CIRED Lyon (France), 15-18 June 2015

CIRED Infotag, 26. Jänner 2016

Session 4

DISTRIBUTED ENERGY RESOURCES AND ACTIVE DEMAND INTEGRATION

Berichterstatter: Karl Bauer

Session 4
DISTRIBUTED ENERGY RESOURCES AND ACTIVE DEMAND INTEGRATION

- 122 ausgewählte Beiträge
  - 6 Beiträge aus Österreich
- Verteilung in Sessions
  - 25 in Main Session
  - 9 in RIF
  - ALLE in Poster Session

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- 4 Blöcke
  - Aktive Verbrauchssteuerung
  - Planung und Studien
  - Innovative Technologien und Lösungen
  - Smart Grid Demos

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- Chairman
  - Roger HEY (UK)
- Special Rapporteurs
  - Goran STRBAC (UK)
  - Graham AULT (UK)
  - Ricardo PRATA (Portugal)
- Advisory Group
  - Helfried BRUNNER (AT)

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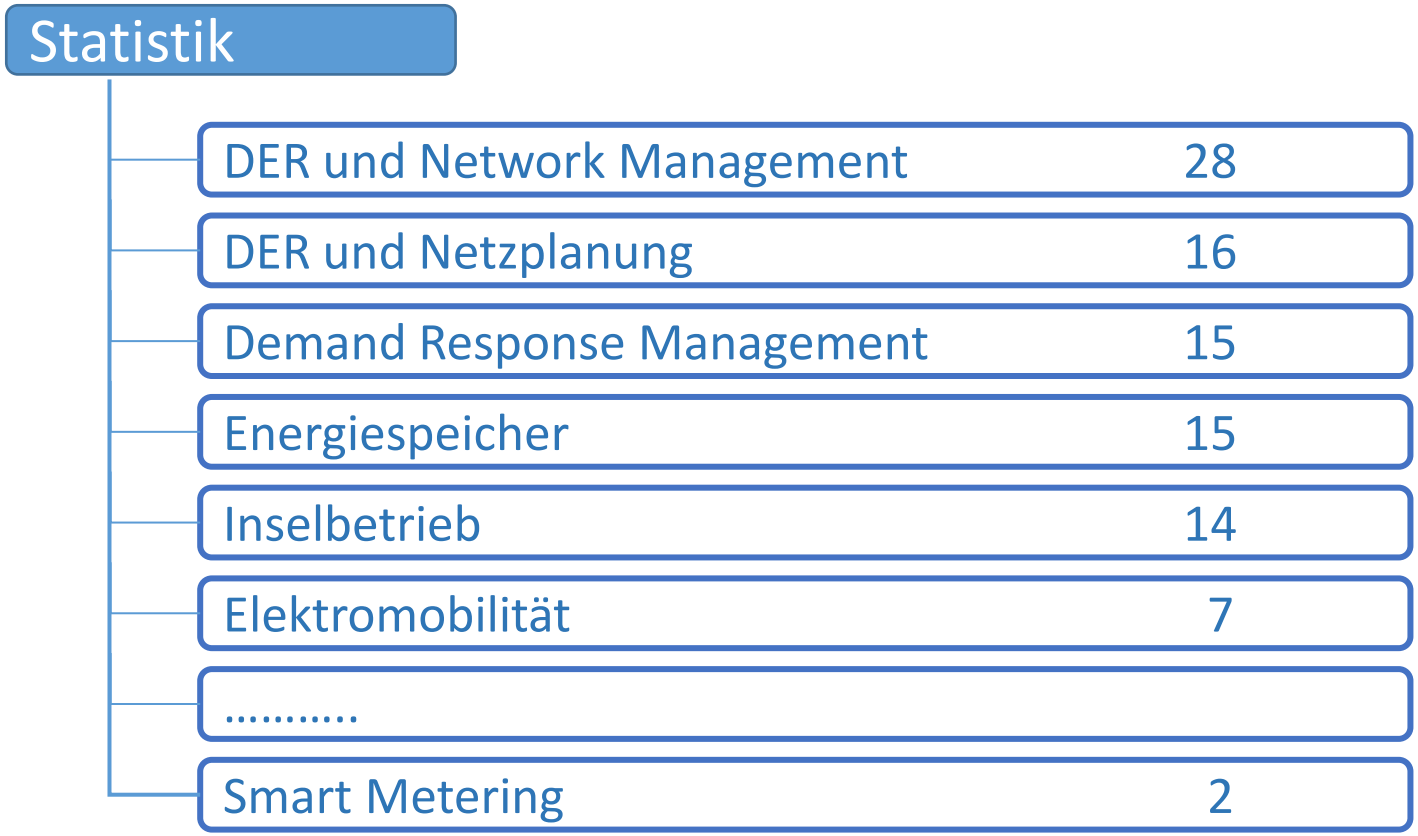
Struktur der Session 4



DER = Distributed Energy Resources

PROSPECTS OF DEVELOPMENT OF LVDC ELECTRICITY DISTRIBUTION SYSTEM ENERGY EFFICIENCY

Andrey Lana, Pasi Nuutinen, Tero Kaipia, Aleksi Mattsson,
Janne Karppanen, Pasi Peltoniemi, Jarmo Partanen

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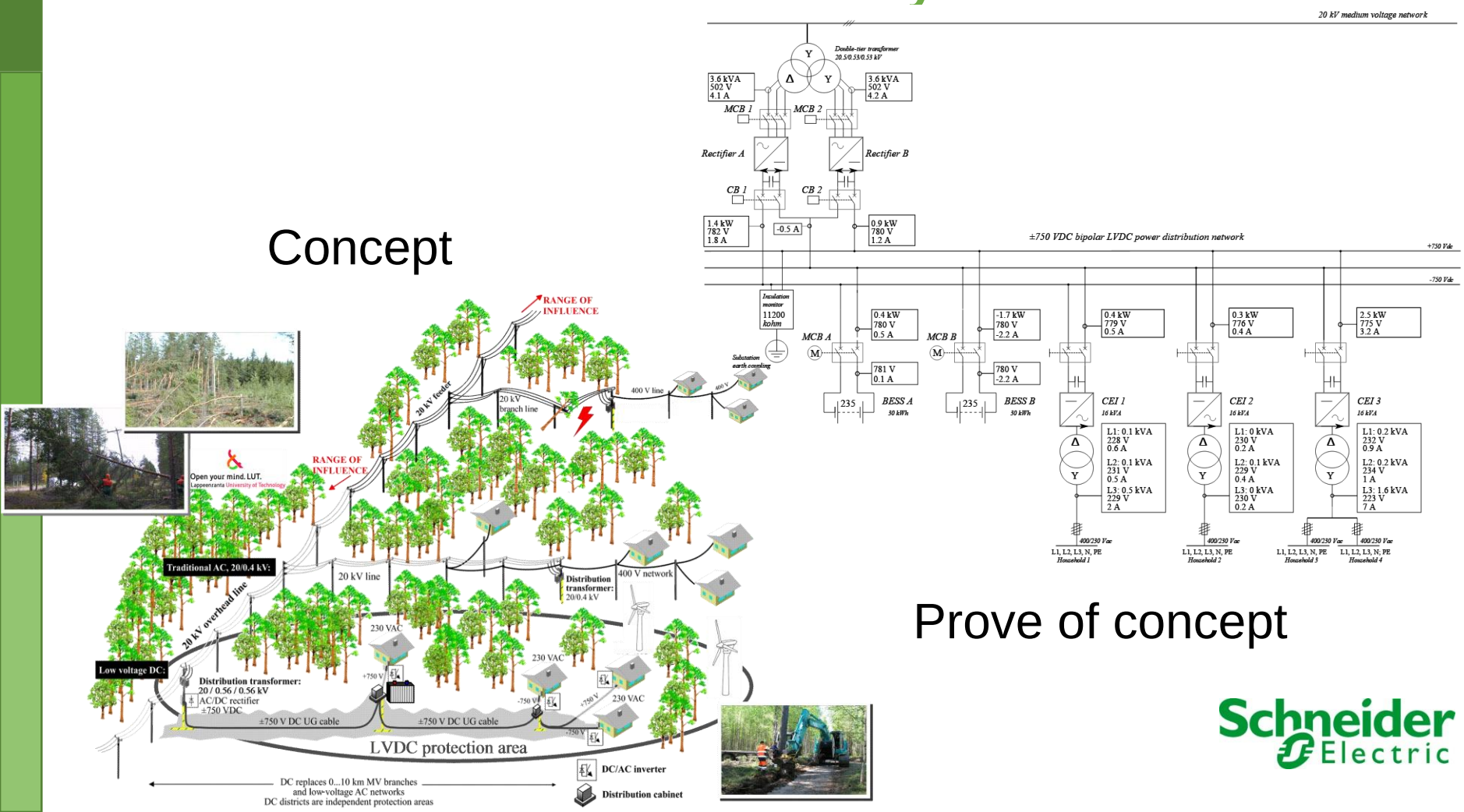
LVDC distribution system

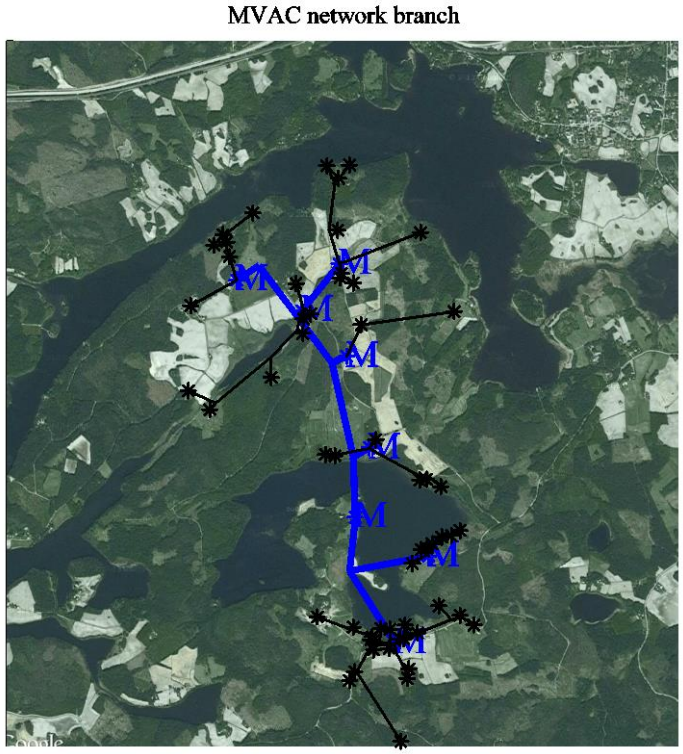
Concept



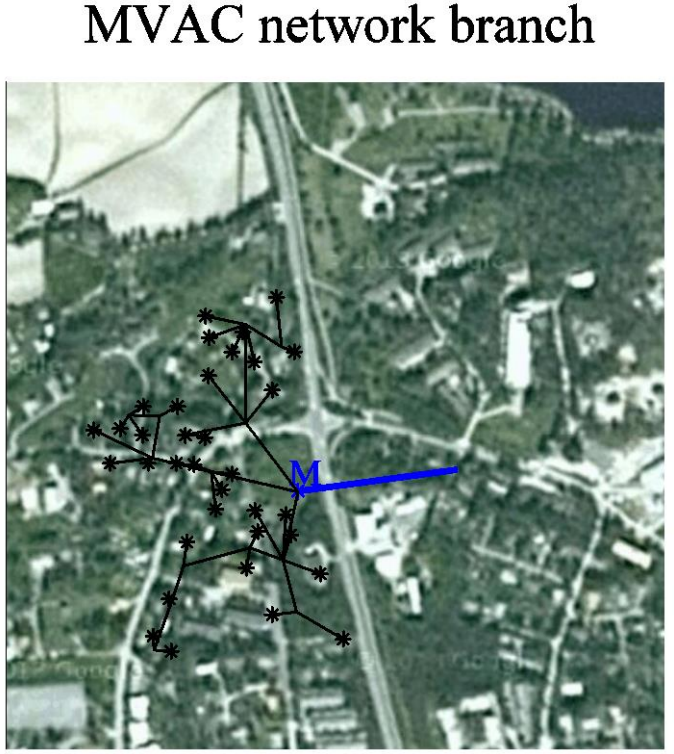
Prove of concept

Network cases

Rural network



City network OK



Description of the network cases

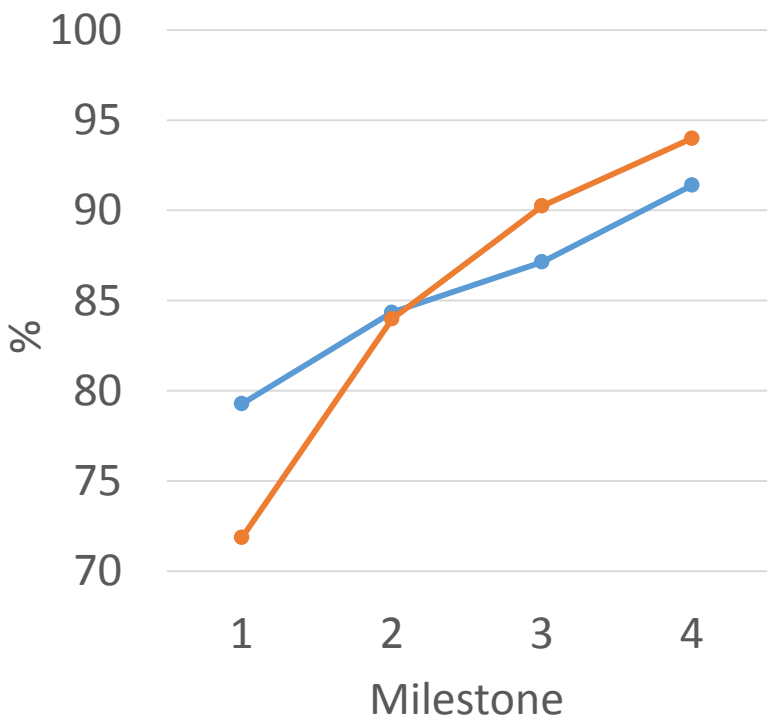
Network case	1	2
Number of customers	56	87
Annual energy consumption [MWh]	530	513
Peak power hours [h]	2800	2750
MV/LV transformers	8	1
MVAC total length [km]	5	0.2
LVAC total length [km]	12	2.2

Effects of Topology and Component Developments on LVDC Energy

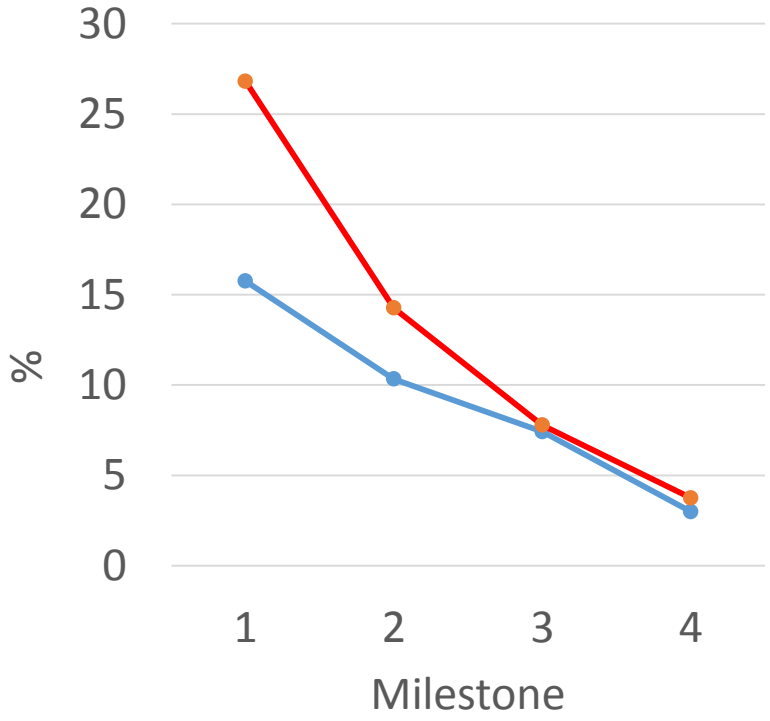
- Milestone 1: Prove of concept
  - LVDC network supplying four residential houses, CEI based on IGBT-bridge and 50Hz isolation transformer
- Milestone 2: Galvanic isolation
  - high-frequency DC/DC converter-based galvanic isolation
- Milestone 3: High efficient components and topology
  - Modern wide bandgap (WBG) semiconductors, Silicone Carbide (SiC) and Gallium Nitride (GaN)
- Milestone 4: Modularity
  - Modular Multilevel Converter (MMC)

Computation Results

LVDC system energy efficiency



Energy loss on customer-end inverter (CEI)

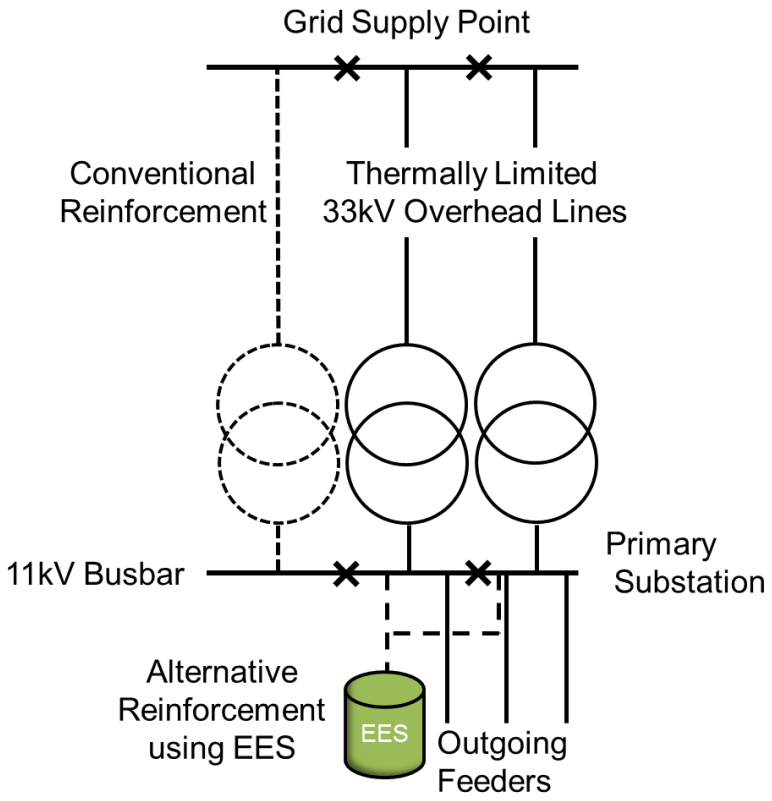


SCHEDULING POWER AND ENERGY RESOURCES IN THE SMARTER NETWORK STORAGE PROJECT

David Greenwood, Neal Wade, Phil Taylor
Newcastle University, UK

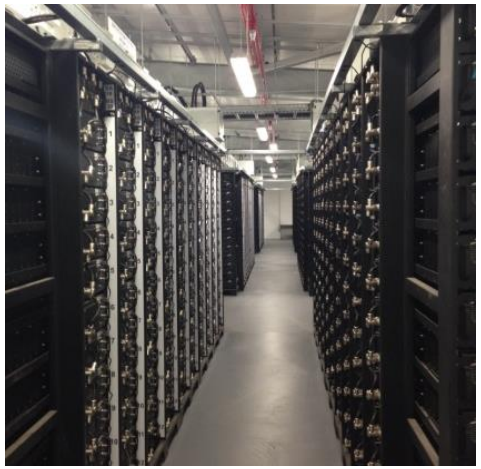
Nick Heyward, Paresh Mehta, Panagiotis Papadopoulos
UK Power Networks, UK

Smarter Network Storage – Aims



- A Primary Substation has reached its loading limit
- Conventionally, another 33kV overhead line would be installed
- Can we solve the problem with storage?
- Can the storage pay its way?

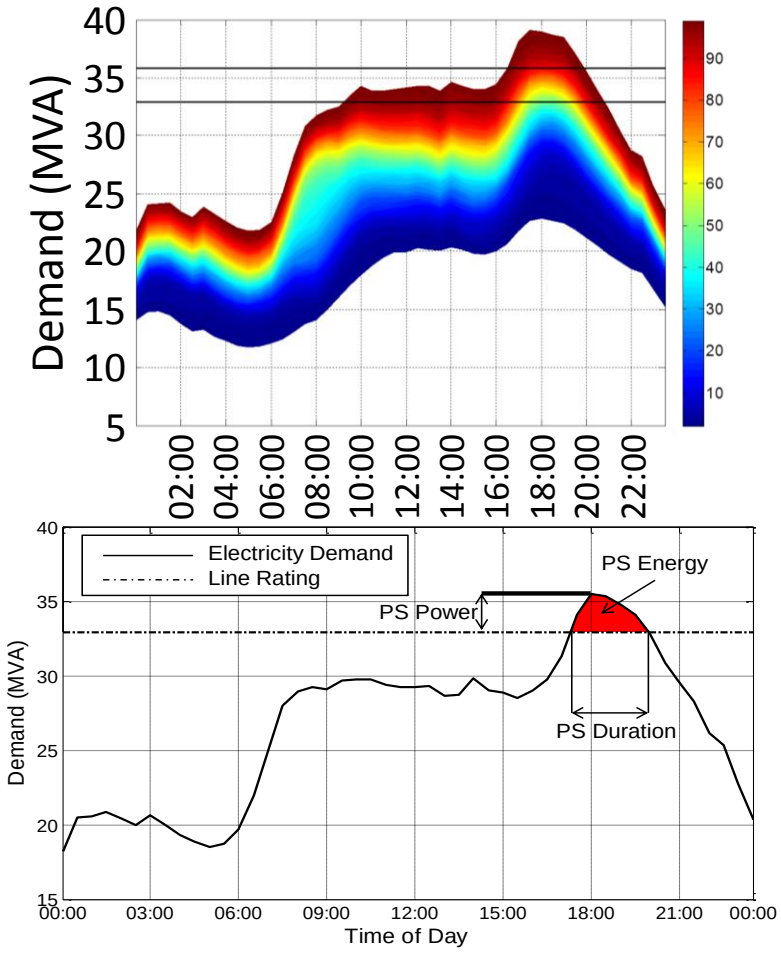
Smarter Network Storage – Project



- 6 MW/7.5 MVA/10 MWh of Lithium-ion storage
- Potential expansion up to 18MWh
- Site shared with existing substation

Demand Peak Shaving

- System design is constrained by peak demand
- Peak reduction needs sufficient power and energy
- Peak needs to be forecast so energy is available



Commercial Opportunities

- Storage is more expensive than conventional reinforcement
- Storage can provide commercial services:
  - Operating Reserve
  - Frequency Response
  - Tolling
  - TRIAD

Conclusion

- 10 MWh/6 MW/7.5 MVA of Lithium-Ion Storage has been installed instead of conventional reinforcement.
- The storage will participate in commercial services to pay its way.
- Demand forecasting and service scheduling algorithms have been developed at Newcastle University
- Trials are underway!

Address – Main lessons learnt and recommendations for the deployment of active demand

Marina Lombardi – Italy – Enel Distribuzione

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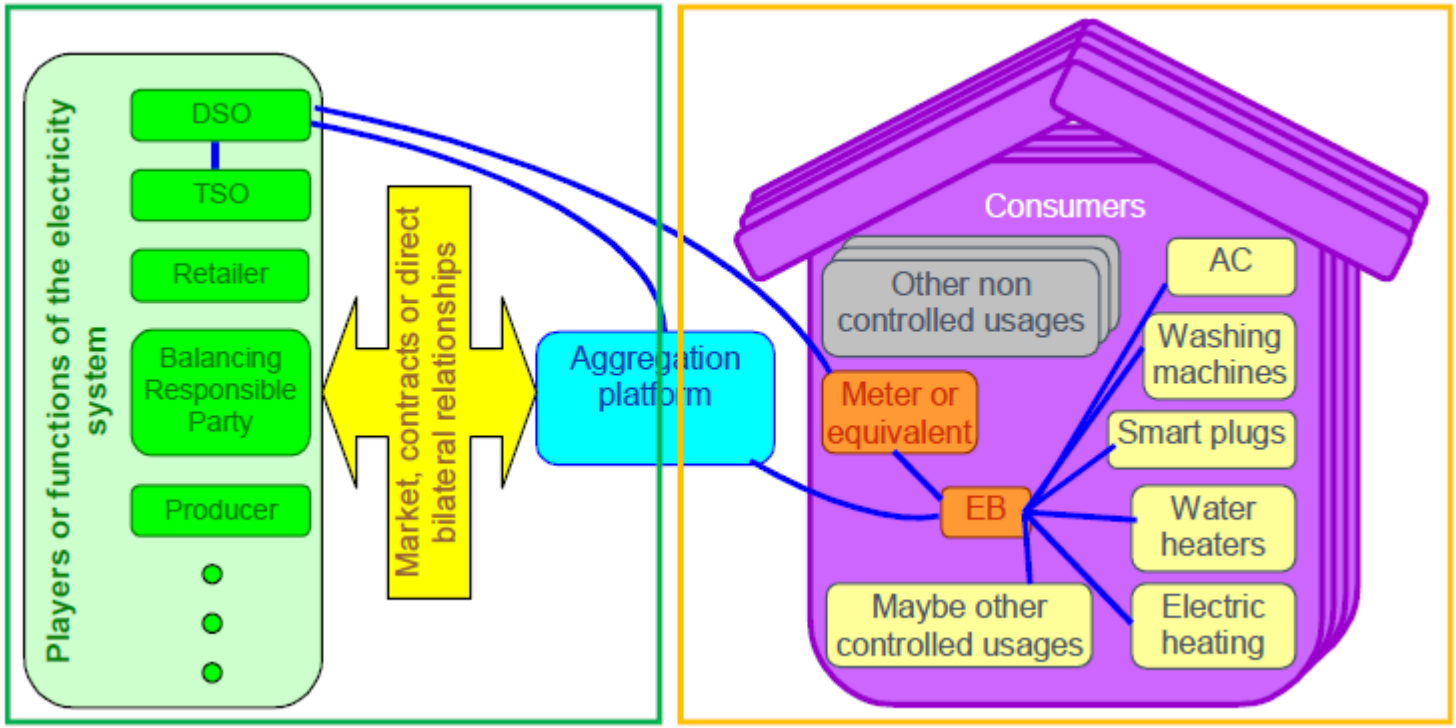

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Consumers – The Keywords!

Usability of technologies

Understandability – friendliness of interfaces, functionalities

Support and training in particular at installation

Override capability

Privacy and data protection

Information on electricity consumption

Contracts: clear, transparent and understandable

- Implication of actions
- Potential benefits

Benefits: not only financial but also environment, security, innovative technologies etc.

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Communication infrastructure

Different communication needs, interfaces, communication channels specific problems and requirements

With large parts "being given" and that cannot be changed

Connect a large number of players

→ Have to be design accordingly

To avoid to rule out certain AD participants

No restriction to specific communication

→ Heterogeneous communication infrastructure

Available, open and proven standards Service-Oriented Architecture (SOA) and exchange of Standardized XML-message

Comprehensive underlying modeling

Use of standards

→ The UM- based Common Information Model (CIM) suitable

Elektromobilität

- 35.000 Ladestationen in D
- Bis 2030 7 Mio. Ladestationen
- Trend zu 40 kW

- Netzinvestitionen in Milliardenhöhe

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Zusammenfassung

- Viele interessante und innovative Lösungen
- Themen mit rückläufiger Beitragszahl bereits Serie ?
- Für viele Smarte Projekte kein erfolgreicher Businesscase
- Publicity oder Sicherstellung des Fortschritts?

Danke für Ihre Aufmerksamkeit

Fragen?

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