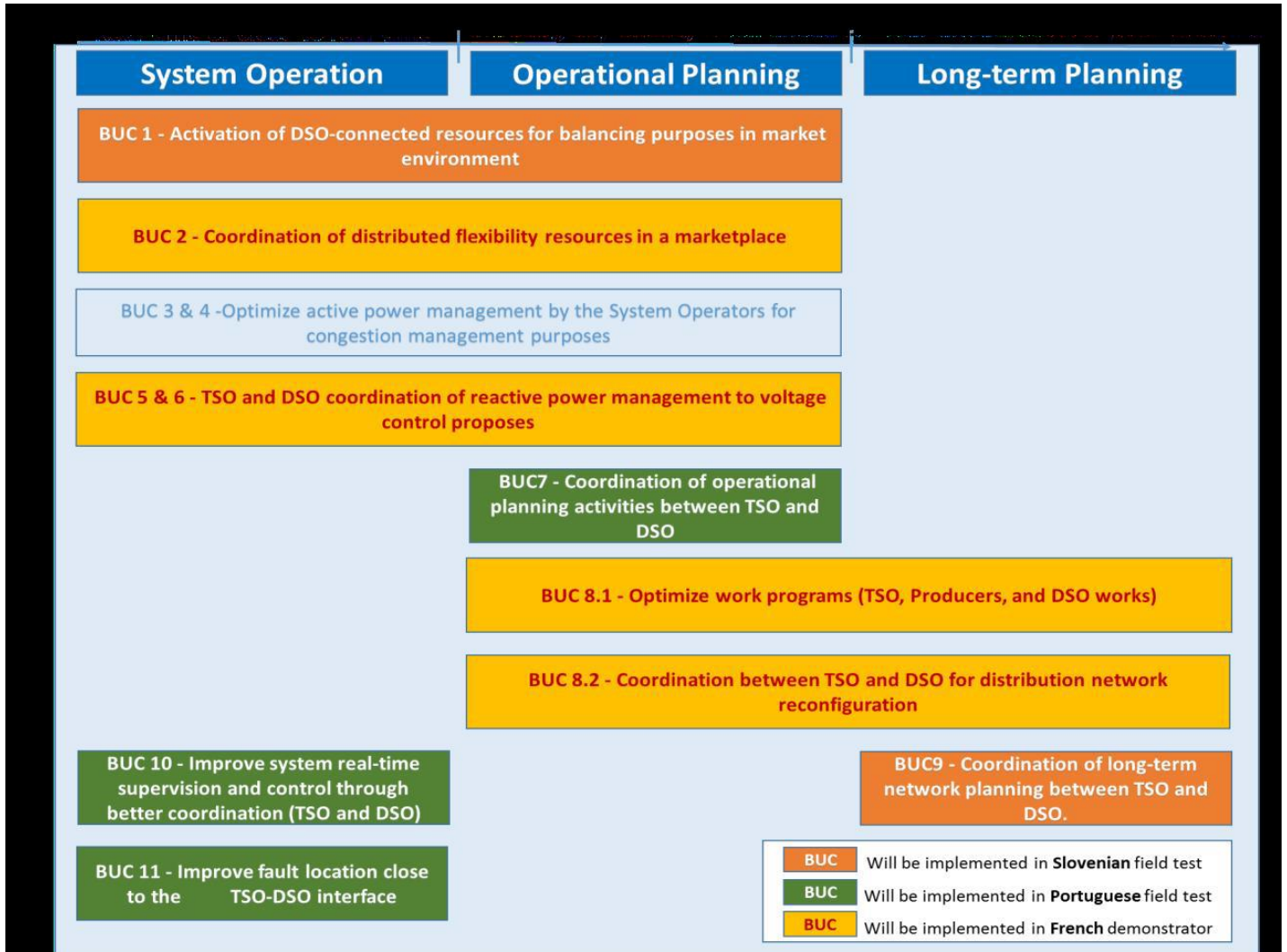
Euphemia power market model with a forecasting tool

Spatial Aggregation of local flexibility

Euphemia market based platform

Data Governance middleware/ECCO- SP

Transparency Platform – additional data exchange

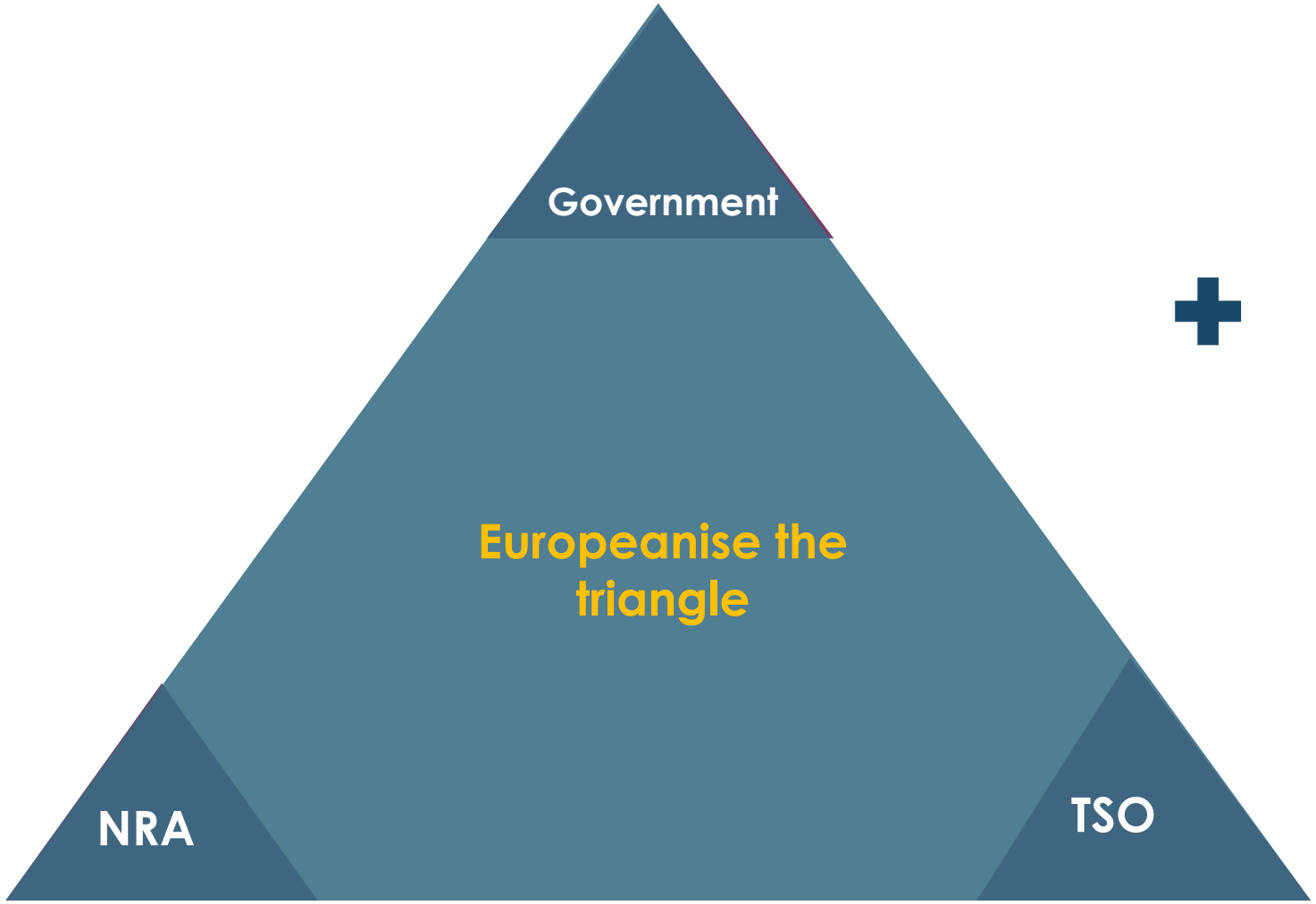


"…for renewables integration in the European Market Place…"

Sector coupling

- Mobility+ Power & Gas networks (both transmission & distribution)
- Power + Gas
- Transmission & Distribution Interface
- Network interface with market participants

AREAS OF INTERACTION FOR A SUCCESSFUL ENERGY TRANSITION



TSO-DSO+

1. Flexibility & active system management
2. Innovation & new services ('neutral market facilitation')
3. Data management @ interface
4. Planning (110 kV & above)
5. Involve stakeholders

Thank you for your attention..

ROLES AND RESPONSIBILITIES AT THE TSO-DSO INTERFACE

TSOs are responsible for overall system security via **frequency control** and **residual balancing**. TSOs and DSOs are responsible for the secure operation of their respective networks, which involves **managing congestion and voltage** on their grids.

In the medium to long term, DSOs may also resort to **local islanding** when an MV line is disconnected from the system, in order to **maintain the quality of service** before the MV line is reconnected to the system.

The DSO also contributes to **congestion management** and **pre-qualification of flexible resources** in order to make sure markets can play without putting the security of the power system at risk.

All of these tasks must be performed in a **transparent** and **non-discriminatory** way