ETIP SNET

EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM

SMART NETWORKS FOR ENERGY TRANSITION

D3.3 Minutes of the regional workshops 2018

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Confidential (Intensys4EU consortium and Commission services)

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Delivery date: September 2018

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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 2018 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	Italy, Slovenia, Malta, Hungary, Romania, Bulgaria, Croatia, Greece and Cyprus	Zagreb (Croatia)	19-20 September 2018
2	Denmark, Sweden, Norway, Finland, Latvia, Lithuania and Estonia	Helsinki (Finland)	3-4 October 2018
3	Belgium, Netherlands, Luxembourg, Poland, Austria,	Brussels (Belgium)	11-12 October 2018

	Germany, Switzerland, Czech Republic and Slovakia		
4	Spain, France, Portugal, Ireland and the UK	Madrid (Spain)	22-23 November 2018

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	**ETIP SNET Chair/co-chair**	Introduction to R&I activities in the scope of the ETIP SNET; presentation of the ETIP SNET Vision 2050, purpose of the workshop and agenda
Project session 1 (group of projects addressing topics within the scope of ETIP SNET WG1)		
15 min	**ETIP WG1 representative**	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). Topics to be discussed during the roundtables.
30 min per project	Projects' representatives	Presentation of the findings of the project. Focus on: • The project overarching objectives, the consortium; • Project Key exploitable results: Added value, quantifiable benefits (improvement of the management of the grid, decrease of CO2 emissions, etc…) and final beneficiary; • The main lessons learned and barriers to innovation / exploitation of the results; • Needs for future R&I activities coming out of the project (if any !); • Deployment prospects of the most promising solutions. • Identify needs for further testing (platforms, demos, etc…) and an emphasis on interoperability is welcome • Information about the use/need of an inter-regional cooperation. Each presentation is followed by Q&A.
30 min	Roundtable (animated by **ETIP SNET support team**)	Presence of all speakers in the session + **ETIP WG1 representative** + **WG5** representative

Project session 2 (group of projects addressing topics within the scope of ETIP SNET WG2)		
Similar structure than first session		
Project session 3 (group of projects addressing topics within the scope of ETIP SNET WG3)		
Similar structure than first session		
Project session 4 (group of projects addressing topics within the scope of ETIP SNET WG4)		
Similar structure than first session		
Concluding session		
45 min	**WG5 representative**	Consolidation of recommendations in terms of "Innovation implementation in the business environment"
45 min	**ETIP SNET support team**	Wrap-up of the recommendations from the projects presented and of the conclusions from the roundtables
10 min	**ETIP SNET support team / Host**	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;
- Recommendations for innovation implementation in the business environment;
- Summary of the main recommendations from the projects and conclusions from the roundtables.

2. REGIONAL WORKSHOP 1 (BULGARIA, CROATIA, CYPRUS, GREECE, HUNGARY, ITALY, MALTA, ROMANIA AND SLOVENIA)

The first workshop was held in Zagreb (Croatia) on the 19-20 September 2018. 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

Thirteen 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
Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")				
The NEDO Project	Slovenia	The Slovenian electric Transmission system operator ELES and the Japanese research agency NEDO (through company Hitachi) are financing an overall smartgrids project in Slovenia covering a wide scope of smart grids and smart communities' topics. Part of the project dealing with demand response is already running 9 months of demonstration during which a Demand Response Control System was designed and 830 household and small commercial consumers were included to participate in active demand response activities aiming at reducing energy (power) consumption during peak consumption periods. One hundred (100) households are equipped with direct load control units and HEMS, which perform demand reduction automatically, while the rest receive SMS and email notifications. So far, the results are very promising providing approximately 30% peak power reduction at participating users.	**Gregor OMAHEN**	
The LivinGrid Project	Italy	The aim of the project is to develop new models for the enhancement of the system observability, as well as for the optimal management, in emergency conditions, of the National Transmission Network (NTN), of the disconnection and reconnection of portions within the network, and of the related DER. The project will contribute to overcome the traditional "load shedding" concept, and the distributed generation curtailment. The project benefits from the outputs of other projects: the ISERNIA project and the Puglia Active Network Project.	**Gareth BISSEL**	

Projects for Smartening the Greek Islands	Greece	The projects are realized in the Non-Interconnected Island Systems (NIIS) in Greece. The aim is to increase RES penetration in energy systems of the non-interconnected islands, reducing the operational cost and ensuring an uninterruptible electricity supply to their inhabitants. The projects deal with the development of advanced Energy Management Systems having as main goal the establishment of the needed infrastructure for 32 ES of NII, covering the emerging needs of all participants in the NII's market. The also deal with generation planning tools able to maximise RES installations. An ambitious project is the preparation of 3 pilot Smart Islands projects that will achieve over 60% annual RES penetration by installing Hybrid stations with Smart Management systems. This is a major challenge for Non-Interconnected Islands that need to maintain voltage and frequency stability faced solely by RES.	**Nikos HATZIARGYRIOU**	
Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"				
Husahagi Wind Power Plant and Battery Energy Storage System	Faroe Islands	The energy storage system installed at the Husahagi Wind Power Plant on the Faroe islands is enhancing grid stability by smoothing ramp rates and allowing a very high wind penetration to be present in the electrical grid reaching levels of even higher than 80% for hours at multiple times during the course of the year. Additionally, it reduces the noise in system frequency and can provide ancillary grid services such as frequency control in the future. The power of the Wind Power Plant is 11.7 MW with 2.3MW / 0.7MWh of Li-On Battery Storage installed in a weak grid on the Faroe Islands. The project presents a very high attractive return of investment.	**Georgios ARGYRIS**	
The EVBASS Project	Croatia	The first part of the project is focused on analysis of current scientific and commercial state-of-the-art, as well as legislative so as to develop a viable business model of the BSS business case considering the optimization of the BSS operation (day-ahead scheduling and real-time operation) and control and communication of the BSS. The second part of the project will assess the impacts that BSS and a group of BSSs have on power systems considering points of view of Distribution and Transmission System Operators. The final stage of the project will be the deployment of a testbed that consists of a central computer, a large number of EV battery stacks, and all the accompanying control and communications infrastructure. This will provide the opportunity to test the developed algorithms in a realistic environment and to verify the results.	**Hrvoje PANDZIC**	
The StoRES Project	Cyprus, Greece, Slovenia, Italy	StoRES foresees the development of an optimal policy for the effective integration of photovoltaics (PV) and energy storage systems (ESS) via testing smart solutions in 5 MED islands and rural areas. The challenge is to achieve high PV penetration in their energy mix through solving all market/technical/grid/tariff issues without compromising grid stability or security of supply.	**Venizelos EFTHYMIOU**	

The SUCCESS Project	Croatia	The project aims at answering the following questions: *Who and why will install and own storage? What size and where? What services will these units provide?* The project focuses on the aspects of storage role in distribution networks, considering market and regulatory environment of EU, with special focus on Croatia so as to enable larger RES integration.	**Tomislav CAPUDER**	
Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible generation				
the uGRIP Project	Croatia	This project aims to develop a full-scale microgrid that consists of distributed generators, both renewable and controllable, storage units and flexible loads. A real-life microgrid may perform arbitrage, provide flexibility thus increasing the utilization of RES, take part in corrective actions, provide voltage support, and defer investments in power lines and (distributed) generation. A structure of the local, distribution-level market is defined and demonstrated within the project. The complex interactions between the microgrid, distribution network, transmission network, wholesale electricity market and local distribution level market has been investigated and a viable operation mechanism is proposed.	**Hrvoje PANDZIC**	
the Energia 2020 Project	Italy	The "Smart Polygeneration Microgrid" (SPM) is a LV demonstrator infrastructure hosted at Savona Campus facilities, within the project 'Energia 2020' lead by the University of Genova. It consists of renewable and innovative generation/cogeneration units (micro turbine fed with natural gas, photovoltaic plants, energy storage, EV charging stations), a dedicated electric network, integrated with the existing grid of the University Campus and an Energy Management System to optimally manage the sources. The entire system is supervised by a control room to which signals are sent from sensors, actuators and, in general, from all the smart distributed systems in the field.	**Mansueto ROSSI**	
the SMARTGEO Project	Italy	The project aims to design, build and integrate an innovative concept of advanced remote diagnostic and prognostic system on the geothermal power plant «Rancia 2» (Italy- Tuscany), and its related equipment's and infrastructures (wells, steam gathering network, reinjection pumps and pipelines, steam cleaning systems, Amis).	**Matteo GALGANI**	
Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"				
The SUCCESS Project	Romania	The SUCCESS project will develop an overarching approach to threat and countermeasure analysis with special focus on the vulnerabilities introduced by Smart Meters in the energy domain. The project aims at designing, developing and validating on small scale field trials a novel holistic adaptable security framework. This would be able to significantly reduce the risks of cyber threats and attacks when next generation, real-time, scalable, unbundled smart meters	**Mihai SANDULEAC**	

		are deployed in smart electricity grids, enabling innovative applications and value-added services within the emerging smart decentralised energy system paradigm. SUCCESS will achieve this objective by encapsulating the key challenges of Security, Resilience, Survivability and Privacy into 3 use cases which will focus the research, implementation and evaluation concepts of the project.		
The “Smart metering LTD” Project	Hungary	The main objective of the Pilot Project is to evaluate the possibilities of establishing a nation-wide smart grid. The survey should be able to provide an opportunity to analyse the economic aspects of extending the smart grid nationwide in the future and to evaluate the operational experiences in relation to certain elements of the smart grid. The goal of the Smart Grid Pilot Project is to develop and test a metering infrastructure, mainly for electricity, natural gas and water, that may contribute to the modernization of the energy system as regards sustainability, competitiveness and security of supply, to increasing energy efficiency and consumer savings, as well as to the management of system balancing problems.	**Gusztav VARGA**	
The STEELFLEX Platform Project	Slovenia	"The platform for flexible energy management in steel (STEELFLEX)" refers to the development of the advanced platform for flexible energy consumption management. Two pilot demonstrations will take place, a flexible energy consumption master platform and the Steelflex application that targets the steel industry, offering steel companies to optimize their energy flexibility potential to reduce their energy costs, provide ancillary services to TSO/DSOs and improve their forecasting activities to reduce balancing costs.	**Tomaz FATUR**	

During this workshop, there were no presentations of projects from Malta.

2.1.2 ROUNDTABLES

Four roundtables were held during the workshop, moderated by Coralie BADAJOZ and Daniel HERNANDEZ. The four were devoted to questions and different exchanges between the speakers of the projects presented, the representatives from EDSO for Smart Grids and EASE and the respective representatives of the different ETIP SNET Working Groups. The table below shows the participants in each roundtable.

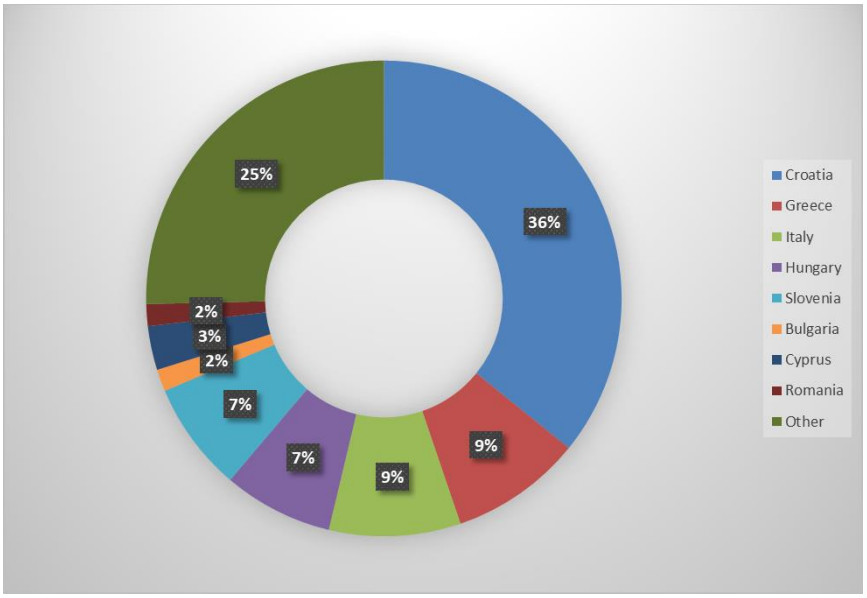
Table 3 – Participants in roundtables at the first regional workshop

Roundtable nr.	Participants
1	• Gareth BISSEL (Enel, WG1 Representative) • Gregor OMAHEN (ELES) • Nikos HATZIARGYRIOU (NTUA) • Venizelos EFTHYMIOU (FOSS) • Coralie BADAJOZ (ETIP SNET Support Team, DOWEL)
2	• Claire LAJOIE-MAZENC (RTE, WG2 representative) • Hrvoje PANDZIC (FER, University of Zagreb) • Venizelos EFTHYMIOU (FOSS Research Centre) • Tomislav CAPUDER (FER, University of Zagreb) • Daniel HERNANDEZ (ETIP SNET Support Team, DOWEL)
3	• Michael LADWIG (General Electric, WG3 Representative) • Hrvoje PANDZIC (FER, University of Zagreb) • Mansueto ROSSI (University of Genova) • Matteo GALGANI (EGP) • Coralie BADAJOZ (ETIP SNET Support Team, DOWEL)
4	• Elena BOSKOV KOVACS (Blueprint Energy Solutions, WG4 Representative) • Mihai SANDULEAC (CRE) • Gusztav VARGA (KOM Central Smart Metering Plc.) • Tomaz FATUR (Solvera LYNX) • Daniel HERNANDEZ (ETIP SNET Support Team, DOWEL)

2.1.3 LIST OF ATTENDEES

Around 70 participants were registered for the workshop. The distribution of participants by country is provided in the figure below:

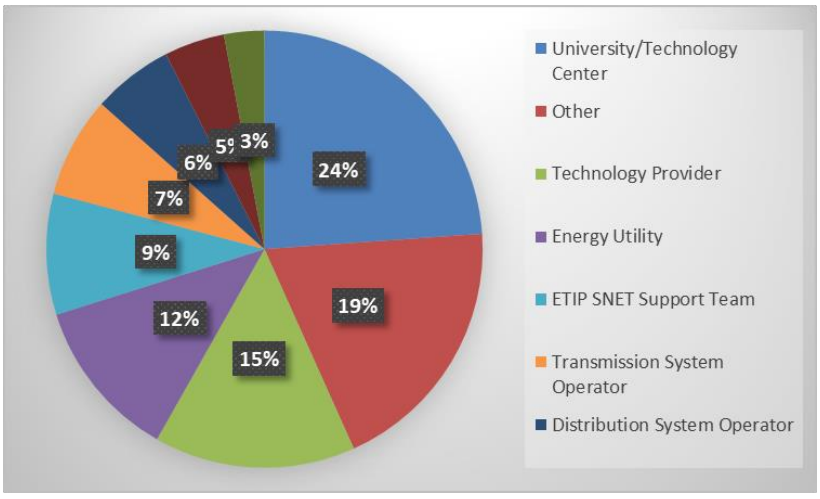
Figure 1 – Distribution of participants by country



It can be noticed that the three main countries represented from the eastern region are Croatia, Greece and Italy. Also, 25% of the participants are coming from other countries located outside of the eastern region: the UK, France and Germany are the most represented.

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

Figure 2 – Distribution of participants by organization



It can be pointed out that 24% of the audience comes from University/Technology Centres 19% from Other category (automobile, media, funding agency, research institute, NPO, etc.) and 15% 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 (10 minutes for each session). The main questions and comments are collected in the table below:

Table 4 – Main questions and comments by project

Project	Country	Main Questions & comments
Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")		
The NEDO Project	Slovenia	The main issues raised by the project concerned the mechanism used to involve potential participants in DSM projects observing that the present methods (e.g. mechanism of compensation for participation) are not very effective. The economic gain for consumers (20€/yr) is perceived as not "appealing" and it does not motivate participation on a large scale. Some questions were asked in order to investigate different mechanisms to motivate people (fee for non-participation? a more severe regulation? how to recruit voluntaries? by mail? by presentation in local communities?). In order to increase participation, solutions should be simple and cost effective. Home automation is good solution for quick response needs but questionably cost effective. A second important issue concerned the rural areas, difficult to reach, with problems of reliability of supply and where ICT is an issue. One of the solutions pointed out was to develop and apply innovative market approaches for flexibility services, such as for example a nodal flexibility market.
The LivinGrid Project	Italy	Main questions were focusing on the innovation level of the project. The project uses an existing microgrid, and the innovation consists in the high-speed communication (that is a target to be reached by 2050). In this aim, 5G is needed which might be more energy demand than what it would bring. Another point was the involvement of the prosumer in the project (bulk production VS prosumer generation). It was stressed that, in this project the prosumer is simply the interface.
Projects for Smartening the Greek Islands	Greece	The main issue was about the percentage (or the threshold) of RES that can contribute to the energy mix. The importance to have 50% of thermal generation in the system was reminded to keep the relevant frequency. Again, the participation of local community in the projects was discussed. Local energy communities (LEC) are key in the clean energy package: the intention to put the local into the equation and to develop incentives was raised.
Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"		
Husahagi Wind Power Plant and Battery Energy Storage System	Faroe Islands	The project generated an important reaction of the public about the 'very fast' Return of Investment reached of 4.5 years. It was mentioned that this project would have a very good replicability in MED islands; however, due to the specific network topology of the Faroe Islands, the remuneration schemes and cost-savings generated with the project, it was economic viable and profitable with the BESS used. It was said, that the reduction of curtailment will increase with more experience and the penetration of wind energy in the island will be higher than the 80 % (load share) reached nowadays. The speaker highlighted that the close cooperation of all the stakeholders involved in the project has been a key factor to succeed. The full integration of the BESS is a very big challenge and the coordination and cooperation between batterie manufacturers, power electronics manufacturers and integrators, is crucial for the well-development of the project and a viable business case.

The EVBASS Project	Croatia	The scaling up of this project has been evoked. Some other cases about car batteries' swapping stations businesses have been discussed (i.e. Israel – Better Place). The lack of standards has been commented. This is a major issue impacting the technical and business viability of this type of projects. Possible users and customers have been discussed: i.e. transportation companies' fleet. Issues related to the life cycle of the battery when providing different type of services has been commented. Also, the impact and issues of using 2nd life batteries. EU Projects dealing with these issues have been mentioned (inteGRIDy, ELSA…).
The StoRES Project	Cyprus, Greece, Slovenia, Italy	The following questions were discussed in the context of this presentation: centralise vs decentralise storage? where is the right place to use the BESS (HV/MV/LV/household)? and who should own the assets? in order to maximise the impact and the technical and economic benefits of the batteries in the energy network. It has been said that it will depend on the local context and the specific needs of the energy system where the batteries are been deployed. Emphasis was given to the fact that ancillary services delivered by batteries are best suited to Operators for developing and operating. This will also determine the properties of the battery (cycling, manufacturing, composition materials). The need of innovative products and multiplicity of use in the different markets would help the BESS deployment and the business cases to be adapted. The differences between regulatory practices related to BESS in the Southern Region of Europe were evoked (Greek Islands, Cyprus, Croatia, Slovenia). Finally, it has been recommended that future policies should identify the right combined tariff system so as to favour the deployment of storage at EU level.
The SUCCESS Project	Croatia	It has been said that regulatory framework for aggregators is still missing. The lack of aggregators in EU is difficult to validate results of modelling (and business cases) for the Croatian case. The lack of reliable and accurate data related to EVs has been commented: data is needed to facilitate the planning and calculations for reinforcement of the grid, for developing charging stations, etc. When developing the business models for EVs, how to evaluate the cost for the owner? how to consider the degradation of the battery and the issues caused to the owner of the vehicle? It has been asked if the DSOs would need additional flexibility or if the grid is strong enough to be reliable.
Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible Generation"		
the uGRIP Project	Croatia	The discussions focused on the following topic: - How the aggregator can provide cheaper prices to the consumer: the need to pay more attention to the customers and learn their habits was stressed. - Moreover, additional information has been requested related to the final beneficiary of the project. It was indicated that the 2 main targets are the policy makers and the operators of the electricity system.
the Energia 2020 Project	Italy	The main topics discussed focused on the technical aspects of the project: why did the project use microturbines? How to co-optimize the thermal and electrical supply? It was indicated that the microturbines are more flexible and that an optimization algorithm has been used for the co-optimization of thermal and electrical supply. Indeed, the coupling of micro-turbines intends to satisfy the electrical and thermal demand. It was also stressed that renewable fuels shall be considered for the future such as liquid fuels. Last but not least, since the project was being developed at the campus scale, the question of the scalability of the project has been raised: the projects' outputs might be used for refurbishment areas in Savona.
the SMARTGEO Project	Italy	The collaboration between industries and Universities to foster synergies was stressed during the discussion. Moreover, the replicability of the outputs of the project within other industries' sectors was considered: it was reminded that the results could be used in industries that can adopt the platform developed within the project.

Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"		
The SUCCESS Project	Romania	The need for standards and communication interfaces for the integration of smart meters has been stated. The industrialisation of 'enhanced' smart meters with a multiservice approach is a very difficult step towards deployment. Difficulty to reach the market. Also, who is going to pay for this technology? It has been proposed that a joint multi-actor investment for stacked services might be a solution for the deployment of this technology. A multi revenue stream business model is needed to have a viable business case. The issues related to data privacy, cybersecurity and the GDPR have been stated as essential when dealing with this type of technologies.
The "Smart metering LTD" Project	Hungary	The issues related to the deployment of smart meters in Hungary have been exposed and commented with the audience. When deploying smart meters, it is very hard to convince customers in countries where there are only a couple of euros/month earned. Impact in the energy bills matters. It has been commented that in some EU countries there is a need to build relevant infrastructure before thinking about the deployment of smart devices (smart meters, etc.) in the energy network. Discussions have taken place about the costs of this modernisation and who should be paying for this. The role of attractive applications (gamification) is very important to foster the social acceptance regarding smart meters and appliances.
The STEELFLEX Platform Project	Slovenia	It has been said that 'Interoperability' towards the deployment of flexibility platforms managed by aggregator(s) is a key success factor and a major challenge: for instance, between the steel industry and energy suppliers (STEELFLEX project). Issues related to the quality of the data and ownership of the data have been stated. The need for new markets and products for flexibility has been discussed. Technical questions have been made from the public regarding the voltage level of the steel factory involved in the project (TSO network) and about its power needs and issues (time frame).

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"

- Societal aspects and communication campaigns have to be considered in order to foster the participation of stakeholders in evolving retail energy markets.
- Additional European standards are still needed to facilitate communication between stakeholders (regulated operators for instance) to avoid interoperability issues.
- Subsidies schemes are needed to foster and support the advent of local energy communities (with all its possible roles), in line with the Clean energy Package negotiations.
- A neutral body is needed to implement and assess the planning process of the integrated energy system, including the interfaces between energy vectors (mainly PtX).
- High level transparency is required to solve the lack of trust among stakeholders to achieve an integrated perspective of the energy system.
- Network regulation shall address both CAPEX and OPEX (TOTEX) when deploying innovative technologies in order to achieve viable business cases.

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

- Investment from the government in charging infrastructure is strongly recommended to increase the amount of EVs in some countries.
- To satisfy the energy system needs (specifications) and have a viable business case, a holistic design of the BESS is required. Full cooperation between batterie manufacturers, power electronics manufacturers and integrators, is needed.
- The regulated operators shall own and operate BESS in order to provide system services and to optimise the use of the grid (cost optimisation strategies).
- New approach to network planning to account for available flexibilities provided by the DRS.
- More accurate and reliable EV data is needed to facilitate the planning and calculations for reinforcement of the grid, for developing charging stations, etc.

- Many regulatory barriers need to be removed (double grid fees, add value of different services) in order to foster the development of BESS for instance.

2.3.3 SESSION 3: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 2 "STORAGE TECHNOLOGIES

- Regulatory barriers have to be removed to allow aggregators to participate in different markets and provide different kind of services to the energy systems (flexibility).

- Aggregators need to reach a critical mass (MW/MWh) to be able to participate to the ancillary services markets.

- Match making between industry and academia needs to be enhanced, for instance, with collaborative Platforms allowing optimum exploitation and dissemination strategies.

- For the development of microgrids, which provide flexibility, interoperability related standards are needed.

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"

- To allocate fund, the authority has to make sure that the societal aspects are considered within the project so as to have larger samples of stakeholders.

- Internet should be assured at European level, as a pre-requesit to support the digital agenda. Emphasis should be made in rural areas.

- In general, NORM as a DSO-only related equipment is a barrier. A joint investment between stakeholders for stacked services might be a solution.

- It is needed to generate the correct value chain of the different energy services without forgetting to create benefit to the end-user.

- Need to build and enhance the relevant infrastructure to continue the development of smart appliances

- « Qualified energy user », and « non-qualified energy user »: attractive communication strategies for each of these groups is needed.

- Right incentives (gamifications, contests) are to be foster to reach the critical mass.

- The need of societal approach hubs is needed to manage data. The identification of a responsible party is needed and data access from the source could be a solution.

3. RECOMMENDATIONS FOR INNOVATION IMPLEMENTATION IN THE BUSINESS ENVIRONMENT

To be completed after the round of the 2018 workshops

4. REGIONAL WORKSHOP 2 (DENMARK, ESTONIA, FINLAND, LATVIA, LITHUANIA, NORWAY AND SWEDEN)

The second workshop was held in Espoo (Finland) the 3-4 October 2018. The agenda of the event is available on the ETIP-SNET website.

4.1 PROJECTS AND PARTICIPANTS IN THE WORKSHOP

4.1.1 R&I PROJECTS PRESENTED

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

Table 5 – Projects presented at the workshop 2

Project	Country	Purpose	Speaker	Link to presentation
Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")				
Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"				
The InteGER Project	Norway	The InteGER project (Integration of energy storage in the distribution grid) has the overall objective of contributing new knowledge and practical guidelines for the integration and use of energy storage (mainly electric batteries) for various applications in the Norwegian distribution grid. The Skagerak Energilab, part of the InteGER project, focuses on coupling PV panels installed on the roof of a football stadium with a li-ion battery (800 kW/1 MWh). Several different uses for the battery will be tested: maximising self-consumption/peak shaving/energy use management for the stadium; provision of grid services to the DSO; and provision of services to nearby customers.	**Henrik LANDSVERK, Skagerak Nett AS**	

Sello smart energy system	Finland	This project focuses on optimising the energy consumption of Sello, one of the biggest shopping malls in Finland. Siemens was engaged to use data from energy efficiency and HVAC systems, air quality and temperature sensors, occupancy rates and weather data, to identify areas for improvement and deliver a comprehensive optimisation for optimising Sello's energy consumption and air quality. Using these different resources and a li-ion battery, Sello can also provide balancing and ancillary services to the Finnish TSO by serving as a virtual power plant.	**Anssi LAAKSONEN, Siemens**	
Suvilahti Battery Energy Storage Syste	Finland	Using a 1.2MW/600kWh lithium titanate battery and conducting different trials over 3 years, the Suvilahti project is researching different aspects related to grid service provision by batteries and possibilities for stacking revenues. In doing so, the project also sought to answer key questions related to use cases, profitability of battery storage systems, market models, and grid codes/regulations.	**Kristiina SIILIN, HELEN**	
CEDREN-HydroBalance project	Norway	The main goal of the HydroBalance Roadmap is to assess the possibilities for developing the flexibility of Norwegian hydropower resources, both by expanding existing hydro capacity and constructing new pumped-storage by 2040. The project analyses the amount of balancing capacity available in Norwegian hydro reservoirs, relevant business models, demand for storage, environmental impacts of hydropower for balancing, and social acceptance and regulatory frameworks.	**Michael BELSNES, SINTEF**	
Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible generation				
Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"				
Arrowhead Project	Sweden	The objective of the Arrowhead project is to address the technical and applicative challenges associated to cooperative automation: 1) Provide a technical framework adapted in terms of functions and performances. 2) Propose solutions for integration with legacy systems. 3) Implement and evaluate the cooperative automation through real experimentations in applicative domains: electro-mobility, smart buildings, infrastructures and smart cities, industrial production, energy production and energy virtual market. 4) Point out the accessible innovations thanks to new services.	**John LINDSTRÖM, Luleå tekniska universitet**	

		5) Lead the way to further standardization work.		
CloudGrid Project	Sweden	In the CloudGrid project, R&D on smart grid solutions will be focusing on three main areas: System stability, Ancillary services & energy management and Converter interoperability. The method used in the CloudGrid project to improve the research is to increase the cooperation between the partners based on an interconnection between smart grid labs. The establishment of this transnational smart grid cloud shall facilitate possibilities to validate research result in different laboratory environment, in this way the project will be able to provide solutions with a broader level of validation and suitable for a wider range of equipment.	**Michael CALDER, ABB**	
The "Platform for Flexibility Services" Project	Estonia	One platform for flexibility services to provide environment to all flexibility market participants, from TSO to aggregators. On this platform it is going to be managed flexibility trading, information flows and flexibility operations.	**Kalle KUKK, Elering**	
The TAKE-5 (5th Evolution Take of Wireless Communication Networks) Project	Finland	The project targets the creation of a multidisciplinary and open research platform for investigation and experimental evaluation of innovative ideas in networking and services of 5G. The platform and 5G functionalities are incrementally built and refined after each implemented extension. TAKE-5 concentrates on research and initial testbed setup and on End-to-End testing including new 5G technologies verification. One of the main application areas is grid communication focusing on latency and reliability aspects. The project belongs to the 5G test network of Finland (5GTNF) framework.	**Seppo HORSMANHEIMO, VTT**	

During this workshop, there were no projects' presentations from Denmark.

4.1.2 ROUNDTABLES

Four roundtables were held during the workshop, moderated by Michele DE NIGRIS, Brittney ELZAREI and Daniel HERNANDEZ MALDONADO. The four roundtables evoked questions and different exchanges between the speakers of the projects presented, the representatives from EASE and the respective representatives of the different ETIP SNET Working Groups. The table below shows the participants in each roundtable.

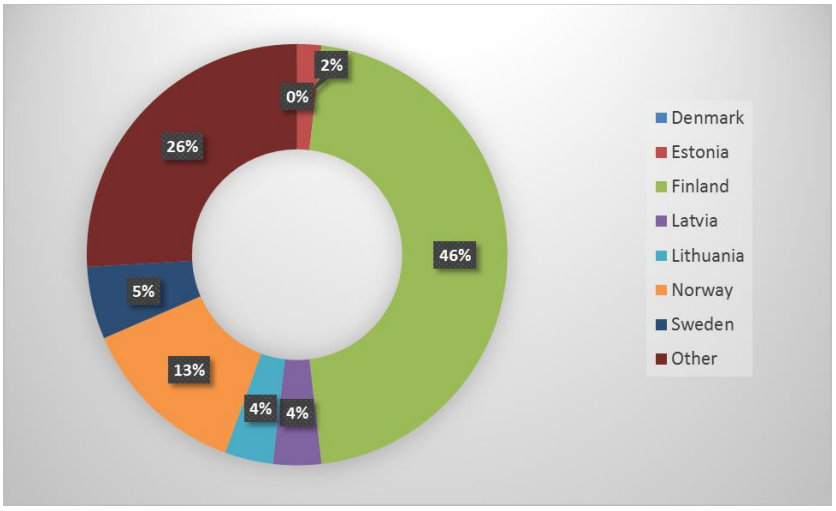
Table 6 – Participants in roundtables at the second regional workshop

Roundtable nr.	Participants
1	• Anna KULMALA (VTT, WG1 Representative) • Kjell TUTVEDT (Hafslund) • Antons KUTJUNS (AST – Latvian TSO) • Neringa RADZIUKYNIENE (Lithuanian Energy Institute) • Michele DE NIGRIS (ETIP SNET Support Team, RSE)
2	• Seppo HANNINEN (VTT, WG2 representative) • Henrik LANDSVERK (Skagerak Nett AS) • Anssi LAAKSONEN (Siemens) • Kristiina SIILIN (Helen) • Michael BELSNES (SINTEF) • Brittney ELZAREI (ETIP SNET Support Team, EASE)
3	• Kaj PORTIN (Wärtsilä, WG3 Representative) • Seppo VALKEALAHTI (Tampere University of Technology) • Stig FRETHEIM (REN) • Christian BREYER (Lappeenranta University of Technology) • Michele DE NIGRIS (ETIP SNET Support Team, RSE)
4	• Maher CHEBBO (GE, WG4 Representative) • John LINDSTRÖM (Luleå tekniska universitet) • Michael CALDER (ABB) • Kalle KUKK (Elering) • Seppo HORSMANHEIMO (VTT) • Daniel HERNANDEZ MALDONADO (ETIP SNET Support Team, DOWEL)

4.1.3 LIST OF ATTENDEES

Around 50 participants were registered for the workshop. The distribution of participants by country is provided in the figure below:

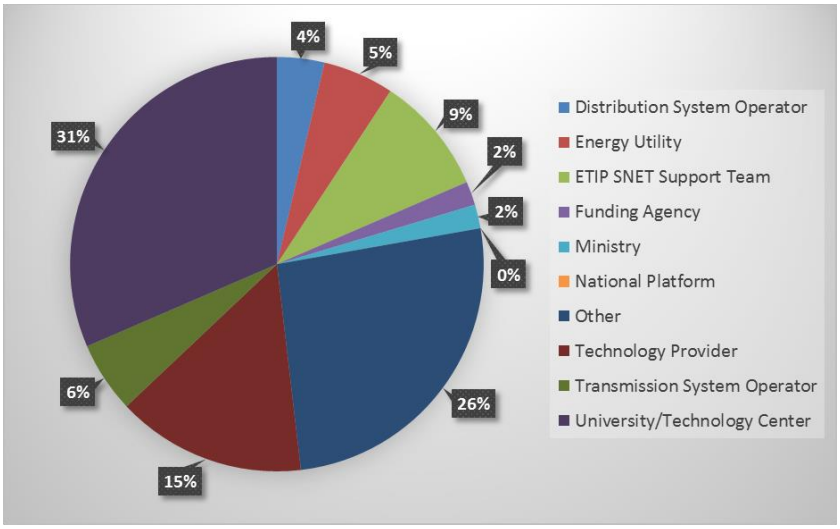
Figure 3 – Distribution of participants by country



The figure shows that the two most represented countries from the Northern region are Finland and Norway. Also, it is to highlight that 26% of the participants are coming from other countries located outside of this region such as: Belgium, France and Italy.

In addition, the following figure provides an overview of the distribution of attendees classified by their type of organization:

Figure 4 – Distribution of participants by organization



The figure shows that 31% of the audience comes from University/Technology Centres, and 15% are technology providers. Among the 26% of the 'Other' category we can find: independent research centres, associations and consultants.

4.2 MAIN QUESTIONS FROM THE PROJECTS' Q&A SESSIONS

Each project presentation has been followed by a session of questions and discussions (10 minutes for each session). The main questions and comments are collected in the table below:

Table 7 – Main questions and comments by project

Project	Country	Main Questions & comments
Session 1: Projects addressing topics within the scope of ETIP SNET's Working Group 1 (WG1): "Reliable, economic and efficient smart grid system")		
Session 2: Projects addressing topics within the scope of ETIP SNET's Working Group 2 (WG2): "Storage technologies and sector interfaces"		
The InteGER Project	Norway	Questions from workshop participants centred mainly on the business model for this project (who pays and who benefits? Is the project expected to generate a return on investment?) and ownership-related aspects (who owns the battery? Which services and uses did the regulator allow the DSO to provide with the battery?). The speaker explained that the exact revenue streams and therefore ROI of the project are not yet clear, but different uses will be trialled. The battery is owned by the utility for the moment. Participants also questioned the replicability of the project in Norway. The speaker noted that many football stadiums in Norway, but also other countries, have expressed interest in possibly replicating the project. A final point of discussion was societal acceptance and the fact that this project was able to reach a population (football fans) that does not generally about renewables and storage. The speaker underlined that the most urgent policy recommendation from the project would be to clarify the ownership of storage b regulated entities.
Sello smart energy system	Finland	Again, most of the questions related to the Sello project centred on the business case and the use of the battery. The speaker explained that the project would be profitable without public support, as the building can provide significant demand response and flexibility services to the grid, which generate significant revenue for the building owner. Also, some of the value of the battery is provided by peak shaving. One of the most urgent policy recommendations from this project would be to address safety issues and standards for installation of batteries in commercial buildings.
Suvilahti Battery Energy Storage Syste	Finland	The participants asked about how this project led to the removal of double taxation for storage devices in Finland. The speaker explained that the regulator was receptive to the storage industry's arguments but noted that only grid-scale storage is now excluded from double taxation; behind-the-meter storage still faces this problem. Asked about which business model is most profitable, the speaker noted the need to stack different services, but explained that FCR-N is currently the most valuable market. A market for services to the DSO could significantly improve the business case for storage in the future. The speaker emphasised the need to clarify ownership of storage, as well as remove double taxation of storage devices. As in the other presentations, it

		is essential to have a clearer view of the different revenue streams for storage, access to different services tendered on the market, and for long-term views on possible revenue streams.
CEDREN-HydroBalance project	Norway	One participant asked whether Norway faces an issue regarding competition for the use of water. The speaker explained that in Norway, there are significant water resources and little tension related to competition. There were also discussions about social acceptance of hydropower and how this is changing over time. The speaker noted that his most urgent policy recommendation would be to ensure that EU policy is technology neutral and accepting all different sources of flexibility.
Session 3: Projects addressing topics within the scope of ETIP SNET's Working Group 3 (WG3): "Flexible Generation"		
		-
Session 4: Projects addressing topics within the scope of ETIP SNET's Working Group 4 (WG4): "Digitisation of the electricity system and Customer participation"		
Arrowhead Project	Sweden	The benefits of Arrowhead systems that could be useful for the energy applications have been explained: local clouds concept (flexible and modifiable) and predictive maintenance for instance for grid for district heating applications. The lack of education and training of the staff working with new digital/software technologies such as the one developed by Arrowhead and the consequences when implemented have been discussed. Different types of contrasts between classical legacy systems vs Internet of things (IoT) and System of systems (SoS) when implemented have been commented: financial, time saving, competences between ICT and OT... Questions from the audience were related to the time consumed to secure the Arrowhead system and its ratio when compared to the productivity time.
CloudGrid Project	Sweden	Questions regarding the pilot site implementing the CloudGrid technology and its scalability and replicability were raised. Technical questions about the convertor interoperability were asked: different interactions DC/AC, DC/DC… It has been pointed out that to foster the development of viable business models for the ancillary services and energy management studied in the project, the cooperation with network operators would be a powerful asset. It is to highlight that the cooperation between laboratories allowed this project to perform tests and analysis that would not be possible stand-alone. This kind of cooperation are to be enhanced in some EU countries.
The "Platform for Flexibility Services" Project	Estonia	It has been discussed the necessity of continue developing interoperable flexibility platforms at EU level such as the one developed by Elering as they could facilitate the coordination between network operators when managing the network. Interesting discussions with the audience have been held about who should own and operate these flexibility platforms and at which level (local, centralised…). The audience has concluded that a 'neutral body' would be needed to play these roles to avoid data compromising and market-driven behaviour from different stakeholders. The lack of flexibility products definitions has been commented. The need of a single EU flexibility market was discussed.

		Questions about the cooperation with other flexibility platforms and their differences were raised to the speaker (NODES-Microsoft, PICASSO project).
The TAKE-5 (5th Evolution Take of Wireless Communication Networks) Project	Finland	The need of reliable communication networks has been commented. Questions regarding the use of communication networks of private companies by regulated players were discussed. Differences between the 4g which is more technology-driven as it focuses on offering mobile services to consumers and 5g which is more service oriented (industrial customers and communications between machines) were commented. The differences between the technology readiness level (TRL) and the System Readiness Level of technologies in the telecom sector when deployed in the EU energy system were discussed. Questions about who is affording the costs for the 5G deployment in the energy system were raised. The stakeholders recruitment phase and how to involve them in the pilot sites was commented by the speaker.

4.3 RECOMMENDATIONS FROM THE PROJECTS AND CONCLUSIONS FROM THE ROUNDTABLES

These recommendations and conclusions of the Northern workshop have been discussed and validated during the final wrap-up session of the event. They are announced hereafter.

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

- Efforts are needed at EU level for the finalization of the set of standards, to ensure actual smart grid (real) interoperability.
- Research and development activities are needed for the setting up of common data and information models with the final goal to ensure the final development of digital twins for the energy system.
- Research activities are needed to assess the system vulnerability characteristics in view of increasing system resilience towards different types of stresses.
- There is a need to consider requirements for the system characteristics to minimize dependability issues from the communication systems.
- The need of considering existing and retrofitted networks (not only new) should not be neglected when developing new functionalities (software and hardware) by technology providers.
- Public acceptance of transmission infrastructures and the related tools for the community involvement still need to be enhanced.
- Cooperation between Academia, public research centres and industry (technology providers and network operators) is a top priority in some EU countries.

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

- There is a need to clarify as soon as possible the ownership of storage by regulated entities.
- Support the development of standards for integration of storage in buildings/commercial and industrial sites.
- Efforts to encourage MS to remove double grid fees/charges related to storage. NSCG would need to be more involved.
- Pursue a technology neutral approach at EU level for energy storage R&D and regulation/policies.

- More research efforts should be allocated to assess storage revenues, stacking of services, BMs, and monetization of storage services.
- Social acceptance and environmental impact should not be neglected in storage projects.
- Innovative communication strategies are needed to reach a bigger audience when projects deployment.

4.3.3 SESSION 3: ADDRESSING TOPICS WITHIN THE SCOPE OF ETIP SNET'S WORKING GROUP 2 "STORAGE TECHNOLOGIES

- Innovative methods to maintain the reliability of the system are to be further developed, with a special reference to power electronics diagnosis (but not limited).
- The response of the system with high shares of RES in the occasion of large failures needs to be further investigated.
- Evaluate the consequences of application of grid codes in terms of responsibility for power quality deviations and the necessity of monitoring power quality at the different level in the network, to asses responsibility.
- Additional research is needed towards flexibility means so as to investigate the impact of the market consequences when curtailing RES production or limiting low consumption in case of network issues.
- Protocols and guidelines are still needed to control and monitor microgrids in terms of responsibilities of the different stakeholders (frequency and voltage control).
- Starting from the ETIP-SNET vision, scenarios should be developed taking into consideration the dynamics of the energy at '*sufficiently short-time steps*' to correctly investigate the effects of flexibility through sector coupling.

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

- Lack of analytical tools to train the algorithms to monitor and detect abnormal grid operation for the benefit of TSOs and DSOs.
- Lack of full understanding, analysis and modelling approaches for hybrid HVAC/HVDC systems, with particular emphasis on the dynamics arising from their interconnection.
- There is a need for a single EU flexibility market, and platforms for data information exchange and for the development of flexibility services market places.
- In general, (not only from the ICT perspective) there is a need to define flexibility products.

- TSO-DSO platforms should be fostered to leverage coordination within the energy system.
- The blockchain is to be assessed for the energy system applications and services: i.e. real time data exchange across many systems.
- A ‘neutral actor’ would be needed to manage and operate flexibility market/platform to ensure independency and transparency.
- The TRL of the communication technologies may not be fully aligned with the system needs as potential functionalities do not match with the present requirements (gap between TRL vs SRL).

5. RECOMMENDATIONS FOR INNOVATION IMPLEMENTATION IN THE BUSINESS ENVIRONMENT

Session hosted by Marina MILOSEVIC (Vattenfall, WG5 Representative).

- **Identify & recruit the right receivers/influencers**
    - Collaborate with influencers effectively, and stay within regulations
    - Cooperate with/involve recievers in early stage of research, maybe even from idea level
- **Base research on business case**
    - The market/industries are more willing to support and implement innovation that solves their specific problems
- **Build team with interdisciplinary, intersectoral competence**
    - Successful results require expert skills in technology, data management, marketing…
- **Be transparent**
    - Supply right information to market/influencers, with clear business case(s). Supplying the right information to the influencers upfront, can prevent a lot of back and forth and other common pitfalls.
- **Work in agile manner** and be prepared to do some compromises in order to go further in your own research.

ETIP SNET

EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM

SMART NETWORKS FOR ENERGY TRANSITION

This publication has been developed in the frame of the INTENSYS4EU project, co-funded under the Horizon 2020 Programme

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