



ETIP SNET

EUROPEAN  
TECHNOLOGY AND  
INNOVATION  
PLATFORM

SMART  
NETWORKS FOR  
ENERGY  
TRANSITION



## D3.3 Minutes of the regional workshops

# D3.3 Minutes of the regional workshops

*Confidential (Intensys4EU consortium and Commission services)*

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# 1. INTRODUCTION

## 1.1 OBJECTIVES OF THE REGIONAL WORKSHOPS

The Regional Workshops aim at:

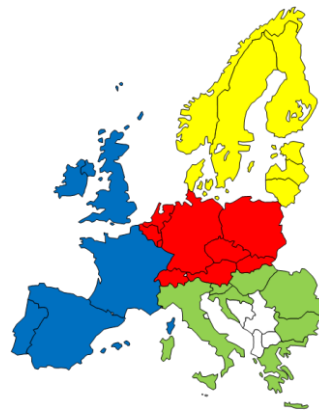
- Presenting national and regional RD&I projects of significant added value addressing energy system integration issues, in line with the thematic priorities of the ETIP SNET Working Groups;
- Identifying unsolved RD&I topics and monitoring the implementation of RD&I activities at national and regional levels in Europe;
- Ensuring consistency between national and European views;
- Stimulating knowledge-sharing between stakeholders and among Member States and associated countries, so as to foster the efficient implementation of RD&I projects all over Europe.

## 1.2 ORGANISATION OF THE REGIONAL WORKSHOPS

### 1.2.1 REGIONAL APPROACH

Based on the experience gained during the Grid+Storage workshops organised in 2016 (see <http://www.gridplusstorage.eu/workshops>), and on the will to stimulate exchanges between stakeholders within different countries, it was proposed to adjust the scope of the different regions and to divide Europe into four parts, as illustrated below.

- Region 1: PT, ES, FR, UK, EI
- Region 2: DK, SE, FI, NO, LT, LV, EE
- Region 3: IT, SL, KR, MT, HU, RO, BG, GR, CY
- Region 4: BE, NL, LU, DE, PL, CH, AT, CZ, SK, HU



The workshops were organised for 2017 according to the schedule presented in the table below.

Table 1 – Planning for the 4 regional first knowledge sharing workshops

Workshop nr.	Member States	Location	Date
1	Belgium, Netherlands, Luxembourg, Poland, Austria, Germany, Switzerland, Czech Republic and Slovakia	Aachen (Germany)	18-19 September 2017
2	Spain, France, Portugal, Ireland and the UK	Lisbon (Portugal)	28-29 September 2017

3	Italy, Slovenia, Malta, Hungary, Romania, Bulgaria, Croatia, Greece and Cyprus	Nicosia (Cyprus)	23-24 November 2017
4	Denmark, Sweden, Norway, Finland, Latvia, Lithuania and Estonia	Riga (Latvia)	7-8 December 2017

In Cyprus, the ETIP-SNET workshops was organised in cooperation with the JRC in order to stimulate the participation of local stakeholders.

## 1.2.2 PROGRAMME OF THE KNOWLEDGE SHARING WORKSHOPS

The 4 workshops are held over two days according to the agenda below (adjusted depending on logistical constraints and number of projects presented):

Slot duration	Speaker	Purpose
5 min	Workshop host representative	Welcome words
15 min	<b>ETIP SNET support team</b>	Introduction to R&I activities in the scope of the ETIP SNET; presentation of the R&I roadmap 2016-2025 – focus on the topics of the concerned WG(s); presentation of the other workshops (past and future)
<b>Project session 1 (group of projects addressing topics within the scope of ETIP SNET WG1)</b>		
15 min	<b>ETIP WG1 representative</b>	High-level vision (overarching goals and constraints) for the European energy system and respectively of the contribution of various technologies to this system – in relation with the concerned WG(s)
30 min per project	Projects' representatives	Presentation of the findings of the project. Focus on: <ul style="list-style-type: none"> <li>the new knowledge gained so far;</li> <li>the main lessons learnt;</li> <li>the next projects steps;</li> <li>the needs for future R&amp;I coming out of the project;</li> <li>deployment prospects.</li> </ul> Each presentation is followed by Q&A.
30 min	Roundtable to conclude session N (animated by <b>ETIP SNET support team</b> )	Presence of all speakers in the session + <b>ETIP WG1 representative</b> + <b>ENTSO-E, EDSO, EASE and EERA</b> representatives
<b>Project session 2 (group of projects addressing topics within the scope of ETIP SNET WG2)</b>		
Similar structure than first session		
<b>Project session 3 (group of projects addressing topics within the scope of ETIP SNET WG3)</b>		
Similar structure than first session		
<b>Project session 4 (group of projects addressing topics within the scope of ETIP SNET WG4)</b>		
Similar structure than first session		
<b>Concluding session</b>		

20 min	<b>ETIP SNET support team</b>	Wrap-up of the recommendations from the projects presented and of the conclusions from the roundtables
10 min	<b>ETIP SNET support team</b>	Closing words, invitation to participate in upcoming consultation processes

### 1.3 STRUCTURE OF THIS REPORT

For each of the regional workshops, this report gathers the following information:

- List of projects presented, including the link to the slides displayed at the workshop;
- Participants in the different roundtables and statistical analysis of the attendees per country and organisation of origin;
- Main questions raised during the projects' Q&A sessions;
- Summary of the main recommendations from the projects and conclusions from the roundtables.

## 2. REGIONAL WORKSHOP 1 (BELGIUM, NETHERLANDS, LUXEMBOURG, POLAND, AUSTRIA, GERMANY, SWITZERLAND, CZECH REPUBLIC AND SLOVAKIA)

The first workshop was held in Aachen (Germany) on the 18<sup>th</sup> and 19<sup>th</sup> of September, 2017. The workshop agenda is available on the [ETIP-SNET website](#).

### 2.1 PROJECTS AND PARTICIPANTS IN THE WORKSHOP

#### 2.1.1 R&I PROJECTS PRESENTED

Fourteen R&I projects were presented during the first workshop, as displayed in the table below:

Table 2 – Projects presented at the workshop 1

Project	Country	Purpose	Speaker	Link to presentation
<b>Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system"</b>				
Hybrid AC/DC overhead lines in Switzerland	Switzerland	Swissgrid together with electric utilities, manufacturer and universities is testing the concept of hybrid AC/DC lines on existing AC towers: increasing the transfer capacity without the need for new transmission corridors.	<b>Joshu JULLIER</b> (Swissgrid)	<a href="#">Link</a>
Proaktives Verteilnetz Project	Germany	The project shows synergies between market- and grid-driven usages of flexibility. The traffic light system indicates the actual status of the interaction of the grid with the market. Flexibility in this project means adapting generation and/or demand behaviour by external signals.	<b>Thomas WIEDEMANN</b> (Innogy)	<a href="#">Link</a>
Automatic voltage regulation and reactive power system (SAVR) Project	Czech Republic	The project deals with controls of power systems including the reactive power. The SAVR controls voltage in pilot nodes by reactive power of the connected generators. Demanded voltage is defined by dispatcher or by the OPF. Producers with the SAVR installations support the distribution grid instead of neutral behaviour only.	<b>Jaromír BERAN</b> (EGÚ Praha Engineering, a.s.)	<a href="#">Link</a>
Ampacity- 10-kV-Superconducting medium-voltage	Germany	Development, manufacturing and field testing of a 10 kV superconducting cable system in the city centre of Essen. Proof of the technical and economic feasibility of a high-temperature superconducting cable system in a distribution network under real operating conditions.	<b>Thomas WIEDEMANN</b> (Innogy)	<a href="#">Link</a>

cables for urban power supply				
<b>Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"</b>				
StEnSEA Project	Germany	The development and research project "StEnSEA" (Stored Energy in the Sea) is investigating the installation of large storage facilities on the sea floor, in combination with offshore wind farms. The physical principle on which the energy storage facility operates is similar to that of conventional pumped storage power plants, but based not on two reservoirs, but a hollow sphere.	<b>Matthias PUCHTA</b> (Fraunhofer IWES)	<a href="#">Link</a>
WESpe Project	Germany	How can surplus wind energy be stored efficiently in the form of hydrogen at large scale? Scientists consider the value chain from a technical and economic point of view. The Analysis includes electrolysis, underground storage facilities and the connection to gas grids.	<b>Ulrich FISCHER</b> (Brandenburgische Technische Universität)	<a href="#">Link</a>
Underground Sun Storage Project	Austria	The project attempts to demonstrate the ability of underground natural gas storage facilities to reach hydrogen content of up to 10%, in order to extend the storage potential of the gas network as a whole. To achieve this aim, the project comprises laboratory experiments, simulations and a field trial conducted on an industrial scale at an existing storage reservoir with similar characteristics to Austria's large storage facilities.	<b>Stephan BAUER</b> (RAG)	<a href="#">Link</a>
SAVE Project	Belgium	The project looks for practical solutions for the smart use of renewable energy at SME level (with a focus on energy storage and demand side management in agriculture). The target groups are end users as well as providers of energy technology. The main results are: simulation tools (offline and online) to define the potential of demand side management and/or energy storage, 3 demonstration sites, a guideline with economic analyses for representative cases and knowledge dissemination.	<b>Jeroen BÜSCHER</b> (VITO)	<a href="#">Link</a>
<b>Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible Generation"</b>				
Dynamo Project	Netherlands	The DYNAMO project develops a well-functioning and open market for flexibility and ensures that the DSO is capable of procuring flexibility for grid management. It is applying the open-source Universal Smart Energy Framework (USEF), which defines what roles contain what responsibilities and what information exchange is necessary for optimal use of flexibility of consumers.	<b>Bram SIEBEN</b> (Alliander)	<a href="#">Link</a>
Kryolens Project	Germany	This project focuses on the technical development and assessment of liquid air energy storage (LAES). The LAES technology combines flexible generation and energy storage as it can be integrated in conventional generation facilities as well as designed as stand-alone energy storage system. Process analysis as well as component analysis are performed.	<b>Dr. Christian BERGINS</b> (Mitsubishi Hitachi Power Systems Europe)	<a href="#">Link</a>
PV Forecast project	Luxemburg	The project developed a forecasting scheme for timely resolved (hourly resolution), spatial PV power forecast, up to 72 hours ahead, for whole Luxembourg. Beside the irradiance forecasts, the algorithm uses a feedback loop of online measured PV reference systems, distributed all over Luxembourg.	<b>Daniel KOSTER</b> (LIST)	<a href="#">Link</a>



Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"				
Planning the future electricity grid by using 3D Decision Support System	Switzerland	The project developed a 3D Decision Support System that supports finding the optimal path between two points for a new overhead line. The developed system allows stakeholders to assess various spatially-explicit factors concerning social, environmental and economic impact in order to compute corridors, path alternatives, and corresponding costs.	<b>Joshu JULIER</b> (Swissgrid)	<a href="#">Link</a>
HelloData	Netherlands	HelloData authorizes consumers to share real-time data from the commercial exit point of their smart meter in a secure way. The project creates an equal level playing field which facilitates the development of innovative data-based products and services by introducing an open standard for energy data handling.	<b>Bart JANSSEN</b> (Hellodata)	<a href="#">Link</a>
SHAR-Q Project	Slovak Republic	The SHAR-Q project aims at establishing an interoperability network that connects the capacities of the neighbourhood and wide regional RES+EES ecosystems into a collaboration framework that mitigates the requirement on the overall EES capacities thanks to the shared capacities among the participating actors.	<b>Stefan VANYA</b> (Bavenir)	<a href="#">Link</a>

Poland was not represented during this workshop but several projects being at an early stage of development have already been identified. Those projects would be involved in the next years' workshops.

## 2.1.2 ROUNDTABLES

Four roundtables were held during the workshop, all moderated by Eric PEIRANO and Rainer BACHER. They were mainly devoted to questions for the speakers of the projects presented. Representatives from EASE, EDSO for Smart Grids and ENTSO-E, were also attending in the audience. Table 3 below shows the participants in each roundtable.

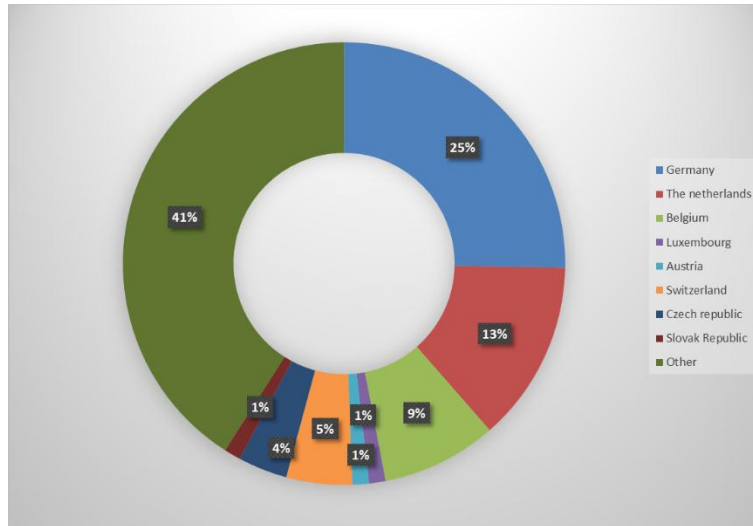
Table 3 – Participants in roundtables at the first regional workshop

Roundtable nr.	Participants
1	<ul style="list-style-type: none"> <li>• Frank WIERSMA (TenneT, WG1 Representative)</li> <li>• Joshu JULLIER (Swissgrid)</li> <li>• Thomas WIEDEMANN (Innogy)</li> <li>• Jaromír BERAN (EGÚ Praha Engineering, a.s.)</li> <li>• Rainer BACHER (ETIP SNET Support Team, BACHER)</li> </ul>
2	<ul style="list-style-type: none"> <li>• Mathilde BIEBER (General Electric, WG2 Representative)</li> <li>• Matthias PUCHTA (Fraunhofer IWES)</li> <li>• Ulrich FISCHER (Brandenburgische Technische Universität)</li> <li>• Stephan BAUER (RAG)</li> <li>• Jeroen BÜSCHER (VITO)</li> <li>• Niels Leemput (TRACTEBEL)</li> <li>• Eric PEIRANO (ETIP SNET Support Team, TECHNOFI)</li> </ul>
3	<ul style="list-style-type: none"> <li>• Alexander WIEDERMANN (MAN Diesel &amp; Turbo SE, WG3 representative)</li> <li>• Bram SIEBEN (Alliander)</li> <li>• Dr. Christian BERGINS (Mitsubishi Hitachi Power Systems Europe)</li> <li>• Daniel KOSTER (LIST)</li> <li>• Eric PEIRANO (ETIP SNET Support Team, TECHNOFI)</li> </ul>
4	<ul style="list-style-type: none"> <li>• Prof. Antonello MONTI (E.ON Energy Research Centre, RWTH Aachen University, WG4 representative)</li> <li>• Joshu JULLIER (Swissgrid)</li> <li>• Bart JANSSEN (Hellodata)</li> <li>• Stefan VANYA (Bavenir)</li> <li>• Rainer BACHER (ETIP SNET Support Team, BACHER)</li> </ul>

### 2.1.3 LIST OF ATTENDEES

In total, the workshop was attended by 82 participants. The distribution of participants by country is provided in the figure below:

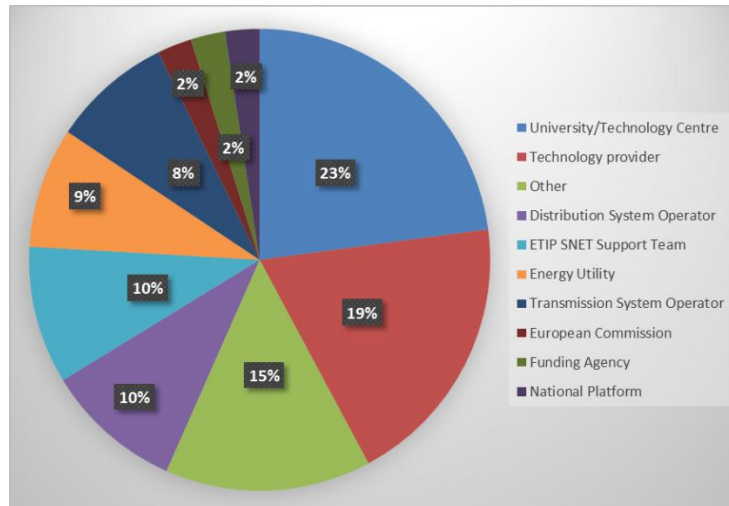
Figure 1– Distribution of participants by country



It can be noticed that the three main countries represented from the central region are Germany, The Netherlands and Belgium. It is also to highlight that 41% of the participants are coming from different countries outside of the central region.

Moreover, the following figure gives an indication of the distribution of participants by organization:

Figure 2– Distribution of participants by organization



It can be pointed out that more than 40% of the audience comes from University/Technology Centre as well as from Technology provider.

## 2.2 MAIN QUESTIONS FROM THE PROJECTS' Q&A SESSIONS

Each project presentation has been followed by a session of questions and discussions. The important questions and comments are collected in the table below:

Table 4 – Main questions and comments by project

Project	Country	Main Questions & comments
<b>Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system"</b>		
Hybrid AC/DC overhead lines in Switzerland	Switzerland	Measures to increase the transmission capacity of an existing line were discussed. It was explained that the first step to increase the capacity of a line is to increase the voltage from 220 to 380 kV. If the line has already 380 kV, an increase of capacity is just possible with a new line or with the conversion into a hybrid line. Moreover, it was highlighted the importance of communication campaigns for the acceptance of new technologies.
Proaktives Verteilnetz Project	Germany	The size, the role and the feedback from market players in the congestion management issues have been discussed. Again, the transparency between the different actors has been emphasized.
Automatic voltage regulation and reactive power system (SAVR) Project	Czech Republic	The presentation raised some questions about how central and distributed new control systems would need to be. This project showed that country-specific regulations/laws would require the adaption of existing central control mechanisms leading new questions such as: How to handle the need for much more automation?
Ampacity- 10-kV-Superconducting medium-voltage cables for urban power supply	Germany	The question related to the investments expected with the development of the technology presented by the project was raised. It was specified that different investment scenarios are foreseen. Moreover, it was reminded that social acceptance was the key to support the use of new technologies. Once more, communication campaigns must be done at an early phase of the project and involve the different parties affected.
<b>Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"</b>		
StEnSEA Project	Germany	The questions were linked to the specific investment costs of the storage facilities developed within the project which were indicated to be around 1500 to 2000 euros/kW. Moreover, environmental aspects were tackled in order to point out the potential impact of the technology: the project indicated that it was working, among others, on bio films to protect the environment.

WESpe Project	Germany	Legal aspects related to storage in Europe and specifically, to underground's storage permits were highlighted during this presentation. It was reminded that, in Germany, where the next R&D projects will be set, the legal framework authorizes such activities.
Underground Sun Storage Project	Austria	The process described within the project highlighted the presence of micro-organisms being able to convert Hydrogen and CO <sub>2</sub> to Methane in depleted gas reservoirs and questions related to their speed of development, the repetition cycle of the process, etc. fed the discussions. A follow up project called "Underground Sun Conversion" plans to study further those micro-organisms and their behaviour within its next step of development. It was stressed that, those microbial processes could be a sustainable way to convert renewable energy in an energy carrier which is seasonally storable and completely compatible with the existing gas infrastructure. A sustainable closed carbon loop can be established.
SAVE Project	Belgium	The project indicated that the smart use of own produced electricity does not have a generic solution. Each situation can be different (location, power needed, activities of the facilities,...) and for this reason it was reminded that case by case solutions would be more relevant. It was also highlighted that, the project was able to develop a profitable business model for the battery in niche markets (such as agriculture, etc.).
<b>Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible Generation"</b>		
Dynamo Project	Netherlands	During the discussion, it was stressed that the DSO is not the only customer of flexibility, all interactions between market roles (especially emerging market players) should be defined. As such it is very important that these (new) players fully the DSO requirements versus flexibility product characteristics of different flexibility sources. Also, it is pointed out that the open platform introduced in the project is of high value (standardized information exchange is essential) and that it would make a relevant link with topics encountered within WG4.
Kryolens Project	Germany	The comments following the project presentation were mainly related to the size of the land needed for the <u>Cryogenic air energy storage</u> infrastructures introduced. It was reminded that the energy density for the liquefied air is in the range of the one for CAES (Compressed Air Energy Storage) and LNG (Liquefied Natural Gas). Also, it was indicated that 1600 m <sup>3</sup> of storage capacity are enough for a facility of 100 MWh. This would enable to locate a pilot plant next to a city.
PV Forecast project	Luxemburg	Possible optimisations for the PV Forecast tool presented were focused on: <ul style="list-style-type: none"> <li>- Incorporation of a hybrid method (e.g. using machine learning) to reach higher accuracy – which is intended to be done in a further development step,</li> <li>- Consideration of the underline grid - planed as soon as the necessary degree of detail on the grid is available,</li> </ul>

		<ul style="list-style-type: none"> <li>- Prediction of the wind and of the clouding effect -which is incorporated in the used irradiance forecast and additionally the feedback loop of connected PV systems delivers data to correct for prediction errors</li> <li>- Consideration of the eclipse – which is comparably straight forward, from a forecasting perspective but not yet included in the ECMWF solar irradiance forecast model</li> </ul> <p>All these aspects could be taken into account or are already considered by the project.</p>
<p>Session 4: Projects addressing topics within the scope of ETIP SNET’s Working Group 4 (WG4): “Digitisation of the electricity system and Customer participation”</p>		
Planning the future electricity grid by using 3D Decision Support System	Switzerland	<p>The demonstration tool introduced by the project was appreciated and leads to different discussions:</p> <ul style="list-style-type: none"> <li>- Some alternative scenarios were presented in order to plan future electricity grids</li> <li>- The tool is a good approach to communicate with the public but the real influence of such tool in the decision process is not yet known.</li> </ul> <p>One of the next step of the project is to compare the tool’s results with the solutions of the experts so as to identify significant discrepancies in order to improve the underlying decision making algorithm.</p>
HelloData	Netherlands	<p>Different topics related to the secure sharing of energy data have been raised: who is controlling? Does it have to be anonymous? What about the connectivity and freedom of choice? Etc. The main challenge of the project would be to develop an ecosystem/ platform enabling to prepare the future management of consumers’ energy data.</p>
SHAR-Q Project	Slovak Republic	<p>The projects introduces several challenges: data privacy, tracking of the data ownership, etc. It was indicated that most of the challenges to be faced could be solved with the blockchain technology. Today, because of the lack of regulatory framework, the project works as if the regulation were available so as to provide relevant recommendations to the commission.</p>

## 2.3 RECOMMENDATIONS FROM THE PROJECTS AND CONCLUSIONS FROM THE ROUNDTABLES

These recommendations and conclusions have been discussed and agreed upon during the Final Wrap-up session of the workshop.

### 2.3.1 SESSION 1: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 1 "RELIABLE, ECONOMIC AND EFFICIENT SMART GRID SYSTEM"

- Public acceptance for innovative solutions is key for future grid developments.
- AC/DC hybridisation is a promising technology to increase transmission and distribution grid capacity without building new lines. HVDC converters will bring additional degree of freedom.
- Superconducting cables are a promising solution for reinforcements in densely populated areas.
- Interactions between regulated players (grid operators) and market players should be performed on the basis of user-friendly and efficient signals, especially for the "yellow light" state.
- The full monitoring, automation and control of the flexible electricity grid (all voltage levels) calls for new approaches (governance and technical solutions) so as to be able to handle at different time scale the huge amount of data.
- Enhanced TSO/DSO (market makers) coordination is needed so as to be able to have, at the same time, efficient markets at all spatial scale (wholesale and retail) within an open, adaptive regulatory framework.

### 2.3.2 SESSION 2: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 2 "STORAGE TECHNOLOGIES AND SECTOR INTERFACES"

- Deep water off-shore PHS (StEnSEA concept) seems to be a promising solution (in terms of costs) provided that key maintenance issues are solved at affordable costs (e.g. fouling).
- Direct electrolyser H<sub>2</sub> use for transport application (H<sub>2</sub>-powered passenger vehicles) is nearly cost competitive provided that regulatory issues can be addressed (storage of H<sub>2</sub>).
- Storage of energy (H<sub>2</sub>) is technically feasible with available know-how and provides solutions for large-scale (including seasonal) storage of renewable electricity.
- Microbiological applications can be a way to establishing a sustainable carbon cycle (CH<sub>4</sub> and CCU): more R&I needs.

- Small-scale BESS can provide cost competitive solutions in niche markets (e.g. agriculture).
- Need for system optimisation to find the most efficient coupling between electricity and gas (including large-scale storage of electricity).

### **2.3.3 SESSION 3: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 3 ““FLEXIBLE GENERATION”**

- R&I activities are needed for the development of adaptive solutions so as to quickly set up a 100% RES based energy system at affordable costs.
- There is a need to study the overall coherence between the different aspects of the Energy Union, for instance mechanisms to foster the penetration of renewables and CO2 prices (ETS).
- Open source environment are needed (e.g. the USEF framework) so as to define the interactions between the different market players at local level (ancillary services for DSOs), stressing on the essential need for standardized information exchange.
- LAES could be an alternative solving some of the drawbacks of CAES: more research is needed to prove the commercial soundness provided that the ancillary services brought by this technology are fairly valued and remunerated on electricity markets.
- Efficient PV forecasting tools at local level (small cells) could help local system players (DSO level) to better handle decentralized PV generation.

### **2.3.4 SESSION 4: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 4 ““DIGITISATION OF THE ELECTRICITY SYSTEM AND CUSTOMER PARTICIPATION”**

- GIS-based solutions can provide a practical framework to quantify and visualize the possible impact and costs of new OH lines and cables and to support public acceptance processes.
- Customer (end-users) should keep control over their data and give access permissions through dedicated platforms (who has the right to use the data? To what end?).
- Peer-to-peer interoperability of smart energy components might provide further local flexibilities supported by blockchain technology.
- Smart meters should be used for network management and billing services; service provisions should be performed through other channels (energy box?).



## 3. REGIONAL WORKSHOP 2 (FRANCE, IRELAND, PORTUGAL, SPAIN AND THE UK)

The second workshop was held in Lisbon (Portugal) on the 28<sup>th</sup> and 29<sup>th</sup> of September, 2017. The workshop [agenda](#) is available on the [ETIP-SNET website](#)

### 3.1 PROJECTS AND PARTICIPANTS IN THE WORKSHOP

#### 3.1.1 R&I PROJECTS PRESENTED

Seventeen R&I projects were presented during the second workshop, as displayed in the table below:

Table 5 – Projects presented at the workshop 2

Project	Country	Purpose	Speaker	Link to presentation
<b>Session 1:</b> Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")				
The REN and Nester Projects	Portugal	<p>Three projects have been introduced during this presentation:</p> <ul style="list-style-type: none"> <li>- The power system simulation project: within this project a real-time power systems simulation laboratory is set-up to enable the simulation and testing capabilities of both power systems and communication networks, either in a stand-alone mode or by performing co-simulations. Another relevant component of this project is the assessment, both from operational and planning power systems' perspectives, resulting from an improved and better structured collaboration between TSOs and DSOs.</li> <li>- The substation of the future project: this project defines a new set of technical specifications for the secondary systems of a transmission substation, oriented to demanding requirements of TSOs. It takes advantage of a real-time testing platform to demonstrate the concept of a smart substation and its homologation processes.</li> <li>- The renewable Energy dispatch tools project: The aim is to deploy new and improve existing tools to be used by the Portuguese system operator to manage high levels of intermittent renewable energy such as wind and solar. The tools developed aim at improving the decision making of system operators under uncertainty.</li> </ul>	Rui ALVES (NESTER)	<a href="#">Link</a>

The SINAPSE Project	Portugal	The project consists in developing an information platform to improve the visibility over the low voltage grid, making available an automatic communication channel (for EDP and its customers) for low voltage anomalies, with internal and external sources of data, adding intelligence to the distribution grid.	<b>Jorge SIMOES</b> (EDP)	<a href="#">Link</a>
The CONIFER / MASSENA Projects	France	<p>The <u>CONIFER project</u> proposes to anticipate the electrical energy production and distribution evolution of the railways and to provide the following tools:</p> <ul style="list-style-type: none"> <li>- A sizing for Fixed Installations of new Railway Electric Traction (IFTE) (electrical substations, catenary ...) that will integrate delocalized production sources and storage systems (including additional features to enhance the recovery of braking energy of trains);</li> <li>- The design of the future electric railway networks in a smart overall approach that will be based on a systemic view of the network requiring to consider the conversion components between the energy transportation network and the power supply network.</li> </ul> <p>The <u>MASSENA Demonstrator</u> includes:</p> <ul style="list-style-type: none"> <li>- A reversible DC Substation Demonstrator;</li> <li>- A Smart grid study integrating: substation, François Mitterrand Library stop (RER C), renewable energies production and EVs (V2G services).</li> </ul>	<b>Benoit ROBYNS</b> (HEI) and <b>Guillaume GAZAIGNES</b> (SNCF)	<a href="#">Link</a>
<b>Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"</b>				
The SMART ZAE Project	France	<p>The project aims at controlling and reducing the energy consumption of an industry park (in Toulouse), by storing the energy produced on the site.</p> <p>The expected results are:</p> <ol style="list-style-type: none"> <li>1) Innovation: smart control algorithm that optimizes the consumption profile of the park. High-efficiency flywheels with very low self-discharge rate; DC bus reducing the number of stages of energy conversion.</li> <li>2) Economic and social: New offers of dynamic energy optimization of activity areas and reduction of the energy bill of the users, collaboration between actors of the same zone.</li> </ol>	<b>Eric CAHUET</b> (Engie Ineo)	<a href="#">Link</a>
The CECOVEL Project	Spain	The Control Centre for Electric Vehicle (CECOVEL) is REE's control centre created to integrate in the electric system and under security conditions electric mobility. The centre controls the charging of electric vehicles receiving real-time information.	<b>Joan MANRESA BALLESTER</b> (REE)	<a href="#">Link</a>
The Storage Project	Portugal	This is a Pilot project to test several use cases on the use of energy storage for grid management support: backup, voltage control, peak shaving, and fault ride-through. This project will also provide MV storage for the H2020 SENSIBLE project, to test MV/LV extended islanding operation and central control systems for grid operation with heavy penetration of renewable resources.	<b>Ricardo Jorge SANTOS</b> (EDP)	<a href="#">Link</a>
The Renovagas Project	Spain	The objective of the project is to develop a synthetic natural gas production plant with a power of 15 kW. This will produce hydrogen in an electrolyser and then in a methanation reactor, hydrogen will be introduced	<b>Piedad MARTINEZ</b> (Gas Natural Fenosa)	<a href="#">Link</a>

		with a biogas stream for the production of synthetic natural gas. A Spanish P2G (power to gas) potential analysis is included in the project.		
<b>Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible Generation"</b>				
MMC Project	Spain	The project aims at designing and developing a small scale Modular Multilevel Converter and the necessary electronic boards to interface with a HIL (Hardware in the Loop) system. The final goal of the whole system is to get a fully flexible and modular converter to test different control algorithms, to validate multi-terminal HVDC architectures that are being designed to integrate offshore wind farms into the main grid.	<b>Susana APIÑANIZ</b> (Tecnalia)	<a href="#">Link</a>
The DS3 Projects	Ireland	The "Delivering a Secure, Sustainable Electricity System" (DS3) Programme is designed to ensure that the Irish power system can be securely operated with increasing amounts of variable non-synchronous renewable generation over the coming years. Achieving high levels of renewable integration in a synchronous system is unprecedented and presents significant challenges for the real-time operation of the power system.	<b>Ian CONNAUGHTON</b> (Eirgrid)	<a href="#">Link</a>
The HVDC LINK Project	Spain	The project investigates HVDC technologies aiming at reducing the cost and complexity of the current HVDC existing architectures to connect offshore wind farms to the main grid. In particular, the following specific objectives are proposed: - Design innovative HVDC architectures based on Diode Rectifier Units beyond the SoA; - Develop models and run simulations to verify the proposed architecture; - Develop a laboratory scale prototype to validate the solution.	<b>Susana APIÑANIZ</b> (Tecnalia)	<a href="#">Link</a>
<b>Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"</b>				
Power off and Save Project	Ireland	It is a new pilot demand-response programme that will reward customers who agree to reduce their energy use when electricity demand is high. This programme involves 1,500 residential customers over an 18 month-period. Those who sign up are asked to switch off appliances for about 30 minutes on ten occasions. Customers will be rewarded with up to €100 off their bill.	<b>David PHELAN</b> (Electric Ireland)	<a href="#">Link</a>
The Predis Project	Portugal	Disaggregated load and generation forecast in real time: this project aims to build an infrastructure and analytics to be able to make a short-term load and generation forecasts for all the distribution grid assets in real time. The forecast algorithms are based on Big Data technologies.	<b>Pedro TAVARES FERREIRA</b> (EDP)	<a href="#">Link</a>
The Smart Electric Lyon Project	France	The large-scale demonstration consists in offers of information services, technical solutions and new tariffs helping consumers to better control their energy bills. The project participants are households, industrial firms, tertiary companies and local authorities. The solutions are being tested in 25,000 homes and 100 businesses and local authority agencies located in the Grand Lyon Metropole. The participants will assess the performance of new equipment and digital solutions that manage energy consumption in their everyday lives.	<b>Sylvie PERRIN</b> (EDF)	<a href="#">Link</a>
The Re:DY Project	Portugal	Home energy management system based on a gateway and several hardware components allowing the monitoring, control, automation and optimization of home electrical systems. This system already allows	<b>Pedro GEIRINHAS ROCHA</b> (EDP)	<a href="#">Link</a>

		the monitoring of the load, the solar panels generation and EV charging, and the control of air conditioning, heat pumps, water heaters and electrical appliances.		
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During this workshop, there were no presentations from projects in the UK. Several projects have been invited but they were not able to attend and some other being at an early stage of development have already been identified in order to be invited to participate in the next years' ETIP SNET workshops of the Western Region of Europe.

### 3.1.2 ROUNDTABLES

Four roundtables were held during the workshop, moderated by Rainer BACHER and Eric PEIRANO. The four were devoted to questions and different exchanges between the speakers of the projects presented, the representatives from EASE, EDSO for Smart Grids and ENTSO-E and the respective representatives of the different ETIP SNET Working Groups. The table below shows the participants in each roundtable.

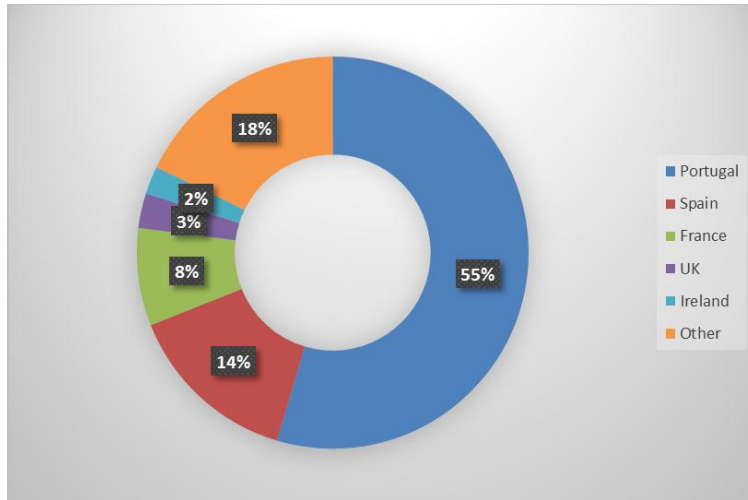
Table 6 – Participants in roundtables at the first regional workshop

Roundtable nr.	Participants
1	<ul style="list-style-type: none"> <li>• Raphaël Rinaldi (Enel GI&amp;N, WG1 Representative)</li> <li>• Rui ALVES (NESTER)</li> <li>• Jorge SIMOES (EDP)</li> <li>• Benoit ROBYNS (HEI) and Guillaume GAZAIGNES (SNCF)</li> <li>• Norela Constantinescu (ENTSO-E representative)</li> <li>• Ricardo PRATA (EDSO representative)</li> <li>• Rainer BACHER (ETIP SNET Support Team, BACHER)</li> </ul>
2	<ul style="list-style-type: none"> <li>• Jean-Baptiste BART, (EDF R&amp;D, WG2 representative)</li> <li>• Eric CAHUET (Engie Ineo)</li> <li>• Joan MANRESA BALLESTER (REE)</li> <li>• Ricardo Jorge SANTOS (EDP)</li> <li>• Piedad MARTINEZ (Gas Natural Fenosa)</li> <li>• Patrick CLERENS (EASE representative)</li> <li>• Eric PEIRANO (ETIP SNET Support Team, TECHNOFI)</li> </ul>
3	<ul style="list-style-type: none"> <li>• Jesus GARCIA MARTIN (Iberdrola Renovables, WG3 Representative)</li> <li>• Susana APIÑANIZ (Tecnalia)</li> <li>• Ian CONNAUGHTON (Eirgrid)</li> <li>• Susana APIÑANIZ (Tecnalia)</li> <li>• Eric PEIRANO (ETIP SNET Support Team, TECHNOFI)</li> </ul>
4	<ul style="list-style-type: none"> <li>• Bruno SOARES (R&amp;D NESTER, WG4 representative)</li> <li>• David PHELAN (Electric Ireland)</li> <li>• Pedro TAVARES FERREIRA (EDP)</li> <li>• Sylvie PERRIN (EDF)</li> <li>• Pedro Geirinhas Rocha (EDP)</li> <li>• Rainer BACHER (ETIP SNET Support Team, BACHER)</li> </ul>

### 3.1.3 LIST OF ATTENDEES

In total, the workshop was attended by 150 participants. The distribution of participants by country is provided in the figure below:

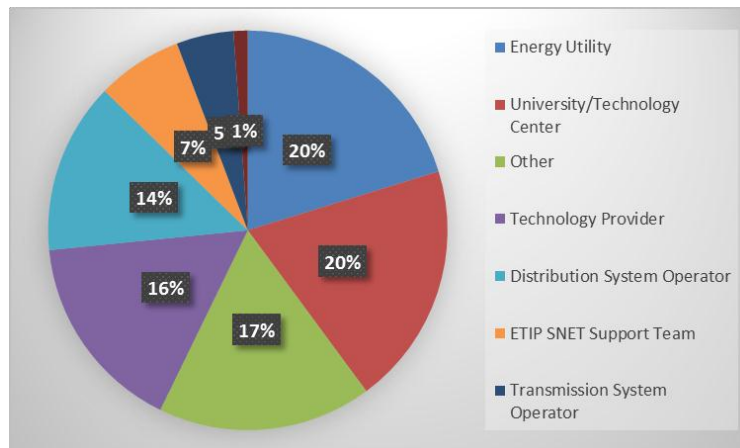
Figure 3– Distribution of participants by country



It can be noticed that the three main countries represented from the western region are Portugal, Spain and France. Also, 18% of the participants are coming from other countries located outside of the western region.

Moreover, the following figure gives an indication of the distribution of participants by their type of organization:

Figure 4– Distribution of participants by organization



It can be pointed out that 40% of the audience comes from Energy Utilities and University/Technology Centres. Within the category “other”, around 50% of the attendees comes from Research and Development and Innovation organizations.

### 3.2 MAIN QUESTIONS FROM THE PROJECTS' Q&A SESSIONS

Each project presentation has been followed by a session of questions and discussions. The main questions and comments are collected in the table below:

Table 7 – Main questions and comments by project

Project	Country	Main Questions & comments
<b>Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")</b>		
The REN and Nester Projects	Portugal	<p>During this session it has been highlighted that cooperation between regulated players, TSOs and DSOs for instance, would need to be enhanced in order to bring more benefits to the system such as energy efficiency and reliability, since most generation is going to be connected at MV/LV level.</p> <p>In addition, discussions about how forecasting tools would represent today a very important enabler of flexibility for network operators have taken place. The future role of storage in this context has been mentioned.</p> <ul style="list-style-type: none"> <li>- Moreover, it has been commented that power electronics (not only from wind energy) used already nowadays are capable to solve low inertia issues (i.e. examples from US were cited).</li> </ul>
The SINAPSE Project	Portugal	<p>The outages situation in Portugal were discussed: how often? for how long? and the costs related to these events were explained. It has been specified that micro-outages are taken place every day and they are practically unnoticed.</p> <p>Furthermore, it has been pointed out that the collaboration between different nature of stakeholders (consumers included) is needed in order to share high-quality data in order to generate value-added services for the energy and telecommunications sectors for instance (setting win-win deals), with the end purpose to better monitor the state of the network.</p>
The CONIFER / MASSENA Projects	France	<p>For the management of the reverse flows coming from the braking energy of high-speed trains, the difference of using energy storage assets (batteries, EVs, etc.) vs invertors for the reversible substations presented in the CONIFER and MASSENA projects respectively have been discussed. Cost issues and value proposition of storage solutions for these cases were discussed during this session.</p> <p>The speakers have explained that electricity-based trains must be considered as a significant part of the load of the power system (i.e. French TGVs at high speed need 10-12 MW and when they break the braking power goes down to 4MW).</p>

<b>Session 2: Projects addressing topics within the scope of ETIP SNET’s Working Group 2 (WG2): “Storage technologies and sector interfaces”</b>		
The SMART ZAE Project	France	Discussions about the software used in the innovative Energy Management System of the project have taken place during this presentation. It was highlighted that the EMS has been developed specifically by and for the project itself.
The CECOVEL Project	Spain	The involvement of DSOs and their possible role within the CECOVEL project were discussed. It has been pointed out that DSOs would need to monitor closely EV’s charging loads at station level (i.e. be provided with sufficient data, data management, etc.). Moreover, the “Gestores de carga” and their role in Spain were explained. It was stated that these players should be more involved in V2G R&I projects in order to deliver more accurate recommendations towards the Spanish regulatory framework related to EVs.
The Storage Project	Portugal	Questions regarding the economic valuation of the project were raised. It was pointed out, that the business cases taken into account in the project (tackling issues related to system’s flexibility) have been closely related to real-life situations in order to assess the possible economic benefits that these solutions may provide.
The Renovagas Project	Spain	Issues about the geographical location of the biogas plants were discussed during the session (i.e. how far the biogas plant should be from the grid and gas pipelines? The efficiency of this type of technology was debated. It has been stated that an efficient pre-treatment in order to optimise as much as possible the general process (i.e. catalyst, electrolyzers, methanation reactor, raw materials, etc.) is necessary to have satisfactory conversion yields in the overall reaction. The importance of using the heat produced during the biomethane production was mentioned (i.e. use of steam turbines).
<b>Session 3: Projects addressing topics within the scope of ETIP SNET’s Working Group 3 (WG3): “Flexible Generation”</b>		
MMC Project	Spain	During this session, the lack of a regulatory framework for HVDC grids was commented and pointed out. It was expressed that this topic would need to be better addressed from the regulations’ point of view.
The DS3 Projects	Ireland	One of the main concerns during this session was related to the size of storage that would be convenient for the DS3 project to achieve its ambitious objectives about fostering RES integration. It was mentioned that the focus of the project was in the overview of the entire Irish energy system and not only on the adaption of some technologies that may allow more RES integration, but however, in order to Deliver a Secure Sustainable System (DS3) with many RES, Eirgrid was aware that the use of technologies such as power electronics, storage, forecasting tools, etc. foreseen in the Irish grid and the coordination between different stakeholders in the scope of the project would take time. Moreover, it has been stressed that for some services and some technologies, the market would need to be more attractive to facilitate their integration into the energy system.



The HVDC LINK Project	Spain	The challenges for HVDC technologies' manufacturing were discussed. The audience agreed that the promotion of more R&I activities (from public and private entities) in this topic is fundamental to achieve better and more efficient technologies at lower prices. The very expensive costs of these technologies would be hindering their development and massive deployment.
<b>Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"</b>		
Power off and Save Project	Ireland	During this session, the importance and the focus of customer's engagement and the relevance of communication campaigns in order to increase and improve customer's behaviour in this kind of projects have been highlighted. It has been stated that informing and training the customer before and during the project duration is as important as the contractual agreements between the involved stakeholders for the success of these projects. Customer participation would be the main driver towards energy savings. Exchanges about controlling smart appliances (IoT) with "set-away" communication have taken place.
The Predis Project	Portugal	The daily load forecast with a time resolution of 15 mins (few margins of forecast errors) which is one of the main results of the project was matter of different discussions. It was commented that EDP Distribuição was able to collect enough information at the PV plant level to foster forecasting tools and their development in order to handle in a more optimal manner the negative residual loads resulting from PV.
The Smart Electric Lyon Project	France	The relevance of providing real-time information in a very accessible manner (i.e. text messages about weather conditions to better manage customer's energy consumption) to the customers participating in these projects was stated. It was also explained that tariff stimulation was a very powerful way of influencing people's behaviour towards better use of electricity. Once again, the importance of communication campaigns, customer's training and technical help to the households at the beginning of the project are key drivers for the success of these demonstrators dealing with active customer's participation.
The Re:DY Project	Portugal	The future possibilities of EDP Distribuição functioning as an aggregator in order to provide different type of services to the system with this project were commented. In addition, the price of this EDP technology and the multiple energy saving benefits (i.e. avoiding/preventing extra power demand fees for the households in Portugal) for the household/users were detailed during this session.

### 3.3 RECOMMENDATIONS FROM THE PROJECTS AND CONCLUSIONS FROM THE ROUNDTABLES

These recommendations and conclusions have been discussed and agreed upon during the Final Wrap-up session of the workshop.

#### 3.3.1 SESSION 1: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 1 "RELIABLE, ECONOMIC AND EFFICIENT SMART GRID SYSTEM"

- Probabilistic approaches embedding different sources of risks can bring a new efficient way to perform security assessments.
- Accurate forecasting tools are today a key flexibility mean for network operators while waiting for storage to be fully integrated in the power system.
- Operating networks with low inertia (rotating machines) is already possible today thanks to power-electronics solutions. RES generators are already able to provide various ancillary services for FCR and aFRR.
- IIoT: many connected objects can bring valuable information streams for service providers and grid operators if they are able to handle in an efficient way the space and time correlations of the output data.
- IIoT: the engagement of all stakeholders of the telecom systems is needed in order to reach a critical mass of data so as to be able to estimate accurately the space and time correlations.
- Stakeholders of the power system could have access to exogenous data through available open source platforms provided that the quality of the data can be assessed.
- Consumers, telecom operators and energy service providers (Win-Win-Win) should join forces to share data so as to help generate value-added services using generated high quality data as input for improved system efficiency (Social welfare).
- Electricity-based transport must be considered as a significant part of the load of the power system.
- The use of reverse flows coming from breaking energy within the railway DC electricity system (high speed trains) can bring flexibility to power system with batteries and/or power electronics.
- The power system should remain the backbone of the energy system: overall energy system optimization must however be accounted for (including connections with telecom networks).

### **3.3.2 SESSION 2: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 2 "STORAGE TECHNOLOGIES AND SECTOR INTERFACES"**

- BESS: need for new duty cycle standards so as to give undisputed performance certifications (link with ongoing IEC activities).
- There is still a need for focused demonstration projects (with a set of specific applications) so as to understand how the BESS can be used in the power system.
- Multiservice business models for storage integration might be a solution provided that the system services brought by storage are fairly valued (regulations and market mechanisms).
- There is a wide portfolio of storage technologies which fulfil different functionalities. Hybrid systems (e.g. flywheel-BESS-supercap) could help to cover a wide range of functionalities.
- Further LCA studies are needed to fully appraise the environmental impact of BESS.
- Storage is one possible flexibility mean which must be compared (services and associated costs) with other flexibility means (generation, demand, grid).
- Power-to-gas: there is a need for an adapted regulatory framework to unlock the potential of these solutions and reach affordable costs.

### **3.3.3 SESSION 3: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 3 "FLEXIBLE GENERATION"**

- Flexible generation can be achieved with all different generation technologies.
- The combination of enhanced capabilities of existing power plants and different technologies providing a range of new ancillary services is enough to operate the power system at very high shares of renewables, within the physical limits and at affordable costs.
- These (new) ancillary services, at different time scales, can be provided by market players through transparent procurement and adapted qualification trial processes of the equipment
- Synergies between manufacturers and research centres have to be favoured in order to foster partnership delivering reliable and efficient HVDC converter solutions at affordable costs.

### **3.3.4 SESSION 4: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 4 "DIGITISATION OF THE ELECTRICITY SYSTEM AND CUSTOMER PARTICIPATION"**

- Short-term operational needs can be supported by consumers equipped with adequate digital technologies.

- Small-scale hot water tanks are an efficient solution to couple electricity and heat to bring flexibility in the energy system.
- For system operators, big data issues can be handled with available on-the-shelf hardware and open source software.
- Solving big data problems brings cross-sectoral cooperation (system operators, service providers, research centres, etc.) which foster knowledge exchange as well as scientific and technological progress.
- Demand response for households: tariffs associated to penalties are more efficient than reward. However, the optimum is automatization of the management. Customization (parametrization) is needed for the adoption of the technical solution(s) by the consumer.
- Utilities of the future might be a new type of companies that have the knowledge on how to address the end users at very large scales.
- Utilities must develop new tools for customer adoption and understanding when promoting their services. Interoperability remains a key issue.



# ETIP SNET

EUROPEAN  
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INNOVATION  
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SMART  
NETWORKS FOR  
ENERGY  
TRANSITION



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