



ETIP SNET

EUROPEAN
TECHNOLOGY AND
INNOVATION
PLATFORM

SMART
NETWORKS FOR
ENERGY
TRANSITION

PLAN.
INNOVATE.
ENGAGE.

WG2: Storage Technologies and Sector Interfaces

24 November 2017

Jan-Hendrik Ernst (Maxwell Technologies)

Agenda

1. WG2 scope
2. WG2 organisation
3. WG2 activities
 - i. ETIP SNET Implementation Plan 2017-2020
 - ii. H2020 Work Package 2018-2020 lobbying
4. WG2 next steps

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1. WG2 next steps

Name: Storage Technologies and Sector Interfaces

Specific objective: addressing the technological and market developments related to energy storage solutions and the interfaces between energy sectors as tools to ensure the required level of flexibility for the transmission and distribution of electricity.

All energy storage technologies and all possible interfaces are covered, among others:

- Power-to-power
- Power-to-gas
- Hydro and marine storage
- Compressed air energy storage
- Thermal mass of buildings
- Hot water storage...

The **entire value chain of all energy storage options** is also covered, starting from the development and demonstration of new materials, technologies and solutions, addressing their integration into the overall energy system, the evaluation of their impact on flexibility and the related costs/benefits.

Interfaces between the power sector and the sectors heat, gas and transport are also included.

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Chair: Cristiana La Marca (Enel)

Co-chairs: Mathilde Bieber (General Electric) and Carlos Arsuaga (Circe)

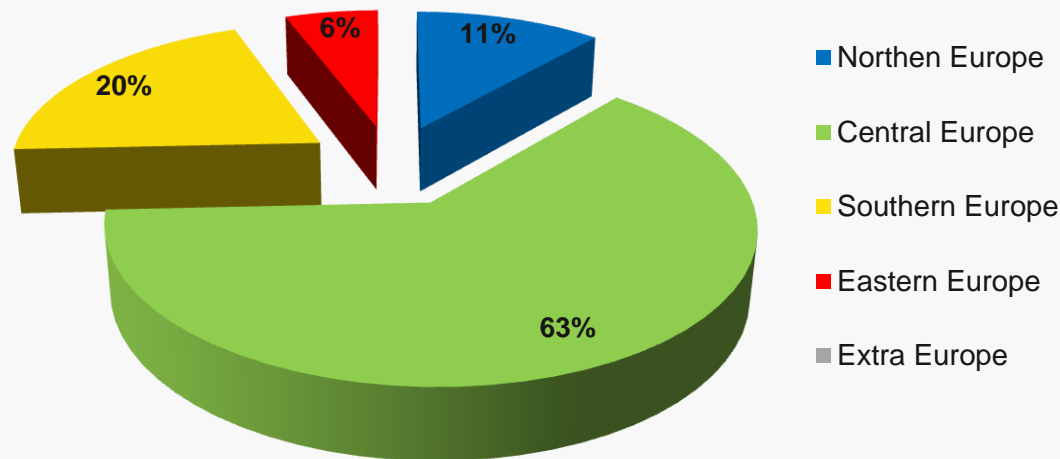
Special adviser: Omar Perego (RSE)

Organizational support: Marine Delhommeau (EASE), Maria-Laura Trifiletti (EASE)

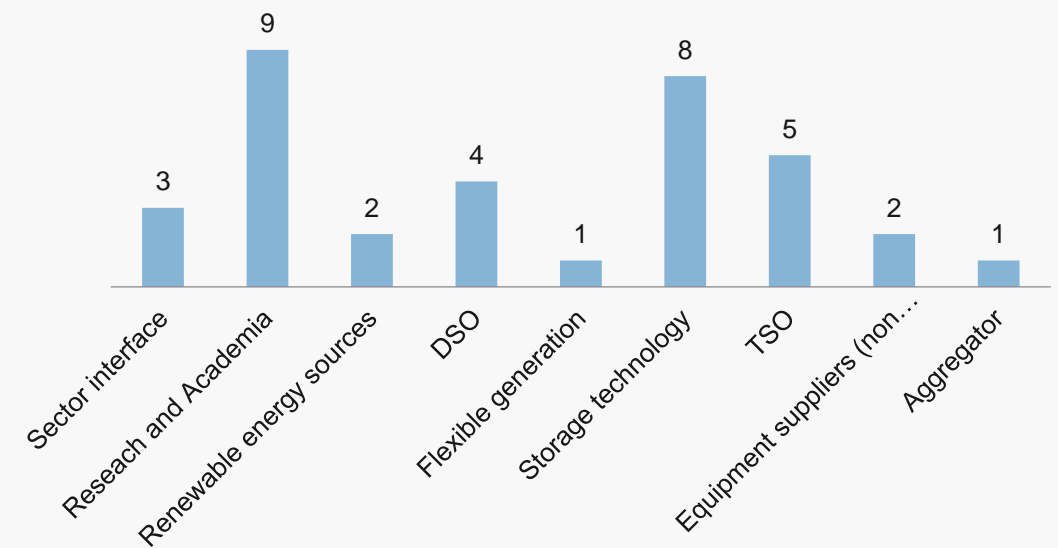
Experts are divided into:

- Tier 1: 35 experts, actively participating in the WG2 activities
- Tier 2: 54 experts, supporting Tier 1's activities

WG2 Expert per geographical area Tier 1 (%)



Breakdown of experts by sector



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❖ ETIP SNET Implementation Plan 2017-2020

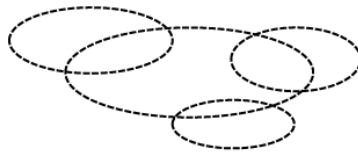
Final structure of the IP



High-RES and empowered end-user energy system:
governance and market design



Digitalisation of the energy system



Integrated grid with improved interfaces between energy system components (such as gas and heat)



Improved components of the energy system: electricity networks (transmission & distribution), generation units (thermal, variable renewable, hydro, etc.) and storage



3 topics

- **Topic 2: Market design for trading heterogeneous flexibility products**



6 topics

11 topics

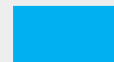


- *Synergies between electricity and heat systems*
 - **Topic 10: Coupling of electricity and thermal sectors**
 - **Topic 11: Increase energy efficiency by utilising excess heat from other processes via heat networks and thermal storage**
- *Synergies between electricity and gas systems*
 - **Topic 12: Coupling of electricity and gas sectors**
- *Synergies between electricity transmission networks, generation and storage*
 - **Topic 15: Multiservice storage applications to enable innovative synergies between system operators and market players**
- *Coupling between flexible generation and storage*
 - **Topic 19: Towards fully dispatchable RES: Variable RES with Storage**



18 topics

- *Electricity networks*
- *Storage units*
 - **Topic 31: Advanced energy storage technologies for energy and power applications**
 - **Topic 32: Coupling of electricity and transport networks**
- *Generation units*



❖ ETIP SNET Implementation Plan 2017-2020

Topic 2: Market design for trading of heterogeneous flexibility products

Develop a market concept that allows the trading of 'heterogeneous' flexibility products (coupling electricity, heat and gas markets, both at the wholesale and retail level), taking into account the specific capabilities of each resource

Challenges: growing need for short, medium and long-term flexibility to balance intermittent renewables beside conventional fossil-fuel based generation units; flexibility needed at different time scales, different locations, applicable to different end users

Topic 10: Coupling of electricity and thermal sectors

Develop methodologies and tools to quantify and test the technical and cost performances of the coupling while addressing governance and market issues

Challenges: major part of heating and cooling still generated with fossil fuels; management and efficient operation of integrated energy systems, organisation of interactions, associated business models...

Topic 11: Increase energy efficiency by utilizing excess heat from other processes via heat networks and thermal storage

Investigate how to capture excess heat in an efficient way (energy efficiency and costs) so as to decarbonize the heat sector

Challenges: use excess heat wasted in power plants, industry, waste incineration, focus on heat network and thermal storage

Topic 12: Coupling of electricity and gas sectors

Provide additional flexibility options to manage the power system. At transmission level, gas networks can provide an alternative solution to perform large-scale storage (chemical energy) of renewable excess electricity. At distribution level, the existing gas networks, especially in cities, could be used to promote green fuels for thermal or transport applications.

Challenges: avoid dismantling of obsolete gas networks and give them a new purpose with Power-to-Gas

❖ ETIP SNET Implementation Plan 2017-2020

Topic 15: Multiservice storage applications to enable innovative synergies between system operators and market players

Demonstration of bulk storage integration options in the transmission system aimed to valorize the multi (ancillary) services offered by these technologies

Challenges: storage facilities in transmission systems as promising solution for advanced grid services, for increased system flexibility and less back-up conventional energy

Topic 19: Towards fully dispatchable RES: Variable RES with Storage

Demonstrate the local coupling of storage with solar and/or wind energy assets enabling renewable energy to be fully flexible and ensuring the sustainability of the future energy system

Challenges: Economic hybrid systems with storage units localized at the generation plant to make renewable dispatchable, predictable, flexible.

Topic 31: Advanced energy storage technologies for energy and power applications

Validation in demonstrations of different technological options, together with R&I activities related to integration issues and business models (degradation and failure mechanisms which impact profitability) and with a focus on multiservice business models which might be a solution for profitability provided that the system services brought by storage are valued on a fair basis

Challenges: energy storage technologies for energy and power applications far from meeting technical and economic targets, strong need to optimize and demonstrate especially for intraweek and seasonal modulation

Topic 32: Coupling of electricity and transport networks

How to unlock the potential of V2G (vehicle to grid) applications by e.g. testing new business models and market mechanisms.

Challenges: energy transition in transport sector using intermittent renewable energy sources

❖ Horizon 2020 Work Package 2018-2020 contribution

Finally, the WG2 provided input to the draft of the Horizon 2020 Energy Work Programme 2018-2020. WG2 recommendations included:

General comments

- Low share of ‘Energy Systems’ topics compared to ‘Energy Efficiency’ and ‘Renewable Energy’
- Development of technologies should be considered on top of integration strategies

Topic ES1 – Consumer and demand response

- Explicitly mention energy storage solutions to allow automation in demand management.

Topic ES2 - Distribution Grid

- Include demonstration of small scale storage integration in low-voltage network, focusing on the role of the aggregators, and propose solutions of full scale virtual power plants

Topic ES3 – Transmission Grid

- Include stand-alone storage installation at utility scale in specific transmission network nodes

Topic ES4 – Integrated Energy Systems

- Better express the need of introducing thermal storage capacity to increase flexibility and reliability of fully integrated energy systems.

Topic ES5 – Islands

- Include storage coordinated with conventional generators and renewables to provide a reliable and efficient hybrid system operation in an isolated system

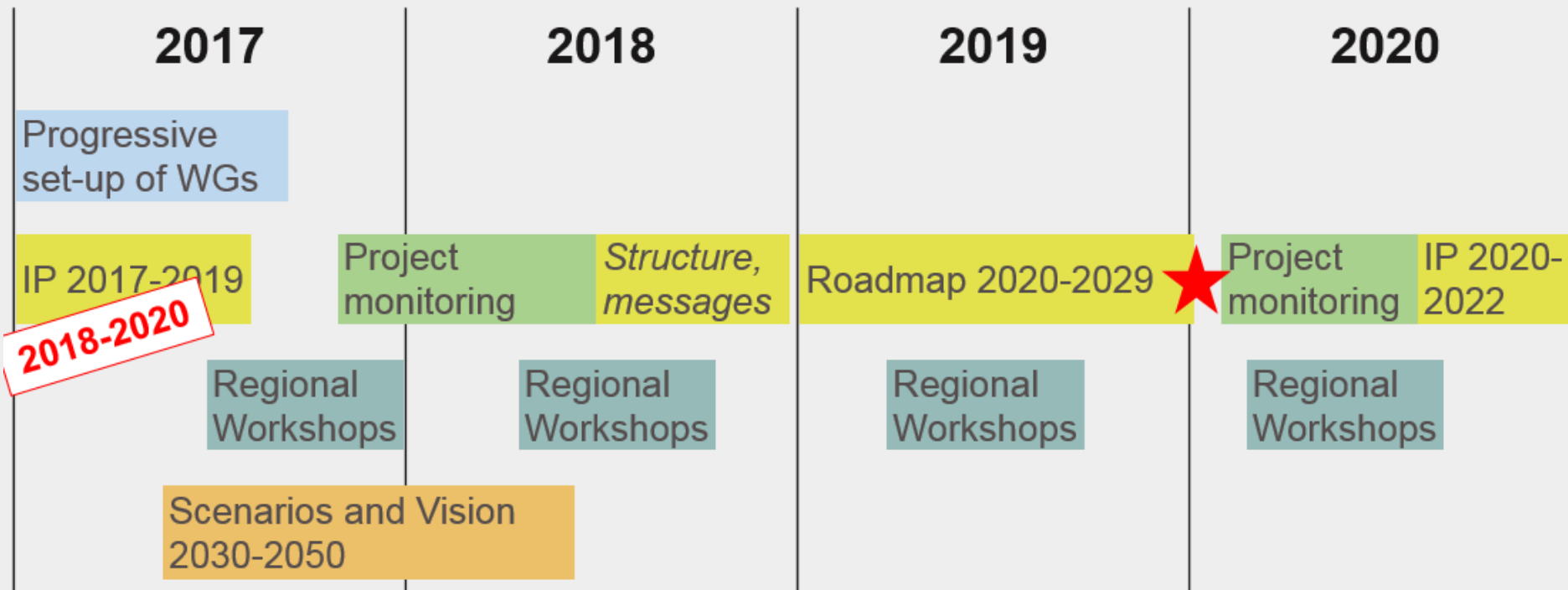
Topic ES7 – Advanced tools

- Add advanced technologies (storage and hybrid)

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**Thank you for your
attention !**