“Energy 21“

The future of the electricity sector

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EASE – European Association for Storage of Energy

European Association for Storage of Energy

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ERSE
ENTIDADE REGULADORA DOS SERVIÇOS ENERGÉTICOS

EASE – who we are

EASE
European Association for Storage of Energy

GL Garrad Hassan is now DNV GL Renewables Advisory

The European Association for Storage of Energy...

...is the European **voice** of the energy storage community.

...advocates the **role of energy storage** as an indispensable instrument for the energy system.

...supports a **sustainable**, **flexible** and **stable** energy system.

...**shares** and **disseminates** information.

Strategic Objectives:

1. **Promotion of the role and benefits of energy storage**
2. **Fair market design for energy storage**
3. **Promotion of funding for energy storage (mainly RD&D)**

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2. EASE work in progress

Paper on "Energy Storage Demand" – as of 15.10.2015

- A look at whether storage demand can economically be built into the framework of an existing market design environment, and a methodology for calculating the storage demand of the EU
- Critical assumptions to assess storage demand:
  - Energy Storage is one of four flexibility options
  - Storage of heat and gas should also be considered
- Calculation method for ES demand in 2050:
  - Looked at overall RES goal of 97% for power generation
  - Contribution of volatile feed-in, ~80% of power generation, is redistributed to Member States
    - respective storage demand is calculated

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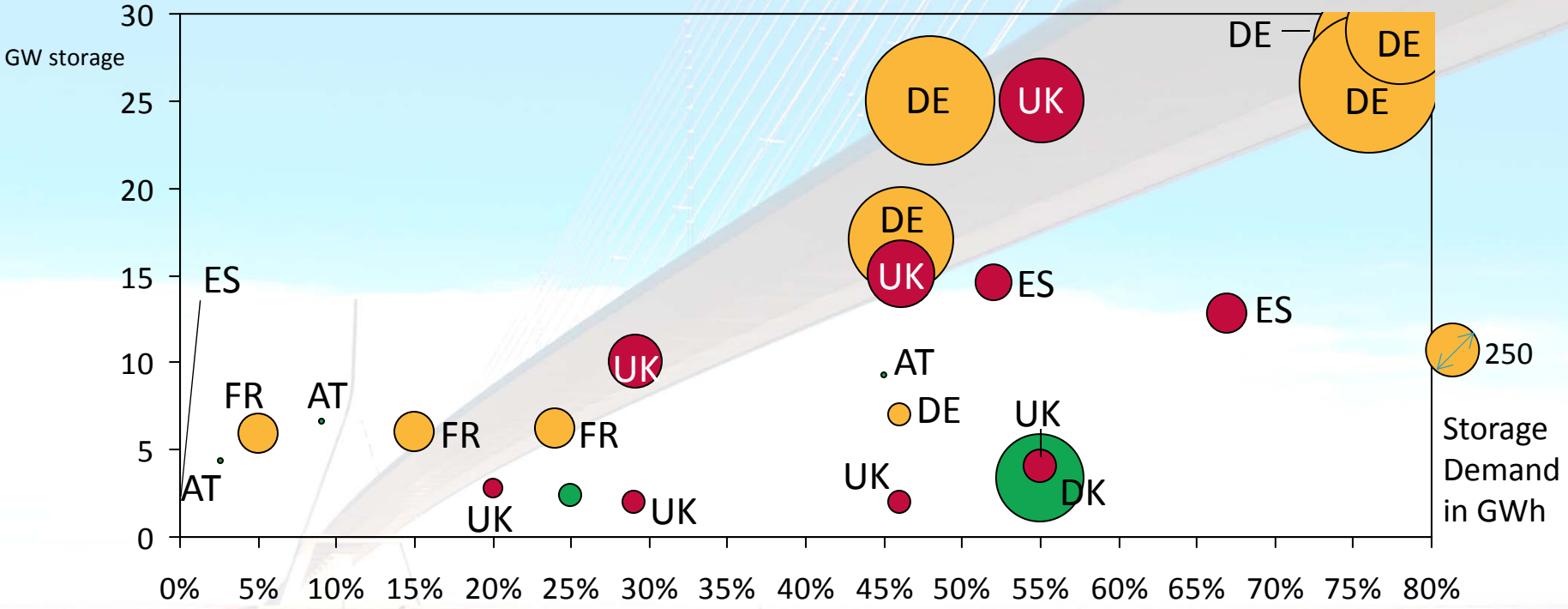
2. EASE work in progress

Range of estimates for storage demand in EU countries



The above diagramm was compiled using a variety of Storage demand outlook studies and scenarios from across Europe

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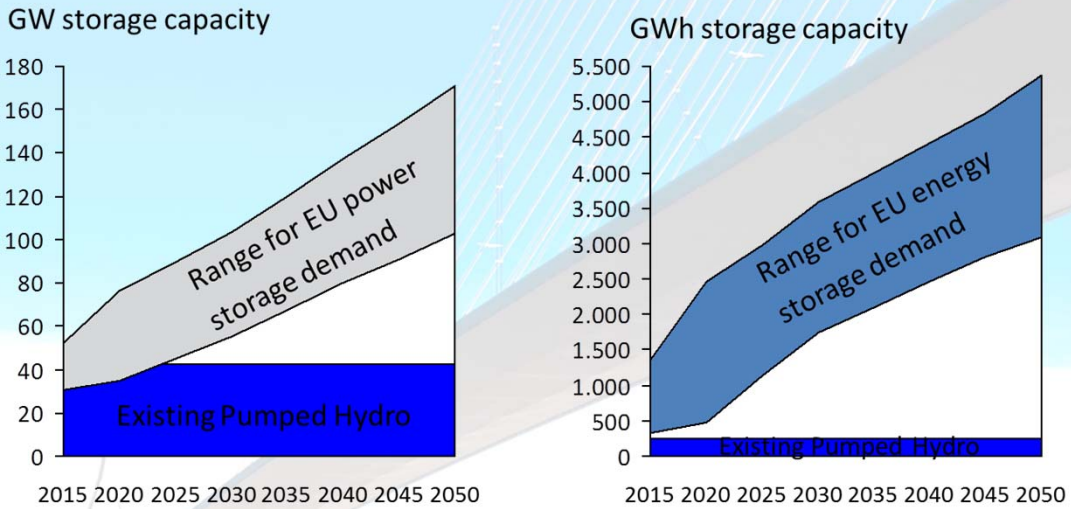
2. EASE work in progress



In contrast to the past years where electricity storage was dominated by pumped hydro, nowadays a large variety of central or decentral storage technologies is readily available to realize this steep increase in terms of power and energy.

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3. Energy Storage Technologies

EASE **supports all energy storage technologies** and believes that storage needs to be addressed **agnostically**.

Chemical

- Hydrogen
- Synthetic Natural Gas

Electrical

- Capacitors
- SMES

Electrochemical

Classic Batteries

- Lead Acid
- Li-Ion
- Li-Polymer
- Li-S
- Metal Air
- Na-Ion
- $Na-NiCl_2$
- Na-S
- Ni-Cd
- Ni-MH

Flow Batteries

- Vanadium Red-Ox
- Zn-Br

Mechanical

- Flywheels
- Adiabatic Compressed Air
- Pumped Hydro
- Diabatic Compressed Air
- Pumped Heat Electrical Storage
- Cryogenic Energy Storage

Thermal

- Heat (Hot Water/PCM)
- Molten salt (Heat/CSP thermal)
- Packed-bed Heat Storage
- Smart Electric Thermal Storage

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4. Energy Storage Applications JMD3

Energy Storage Applications and the Electrical Value Chain

Generation		Transmission	Distribution	Customer Services
Conventional	Renewable			
Black start	Distributed Generation flexibility	Participation to the primary frequency control	Capacity support	End-user peak shaving
Arbitrage	Capacity firming	Participation to the secondary frequency control	Dynamic, local voltage control	Time-of-use energy cost management
Support to conventional generation	Limitation of upstream perturbations	Participation to the tertiary frequency control	Contingency grid support	Particular requirements in power quality
	Curtailment minimisation	Improvement of the frequency stability of weak grids	Intentional islanding	Continuity of energy supply
		Investment deferral	Reactive power compensation	Limitation of upstream disturbances
		Participation to angular stability	Distribution power quality	Compensation of the reactive power
			Limitation of upstream perturbations	

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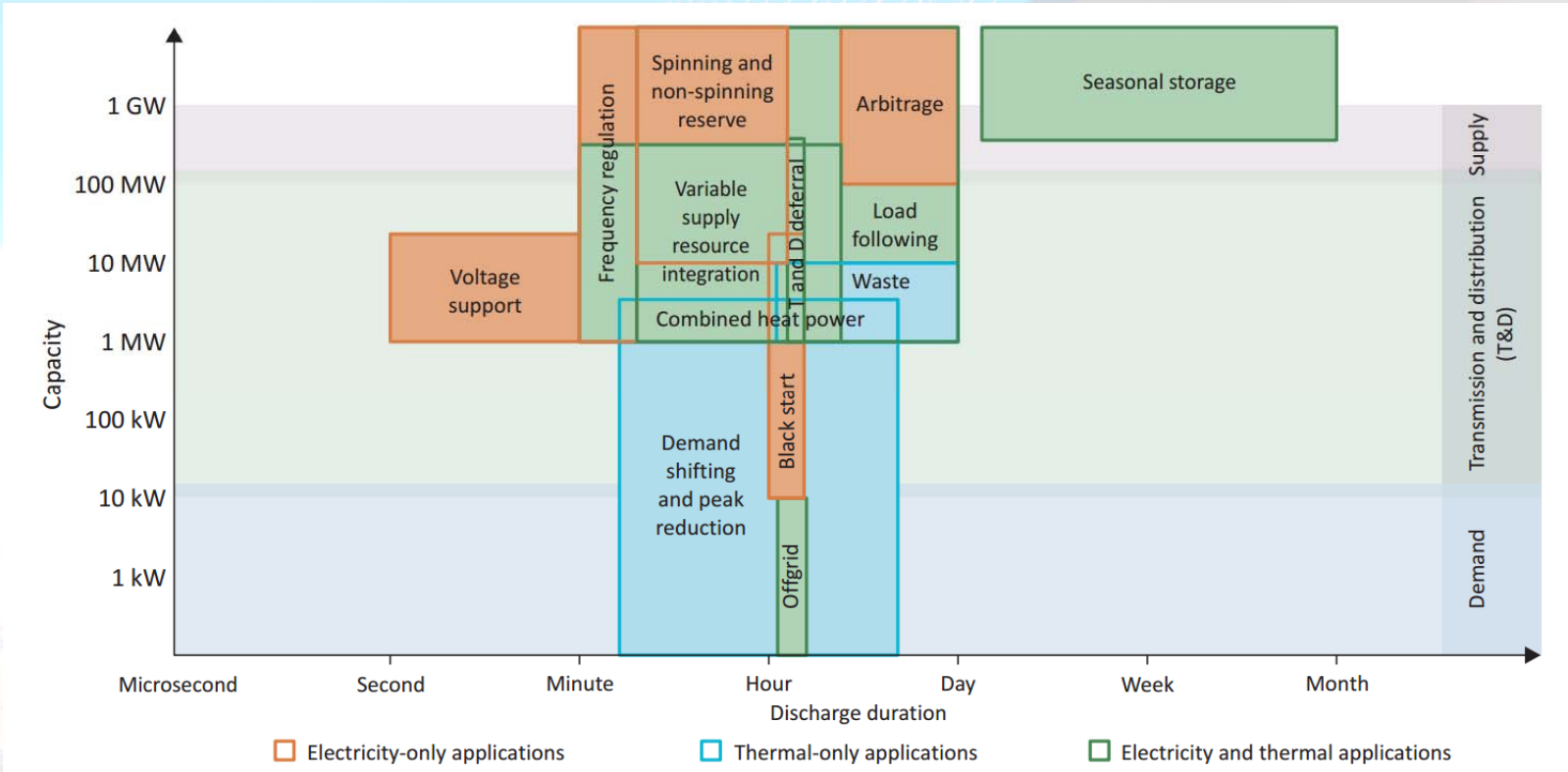
Slide 8

JMD3 This slide concerns the ES applicatio

Jean-Michel DURAND, 27/10/2015

4. Energy Storage Applications

Main storage applications today: Power versus Duration



Sources: modified from IEA (2014), Energy Technology Perspectives, OECD/IEA, Paris, France.

5. Barriers to Energy Storage deployment

No suitable market design & regulation in Europe and its Member States:

No level playing field

» regulation of existing energy system components, e.g. RES

» relationship to existing energy system components

Specific barrier (a.o.): Curtailment / dispatchability for RES

Insufficient market access

» network codes

» openness, competition inter alia, access to bulk markets

Specific barriers (a.o.): Product length / recharging; Pre-qualification and its requirements (size and possibility to aggregate)

Lack of technical standards

» interfaces, e.g. for Smart Grids

System position of energy storage

» lack of an official definition of energy storage on an EU level

» unbundling

» potential for heat storage is underestimated

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5. Barriers to Energy Storage deployment

No suitable market design & regulation in Europe and its Member States:

Remuneration not matching value creation

» for flexibility and capacity
» for additional storage services
» for regulated markets (TSO/DSO)

Specific barriers (a.o.): Long term contracts for ES services; Speed and accuracy of response and how is dealt with in Europe

Unacceptable implementation

» fees & taxes

Specific barrier (a.o.): National issues (taxes and fees)

Insufficient incentives besides R&D funds

Specific barrier (a.o.): Incentives to facilitate capital expenditures (low interests, PCI,…)

Additional regulatory points

» concessional rights
» Water Framework Directive national implementation
» missing acceptance for emission reduction potential: acceptance of Green H2 (P2G) for biofuel quotas

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5. Barriers to Energy Storage deployment

EASE wants Energy Storage to be recognised as an own asset class in all energy related regulations due to its nature, and therefore proposes a definition of Energy Storage for the Electricity Vector:

An "Energy Storage Facility" for the electricity vector is a facility used for the intake and stocking of electricity in different suitable energy forms. The release of this energy, at a controlled time, can be in forms that include electricity, gas, thermal energy and other energy carriers.

➢ Any feedback on this definition, for further improvement?

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7. Other EASE work of importance to the Internal Energy Market Design

- Grid+Storage
  - A tender EASE won in cooperation with Technofi
  - to make proposals for the next Horizon 2020 work programme in regards to suitable Energy Storage projects
- Cost-Benefit-Analysis in cooperation with ENTSO-E
- Achievement of pushing back on the Load Frequency Control & Reserves (LFC&R) Network Code
- Various storage applications are being assessed in the Technology and Value Assessment Committee, led by EDF:
  - Task Force on Generation led by GNF
  - TF on Transmission led by TERNA
  - TF on Distribution led by ENEL
  - TF on End User led by EDF

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7. Other EASE work of importance to the Internal Energy Market Design

Cost-Benefit-Analysis (CBA) in cooperation with ENTSO-E

- EASE contributed to ENTSO-E's CBA methodology for Energy Storage projects in the context of the European Energy Infrastructure priorities and ENTSO-E's Ten Year Development Plan (TYNDP)
- EASE developed a specific environmental indicator “social and environmental sensibility” for energy storage technologies
- The assessment will be used for the evaluation of the influence of storage devices on transmission systems
- The cooperation is continuing

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7. Other EASE work of importance to the Internal Energy Market Design

Achievement of pushing back on the LFC&R Network Code

- Since 2012, EASE has pushed to have the time recommendation for frequency containment reserves (FCR - primary reserve) limited to 15 minutes, since more short-term products for balancing will be needed in the future

- ACER supported ENTSO-E in fixing it at 30min – doubling the time requirement set by many EU Member States.

➢ In the end, EASE was successful in arguing for the EC to propose a 15-minute limit for FCR, this was confirmed by EC officials during the Florence Forum.

➢ The text is now in the final stages of the Comitology, namely the vote by Member States.

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Título do Slide

Thank you for your attention.

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3. Energy Storage Technologies

Energy Storage Technologies Descriptions

The TVAC produced Technology Descriptions for each Energy Storage Technology and is now working on Fact Sheets for these technologies, which provide a less complex overview and can be used for non-technical informaiton purposes by e.g. Polic makers.

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4. Energy Storage Applications

Update of the Energy Storage Application table

Taking into consideration the defintion of Energy Storage Facilities prepared by EASE members, we will now update the Energy Storage Application table in order to make clearer the boundaries for many applications. This work will be undertaken by our Technology and Value Assessment Committee (TVAC), Working Group 'Applications and Economics'.

The TVAC will also produce a Description Sheet for each Energy Storage Application that will be used for the assessment of the different Business Cases.

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7. Other EASE work of importance to the Internal Energy Market Design

Grid+Storage Project (Dec. 2014 – Dec. 2016)

- **Overall objective**: Providing the European Commission and the European Electricity Grid Initiative (EEGI) with stakeholder views for the future RTD&D needs involving technology development and market uptake:
  - To support the development of pan-European electricity grids and energy storage
  - To make such grids able to use energy storage solutions in order to increase the flexibility of the pan-European electricity system
  - To optimise the interactions of such grids with other energy networks

- **Activities:**
  - To revisit the existing EEGI team RTD&D Roadmap
  - To integrate energy storage and energy network integration into the Roadmap
  - To carry out knowledge-sharing activities

- **Outcome:**
  - Two Implementation Plans for RTD&D activities (IP 2016-2018 / IP 2017-2019)
  - One Research and Innovation Roadmap (RIR 2016-2025)
  - ➢ Which propose storage solutions in electricity grids for topics in the next H2020 Work Programmes
  - 9 regional-based workshops to present national projects where energy storage is successfully integrated. The first one will be held in Lille (FR-BE-NL) on 25th – 26th Nov. 2015

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