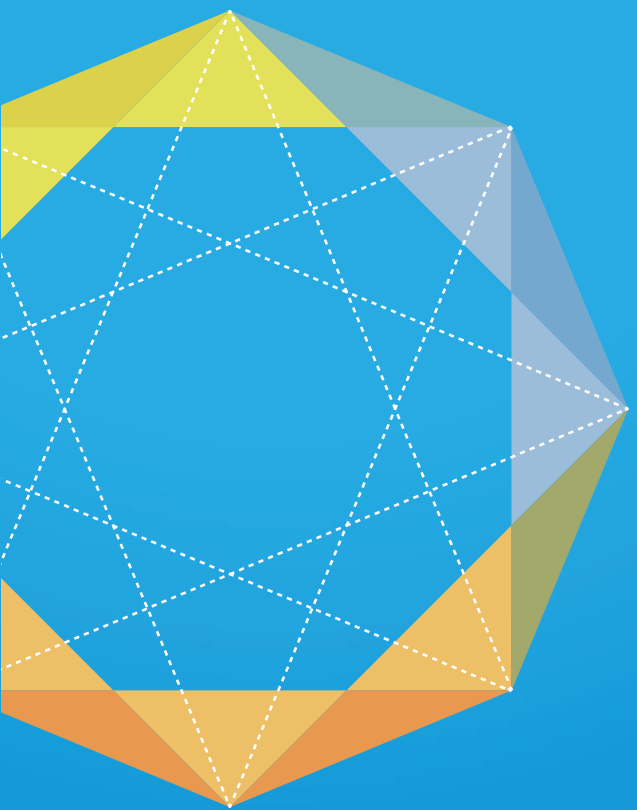
European Commission

14th ETIP SNET Regional Workshop

Proceedings



ETIP SNET

European Technology and Innovation Platform

Smart Networks for Energy Transition

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1. Introduction

As part of its mission of guiding Research and Innovation activities to support Europe's energy transition, the European Technology and Innovation Platform for Smart Networks for Energy Transition (ETIP SNET) will organize 8 Regional Workshops in the course of the next 3 years, covering the whole European Union.

To guarantee to cover all EU countries (including associated ones), these Workshops have been named "Regional" because they gather together Member States in 4 Macro "Regions". The gathering is mainly based on criteria of neighbourhood and common geographic characteristics and priorities.

Please find them below:

- Western Region: (France, Ireland, Portugal, Spain and the United Kingdom)
- Central Region: (Belgium, Netherlands, Luxembourg, Poland, Austria, Germany, Switzerland, Czech Republic, Slovakia)
- South-Eastern Region: (Bulgaria, Croatia, Cyprus, Greece, Hungary, Italy, Malta, Romania and Slovenia)
- Northern Region: (Finland, Denmark, Norway, Latvia, Lithuania, Estonia)

This "Regional" dimension has been discarded for the last 3 workshops due to the pandemic crisis and due to the fact that the workshops have been held online. As of the 14th Regional Workshop, a return to this regional aspect and a restructuring of the sessions, objective and content was made.

In the framework of ETIP SNET – from 2016 till today – a first series of 8 Regional Workshops has already taken place. You can find the minutes and PPTs of all of them HERE.

The 14th workshop took place **on 31st May from 14.00 to 18.00 and 1st June 2022 from 9.30 to 16.00.**

1.1 Objectives of the Regional Workshops

The aim of the regional workshops is to contribute to the next ETIP SNET R&I Implementation Plans, Roadmap update and the Progress Reports. The selected R&I projects present their findings and will help to identify R&I gaps to update the R&I Implementation Plans (2023-2026) and update of the current Roadmap 2020-2030.

The Regional Workshops have four overall objectives:

- Present and create knowledge on project research results, good practices and lessons learnt of R&I projects on energy system integration;
- Monitor and identify gaps in R&I topics and priorities and to have convergence among national, regional and the European levels;
- Ensure consistency between national and European views;
- Collect information from national and regional projects to feed the Progress Reports and Implementation Plans and Road Map.

1.2 Re-structured Organisation of the Regional Workshops

In response to the changing environment surrounding the previously established regional workshops, a re-structuring of the workshops was undertaken. It is understood that this structure was a pilot and that amendments to this structure may still occur but the idea of further involving the respective regional/national R&I programme managers and representatives is the conceptual cornerstone of this new structure.

Regional Workshop Structure

On the first day (31st May), invited representatives exchanged views on R&I topics and priorities in a closed meeting during an afternoon session; the Expert Roundtable (15:00-18:30). On the second day; the Workshop (1st June), they shared their opinions in a session open to the registered participants in a morning session (10:00-13:00). In the afternoon session (14:00-17:40) important EU, national and regional R&I projects was discussed in panel sessions relating to various elements of energy transition.

Day 1: Representative Roundtable

This session aimed to bring together owners and managers of national and regional funding and development programs with the European Commission and ETIP SNET representatives from research and industry. This exchange fostered direct exchanges between the EU and the regional/national representatives for a common understanding of national and EC programs proposed in the ETIP SNET Implementation Plan (IP) and Roadmap (RM). The moderated discussion was based on the High-Level Use Cases (HLUC) and Project Priority Concepts (PPCs) defined within ETIP SNET IP. In this roundtable, many topics of our future energy system in Europe were covered. Representatives of national and regional funding and support programmes met in order that European Commission and representatives of European Associations in (ETIP SNET) learn from each other, streamline their approaches and create synergies. At the end of this session, key conclusions were prepared to be presented during Day 2. Through the minutes and the first session of Day 2, the representatives of funding and development programmes were able to prepare joint approaches, messages and activities to be communicated to and discussed with the wider stakeholders in the European energy system.

Day 2: HLUC Discussion & Projects Focus

The second day was held on 1st of June (10:00-18:00) and consisted of a workshop with 2 sessions open to registered participants. The morning session provided the opportunity in presenting views and priorities to the wider European energy system stakeholders. In the first part of the meeting, the ETIP SNET Rapporteur presented highlights of the Expert Roundtable in Day 1. Following this, a series of panels between the experts was held to discuss approaches towards investigating the identified High Level Use Case (HLUCs). In the afternoon session of Day 2 the broader R&I energy community were invited to participate in subsequent panel and open Q&A sessions. Projects from all levels (European/national/regional) were invited to contribute to this session with their outcomes, challenges and lessons learnt.

The following structure was designed to bring a more coordinated exchange between member state level and EU level state level with respects to the research areas of the ETIP SNET Working Groups and the BRIDGE initiative, as well as with a view to contributing to the ETIP SNET Implementation Plans and Road Map.

1.3 Structure of this Report

For each of the Workshops a Report including all the proceedings and key recommendations will be produced. The proceedings will gather the following information:

- List of projects presented at the workshop, with a short description of each of them;
- Number of people registered to the workshop and their distribution per country and organisation of origin;
- Minutes of each session and main questions raised during the panel sessions, including SLIDO questions and results from each session;
- Recommendations for innovation implementation in the business environment.

2. ETIP SNET 14th Regional Workshop

The 14th ETIP SNET Regional workshop was held online via WEBEX on 31 May from 14.00 to 18.00 CEST and 1 June 2022 from 9.30 to 16.00 CEST.

The workshop was attended by 110 people on the first day and 80 people on the second day, with 6 different panel sessions covering various topics.

Detailed information is included in the next paragraphs.

2.1 Programme of the Workshop

The agenda of the 14th Regional Workshop held on 31st May from 14.00 to 18.00 and 1st June 2022 from 9.30 to 16.00 is the following:

DAY 1 – 31 May Representative Roundtable Closed meeting among MS reps/EC/ETIP SNET GB Members 14:30 – 18:00				
ITEM N°	***TIME***	***TYPE OF ITEM***	***TOPIC***	***SPEAKERS***
1	**14.30**	**Info**	**Welcoming and Tour De Table**	**All**
2	**14.40**	**Info**	**EC Introductory Speech**	**Mark Van Stiphout** – Head of Unit DG ENERG B.5
3	**14.50**	**Info**	**Introduction to ETIP SNET Implementation Plan 2022-2025**	**Nikos Hatziargyriou** - ETIP SNET Rapporteur
4	**15.00**	**Info**	**National/regional representatives on Key Ideas from Funding Programmes**	**National/regional reps**
5	**15.40**	**Disc**	**Panel 1: High Level Use cases (HLUC) 1-3-8 Discussion** **HLUC 1:** Optimal Cross sector Integration and Grid Scale Storage **HLUC 3:** Pan European Wholesale Markets, Regional and Local Markets **HLUC 8:** Transportation Integration & Storage	**Nikos Hatziargyriou** - ETIP SNET Rapporteur **Ludwig Karg** - Moderator **National/regional reps** **ETIP SNET GB Members** **Mark Van Stiphout** – Head of Unit DG ENERG B.5
6	**16.30**	**Disc**	**Panel 2: High Level Use cases (HLUC) 2-4-6 Discussion** **HLUC 2:** Market-driven TSO–DSO– System User interactions **HLUC 4:** Massive Penetration of RES into the transmission and distribution grid **HLUC 6:** Secure operation of widespread use of power electronics at all systems levels	**Nikos Hatziargyriou** - ETIP SNET Rapporteur **Ludwig Karg** - Moderator **National/regional reps** **ETIP SNET GB members** **Mark Van Stiphout** – Head of Unit DG ENERG B.5
7	**17.20**	**COFFEE BREAK**		
8	**17.30**	**Disc**	**Panel 3: High Level Use cases (HLUC) 5-7-9 Discussion** **HLUC 5:** One stop shop and Digital Technologies for market participation of consumers (citizens) at the centre **HLUC 7:** Enhance System Supervision and Control including Cyber Security **HLUC 9:** Flexibility provision by Building, Districts and Industrial Processes	**Nikos Hatziargyriou** - ETIP SNET Rapporteur **Ludwig Karg** - Moderator **National/regional reps** **ETIP SNET GB members** **Mark Van Stiphout** – Head of Unit DG ENERG B.5
9	**18.20**	**Info**	**Concluding Remarks**	**Ludwig Karg** - Moderator
10	**18.30**	**CLOSING**		

DAY 2 – 1 June				
Session A: Finalising Briefings – restricted panel to the participant of the 31st afternoon closed meeting 09:30 – 11:30				
ITEM N°	***TIME***	***TYPE OF ITEM***	***TOPIC***	***SPEAKERS***
1	**9.30**	**Info**	**Welcoming**	**All**
2	**9.40**	**Disc**	**Impressions from ETIP SNET GB on Rep. Roundtable (Day1)**	**ETIP SNET GB Members**
3	**10.00**	**Disc**	**Finalise Representative Roundtable briefings**	**All**
4	**10.40**	**Info**	**Conclusions**	**Nikos Hatziargyriou** - ETIP SNET Rapporteur
5	**11.00**	**CLOSING of restricted panel & COFFEE BREAK**		
Session B: BRIDGE and National Project FOCUS - Public event 11:30 – 16:00				
5	**11.30**	**Intro**	**Welcoming**	**Maria Laura Trifiletti** – ETIP SNET Coordinator
6	**11.35**	**Info**	**Keynote speech EC**	**George Mugurel Paunescu –** Policy Officer DG ENER B.5
7	**11.45**	**Info**	**Introduction to ETIP SNET**	**ETIP SNET Chair**
8	**11.50**	**Info**	**Introduction of BRIDGE**	**Marcos Jareño** - BRIDGE Coordinator
9	**11.55**	**Info**	**Introduction to the High Level Use Cases approach**	**ETIP SNET Core Team rep**
10	**12.05**	**Info**	**Findings of Representative Roundtable**	**Nikos Hatziargyriou** - ETIP SNET Rapporteur
11	**12.30**	**LUNCH BREAK**		
12	**13.30**	**Panel**	**Projects Panel Session 1: Integrated Energy Networks** • Cross Sector Coupling • Transport & Storage • Energy Markets *(based on ETIP SNET IP **HLUC 1,3,8**)*	**ETIP SNET CORE TEAM rep,** SINTEG Project – Germany VZR Project – Austria E-LAND BRIDGE Project
13	**14.20**	**Panel**	**Projects Panel Session 2: Renewable Energy Systems** • Massive RES Penetration • System Operators' Collaboration • Power Electronics Challenges *(based on ETIP SNET IP **HLUC 2,4,6**)*	**ETIP SNET CORE TEAM rep,** SINTEG Project – Germany VZR Project – Austria Coordinet BRIDGE Project
14	**15.10**	**Panel**	**Projects Panel Session 3: Digitalisation** • Empowering Consumers & Smart Communities • System Control • Cybersecurity *(based on ETIP SNET IP **HLUC 5,7,9**)*	**ETIP SNET CORE TEAM rep,** SINTEG Project – Germany VZR Project – Austria Platone BRIDGE Project
15	**15.55**	**Info**	**Conclusions**	**Maria Laura Trifiletti** – ETIP SNET Coordinator
16	**16.00**	**CLOSING**		

2.2 List of Attendees

87 people registered for the workshop. Overall, over the 2 days, the workshop was attended by 80 people online and an additional 30 in person many of whom were Governing Board members.

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

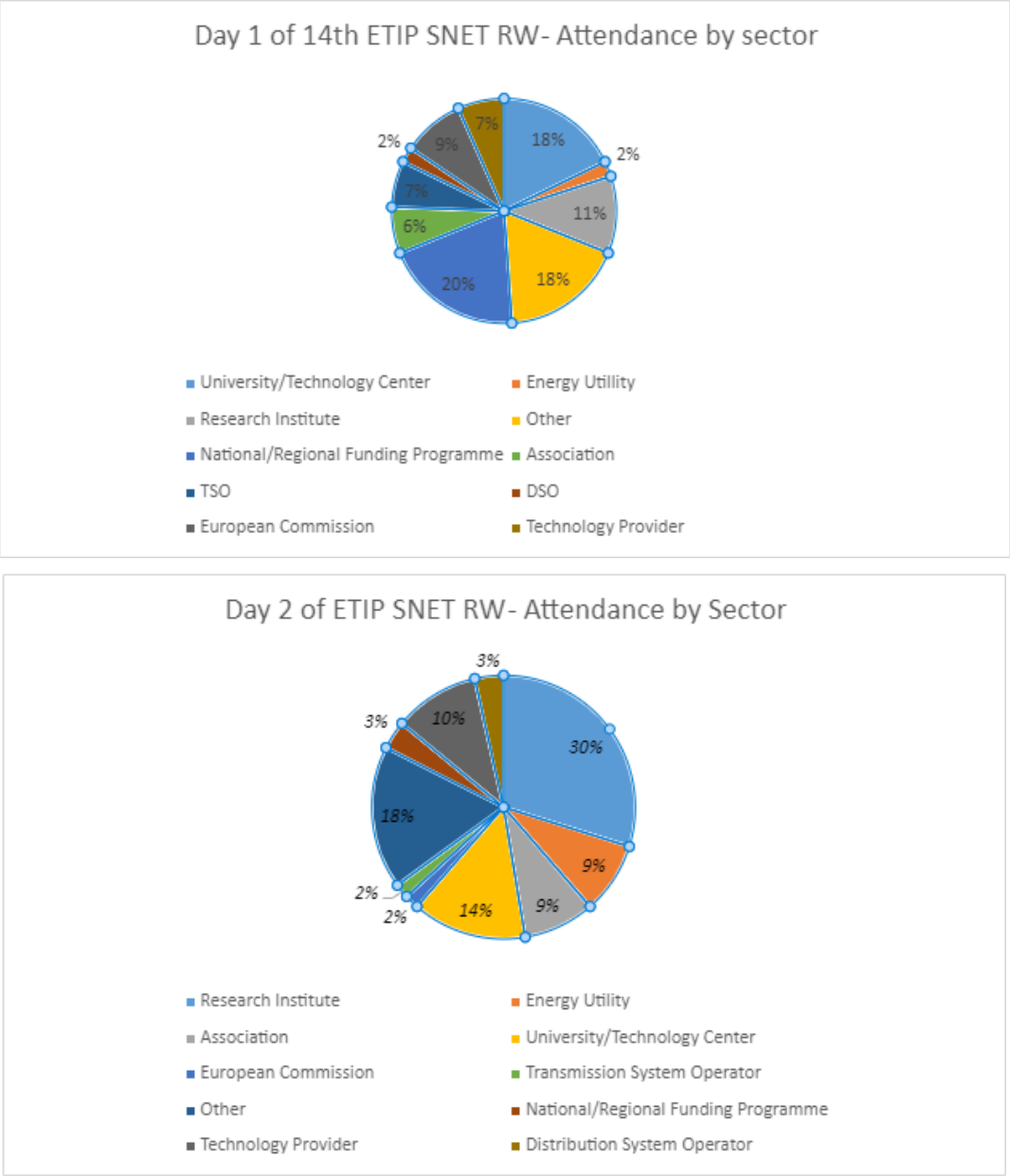


Figure 1: Distribution of participants by sector

Day 1: Expert Roundtable

First Name	Last Name	Company
Antonello	Monti	RWTH Aachen University
Christina	Papadimitriou	TU Eindhoven
Department I 3 – Energy and Environment Technologies		Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology
Efthymiou	Venizelos	University of Cyprus
Elena	Boskov- Kovacs	Blueprint Energy Solutions
European Commission - DG ENER - DIR.B		
Ewa	Mataczynska	Instytutu Polityki Energetycznej
Giuseppe	Palazzo	RSE
Jack	Corscadden	Euroheat & Power
Javier	Olarte	CIC energiGUNE
Jochen	Kreusel	T&D Europe / Hitachi Energy
Jolanta	Drozdz,	Narodowe Centrum Badań i Rozwoju
Jose	Ignacio Blanco	INYCOM
Konstantin	Staschus	Guidehouse
Laura	Marquez	INYCOM
Leon	Leu	NWO (Dutch Research Council)
Leticia	Pascual	INYCOM
Lorant	Dekany	ENTSOE
Ludwig	Karg	B.A.U.M. Consult GmbH
Maher	Chebbo	CTECHNOLOGYS
Marko	Topic	University of Ljubljana
Maria Laura	Trifiletti	ZABALA

Mario	Schweighofer	Cellcube
Martin	Bracken	CLERENS
Michael	Hübner	Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology
Michael	Moser	SFOE - Bundesamt für Energie
Michele	De Nigris	RSE
Miguel	Sanchez Fornie	University Comillas
Natalie	Samovich	Enercoutim
Norela	Constantinescu	ENTSO E
Ondrej	Cerny	E.DSO
Paulius	Butkus	ENTSO-E
Peter	Horvath	EC Europa
Rainer	Bacher	Bacher Energie
Ralf	Eickhoff	Forschungszentrum Jülich
Ralf	Grether	VOITH
Rolf	Riemenschneider	European Commission
Santiago	Gallego	Iberdrola
Sergio	Olivero	Politecnico di Torino
Tanya	Carre	COGEN Europe
Tara	Esterl	AIT
Tomáš	Smejkal	Ministerstvo průmyslu a obchodu
Uroš	Salobir	Strategic Innovation Department (ELES)

Day 2: HLUC Discussion & Projects Focus

First Name	Last Name	Company
Ander	Zubiria	Cidetec
Antonio	Cocco	Acea Energia
António José	Rosa	REN
Aris	Dimeas	National Technical University of Athens
Capucine	Vannoorenberghe	Wind Europe
Carl	Telford	Battery Innovation
Christian	Nabe	Guidehouse
Dagmar	Jarásová	sféra
Edoardo	Corsetti	RSE
Elizabeth	Giraut	ITG Instituto Tecnológico de Galicia
Eranet Jpp Ses		ERA-Net Smart Energy Systems
Esther	Hardi	SDG Energy
European Commission - DG ENER - DIR.B		
Evangelos	Karfopoulos	ICCS
Fabio	Bastianelli	BIP
Fiona	Williams	Ericsson
Francesco Giuseppe	Fornari	Acea Energi
Gianluca	Nori	Acea Energi
Giuseppe	Palazzo	RSE
Goran	Strbac	Imperial College London
Heidi	Tuiskula	Smart Innovation Norway
Helena	Gerard	VITO
Jack	Corscadden	Euroheat & Power

Javier	Olarte	CIC energiGUNE
Iosu	Cendoya	CIDETEC
Jens	Merten INES.2S	CEA
John	Karakitsios	ECE-NTUA
Jörg	Seiffert	Uniper Technologies
Laurent	Schmitt	dcbel
Lea	Giordano	Lucerne University of Applied Sciences and Arts
Luciano	Martini	RSE
Ludwig	Karg	B.A.U.M. Consult GmbH
Mahboubeh	Hortamani	BAAM Consulting
Maria Laura	Trifiletti	ZABALA
Mario	Schweighofer	CellCube
Mário Bruno	Ferreira	REN
Marko	Topic	University of Ljubljana
Martin	Bracken	CLERENS
Maximilian	Niederehe	Siemens Energy
Michael	Hübner	Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology
Michele	De Nigris	RSE
Natalie	Samovich	Enercoutim
Nikolaos	Savvopoulos	National Technical University of Athens
Nuno	Souza E Silva	R&D Nester
Okko	Ziegler	Enel
Ondrej	Cerny	E.DSO
Ralf	Eickhoff	Forschungszentrum Jülich

Ralf	Grether	Voith
Rainer	Bacher	Bacher Energie
Riccardo	Sassi	BIP
Sebastian	Vogel	E.DSO
Shenja	Ruthenberg	CLERENS
Simon	Gianordoli	ETN Global
Susanne	Supper	Green Energy Lab
Sylvie	SEVESTRE-GHALILA	CEA
Tara	Esterl	AIT
Vincenzo	Casamassima	RSE

3. Proceedings

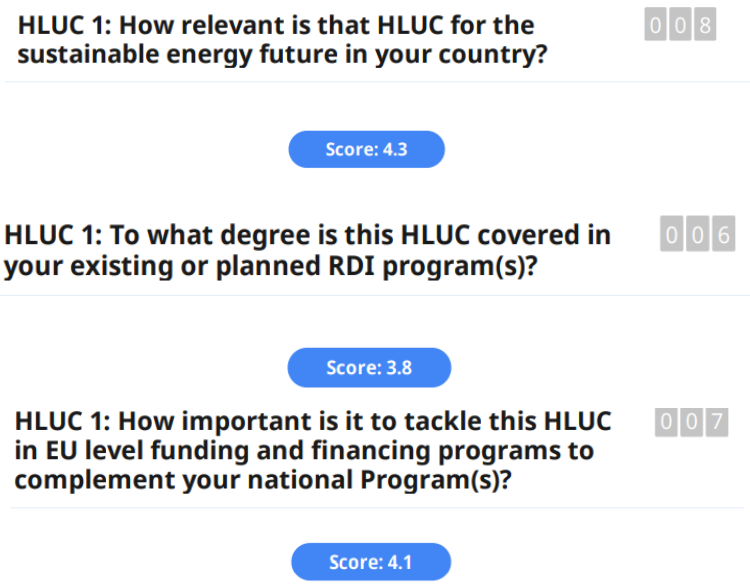
In previous Regional Workshops, these proceedings took the form of formal minutes divided by each of the different sessions as portrayed by the prior format. For the purposes of the future proceedings, the ETIP SNET Rapporteur's conclusions of the interaction between the regional/national representatives and the ETIP SNET's CORE Team regarding the ETIP SNET's High Level Use Cases were detailed below.

3.1 Representative Roundtable

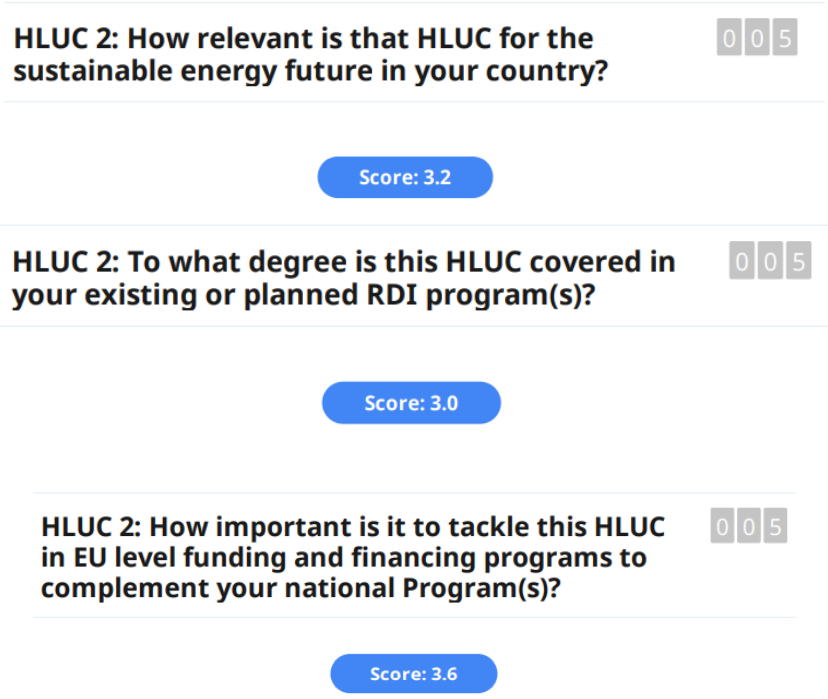
The representative roundtable took place in the afternoon of the 31st of May 2022 and consisted of talks starting with a round of Slido polling and followed by discussions depending on the degree of differences found in the polling. The slido results with the average score out of 5 will be shown followed by a summary of the discussions that took place at the representative roundtable concerning the HLUC.

3.1.1 Slido Results of Representative Roundtable

HLUC 1: Optimal Cross Sector Integration and Grid Scale Storage (PPC 2022-2025)
PPC 1.1: Value of cross sector integration and storage
PPC 1.2: Control and operation tools for multi-energy systems
PPC 1.3 Smart asset management



HLUC 2: Market-driven TSO–DSO– System User Interactions (PPC 2022-2025)
PPC 2.1: Market models and architecture for TSO-DSO-System User interactions
PPC 2.2: Control and operation for enhanced TSO-DSO- System User interactions
PPC 2.3: Platform development for TSO-DSO cooperation
PPC 2.4: Planning tools for TSO-DSO cooperation



HLUC 3: Pan European Wholesale Markets, Regional and Local Markets (PPC 2022-2025)
PPC 3.1: Fundamental market design
PPC 3.2: Regulatory framework and strategic investments
PPC 3.3: IT systems for cross-border trading

HLUC 3: How relevant is that HLUC for the sustainable energy future in your country? 007

Score: 4.0

HLUC 3: To what degree is this HLUC covered in your existing or planned RDI program(s)? 006

Score: 2.8

HLUC 3: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 006

Score: 4.0

HLUC 4: Massive Penetration of RES into the Transmission and Distribution Grid (PPC 2022-2025)
PPC 4.1: Technical barriers and technical measures for integration of RES at multiple levels and sectors
PPC 4.2: Control and operation tools for a RES based energy system
PPC 4.3: Infrastructure requirements and network technologies as solutions for integration of massive RES
PPC 4.4: Planning for a resilient system with massive penetration of RES

HLUC 4: How relevant is that HLUC for the sustainable energy future in your country? 005

Score: 4.0

HLUC 4: To what degree is this HLUC covered in your existing or planned RDI program(s)? 005

Score: 3.2

HLUC 4: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 005

Score: 3.6

HLUC 5: One Stop Shop and Digital Technologies for Market Participation of Consumers (Citizens) at the Center (PPC 2022-2025)
PPC 5.1: Value of consumer/customer acceptance and engagement
PPC 5.2: Plug and play devices and IoT (Internet-of-things) including security by design
PPC 5.3: Utilisation of communication networks including cyber security
PPC 5.4: Cross-sectorial flexibility use cases

HLUC 5: How relevant is that HLUC for the sustainable energy future in your country? 004

Score: 4.0

HLUC 5: To what degree is this HLUC covered in your existing or planned RDI program(s)? 003

Score: 3.0

HLUC 5: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 003

Score: 3.7

HLUC 6: Secure Operation of Widespread Use of Power Electronics at all System Levels (PPC 2022-2025)
PPC 6.1: Control solutions for next generation PV and battery inverters
PPC 6.2: Hybrid transmission/distribution and hybrid distribution AC/DC grids
PPC 6.3: Next generation distribution substation
PPC 6.4: Simulation methods and digital twins at distribution and transmission level for power electronics driven networks

HLUC 6: How relevant is that HLUC for the sustainable energy future in your country? 004

Score: 3.8

HLUC 6: To what degree is this HLUC covered in your existing or planned RDI program(s)? 004

Score: 3.3

HLUC 6: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 004

Score: 2.8

HLUC 7: Enhance System Supervision and Control including Cyber Security (PPC 2022-2025)
PPC 7.1: Next generation of TSO control room
PPC 7.2: Next generation of DMS (Distribution Management Systems)
PPC 7.3: Next generation of measurements and GIS (Geographical Information System) for distribution grids
PPC 7.4: Wide Area monitoring, control and protections

HLUC 7: How relevant is that HLUC for the sustainable energy future in your country? 003

Score: 3.7

HLUC 7: To what degree is this HLUC covered in your existing or planned RDI program(s)? 003

Score: 2.7

HLUC 7: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 003

Score: 4.3

HLUC 8: Transportation Integration & Storage (PPC 2022-2025)

PPC 8.1: Technical and economic implication of decarbonisation of transport sector

PPC 8.2: Enhancing effectiveness of energy system operation and resilience with electromobility

HLUC 8: How relevant is that HLUC for the sustainable energy future in your country? 006

Score: 3.8

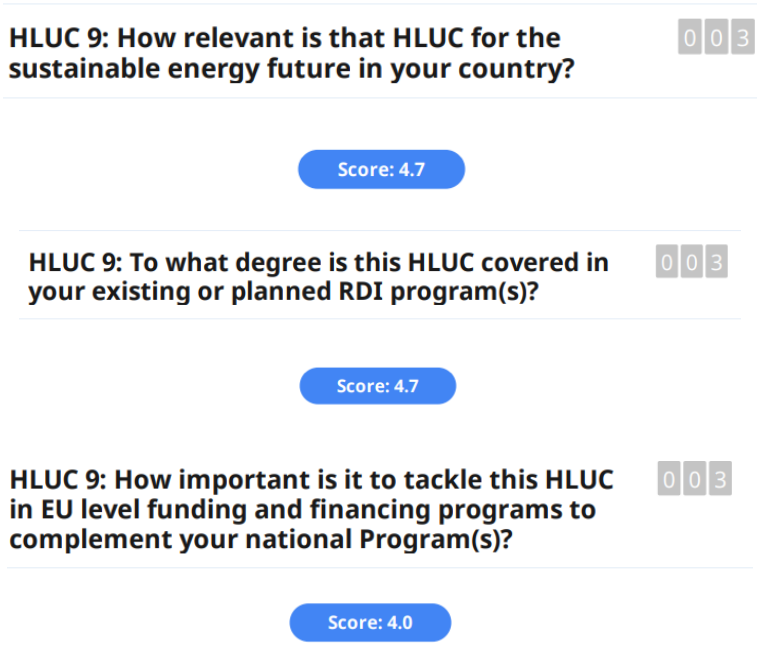
HLUC 8: To what degree is this HLUC covered in your existing or planned RDI program(s)? 005

Score: 3.8

HLUC 8: How important is it to tackle this HLUC in EU level funding and financing programs to complement your national Program(s)? 007

Score: 3.6

HLUC 9: Flexibility Provision by Building, Districts and Industrial Processes (PPC 2022-2025)
PPC 9.1: Value assessment of the integration of buildings, infrastructure and smart communities in a RES based energy system
PPC 9.2: Control and operation tools for the integration of buildings and smart communities
PPC 9.3: Planning for resilient integration of buildings and infrastructures in an integrated energy system



3.1.2 Summary of the Representative Roundtable HLUC feedback

It is noted that the ETIP SNET IP is in general well aligned with the National/Regional Research Programs that were presented in the Workshop. This is particularly true for regions/countries that provided a holistic view of R&I activities or plans in Smart Energy Networks (Germany, Switzerland). Even focused regional programs (Wallonia/Belgium), were also in close agreement with individual ETIP SNET HLUCs. It is characteristic, that a mapping of national projects to the ETIP SNET HLUCs was presented, in particular by Austria and Germany. This is very helpful and could be expanded.
Nevertheless, several valuable points were made during the presentations and the follow up discussions, that will help the ETIP SNET Core Group to further improve the IP. These will be taken into count in order to fine tune the Roadmap under preparation (due End Dec. 2022) and the next IP (Due End Aug. 2023).
The most important points to consider are listed per HLUC:

HLUC-1: Optimal Cross sector Integration and Grid Scale Storage
RePowerEU stresses the need for Energy Security. In view of this priority the role of synthetic gas (instead of natural gas) and Hydrogen should be stressed for the integration of Electricity-Gas networks at Transmission Level. For Regional/Local distribution networks, the wider implementation of heat pumps should be stressed, while the role of local CHPs might need to be revised.
This HLUC appears quite important and might call for a reconsideration of the assigned budget.

HLUC-3: Pan European Wholesale Markets, Regional and Local Markets
Research needs to be done for developing models for markets at EU level, and also national, local markets, especially for flexibility. This is particularly important in view of the large penetration of RES that change the value of energy and security and pose questions about the effectiveness of current market structures. These market models should be studied/developed in parallel with the relevant technical issues. It was also stressed that for regulated aspects, there are already mechanisms for implementation and testing, while there is need for further research in non-regulated aspects. This includes a holistic approach in the development of the off-shore infrastructure in the North Sea and the electrification of transport.

HLUC-4: Massive Penetration of RES into the transmission and distribution grid
The timing of research in markets should be better aligned with research in technologies, also in conjunction with HLUC-3. This means that the prioritization of PPCs for this HLUC-4 might need to be reconsidered.

HLUC-5: One stop shop and Digital Technologies for market participation of consumers (citizens) at the centre
The term “consumers (citizens)” was criticized as an already obsolete term. The terms consumer, customer, prosumer, citizen may need to be better defined to reflect the content of this HLUC-5, that is essentially the need to encourage and facilitate passive consumers to become active. To define the right incentives, the importance of sociological studies, related to the different national/regional, cultural and primary energy related situations was stressed.

HLUC-6: Secure operation of widespread use of power electronics at all systems levels
The low score noted in the response of the contributions of national programs to the question of tackling this HLUC-6 at EU level funding was attributed to the fact that the power electronics at different voltage levels require quite high investments and are very specialized. It was discussed that HLUC-6 is an important research area to be carried out at EU-level, to support the relevant EU-industries. Manufacturing industries (energy and ICT), grid (system) operators and research institutes are the main stakeholders of this HLUC. The massive penetration of Power Electronics interfaced with all kinds of RES will also pose great challenges for System Operators. The use of power electronics for the provision of services at low voltage level needs also to be researched with the goal to provide EU wide implementable power electronics technology applicable interoperability, interfaces, reuse, scaling-up.

HLUC-8: Transportation Integration & Storage
Research in smart charging and related efficient control methods should be further stressed so that the system does not need significant extra infrastructure investments for e-mobility. Also, using electrified transportation to strengthen energy/power system resilience should be further researched and demonstrated. EU-wide interoperability and interfacing of sustainable transportation integration technologies should be also strengthened.

HLUC 9: Flexibility provision by Building, Districts and Industrial Processes
Flexibility not only from homes, but also from industrial processes should be considered as a key element

3.2 Projects Focus

In the second day, a series of panel discussions were held with respect to all HLUCs and with the same set of panel members that represented different R&I projects across Europe of both EU funded projects and nationally/regionally funded and coordinated projects. The structure of the panel sessions was as follows:

Projects Panel Session 1: Integrated Energy Networks

- Cross Sector Coupling
- Transport & Storage
- Energy Markets

(based on ETIP SNET IP HLUC 1,3,8)

Projects Panel Session 2: Renewable Energy Systems

- Massive RES Penetration
- System Operators' Collaboration
- Power Electronics Challenges

(based on ETIP SNET IP HLUC 2,4,6)

Projects Panel Session 3: Digitalisation

- Empowering Consumers & Smart Communities
- System Control
- Cybersecurity

(based on ETIP SNET IP HLUC 5,7,9)

Each panel session was organised as follows:

- Introduction by moderator (ETIP SNET Core Team & Technical Support)
- Feedback on each of the 3 HLUC per panel from project representatives
- Closing from the moderator

Below the list of participants for each parallel session:

Table 1: Panellists from the panel sessions

Project	Level	Speaker
Projects Panel Session 1: Integrated Energy Networks		
SINTEG	Germany	Ralf Eickhoff
VZR Project	Austria	Suzanne Super
E-Land	EU	Heidi Tuskula
Projects Panel Session 2: Renewable Energy Systems		

SINTEG	Germany	Ralf Eickhoff
VZR Project	Austria	Suzanne Super
Coordinet	EU	Nikos Savvopoulos
Projects Panel Session 3: Digitalisation		
SINTEG	Germany	Ralf Eickhoff
VZR Project	Austria	Suzanne Super
Platone	EU	Gianluca Nori

To see more detailed information concerning each of the projects and the content presented, please see the Annex.

3.3 Recommendations & Conclusions from the project focus workshop HLUC feedback

What is being developed is broadly in line with what is described in the HLUCs (something completely new is not identified. Moreover, the IP is quite well aligned with the research happening in the regions, while nationally funded research is quite in agreement with the IP's considerations on EU research.
Moreover, the work that is done in the relevant project is quite impressive and indicates that the TRL in some cases may need to be re-thought and upgraded.

What has been presented is also in line with the voting indicated in the previous day. In cases that there is no much activity, it is something that has been asked to be funded and supported by the European projects (although for several regions this not preferred to be supported locally because they are potentially at a higher more centralized level of funding).

Additionally, the families of projects provided a more complete view of the relevant projects in each country. This matches very well with the member states' point of view that needs to be highlighted in the regional workshops.
The BRIDGE projects, as well as the families of projects have presented their activities while also identifying links with the HLUCs. In particular, each one of the three BRIDGE projects (participating in each panel session) have identified links of their projects with the HLUCs indicated in each panel session. The Austrian projects' representatives have allocated their projects with each HLUCs, while the SINTEG representative has indicated links with particular PPCs in each HLUC.
More information on the relevant projects (Austrian projects, SINTEG and BRIDGE projects), as well as the identified links with the HLUCs can be found on the relevant presentations. A summary of the relevant findings and the relevant discussions is provided, as follows.

Projects Panel Session 1 - Integrated Energy Networks (HLUCs 1,3,8)

General Comments:

Austrian projects: When considering the interconnection among markets and grids (including heating, gas, etc.) these HLUCs are very important. National funding is important at a national level, yet very often it helps to work together across countries. In this respect, this topic calls for EU funding. Moreover, the relevant large 'modelling' calls are important, where several universities or organizations, work together, bringing experts from the different sectors together.
SINTEG: SINTEG had a practical focus, as it was a living lab putting things in practice. It has been noted that it is important to think what happens when you put a model into practice. In this respect, it is important to have enough resources to try a model and make it work in practice.
SINTEG: Framework conditions may change, yet practical problems still remain the same. For instance, people not talking to each other, or a certain technology does not work for some reasons, like not fitting an environmental restriction, etc. In this respect, a number of research questions is difficult to be answered. For instance it is difficult to implement markets. On a practical level there is a lot you can do that persists even in framework conditions.
Austrian projects-NEFI: Industry and Heating from the technology side are important. However, such issues are not easy to be placed in the HLUCs.

Austrian projects: Some of the projects that have been presented in this panel session also fit to the digitalization HLUC

Comments particularly related to each HLUC:

HLUC-1:

E-land: The whole communication interface is a big challenge in this HLUC.

HLUC-3:

SINTEG: The question that arises concerns the operational framework and the framework conditions for the future markets. In particular the value that can be created today is probably not the value that can be created in the future. Regulatory sandboxes have been used to create future value, but it is not working well. In this respect, it is important to be aware of the relevant designs (are we talking about a market simulation or explore in practice what values can be taken?)

In this respect, it is important to be very careful with the approach of value operation and what is the relevant framework we operate in.

Austrian Projects, Green Energy Lab: There are projects also related to HLUC-3, not however on the European level. In particular, more regional projects are evident addressing issues of local energy communities, taking into account relevant business models.

Project Panel Session 2 - Renewable Energy Systems (HLUCs 2,4, 6)

General Comments:

Austrian Projects – NEFI: Capacity management taking into account the flexibility of the industrial side (to be used for re-dispatch), at the moment is not a business case. The regulatory framework in Austria is very similar to the one in Germany, so this is very challenging. It is also hard to offer incentives outside the demo projects, since grid operators are curious and careful of the relevant possibilities. At the moment incentives based on cost are being developed.
Concerning the term 'industrial energy communities' used by NEFI for one of their projects called 'InduGrid – Industrial Microgrids', it has been noted that according to the definition of energy communities they cannot involve the industry. In this respect, the title 'microgrids' may seem more preferable than 'industrial energy communities'.
Regarding the HLUCs in the IP, although the term 'microgrids' is not explicitly mentioned, it is evident in various HLUCs (e.g. the distribution system control and techniques).

Austrian Projects – NEFI: From the regulatory point of view, it is not possible to involve industries in energy communities in Austria. It has also been noted that connecting the industry with the energy communities appears to be a valuable point for research.

Comments particularly related to each HLUC:

HLUC-2:

SINTEG: TSO/DSO cooperation is essential. The big question however is whether to use a market process or not. SINTEG is evaluating this aspect, developing explicit flexibility markets for local level congestion. However, it was difficult to test these markets. In SINETG it was demonstrated that a local flexibility market can exist, while all processes around that can work. However, it could not be proved if the relevant opportunities can be exploited. In this respect it is suggested that HLUC-2 is extended to regulatory process between TSO and DSOs. Moreover it is important to open the research question on how to test the market power (is there a way on an experimental setting to find out, or should it be tried in practice?).

HLUC-4:

SINTEG: When considering massive penetration (greater than 60%) congestion situations should be expected. In order to test such cases, future scenarios should be considered combined with reality. However, a question remains on how far the results can be trusted, since this is only 'half reality'. In this respect, it is difficult to prove that a market works in an experimental setting.
SINTEG: In relation to ICT or power electronics for a massive RES penetration, a mixture of both is needed. It has also been noted that the rollout of technologies like digital grid controllers, linear regulators, STATCOM, etc. can result in considerable cost savings, while network constructions can be postponed.
SINTEG: Technologies like STATCOM, linear regulators, etc. are well known, but implementations problems are more on a practical level. In this respect, taking into account such technologies, more should be done, not so much in research level but on a practical level in order to get these technologies on the field.
However, not everything has been researched on the industrial level (for instance, grid forming inverters). In this respect, more things need to be done on a research level (related to technologies not presented in the SINTEG representative's presentation).
SINTEG: Resilience issues and IT security issues are also important and a relevant new field.

Austrian Projects – Green Energy Lab: Since renewable penetration is a topic addressed by a lot of projects, many projects are allocated to HLUC-4. The projects also focus on the topic of increasing the system's flexibility, which is quite relevant in the case of massive RES penetration.

HLUC-6

SINTEG: Regarding PPC 6.1 'Control solutions for next generation PV and battery inverters', technologies for providing reserves, reactive control, synthetic inertia, etc. can be applied, however such technologies can be used at the future. In this respect, research is probably required on how these technologies can be integrated in the network management.
The core team has also noted that HLUC-6 does not refer to new power electronics (for instance developing new semiconductors), but concerns new control algorithms and how they can be integrated in the network.

Austrian Projects – Green Energy Lab: Regarding power electronics and HLUC-6, only one project is highlighted. It has been noted that it was not clear if HLUC-6 refers to the technological site, since new power electronics components are not developed by the Austrian projects. However, new solutions are integrated in the relevant Austrian projects and tested in real-life conditions.

Project Panel Session 3 - Digitalisation (HLUCs 5,7, 9)

General Comments

Austrian Projects - Green Energy Lab: The projects 'Spatial Energy Planning I & II' develop digital tools and processes for integrated energy infrastructure planning. The term integrated refers to cross-sector collaboration, since it is important to integrate the different sectors in the planning processes. In this respect, part of the project focuses on the Heating and Cooling sector, while the integration of the electricity and mobility sector is also considered.
Austrian Projects - Green Energy Lab: The project 'Zukunftsquartier 2.0' (replicable thermally and electrically grid-supporting concept of positive energy districts in dense urban environments) also takes into account the integration of different sectors. The maturity level in the project is quite high (developing and combining different technical components for 100% renewable energy districts). It also refers to processes that can be scaled up for different use-cases.
Austrian Projects - Green Energy Lab: In relation to the project 'Zukunftsquartier 2.0', the way to construct buildings and districts following the principals of circular economy is identified as a next step. Using the relevant buildings for a high share of RES production is also identified as a big question for research.
Austrian projects – Green Energy Lab: Regarding the distribution of funds among the HLUCs, it has been mentioned that there is a big focus in HLUC-5, while there are also high investments related to HLUC-9.

Comments particularly related to each HLUC:

HLUC-5:

SINTEG: It is important to take the consumer/customer along the way of developing the technical features (SINTEG has focused on methods to do this). Customer acceptance is important however, in some cases, it was low. This is a significant barrier for the use of innovative technologies like smart-meters. Concerning smart-meters, in particular, the consumers do not understand the relevant benefits, or do not see the relevant need to use them, while data protection issues are also evident.
PLATONE: Similar to SINTEG, customer engagement has been identified as a point requiring attention in the PLATONE project (and the relevant application in Italy)
Austrian projects – Green Energy Lab: There are many Austrian projects related HLUC-5. In particular many projects in the cluster of energy communities and smart grids are developing platforms, ways to connect the users and ways to communicate/interact with them.

HLUC-7:

PLATONE: Regarding the potential of considering the DSO Technical platform (which has been developed in PLATONE) in new projects it has been noted that work is needed in the integration of the platform in a testing field in order to highlight the grid observability. Moreover, the local flexibility market for the EV sector should be considered in the relevant platform.
Austrian projects – Green Energy Lab: Regarding TSO/DSO, Austrian projects also focus on the relevant software and how to manage such systems (using data from geo-informatics systems, forecast data etc.). However, there are not projects with a main focus on TSO/DSO integration (broader topics are considered).

HLUC-9:

SINTEG: SINTEG has contributed in the way to deal with the complexity (related to ICT systems) when combining network operator systems with the operation technologies at the consumer side. This is quite complex, since there are so many different systems to integrate. This can also indicate issues, particularly when considering the security aspects by network operators. SINTNEG has made contributions in how to develop architecture frameworks and tools to manage this complexity.
SGAM is used to model the system and to have a common language between the DSOs and the developers. SGAM is a bit difficult to be accepted in the beginning, however it proves quite useful at the end.
Austrian projects – Green Energy Lab: The market roll-out and scale-up is identified as one next step, while also considering the

integration of the necessary stakeholders (like project developers and stakeholders from the building sector).

Austrian projects – Green Energy Lab: Regarding the industrial processes included in the projects related to HLUC-9, it has been noted that NEFI is focused on this. Green energy lab has not a strong focus on industrial processes, yet waste heat from industrial processes is integrated, while planning projects also consider the industry integration.

4. Feedback from National/Regional Funding Programme Representatives

Participating representatives of the 14th ETIP SNET Regional Workshop received after the event an evaluation form, where they could express their appreciation for the event. In total, 3 responses were received.

Overall, respondents judged the event positively:

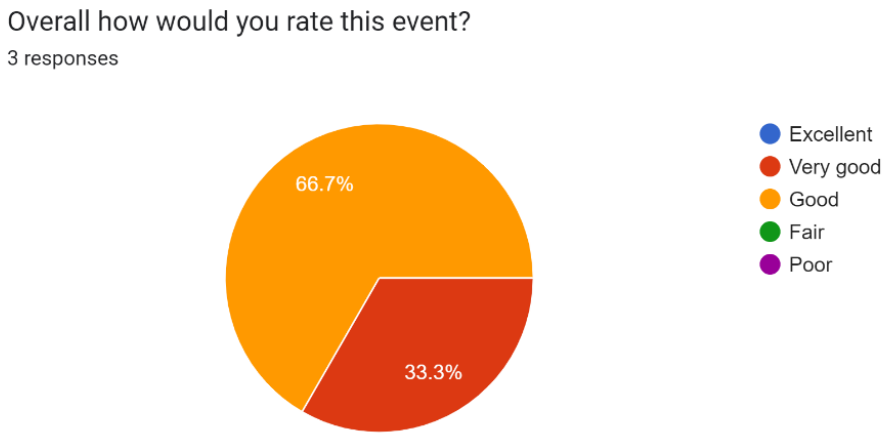


Figure 1: Overall how would you rate this event?

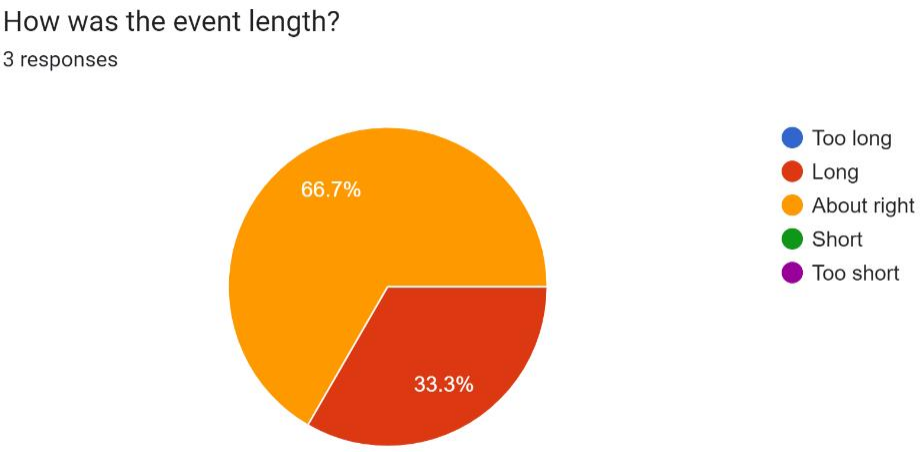


Figure 2: How was the event length?

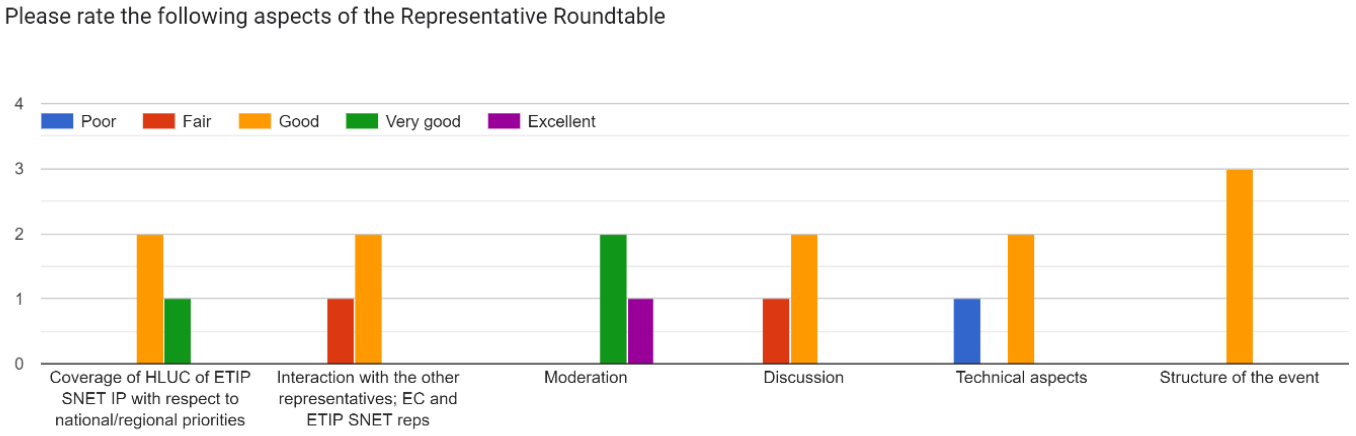


Figure 3: Please rate the following aspects of the Representative Roundtable

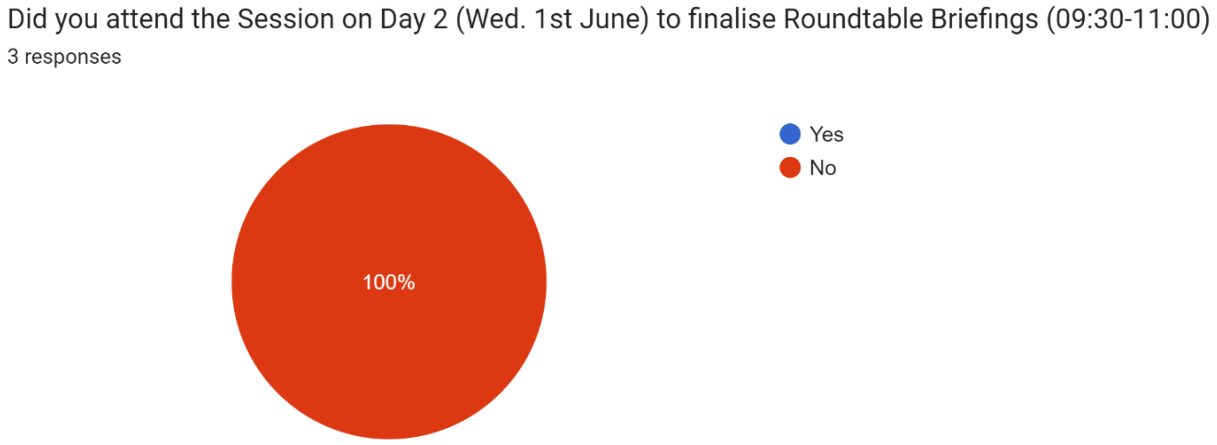


Figure 4: Did you attend the session on Day 2 to finalise roundtable briefings?

Among the suggestions, respondents included the need to invite representatives per country to join the discussion, in order to cover a lot of ground on some very specific topics, so it might be better to have 1-3 persons for a better overview. In addition, the questions should be more specific and relevant for the discussion.

Annex

Intro - Families of National/Regional Projects

The SINTEG program: Smart Energy Showcases Digital Agenda for the Energy Transition:

Sinteg is a large scale 4-year funding program, with the following scopes:

- Transformation to smart networks for connecting generation, demand, storage and grid
- Developing scalable solutions as blueprints for a future smart integrated energy system and for mass markets
- Implementing solutions in large pilot (showcases)
- Gathering information on necessary adjustments to the regulatory framework by creating "regulatory sandboxes" with specific experimental playground
- Continuous refinement and adaptation
- Overarching synthesis of results and accompanying evaluation

There are 5 showcase regions from Dec 2016 – spring 2021, funded by Federal Ministry of Economic Affairs and Climate Action (BMWK). More than 300 companies, universities, research centers and other relevant stakeholder are involved. A funding amount of around 170 Million € will be available to about 200 funded project partners with high private engagement, while strong interaction is expected with public decision bodies.
SINTEG's achievements:

- Identify flexibility potentials and strengthen sector coupling
- Develop flexibility mechanisms that serve the grid
- Digitize - between enabler and value-added services in the smart energy system
- Pioneer for large Living Labs
- Participation & acceptance - creating understanding and arousing passion for an opportunity-oriented energy transition

Briefly summarized results in the 5 showcases:

Showcase	Results
sells	Cellular energy system; flexibility platforms; massive digitalization
DESIGNETZ	Secure and efficient energy concept; system cockpit using cascades
enera	Integration of grids and markets; flexibility market in EPEX
WINDNODE	Large RES with local industrial and private flexibility
NEW 4.0 Norddeutsche EnergieWende	Sectoral coupling energy concept; industrial flexibility

Flagship region energy – (funded by the Austrian Climate and Energy Fund)

Key facts of the Flagship Region Energy:

- 3 flagship regions dealing with smart grids and sector coupling, decarbonization of industry and hydrogen
- 100% renewable energy in real-time operation as mission target
- 120 million EUR Funding objective provided by the Climate and Energy Fund
- 400 M EUR Total investment volume by 2025
- 8 years total duration of the innovation initiative "Flagship Region Energy"
- 300 project partners from industry and research institutions
- Presently more than 60 projects are funded with 88 M EUR

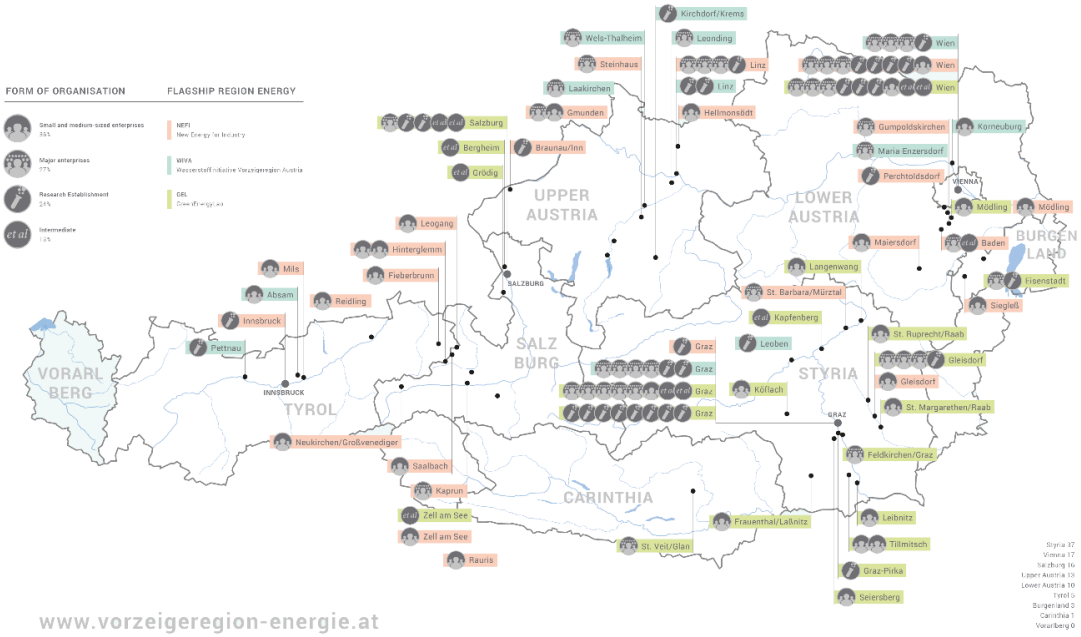
Technology readiness levels (TRL)

- Subprojects: TRL 5 – 9
- Target at the end of the RTDI initiative: TRL 8 – 9

The following **success factors** are identified for the program:

- Bringing new technologies and applications to market. It is important to create prototypes, pilot applications, business models etc.
- Innovative content clearly surpasses state-of-the-art
- Public visibility on a national and international level
- Market access activities (Involvement of users and cooperation between independent partners)
- Tackling joint RTDI-tasks

The map with the different demonstration sites and projects is depicted in the figure below:



The **Strategic Goal** is to develop and demonstrate model solutions for intelligent, safe and affordable energy and transport systems for the future, based on innovative technologies from Austria.
There are three thematically different model regions (flagship regions):

- **Hydrogen Initiative Flagship Region Austria P&G**: Transition of the Austrian economy to an energy system based strongly on hydrogen
- **Green Energy Lab**: Eastern part of Austria with large production of wind energy and a high demand. A number of different projects are developed to address the concern of balancing demand and supply. The project portfolio, which is strongly growing, covers topics like storage, energy communities, heating and cooling, and integrated mobility solutions. All topics should contribute in the following thematic spotlights: Climate neutral security of supply and resilience, Green Heating and Cooling, Circular economy, Social Acceptance of New Technologies. A green energy foresight process has also been developed, in order to set the agenda for the right topics and the new calls for the program.
- **New Energy for Industry – NEFI**: Industry accounts for 32% of Austria's final energy demand. In this respect, there is a goal of decarbonizing the industrial energy systems, with 100 % renewable energy supply at selected locations. The competiveness of Austria should also be achieved, with the relevant technology development, ensuring that Austria is an interesting economic location for the industry in the future. There are approximately 100 partners from industry, RTOs and public institutions, 17 NEFI sub-projects and a funding of 24.6 Mill. EUR

Projects Panel Session 1 - Integrated Energy Networks (HLUCs 1,3,8)

Introduction – Presentation of Projects:

E-land presentation: The E-land project is during its final year (ending November) and is now in the phase of applying the solutions in the pilot sites. The project focuses on solving issues of decarbonisation in local energy systems with a weak or challenging connection to grid. A set of tools has been developed for the local energy community (end-user), focusing on technology solutions, on how to build a strong community and develop feasible business models. The

developed toolbox comprises three layers: the Community Tools (Common Impact Model), the Business Development Tools (Business Model Innovation - BMI) and the Technology Tools (Investment planning and Short-term planning & optimization). The Enterprise Service Bus (ESB) is the technology solution connecting these tools to the pilot sites. In particular the project comprises 3 pilot sites in Europe and 2 simulated pilots in India.

Austrian Families of Projects:

NEFI presentation: NEFI-lab is at the center of NEFI were the monitoring is performed and were the innovation process is developed for the rest of the projects. All the different sectors are analysed while also considering the industrial processes to analyse the possible pathways of Austria's decarbonisation. Three scenarios are identified: Business as Usual scenario - BAU, Mitigation scenario – MGS , and Deep decarbonisation scenario – DCS. Three projects are presented indicating the possibilities to use the large heating potential at high temperatures, and the high temperature heat transport over large distances. :

- SANBA Smart Energy Quarter Baden
- Gmunden High Temperature Heat Link R&D
- HEAT HIGHWAY

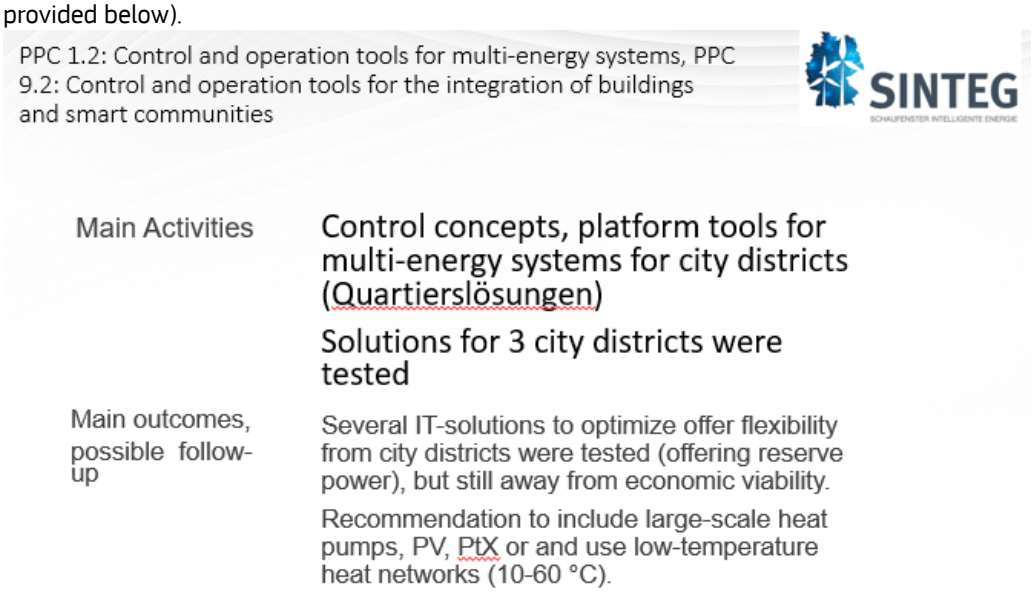
Green Energy Lab

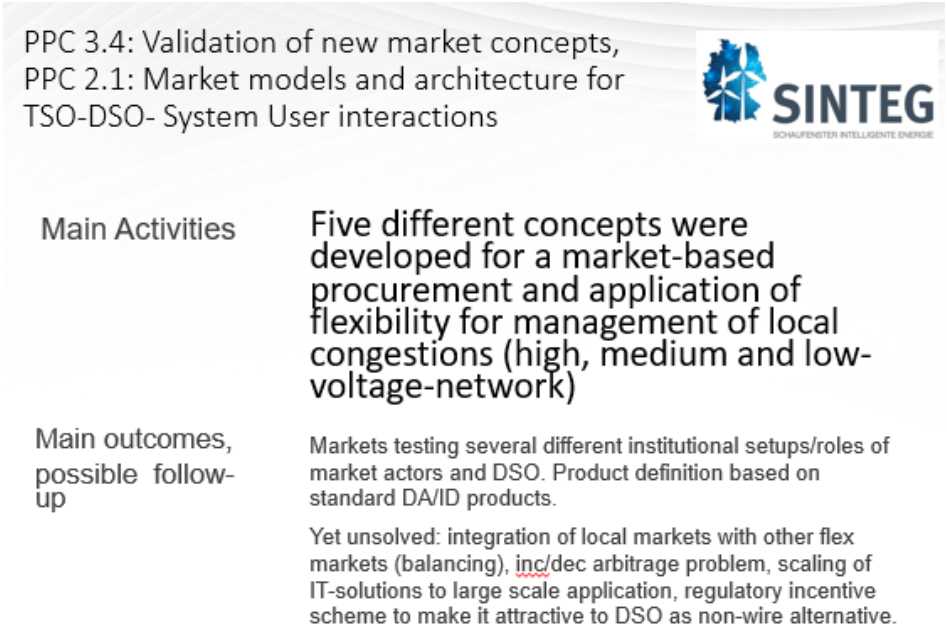
- **ThermaFLEX**: The project focuses on system integration and increase of system flexibility in district heating systems. The project considers the technical components that need to be integrated (Biomass, Solar Energy, Heat Pumps, Geothermal). The importance to integrate storage facilities and waste heat in the system is also highlighted. Non-technical components should also be considered to implement such systems: User Integration, Stakeholder Integration and Innovative Business Models. Moreover, a systemic approach is also necessary considering the Sector coupling, the Intelligent Control, the Reduction of temperature levels, Integrated planning process, Monitoring and Optimisation and Interlink to spatial energy planning. Thermaflex comprises 11 demo-sites across Austria. For instance, the demo site in Vienna is implemented in Vienna Spittelau, where a High-temperature heat pump was installed for waste incineration, with a target to increase thermal output form 60 MW to 76 MW.
- **Second Life Batteries for Storage**: It is a Green Energy Lab project and is Related to the transportation and storage (HLUC-8). The project uses old batteries from EVs for stationary storage. The project is finished and has facilitated the use of storage for optimizing PV self-consumption on site of a big waste disposal company

Fit of the projects in the HLUCs

E-land: The projects is connected with many of the topics indicated in the HLUCs. Regarding the value of sector coupling, the project is contributing with providing the energy user point of view. In particular the project is looking at what value can be provided to the community, while looking at all the assets, regardless of which energy vector they belong to (for instance with the business model innovation tool). From the DSO point of view, customers who are already actively using their assets in the optimal way can be considered as a nice customer for the future DSOs, since they will not cause problems like high peaks.
The technology tools regarding the optimal management of the assets are also important, while the long term investment tool can indicate the allocation of investments. The whole communication interface is a big challenge in this topic.
Regarding the value of storage and transport, battery storage and heat storage is evaluated in the project, while hydrogen storage is also considered in one of the pilots. There are technology challenges in these aspect while interesting opportunities are also evident. A pilot is also evaluating electric vehicles as potential mobile storage connected to the grid while also examining how EV charging can be managed.
The project is not focused in the development of markets.

SINTEG:
The SINTEG activities have been mapped to the HLUCs and PPCs (as evident in the slides, not, however, discussed in the event. The relevant slides are provided below).





General impression: As a very good feedback, new and relevant topics that are not covered by SINTEG are evident. Regarding markets, the question is what the framework we operate in is. Which are the framework conditions for the future markets? The value we can create today is probably not the value we can create in the future**.** Regulatory sandboxes have been used to create future value, but it is not working well. In this respect, it is important to be aware of the design we look at: are we talking about a market simulation or explore in practice what values can be taken? In this respect, it is important to be very careful with the approach of value operation and what is the framework we operate in.

Green Energy Labs: a link of the relevant projects with the HLUCs is provided:

		HLUC1: Optimal Cross Sector Integration and Grid Scale Storage	HLUC3: Pan European Wholesale Markets, Regional and Local Markets	HLUC8: Transportation Integration and Storage
Mobility	ACDC			■
	Car2Flex	■		■
Energy Communities	Blockchain Grid		■	
	NETSE		■	
	PnP Control TABS	■		
	User GRIDs			
	SmartU		■	
	UCERS		■	
	Hybrid LSC			
	BEYOND		■	
	R2EC		■	
	Open Data Platform			
	CLUE		■	
	ZK 2.0			
Storage Systems	2nd Life Batteries			■
	SEKOHS Theiß			
	Energy Cell Johann	■		
	FlexModul			
	ATES Vienna	■		
Heatind and Cooling	ThermaFlex	■		
	AbSolut			
	SEP I/II	■		
	Heat Pool	■		
	Hybrid DH Demo	■		
	ExTRa			
	Smart City Neudörfl			

In particular, the projects address all the three HLUCs (1,3 and 8) . Regarding links with HLUC8, the project of second life batteries mentioned earlier can be considered, while also considering additional projects. For instance, the project Car2Flex considers topics like V2G, regulation, standardization in batteries, user integration, needs of users etc. Another project (not highlighted in the table) is called innovation sandbox, where user and stakeholder integration is considered to evaluate the needs of users in bidirectional charging (integrating the user perspective in the relevant use cases).

The project ThermaFlex is linked with HLUC-1, while many other projects also address issues related to this HLUC. Projects are also related to HLUC-3, not however on the European level. In particular, more regional projects are evident addressing issues of local energy communities, taking into account relevant business models.

Discussions – Regarding modelling and practical applications

From the side of the Austrian projects, it has been mentioned that these HLUCs are very important when considering the interconnection among markets and grids, including heating, gas, etc. National funding is also important at a national level, yet very often it helps to work together across countries. In this respect, this topic calls for EU funding. The relevant large 'modelling' calls are important, where several universities or organizations, work together, bringing experts from the different sectors together.
From the side of SINTEG, it has been noted that SINTEG had a practical focus, as it was a living lab putting things in practice. In this respect, it is important to think what happens when you put a model into practice. In this respect, it is important to have enough resources to try a model and make it work in practice.

Learning from practical experiences and new Framework conditions:
Framework conditions may change, yet practical problems still remain the same. For instance, people not talking to each other, or a certain technology does not work for some reasons, like not fitting an environmental restriction, etc. In this respect, a number of research questions is difficult to be answered. For instance, it is difficult to try implementing markets. On a practical level there is a lot you can do that persists even in framework conditions.

Further comments
NEFI has mentioned that Industry and Heating from the technology side is important. However, such issues are not easy to be placed in the HLUCs.
Some of the Austrian projects that have been presented in this panel session also fit to the digitalization HLUC

Project Panel Session 2 - Renewable Energy Systems (HLUCs 2,4, 6)

Introduction – Presentation of Projects:

Coordinet project: The topic of DSO-TSO coordination is important nowadays and in the past. Many EU projects have set the framework in the past (evolveDSO, Flexiciency, SmartNet). Coordinet is a project for the Large-scale TSO-DSO-Consumer demonstrations of innovative network services. There are 23 partners involved and 10 linked third parties (comprising at least one TSO and DSO from each demonstrating country). A first goal of the project is to demonstrate in which extend the coordination between TSO and DSO will lead to a cheaper more reliable and mode environmentally friendly electricity supply. Moreover the project focuses on defining a set of standardized products and services that can be applied in a pan-European level, while also specifying and developing a TSO-DSO-Consumer platform.
There are two technical phases: 1) create all the necessary tools and integrating them and 2) Technical operation of the market and conclusions. The conclusions will provide the results for the roadmap and the recommendations of the project. Regarding the project's ambition, several tests have been performed (Balancing, congestion management, voltage control and controlled islanding) in different timelines (long-term up to real-time market operation). Several market models have also been considered for the TSO/DSO coordination with both capacity and energy products.

Austrian Projects:

Green Energy Lab: Two projects are selected to highlight the relevant HLUCs in this panel session

Blockchain Grid: The project addresses Battery storage, Grid Capacity Management and Trading. The project takes part in a small community with around 30 households with PV systems on their roofs and also agricultural buildings with PV on their roofs. With the battery storage system and the concept of blockchain grid, the PV self-consumption was increased from 26 to 34%. Moreover, related to a massive RES penetration, the battery storage allows almost all of the PV production (around 99%) to be used. Regarding the impact assessment, 32% CO2 reduction was achieved in the community, while the grid capacity was increased by 50%. The project also has a positive effect on cost savings per household. In particular, regarding last year, it has been identified that 551 € per household can be saved, while much higher savings are expected when considering today's energy prices.
It has been noted that the project's success is mainly related to the storage. Regarding block-chain, the project was just a test-case for block-chain technology. On the other hand, the innovation of the project and the project's impact is mainly linked with storage: control of the storage and trading the storage capacity.

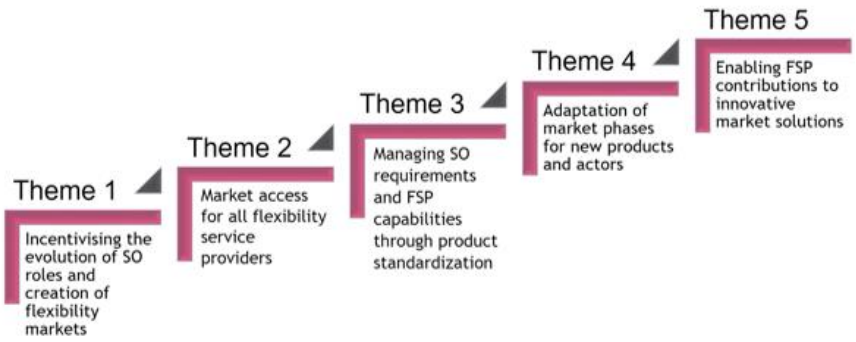
Heat Water Storage Pooling: inter-link among the electricity and the heating system. High production of wind energy is considered. When there are peaks in the wind energy production, all this energy cannot be injected in the grid. In this respect, flexibility measures are necessary. Heat water storage pooling is used to store the additional wind energy. Residential homes, district heating network and individual customer/family houses take part in the project, while the system is optimized in total. The project managed to increase the share of renewables in the system by 60%. Scaling this system to the whole region can achieve a reduction of CO2 emissions by 3%.

NEFI:

Industry4Redispatch: The project focuses on enabling provision of re-dispatch from industrial and large commercial customers. The project also addresses issues related to aggregating all this flexibility that can be offered to the TSO, as well as the relevant TSO/DSO interactions. Moreover, the project evaluates how capacity management can ensure that problems will not be caused in the distribution grid while also evaluating the relevant synergies. Capacity management is quite challenging: the project will start with simulations moving to real practice that will be implemented in the SCADA system of the Distribution Grid Operator, in order to indicate that flexibility of the industrial side can be used for re-dispatch.
At the moment this is not a business case. The regulatory framework in Austria is very similar to the one in Germany, so this is very challenging. It is hard to offer incentives outside the demo projects. Grid operators are curious and careful of the possibilities. At the moment incentives based on cost are being developed.
Business models for the industry: The business models are simulated. The project focuses on implementing digital technologies and provide them to the DSO for voltage control support.
InduGrid – Industrial Microgrids: The project looks at industrial energy communities, since they offer a lot (heat, flexibility, etc.). Taking into account discussions on energy communities, the project is enlarged to also include other stakeholders.
However, it has been noted that energy communities, according to the relevant definition, is something different than industrial. In this respect, the title 'microgrids' may seem more preferable than industrial energy communities.
Regarding the HLUCs, although the term 'microgrids' is not explicitly mentioned, yet it is evident in various HLUCs (e.g. the distribution system control and techniques).
It has also been noted that from the regulatory point of view, it is not possible to involve industries in energy communities in Austria. Yet connecting the industry with the energy communities appears to be a valuable point for research.

Fit of the projects in the HLUCs

Coordinet: The main contributions of Coordinet concern HLUC-2. Different TSO/DSO coordination schemes have been tested while recommendations are provided for an adapted market design at EU, enabling TSOs and DSOs across Europe to procure standardized products for grid services in a coordinated manner. Different themes are tackled by the Coordinet Roadmap as follows:



Regarding HLUC-2, the following Project outcomes' contributions and future directions are identified:

- New market models that will enable procurement of flexibility at every voltage level.
- Increase participation of RES, consumers and local communities to system services.
- Standardized market products.
- Real-time control strategies.
- TSO-DSO cooperation towards network planning (longer time-frames)

Taking into account the communication and platform aspect in HLUC-2, the following outcomes and future directions are identified:

- Effective and efficient platforms for market-driven interactions between multiple players.
- Common IT Architecture and Interfaces.
- Manage (big) data for decision-making at operational and planning level.
- Improve prosumer's self consumption and market participation with IoT and EMS and/or market signals.
- Explore opportunities and benefits of security data sharing

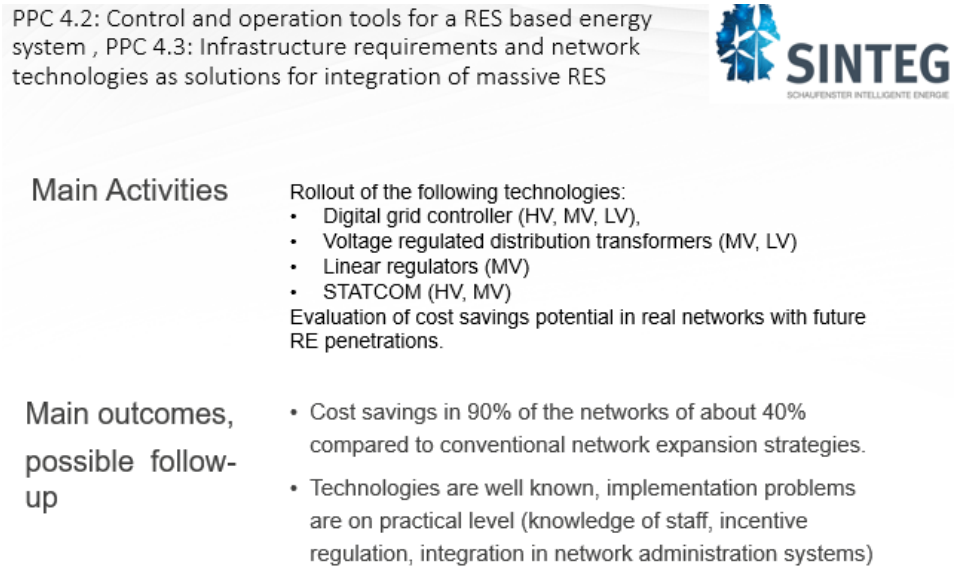
HLUC-4 is tackled indirectly in the project, identifying the following outcomes and future directions:

- Increase RES hosting capacity both in the Transmission and Distribution System.
- Increase flexibility provision from distributed resources.
- Analysis of re-dispatch process and efficient market solutions.
- Coordination with other energy carriers and vectors.

SINTEG:

Regarding HLUC-2, TSO/DSO cooperation is essential. The big question however is whether to use a market process or not. SINTEG is evaluating this aspect, developing explicit flexibility markets for local level congestion. However, it was difficult to test these markets. In SINETG it was demonstrated that a local flexibility market can exist, while all processes around that can work. However, it could not be proved if the relevant opportunities can be exploited.
In this respect it is suggested that HLUC-2 is extended to regulatory process between TSO and DSOs. Moreover, it is important to open the research question on how to test the market power (and arbitrage?). Is there a way on an experimental setting to find out? Or should it be tried in practice?

When considering massive penetration (greater than 60%) congestion situations should be expected. In this case, it has been noted by the SINTEG representative that you have to rely on a scenario in the future, and then combine this scenario with reality to test it. But a question remains on how far the results can be trusted, since it is only 'half reality'. In this respect it is difficult to prove that a market works in an experimental setting.
In relation to HLUC-4, the following slide has been presented:

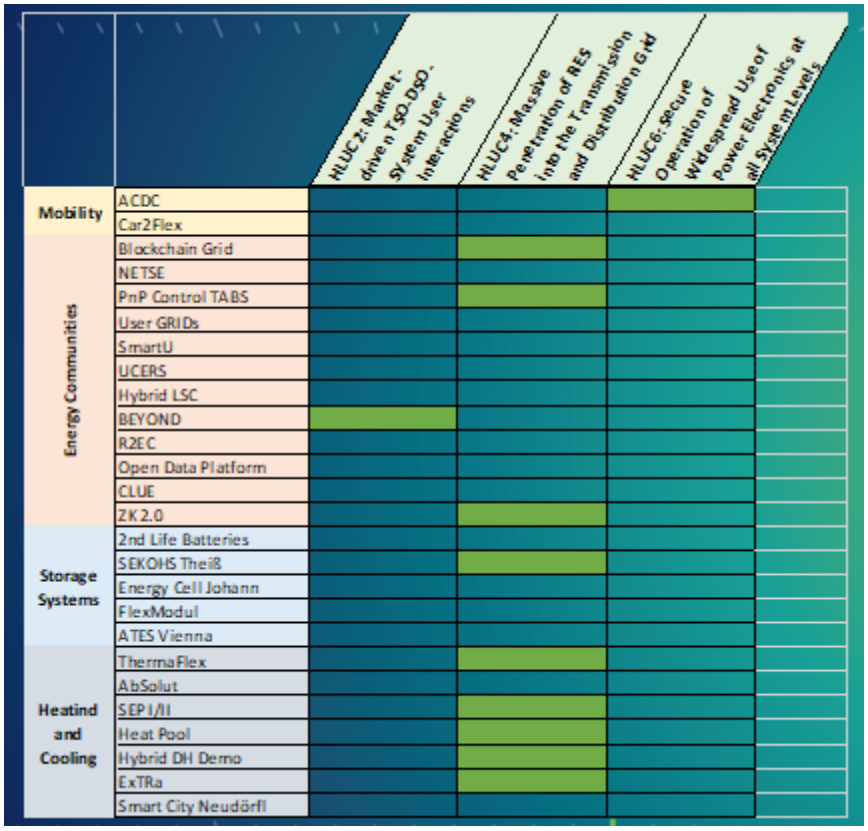


In relation to ICT or power electronics for a massive RES penetration, the SINTEG representative has noted that a mixture of both is needed. It has also been noted that the rollout of technologies like digital grid controllers, linear regulators, STATCOM, etc. can result in considerable cost savings, while network constructions can be postponed.
The technologies presented in the slide are well known, but implementations problems are more on a practical level. In this respect, taking into account the technologies presented in the slide, more should be done, not so much in research level but on a practical level in order to get these technologies on the field.
However, it has also been noted that not everything has been researched is on the industrial level (for instance, grid forming inverters). In this respect, more things need to be done on a research level (related to aspects not presented in the slide).
Resilience issues and IT security issues are also important and a relevant new field.

Regarding PPC 6.1 Control solutions for next generation PV and battery inverters, the SINTEG representative noted that technologies for providing reserves, reactive control, synthetic inertia, etc. can be applied, however such technologies can be used at the future. In this respect, r**esearch is probably required on how these technologies can be integrated in the network management**.

It has been noted that HLUC-6 (and PPC 6.1) does not refer to new power electronics (for instance developing new semiconductors), but about new control algorithms and how they can be integrated in the network.

Austrian-Projects – Renewable Energy Systems
The Austrian projects have allocated their projects to HLUCs 2,4 and 6 as follows:



Since renewable penetration is a topic addressed by a lot of projects, thus many projects are allocated to HLUC-4. The projects also focus on the topic of increasing the system's flexibility, which is quite relevant in the case of massive RES penetration.
Regarding power electronics and HLUC-6, only one project is highlighted: it was not clear if HLUC-6 refers to the technological site (new power electronics components are not developed by the Austrian projects). Rather, new solutions are integrated in the projects and tested in real-life conditions.

Project Panel Session 3 - Digitalisation (HLUCs 5,7, 9)

Introduction – Presentation of Projects:

Platone: "Platone - PLATform for Operation of distribution Networks" responds to the call for proposals "Flexibility and retail market options for the distribution grid", and is promoted by a transnational consortium led by RWTH Aachen University, with the aim to develop and test a high technological solution capable of enabling energy flexibility mechanisms within an open and inclusive market. Platone offers new approaches for managing electricity distribution grids in view of the expected growth of variable electricity production while ensuring affordability of energy, security and stability of supply. Moreover, Platone provides a cost-effective, seamless and secure power supply for customers as active players while also combining flexibility measures, storage and demand response services with smart grid technologies.

The main focus of the project is to develop a multi-layer platform for the management of the distribution network and the operation of the market, creating a perfect integration of local prosumers in an open market structure and allowing the distribution network to operate safely and stably in the presence of large loads of energy from renewable sources with variable generation. The relevant platform architecture comprises a Multi-layered hybrid IoT/off chain vs DLT/Blockchain/Smart Contract. There is dual use of data for market and technical services, while legacy solutions are integrated. Regarding the PLATONE field tests and simulations, the reference implementation takes place in the Germany Lab (RWTH), while three additional test sites are considered (in Gemrany, Italy and Greece)

Austrian Projects

Green Energy Lab

'Spatial Energy Planning I & II': Digital tools and processes for integrated energy infrastructure planning are developed. With the help of digital, integrated planning tools, the development of sustainable energy infrastructures is coordinated. Moreover, issues of land use and urban development are identified considering the requirements of the energy transition. This paves the way for the planning and implementation of plus-energy quarters that produce large amounts of energy on site and are supplied with renewable energy.

It has been noted that the term integrated refers to cross-sector collaboration, since it is important to integrate the different sectors in the planning processes. In this respect, part of the project focuses on the Heating and Cooling sector, while the integration of the electricity and mobility sector is also considered.

'Zukunftsquartier 2.0' : The project won the price of ÖGUT Umweltpreis 2021 for excellent technical and social solutions. The project concerns the replicable thermally and electrically grid-supporting conception of (positive energy) districts in dense urban environments

The project also takes into account the integration of different sectors. The maturity level in the project is quite high (developing and combining different technical components for 100% renewable energy districts). It also refers to processes that can be scaled up for different use-cases.

Regarding innovation and future research (next steps after the conclusions received from the demonstration): the way to construct buildings and districts following the principals of circular economy is identified as a next step. Using these buildings for a high share of RES production is also identified as a big question for research.

NEFI

'EDCSPROOF' : The main goals of the project comprise the integration of renewables through energy storages, achieving waste heat recovery through heat pumps (<150°C), and the development of online, predictive and holistic, reconfigurable control concepts. Modelling and automising the relevant processes is a challenge. However, the heat pumps processes can be automised in order to offer flexibility to the grid and the market

'CE4T – CLEAN ENERGY FOR TOURISM': The project evaluates the water storage potential in ski regions. Additional flexibility options, as well as the potential to increase the RES penetration have also been examined. For instance it has been examined if the electric vehicles from energy communities can be used to increase renewables. The possibility of hydrogen has also been evaluated. The digitalisation aspect has been considered to monitor and optimise the energy needs of ski resorts, while also helping the supplier to use the relevant flexibility.

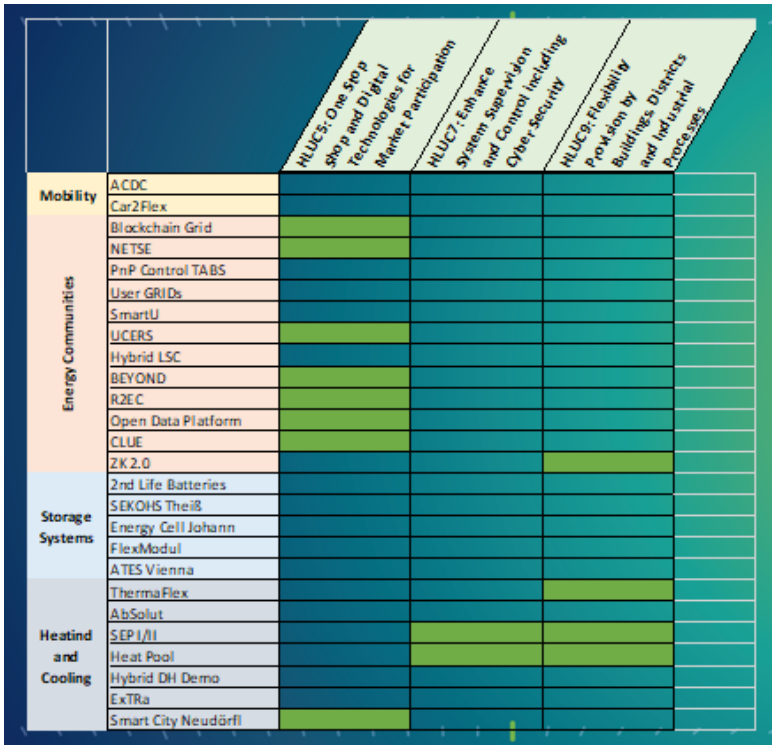
Platone

In relation to HLUC-5 a 'light node' has been developed that allows the certification of the energy exchange transactions with blockchain technology. It also enables the potential for flexibility to be available in distribution Grids with a simplicity of installation and interoperability and the ability to acquire measurements via smart meters. Moreover, the Flessibili application has been developed providing consumption measurement and visibility to the customer. The users can communicate the availability to offer flexibility toward the grids, while compensation is achieved through a digital wallet with a dedicated digital currency.
In relation to HLUC-7, The DSO Technical Platform (DSO TP) that has been developed is an innovative platform able to perform power flows, send flexibility requests to the Market Platform, perform technical validation of flexibility offers, and send set-points to flexible resources.
In relation to HLUC-9, 3 field tests in Italy have been considered in the project. In the first one, 'Smart Building Enea', a smart building is equipped with the most advanced automation technologies for the production and sustainable use of energy is considered in order to test the cross-border functionalities observed in the area. Moreover, the Citizens of the Energy Community of Centocelle ('Centocelle CEC') has been involved in the trial activities and equipped with enabling devices. The 'Collective Self Consumption' will start testing the Italian demo solution on a building block, equipped with a set of storage systems, photovoltaic panels and Light Node in order to enable them to the Local Flexibility Market in conjunction with self-consumption provisions.
Regarding the potential of considering the DSO Technical platform in new projects it has been noted that work is needed in the integration of the platform in a testing field in order to highlight the grid observability. Moreover, the local flexibility market for the EV sector is being implemented and should be considered in the relevant platform.
Question from the chat: is the platform compatible with CIM and CGMS (taking into account the network topology and the compatibility with ENTSO-E, etc.)?
Yes, the platform is compatible with CIM/CGMS (it can be implemented). Moreover, since the relevant work considers open resources, the DSO TP is completely interoperable with other software

SINTEG:
Regarding PPC 5.1 'Value of Consumer/Customer acceptance and engagement', successful ways to get the consumer's acceptance were sought in SINTEG. It is important to take the consumer/customer along the way of developing the technical features (SINTEG

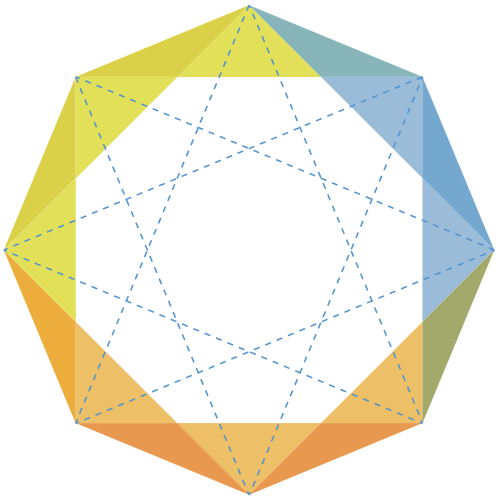
has focused on methods to do this). Customer acceptance in some cases was low. This is a significant barrier for the use of innovative technologies like smart-meters. Concerning smart-meters, in particular, the consumers do not understand the relevant benefits, or do not see the relevant need to use them, while data protection issues are also evident.
Platone representative: Customer engagement has been identified as an attention point also in the Platone project (and the application in Italy)
Regarding PPC 9.3 'Planning for resilient integration of buildings and infrastructures in an integrated energy system', the SINTEG representative noted that as far as handling complexity in ICT systems is concerned, SINTEG has contributed in the way to deal with the complexity when combining network operator systems with the operation technologies at the consumer side. This is quite complex, since there are so many different systems to integrate. This can also indicate issues, particularly when considering the security aspects by network operators. SINTNEG made contributions in how to develop architecture frameworks and tools to manage this complexity.
SGAM is used to model the system and to have a common language between the DSOs and the developers. SGAM is a bit difficult to be accepted in the beginning, however it proves quite useful at the end (so it needs to be used).

Austrian projects:
The projects have been allocated to HLUCs 5,7 and 9, as follows:



There are many Austrian projects related HLUC-5. In particular many projects in the cluster of energy communities and smart grids are developing platforms, ways to connect the users and ways to communicate/interact with them.
Only some projects are allocated to HLUC-7, since this is not a special focus on the green energy lab.
Some projects are addressing HLUC-9. One of the next steps is the market roll-out and scale-up, while also integrating the necessary stakeholders (like project developers and stakeholders from the building sector).
Regarding the distribution of funds among the HLUCs, it has been mentioned that there is a big focus in HLUC-5, while there are also high investments related to HLUC-9.
Regarding TSO/DSO, projects also focus on the relevant software and how to manage such systems (using data from geo-informatics systems, forecast data etc.). However, there are not projects with a main focus on TSO/DSO integration (broader topics are considered).

Regarding the industrial processes included in the projects related to HLUC-9, it has been noted that NEFI is focused on this. Green energy lab has not a strong focus on industrial processes, yet waste heat from industrial processes is integrated, while planning projects also consider the industry integration.



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