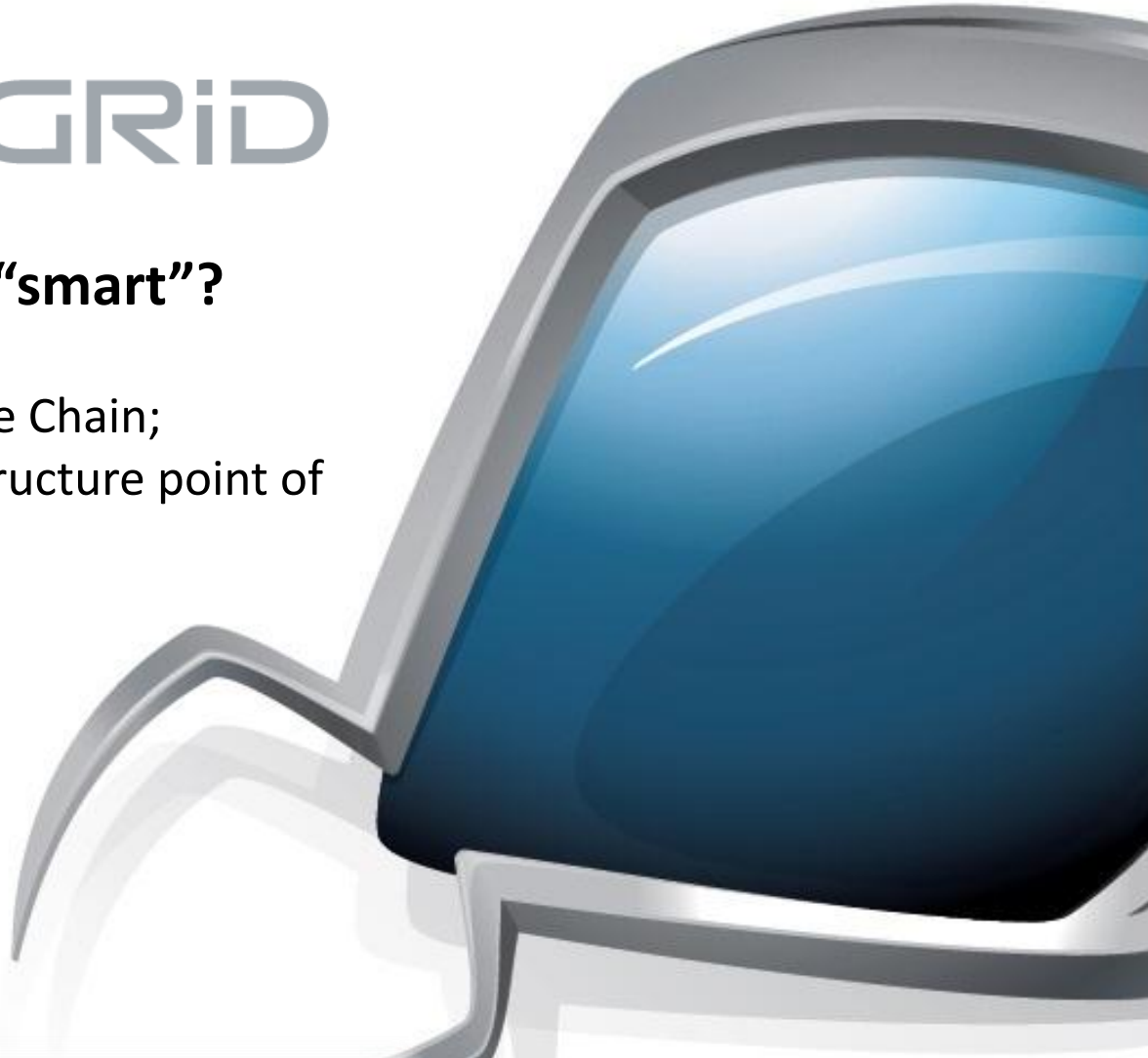
CYBERGRID

Is Demand Response “smart”?

Optimizing Energy Value Chain;
Electricity market & DR Infrastructure point of view

Reinhard Korsitzke – CEO



energieinformatik 2013

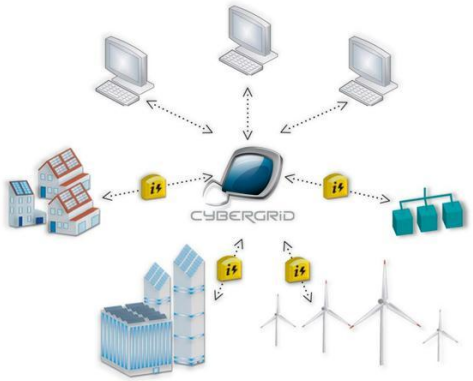
Focus: Europe

cyberGRID

- Founded in 2010; Headquarter in Klosterneuburg (Vienna), offices in SLO, DE, UK
- Technology supplier of solutions for Demand Response und Virtual Power Plants for utilities, grid operators, power traders, balance responsible parties, large industries …
- Consulting and support in the implementation of VPP and business models
- Research projects: EDRC (KLIEN, FFG), cyberPRICE (Eurostars), eBadge (FP7), evolvDSO (FP7)
  ⇒ European Demand Response Center: VPP cloud solution, available worldwide
- A founding member of Smart Energy Demand Coalition
- Since 06/2013 a TOSHIBA Group Company

TOSHIBA
Leading Innovation

Landis+Gyr
manage energy better



SEDC
Smart Energy Demand Coalition

http://sedc-coalition.eu

The SEDC is an industry group, which represents the requirements of programs involving smart energy demand in order to further the development of the Smart Grid and ensure improved end-consumer benefits.

The SEDC **Vision** is to promote the active participation by the demand side in European electricity markets, ensure consumer benefits, increase security of supply and reduce carbon emissions**.**

The SEDC **focus** is to promote Demand Side programs, such as Demand Response, energy usage feedback and information, smart home, in-home and in-building automation, and other programs related to making demand a **smart**, interactive part of the energy value.

SEDC

Smart Energy Demand Coalition

http://sedc-coalition.eu

Executive Members

ALSTOM, ENERNOC, geo Green Energy Options, JOULE ASSETS, Capgemini Consulting, SILVERSPRING NETWORKS, EDF, Enel ENERGY IN TUNE WITH YOU., Honeywell, Landis+Gyr, REstore, Schneider Electric, CYBERGRID, ceced, entelios moving energy, Johnson Controls, NATION-E WHERE POWER GETS SMART, SIEMENS, vaasa ETT Bringing Best Practice Together

Associate Members

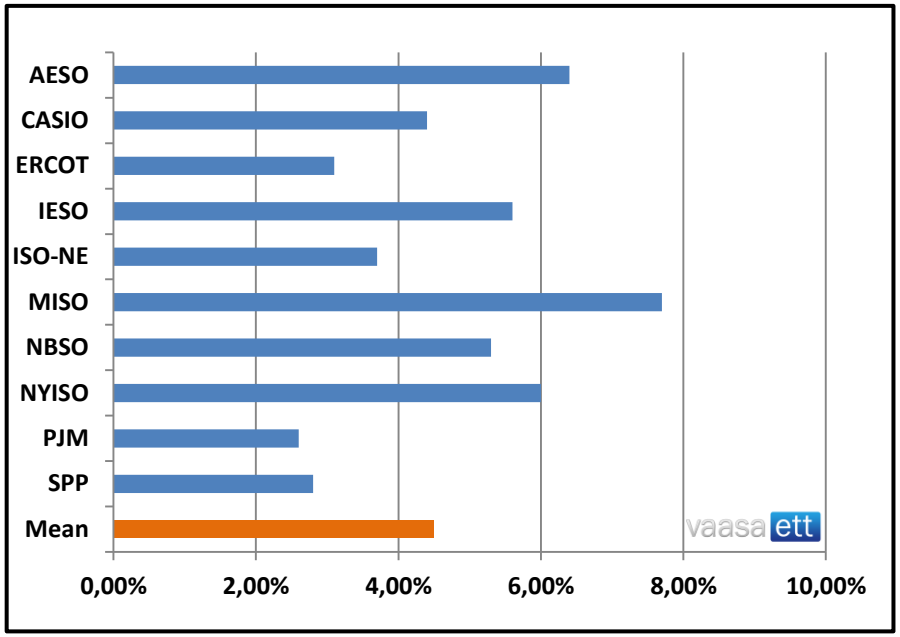
CINTERION a Gemalto company, electric ireland, Enspirion POWERED BY ENERGA, OPOWER, NYS SmartGrid Consortium, DRSG DEMAND RESPONSE and SMART GRID Coalition, UK Demand Response Association, Wroclaw University of Technology, Digi, electricity north west, SEMIG, PÖYRY, Sustainability first, ITE, United Technologies Research Center, vodafone, ESNA, DONG energy, ELEKTRO LJUBLJANA, KISTERS Pioneering Technologies, seam GROUP, THE CLIMATE GROUP, PLMA Demand Response Leadership Since 1999, VATTENFALL, ZigBee Alliance

WHY CARE about Demand Response?

Why Care? $6 billion in annual turnover after only 5 years market access USA.

- **USA $6 Billion Business Direct Revenue**
- **+ avoided investments Generation, T&D**

- Demand Response "took off" in 2005 with Demand Side access to capacity markets
- Average estimate peak clipping 8-11% US
- Average estimate peak clipping 6-13% Europe
- Developing nations looking at DR for peak clipping purposes. India, Brazil, China etc



Actual Peak Clipping USA 2010
C&I + Residential Demand Response.
Source FERC

SEDC Smart Energy Demand Coalition

WHY CARE ?

• Consumer Revenue:

In 2012 in the USA, businesses and homeowners earned **over 2 billion Euros** in direct revenues from Demand Response over and above bill savings and avoided investment - much of this was within the balancing and capacity markets.

This source of revenue could also be made available in Europe and would release money into the local economies.

• System benefits:

Demand Response offers a number of benefits to the electricity system, **including increased efficiency of asset utilization, supporting greater penetration of renewables on the grid…**

These system benefits could be made available in Europe.

• Increased Efficiency:

Demand Response creates a reliable, repeatable and clean source of flexibility. For example in the **USA 29.5 GW of demand side resources are under control** and available to market participants, lowering the number of peaking plants and increasing efficiency. This resource could also become available within European markets.

WHAT TO DO ?

- **Step One - Involve the Customer** and provide the platform to markets…
  → Aggregator
  → e.g. Pool to be treated as a single unit

- **Step Two – Create viable products**
  → take into account the capabilities of both demand and supply
  → multiple resources

- **Step Three – Develop measurement and verification requirements**
  → proper and efficient contractual and communication arrangements

- **Step Four – Ensure fair payment and investment stability**
  → MWh AND MW markets

WHAT TO DO ?

The SEDC would call on the Commission to oversee the coordination of regulatory initiatives and the creation of Demand Response targets at the Member State level.

The Energy Efficiency Directive mandates in Article 15.8 "Member States shall ensure that national regulatory authorities encourage demand side resources, such as Demand Response, to participate alongside supply in wholesale and retail markets"
yet this is far from the case today; the barriers to Demand Response and to consumer participation in the markets are severe.

→ Timing is crucial

Not only are European consumers and businesses being shut out of Smart Grid benefits and losing money, but as unnecessary investments are made – i.e., peaking plants built – part of the potential value of demand side programs, both to European consumers and to the electricity industry, will be lost.

Ten Rules for Successful DR

1. Aggregation should be legal !
2. Pool of load must be treated as a single unit
3. National Regulators and TSO´s should oversee the creation of streamlined, simple, contractual relationships….
4. National Regulators and TSO´s should create clear participation and payment requirements…
5. Create unbundled products…
6. Provide a complete product description incl. both demand and supply…
7. Establish appropriate and fair measurement and communication protocols
8. Ensure DR services are compensated at a full market value…
9. Create market structures which … provides investment stability…
10. Penalties should be fair adopted to business models of the providers…

SEDC Smart Energy Demand Coalition

DR in EUROPE

http://sedc-coalition.eu

DEMAND RESPONSE BASED VPP

Electricity suppliers can offer their prosumers to save money if the overall Power production and distributed generation capacities are intelligently meeting the instant demand

SAVINGS

C&I loads & distributed generation

Urtilities' Demand Response Center

Ancillary services

Scheduled/ emergency services

Market participation & reduction of imbalance costs

Power Grid

DR Potentials and Resources

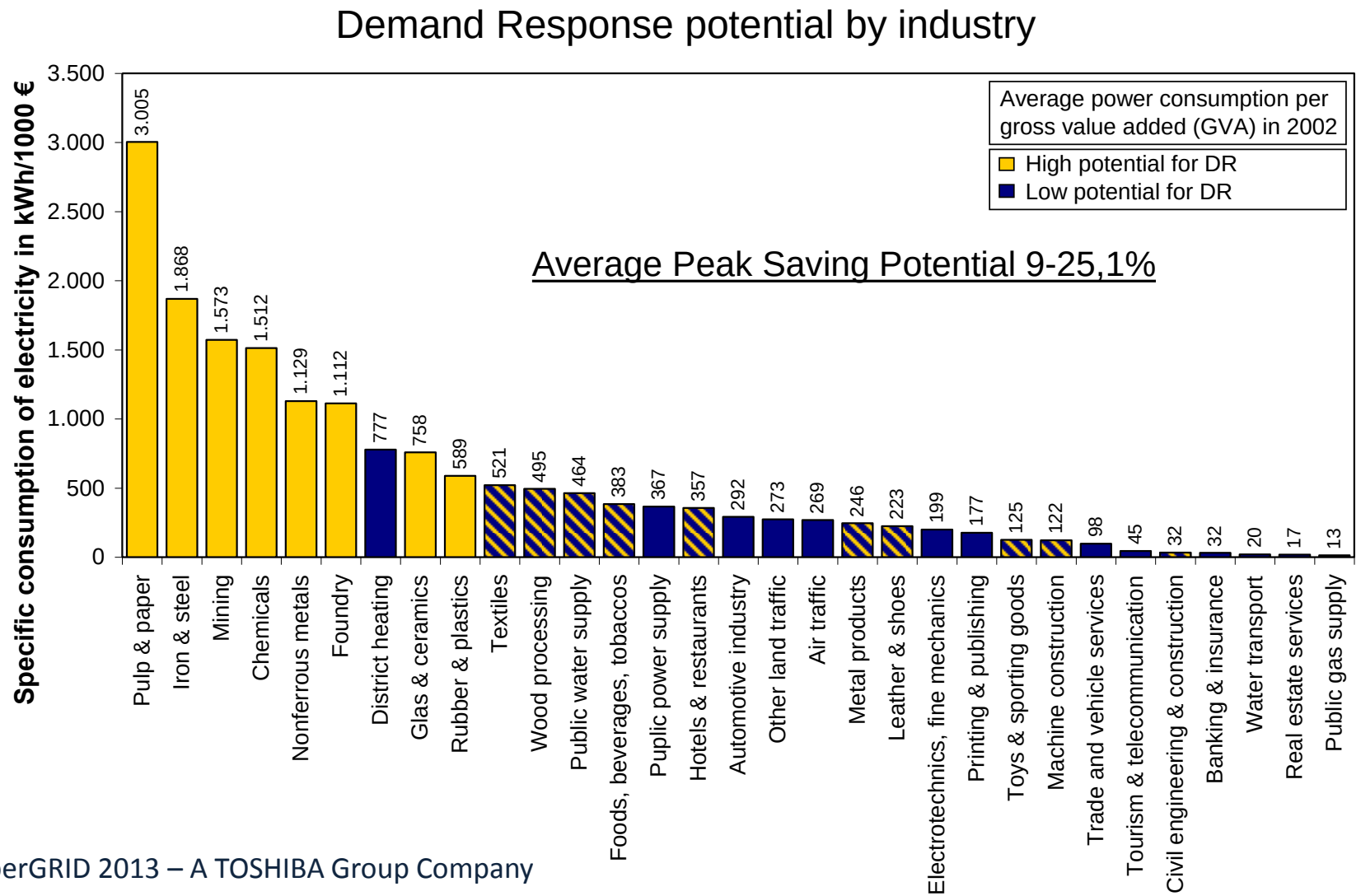
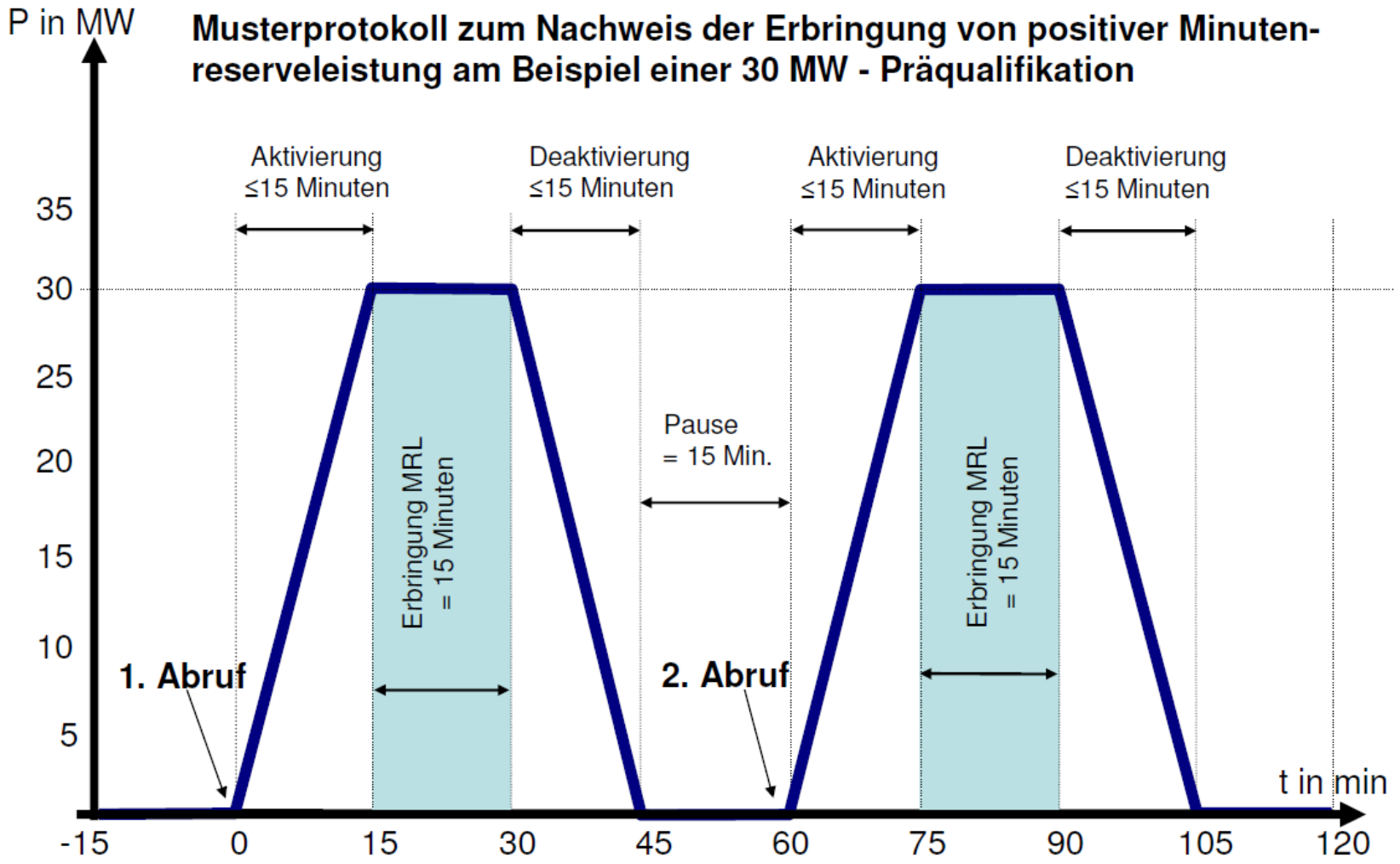


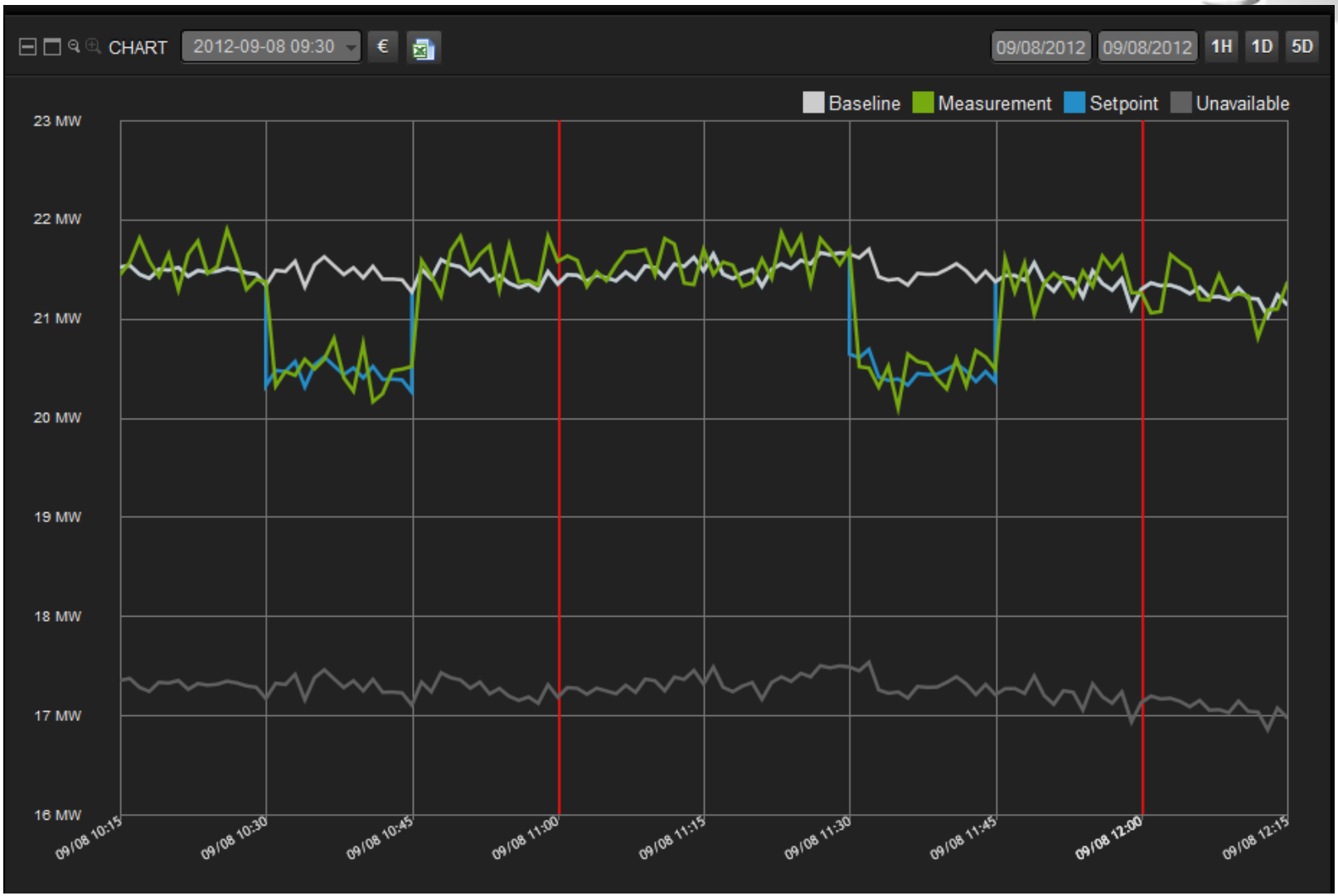
Figure 2: Electricity-intensity of industrial sectors in Austria (Technical University of Graz 2007)

DR Activation

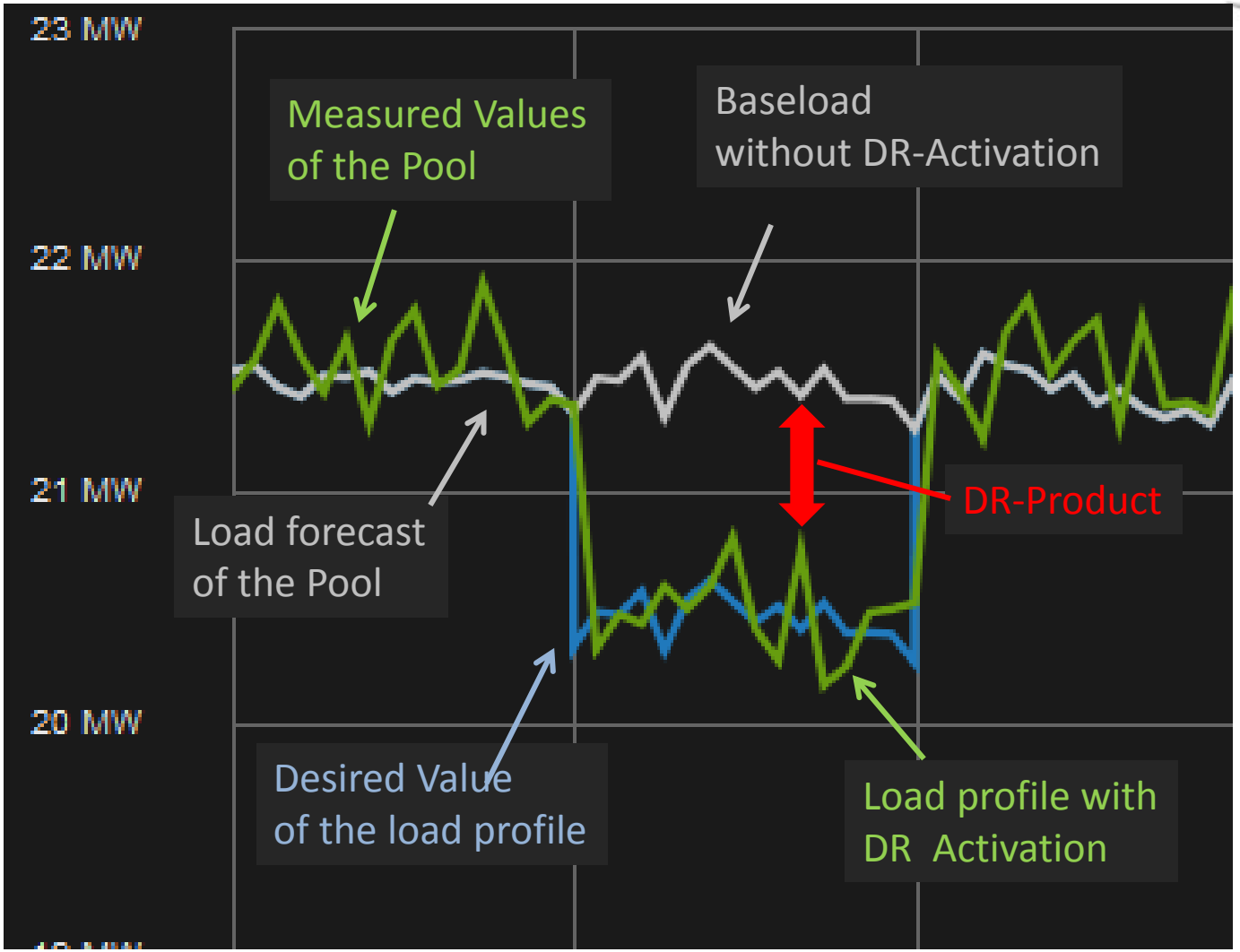


Quelle: www.regelleistung.net

DR Activation



DR Activation



DR Activation

DR characteristics

2 types of customer groups

Market, Generation assets

COMMERCIAL VPP – MAX FINANCIAL OUTCOME

- The customers' drivers are:
  - Retaining customers
  - Increasing revenues

1. Vattenfall, Germany
2. EDF, France
3. GDF SUEZ - Electrabel, Belgium
4. Elektro Ljubljana, Slovenia

Regulated side - Grid

TECHNICAL VPP – OPTIMIZE POWER SUPPLY & DISTRIBUTION

- The customers' drivers are:
  - Increasing share of RES; distribution of RES
  - Underinvested aging infrastructure with long lead times for new projects
  - Public resistance against new projects (transmission lines, nuclear, coal, etc.)
  - Increasing consumption
  - Environmental issues

1. eBADGE

2. evolvDSO - ENEL DISTRIBUZIONE S.P.A. , EDP DISTRIBUICAO ENERGIA SA, ELECTRICITE RESEAU DISTRIBUTION FRANCE, ESB NETWORKS LTD, RTE RESEAU DE TRANSPORT D ELECTRICITE SA , RWE DEUTSCHLAND AKTIENGESELLSCHAFT,…

eBADGE – EU wide intelligent balancing market

eBADGE: short overview

- Development of Novel ICT tools for integrated Balancing Market Enabling Aggregated Demand Response and Distributed Generation Capacity (http://www.ebadge-fp7.eu/)
- Coordinator: Telekom Slovenija d.d.
- Technical coordinator: cyberGRID GmbH
- 13 partners from 5 EU Member States
- Project duration: 3 years

SEVENTH FRAMEWORK PROGRAMME

eBADGE

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

APG AUSTRIAN POWER GRID WE KEEP IT GOING

Borzen

cyberGRID

ELEKTRO LJUBLJANA

ELES

RSE Ricerca Sistema Energetico

SAP

SAUER UMWELT. DATEN. TECHNIK.

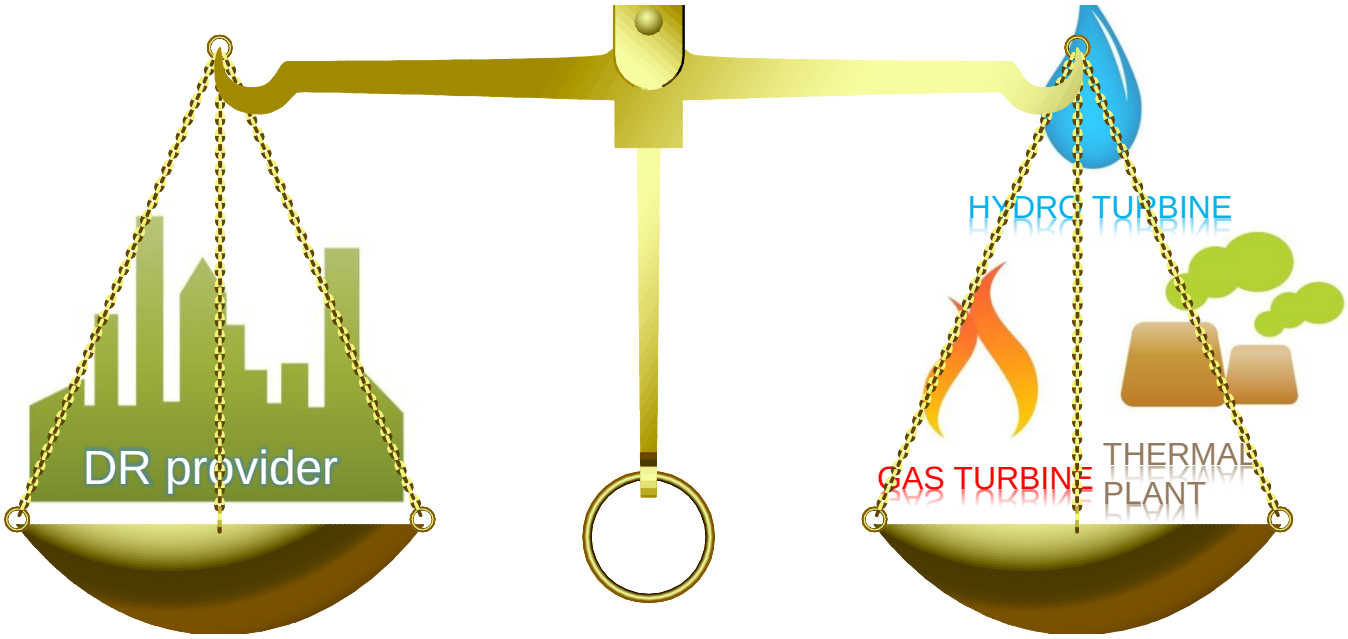
TelekomSlovenije

TU WIEN

vaasaETT Global Energy Think Tank

XLAB NOT IDLE

Value chain optimization



Start up costs of DR are low

DR knows no planned outages

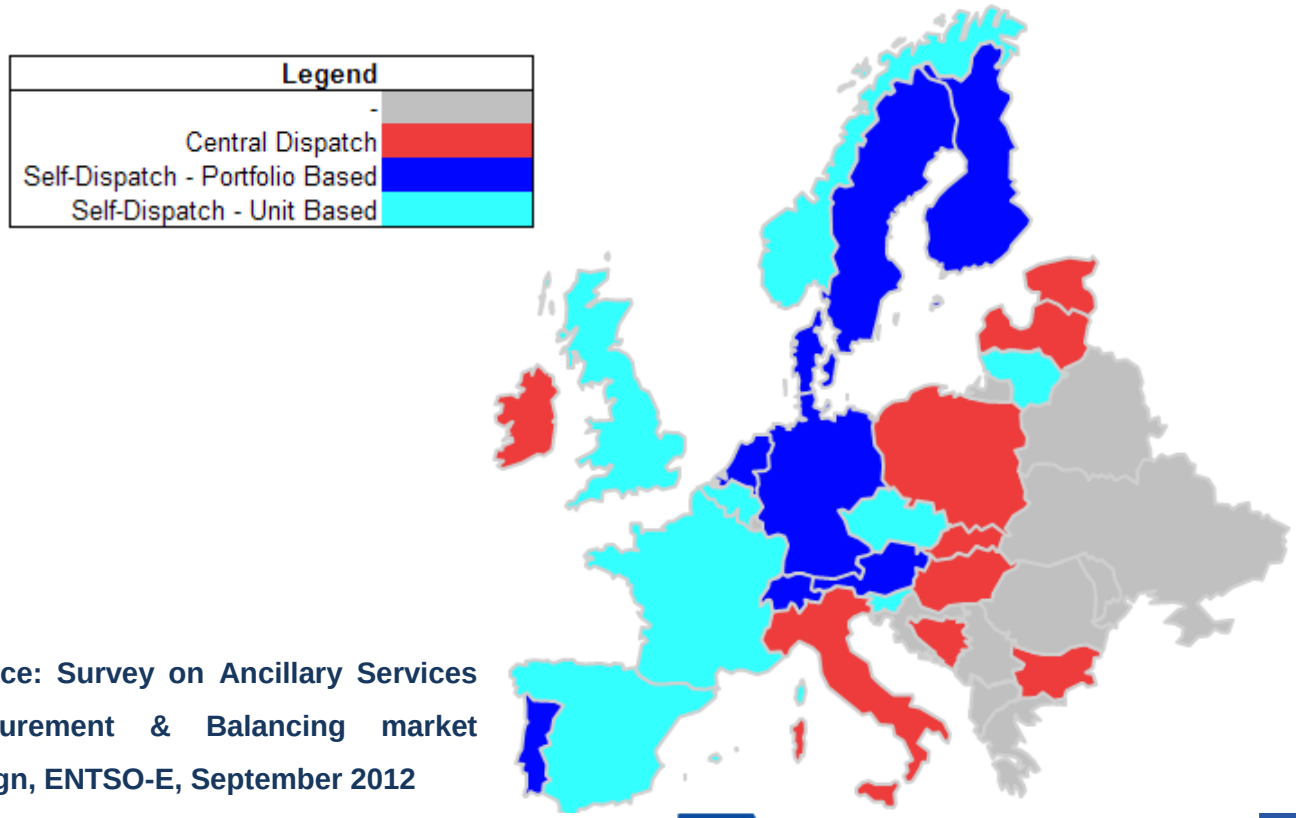
Duration capability (to cover a loss of generation unit) is limited

BADGE

SEVENTH FRAMEWORK PROGRAMME

eBADGE: background

High fragmentation of EU Ancillary Services markets. Even more when going into the market rules and their details.



Source: Survey on Ancillary Services Procurement & Balancing market design, ENTSO-E, September 2012

Many obstacles for Demand Response to compete on equal ground against conventional power generation:

- Power Capacity threshold
- Duration of the activation
- Prequalification procedure
- Balance group rules
- Imbalance settlement
- Lack of baseline rules
- etc.

eBADGE: motivation

- On 11 September 2012, the European Parliament adopted the Energy Efficiency Directive (EED):
  - (29a) **Demand response** is an important instrument to **improve energy efficiency**, since it significantly increases the opportunities for consumers or third parties nominated by them to take action on consumption and billing information and thus provides a mechanism to reduce or shift consumption resulting **in energy savings in both final consumption and, through the more optimal use of networks and generation assets**, in energy generation, transmission and distribution.
- The eBADGE project baseline are ACER‘s **Framework Guidelines on Electricity Balancing** published on 18 September 2012:
  - One of the five **objectives** the specifications for national balancing reserve and balancing energy procurement and cross-border balancing exchanges shall pursue is:
    - **facilitating wider participation of demand response and renewable sources of energy**;

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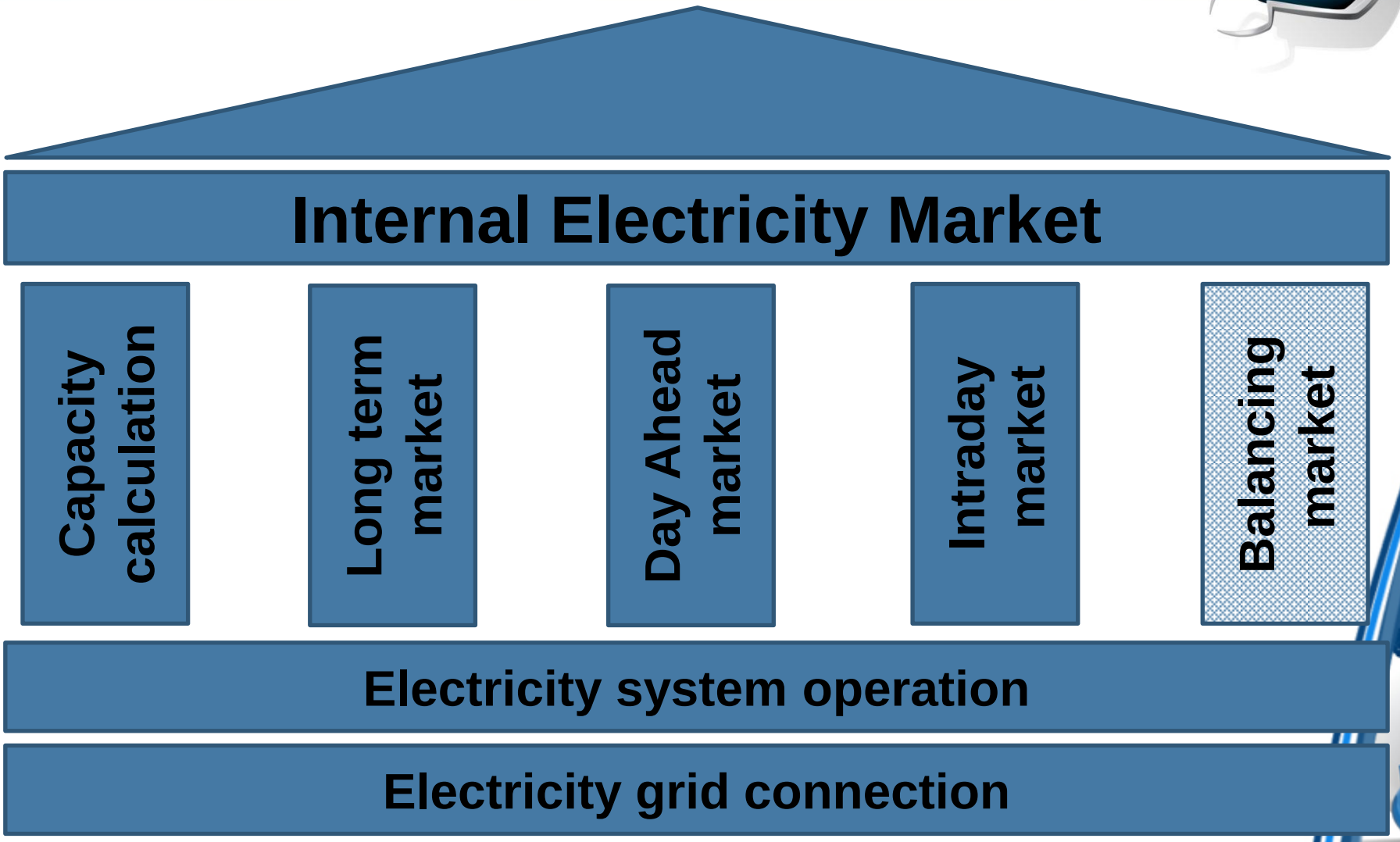


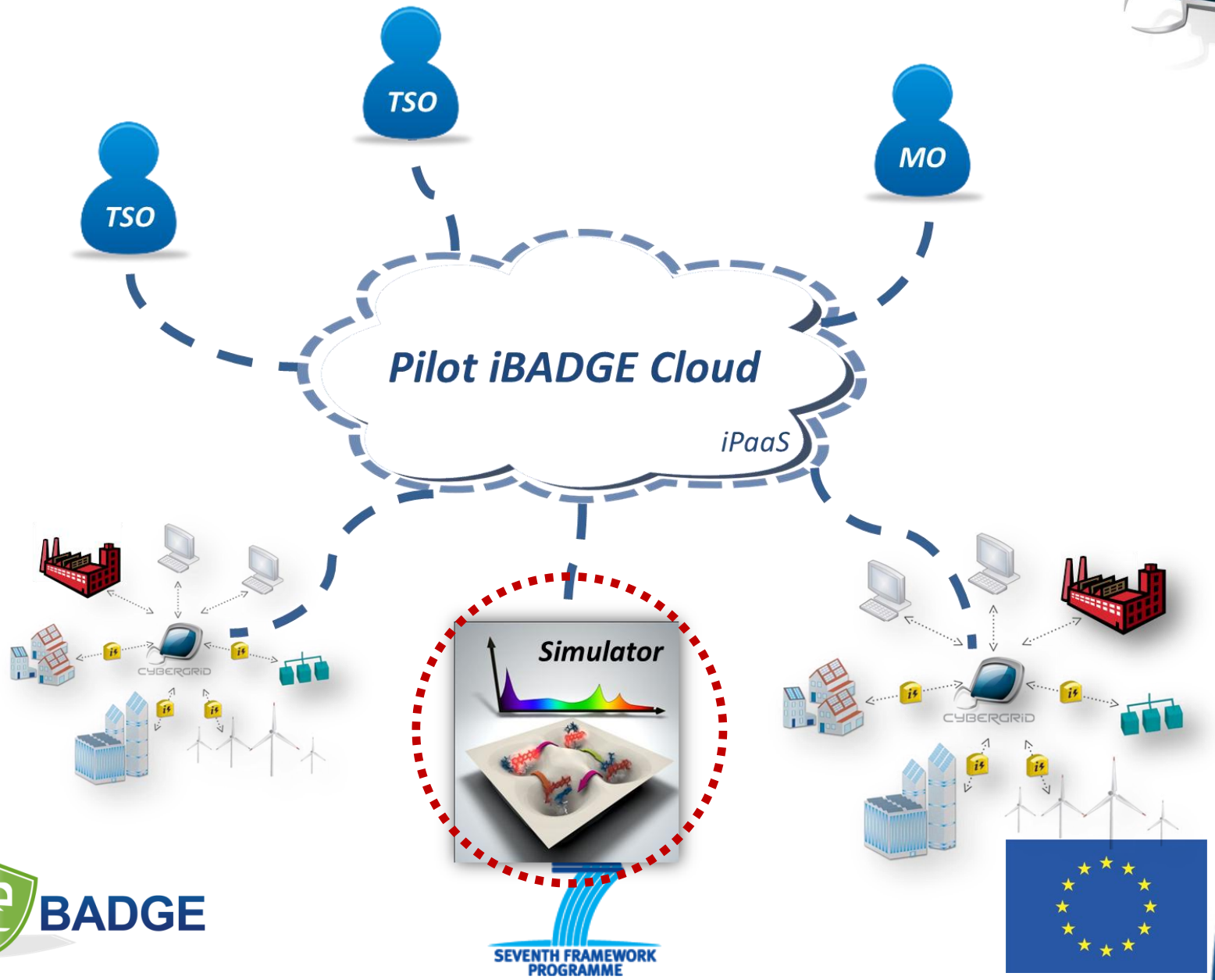
eBADGE

SEVENTH FRAMEWORK PROGRAMME

eBADGE: objectives

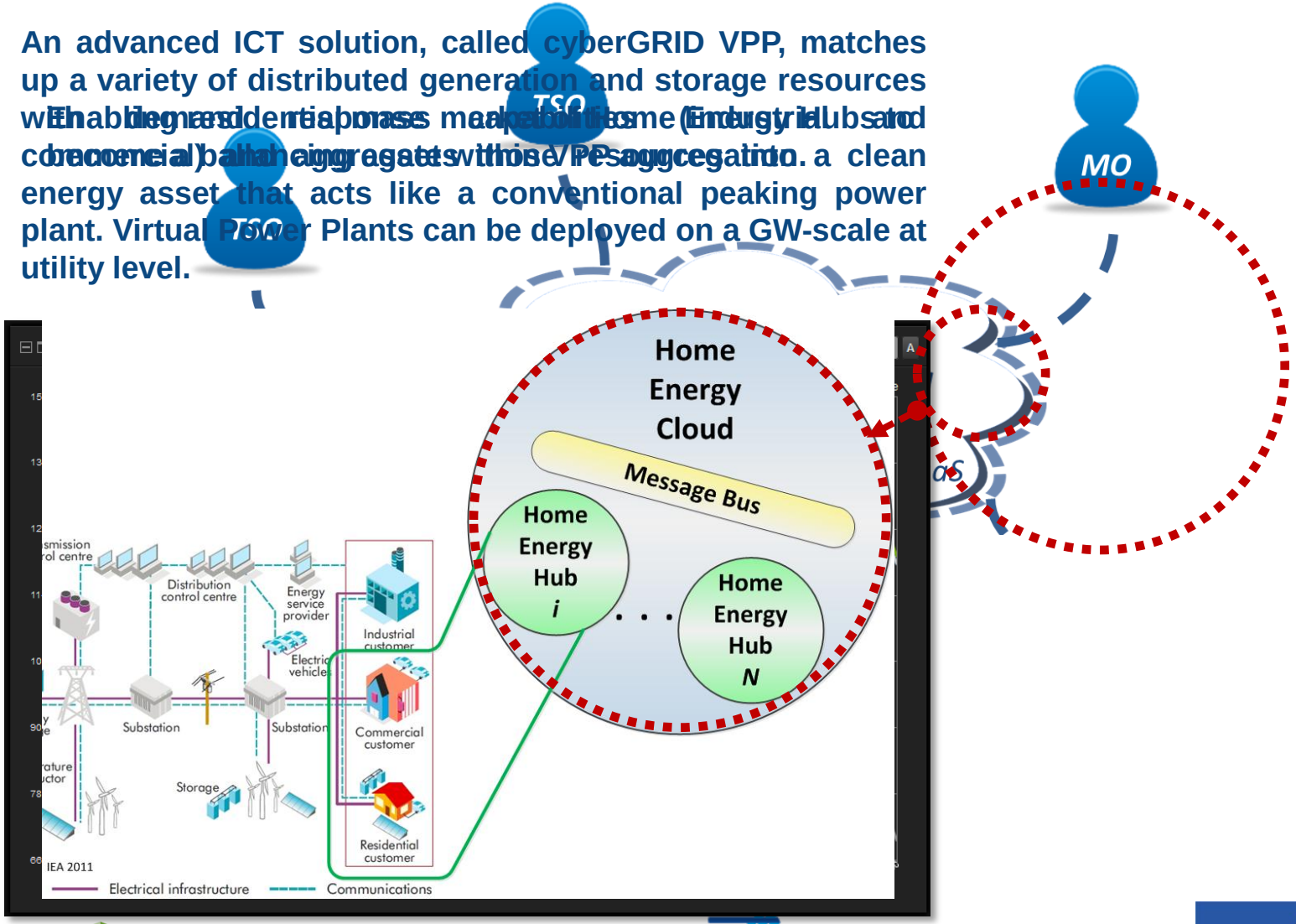
- The overall objective of the eBADGE project is to propose an optimal **pan-European Intelligent Balancing mechanism**, piloted on the borders of Austria, Italy and Slovenia, that is also able to **integrate Virtual Power Plant Systems** that can assist in the management of the electricity Transmission and Distribution grids in an optimized, controlled and secure manner.
- Project objectives are:
  1. To develop the components: simulation and modelling tool; message bus; VPP data analysis, optimisation and control strategies; home energy cloud; and business models between Energy, ICT and Residential Consumers sector;
  2. To integrate the above components into a single system;
  3. To validate these in lab and field trials;
  4. To evaluate its impact.

eBADGE: The Concept

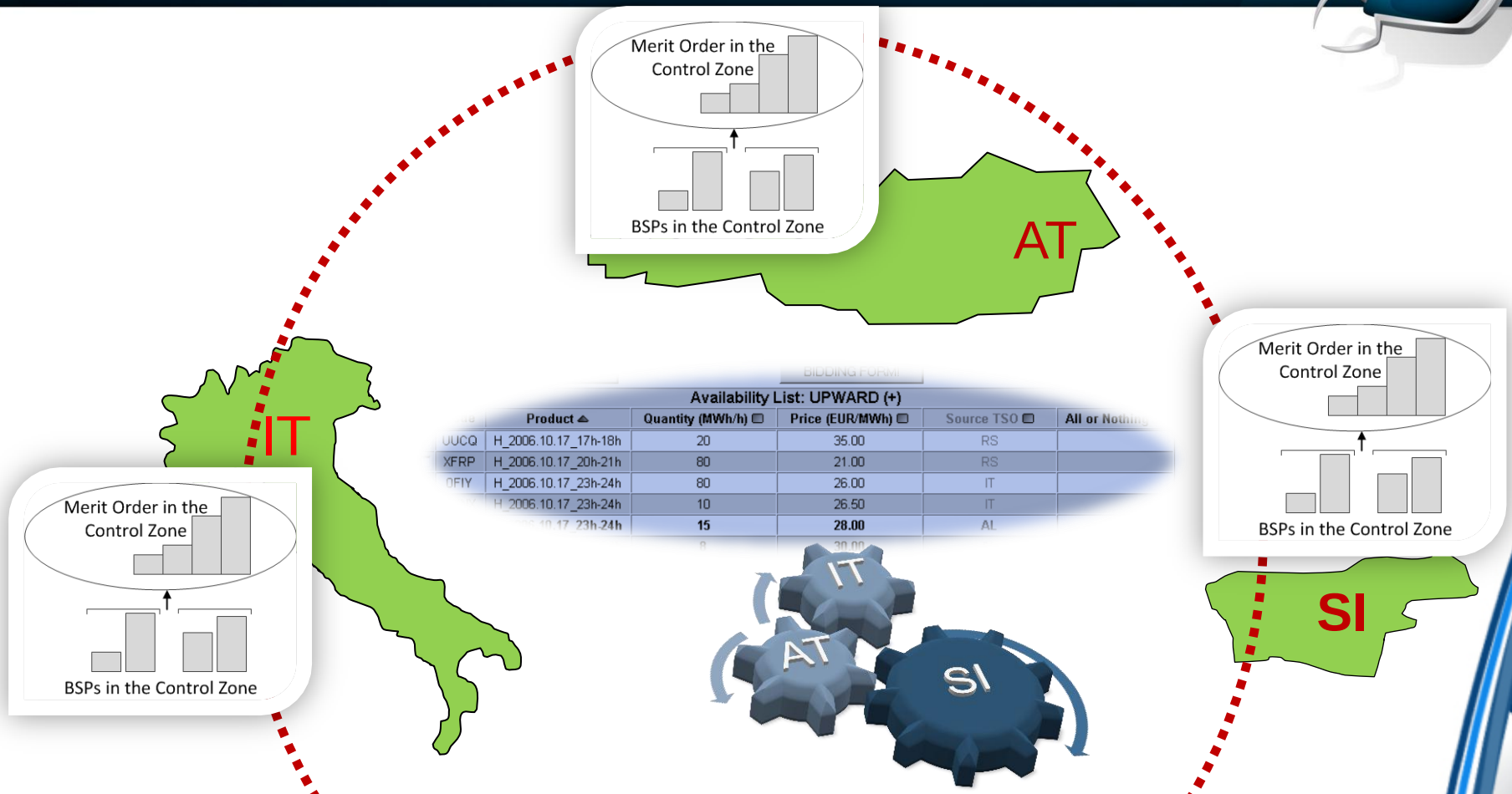


eBADGE: VPP

An advanced ICT solution, called cyberGRID VPP, matches up a variety of distributed generation and storage resources with demand response mechanisms (Energy Hubs and commercial aggregators) to provide a clean energy asset that acts like a conventional peaking power plant. Virtual Power Plants can be deployed on a GW-scale at utility level.



eBADGE: the Pilot



eBADGE

SEVENTH FRAMEWORK PROGRAMME

eBADGE: value for a TSO

CYBERGRID

- **Wider Range of Balancing Options – Renewable Power Sources + Smaller Loads**

- **More Control over Demand Side, Resulting in Better Planning and Consequently Higher Security of Transmission System**

- **Reduced Cost of System Services – Lower Cost of Power Reserve**

eBADGE

SEVENTH FRAMEWORK PROGRAMME

eBADGE: Planned results

- Fragmented EU AS market
- No demand side participation
- Non standardized products
- National balancing markets

- Cross-border balancing market model
- Removing barriers for demand response
- Integration of VPP‘s

eBADGE

SEVENTH FRAMEWORK PROGRAMME

eBADGE: planned results

- Pilot on the borders between Austria, Slovenia and Italy
- Progressive expansion of the pilot zone to other market areas
- EU wide intelligent balancing market as a 5th pillar of internal electricity market

THANK YOU FOR YOUR ATTENTION!

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