asociación iberoamericana de entidades
reguladoras de la energía

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CEER

**Council of European
Energy Regulators**

Fostering energy markets,
empowering **consumers**.

Smart Grid Regulation

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D1: Digitalisation for the Consumer

D2: Decarbonisation at Least Cost

D3: Dynamic Regulation

Digitalisation

1 **Data**

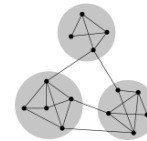Produced by sensors, smart meters & devices in the system

2 **Analytics**

Uses data to provide insights & is advancing with machine learning & AI

3 **Connectivity**

Digital networks provide for connectivity of devices & assets in the system

Digitalisation

Changes to the energy system

1 **Efficiency**

- Improved productivity for networks, generation and gas assets

2 **Changes Demand**

- Smart buildings
- Mobility as a service
- New retail tariffs and products

3 **New platforms**

- Peer-2-peer trading
- Flexibility market places

Potential Value Propositions

Savings

€

Convenience

EASY

Comfort

Choice

Autonomy

Shared Econ

I NEED...   YOU HAVE...
EFFICIENCY
TRUST

Smart Grids - Definition

CEER (2010):

Smart grid is an electricity network that can cost-efficiently integrate the behaviour and actions of all users connected to it – generators, consumers and those that do both – in order to ensure economically efficient, sustainable power system with low losses and high levels of quality and security of supply and safety.

Smart Grids - Definition

Large-scale renewable energy sources

Distributed energy resources (decentralized generation, energy storage, power quality devices, demand response/flexibility)

Two-way communications available

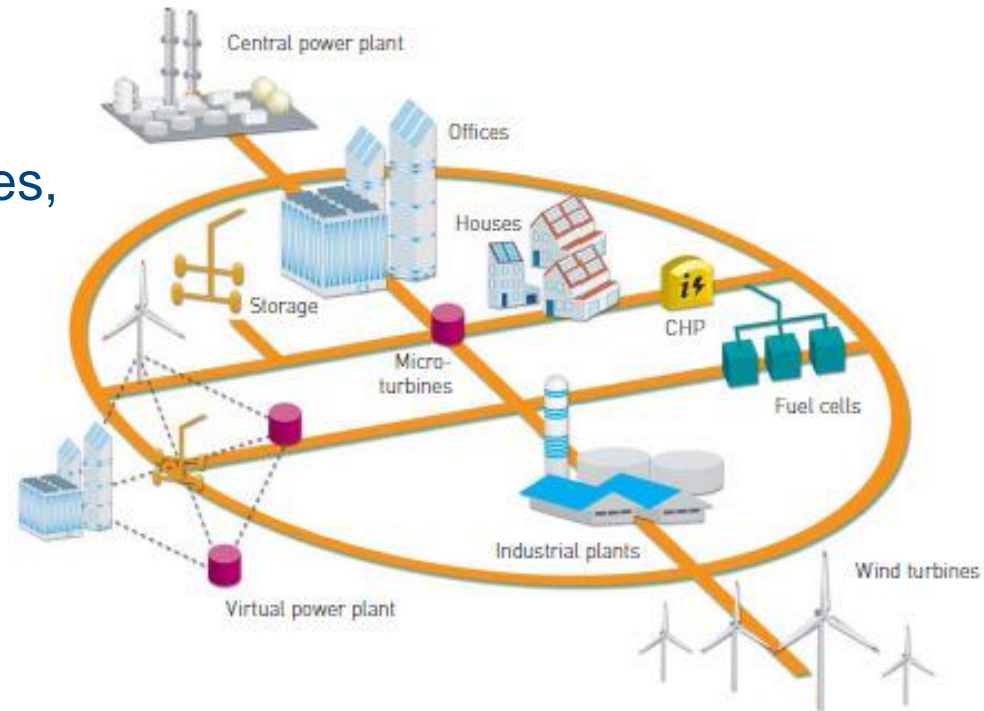Active customer participation

Intermittent generation

Smart meters

Energy efficiency

Improved operational security

Business models for emerging energy applications (smart heat, electric vehicles, energy storage, demand flexibility)

Central power plant

Offices

Houses

Storage

CHP

Micro-turbines

Fuel cells

Industrial plants

Wind turbines

Virtual power plant

Regulation of Innovation/Smart Grids

Portuguese NRA methodology presented in 2012

Basic regulatory revenue formula applied:

i) Cost-plus regulation applied on CAPEX

         +

ii) Incentive regulation applied on OPEX

CAPEX of smart grids (Pilot Projects) benefit from higher remuneration than conventional investments

Reduction of OPEX provided by smart grid efficiencies result in systems savings and price efficiencies for consumers

Close monitoring process by the NRA.

Portuguese NRA proposal 2019: DSO incentives aligned with regulatory objectives

- New **remuneration incentive** for LV distribution network operators based on sharing benefits generated by the smart grid services provided by those operators.

- Associate the **incentive value** with the operators' **performance** in providing explicit (net of cost) benefits to consumers as a result of integrating their facility into a smart grid, i.e. their performance in providing value for money to consumers, including the reduction of operational costs of the operators, through the effective provision of a package of intelligent network services.

  - e.g. real-time billing, automated capacity changes, new tariffs and pricing mechanisms, energy services (efficiency, demand response), quality of service, remote public lighting and management...

- Allow the **adjustment of the incentive over time** so as to reflect technological developments and ensure the continued maximization of benefits for new installations integrated into smart grids, while seeking to limit regulatory risk, in particular by ensuring commitments made for the investments already made.

Smart Grids – Portuguese pilot projects

Inovcity / Inovgrid by EDP Distribuição in city of Évora (2007-2012)

Results

60%

Savings in electricity costs with the implementation of LED and AI technology in Évora

2011

InovCity was selected by the European Commission and Eureletric as a smart grid example
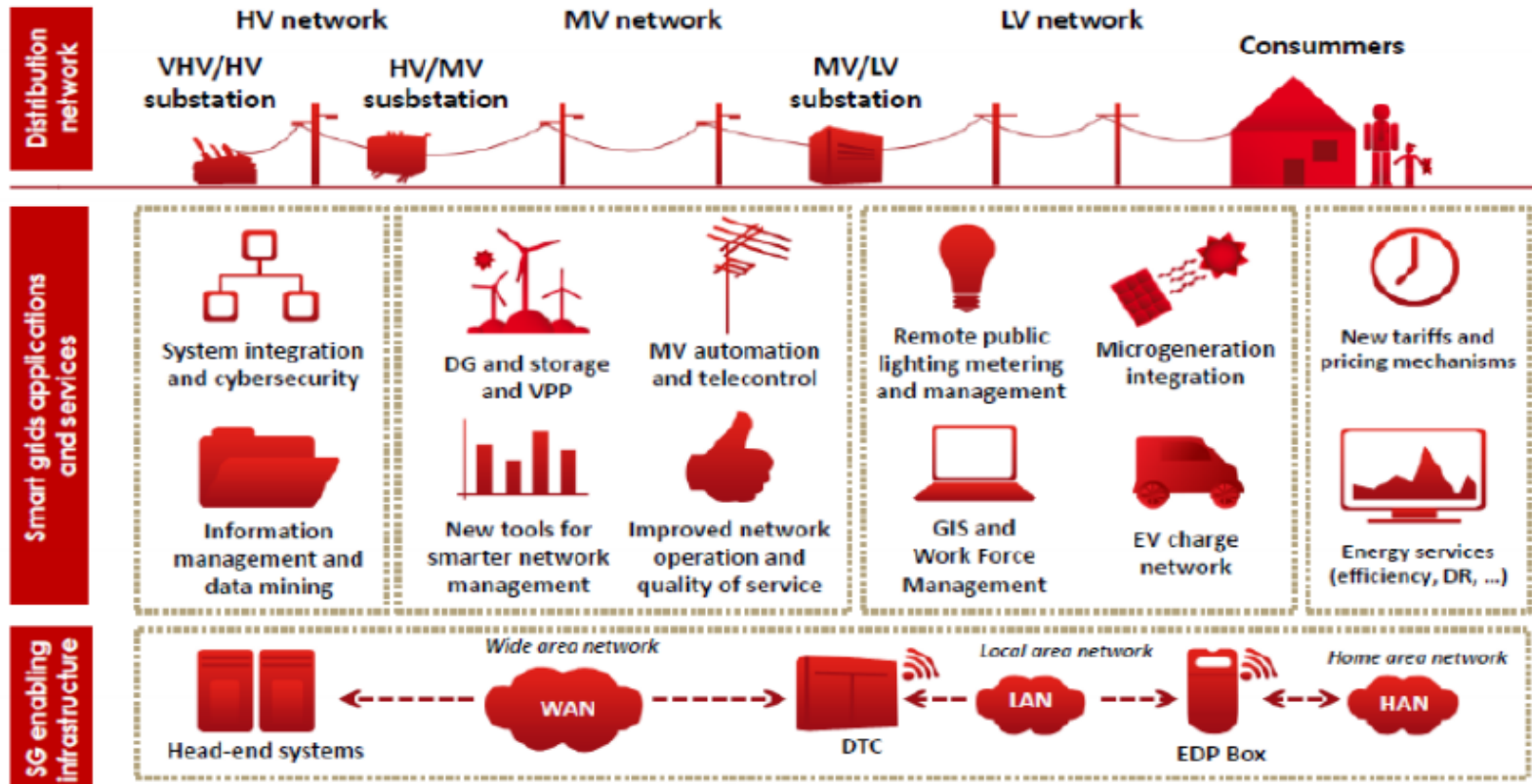
100 thousand

The number of new EDP Boxes installed in Évora, allowing an equal number of Portuguese families to reduce their electricity bills

Inovcity / Inovgrid by EDP Distribuição in city of Évora

Project InovCity (2013 - 2015)

➢ Extension to 7 new cities

Guimarães
Urban and Cultural Centre

São João da Madeira
High density of Domestic and
Industrial Clients

VISEU

Lamego
Rural Network

Marinha Grande
Challenging Quality of
Service

Batalha
Challenging Quality of
Service

inovgrid

Évora
InovCity

Alcochete
"Field laboratory" of new
technologies

Faro (islands)
Operation
challenge
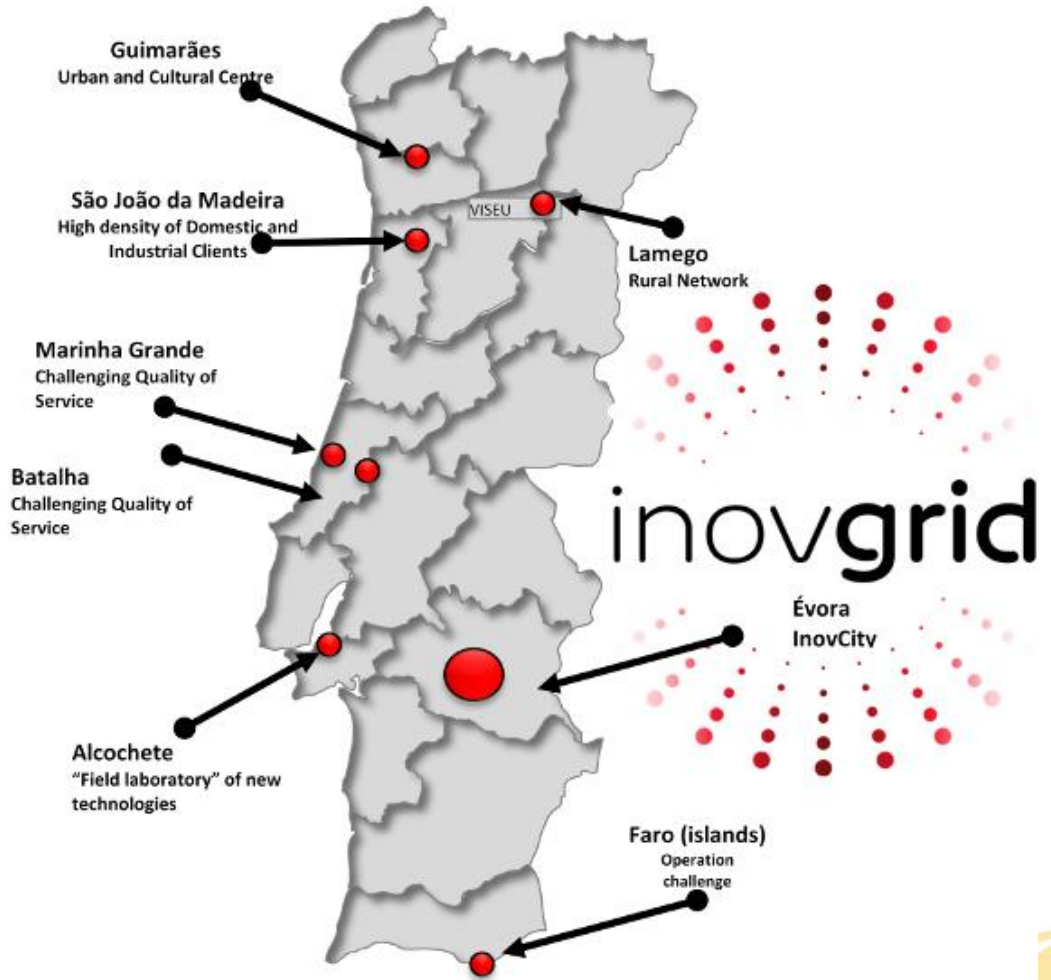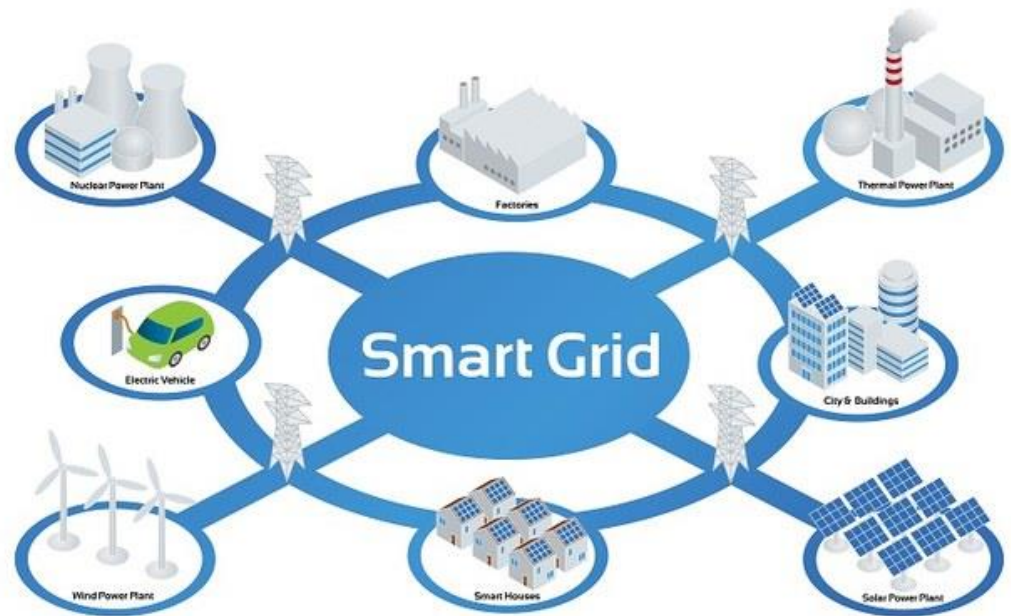
Smart Grids – Cybersecurity Challenges

European Network and Information Security Agency (ENISA) recommendations:

- Foster intercommunication protocol compatibility between devices originating from different manufacturers and vendors.
- Develop a set of minimum security requirements to be applied in all communication interdependencies in smart grids.
- Implement security measures on all devices and protocols that are part, or make use of the smart grid communication network.

Critical Information Infrastructure Protection (CIIP)

Smart Grids – CEER recommendations on cybersecurity

7 CEER recommendations:

1- All parties interacting with the grid should aim to develop and apply cybersecurity standards and measures.

2 - NRAs should proactively engage with energy stakeholders in order to encourage them to be in compliance with the NIS Directive

3 - Extend and adapt tailor-made obligations to the entire value chain of the electricity sub-sector

4 - NRAs may also want to/be required to monitor the cybersecurity related expenditure and the effects of those cybersecurity-related investments to the risk landscape of the energy system and of individual operators

5 - CEER and ACER can promote culture change through activities such as partnerships and awareness campaigns 6 - Management in energy-sector entities, including NRAs, should provide clear guidance on cybersecurity governance.

7 - TSOs/DSOs/Suppliers should have a cybersecurity strategy and they should set clear and effective cybersecurity measures prior embracing new technologies such as Cloud computing or systems for the handling of Big Data.

Smart Grids - Clean Energy Package

Member States should encourage smart grids: decentralised generation and energy efficiency

Provisions foreseen in CEP

- DSOs as **neutral market facilitators**: flexibility, storage & EV charging
- **New EU DSO entity** involved in EU-wide network codes
- **Deployment of smart metering** systems
- **Rules on functionalities** of smart metering systems
- **Interoperability requirements** and procedures for access to data
- NRAs - **performance targets to incentivise DSOs** to improve efficiency through flexibility, smart grids and intelligent metering systems
- NRAs - **monitor and report** on the performance of DSOs and TSOs and report every 2 years

Smart Grids – Clean Energy Package

1 — Big Data

Privacy: GDPR provides data protection requirements

Cybersecurity: recent CEER paper

DSOs: more focus needed on DSO network data

Competition: avoid incumbent monopoly over data being barrier to entrants

2 — Price €

Risk: dynamic pricing and other products = new risks for consumers

Transparency: lower transparency of price in bundled products

Price discrimination: algorithms will facilitate targeted pricing – is this acceptable?

Vulnerable consumers: how to protect them as market gets more complex?

3 — Network regulation

Efficiency: use of flexibility vs investment; send the right price signals for local grid services from distributed resources

TSO/DSO: avoid duplication and missed opportunities

Network tariffs: risk that those less able to take advantage of new services are left to pay more?

4 — Regulators

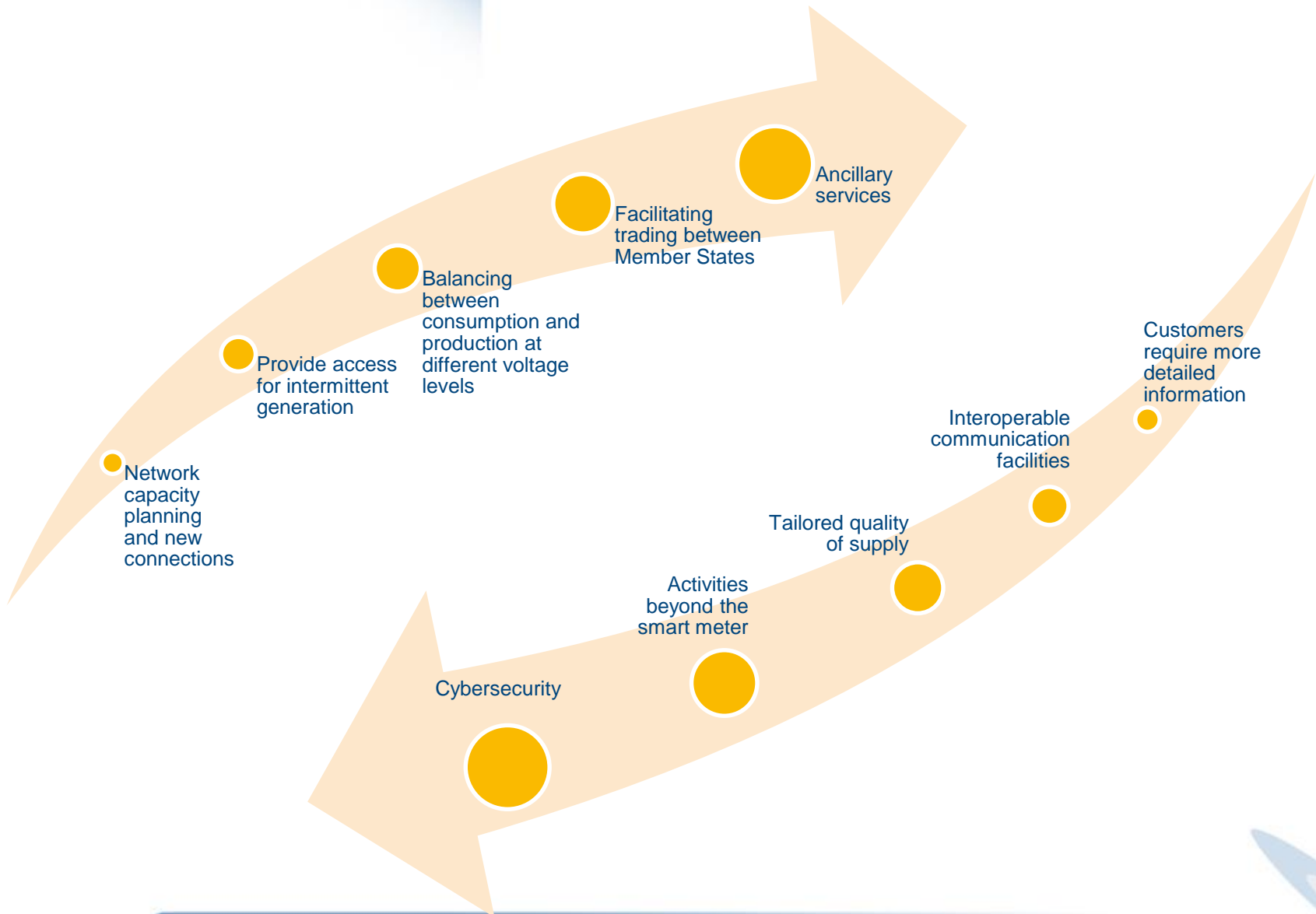**Skills**: digital capabilities required

Consumer regulation: improve coordination and speed; how/whether to regulate new intermediaries and platforms

Learning: from pilots of new products; from publicly-funded trials; from telecoms and financial services
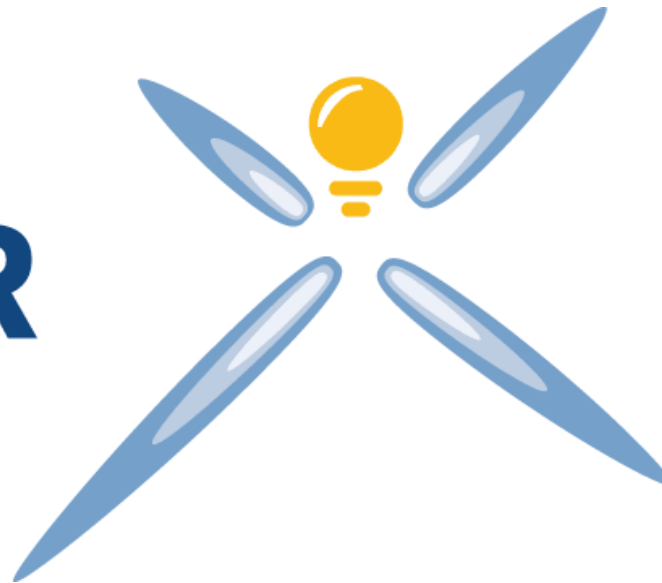
Smart Grids – Future challenges

- Ancillary services
- Facilitating trading between Member States
- Balancing between consumption and production at different voltage levels
- Provide access for intermittent generation
- Network capacity planning and new connections
- Customers require more detailed information
- Interoperable communication facilities
- Tailored quality of supply
- Activities beyond the smart meter
- Cybersecurity

Thank you for your attention!

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