

## **Energy storage, Fuel Cells & Hydrogen. Bringing research and industry closer: accelerating innovation and uptake of new technologies**

Following a series of [introductory webinars](#) and coming on the heels of the [workshop on Wind Energy and Energy Systems Integration](#) that took place in Delft, Netherlands, in April 2022, on the 10th of May, the SUPEERA Project made a stop in Padova, Italy, to discuss research-industry cooperation practices and opportunities to accelerate innovation in two specific pathways: Energy Storage and Fuel Cells and Hydrogen technologies.

The full-day workshop, which took place in hybrid mode, was co-organised with EERA Joint Programmes ES and FCH and it allowed a fruitful knowledge exchange between the panelists and the participants. The main objective of the workshop was to facilitate knowledge exchange and promote a dialogue between the energy research community and industrial stakeholder.

The workshop was joined by 50 participants in presence and about 70 online, gathering professionals, experts and researchers across the EERA community, along with key representatives from energy industry in Italy. The workshop was divided into three main sections at the end of which a panel discussion offered the opportunity to boost lively discussions, animate insightful debates and encourage knowledge exchange activities.

### **Opening the workshop**

The workshop was opened by Prof. **Alberto Bertucco**, Head of the Interdepartmental Center Levi Cases, who introduced the topic by stressing the importance for the research community of considering economic and social aspects, in the challenge of achieving the objectives of Clean Energy Transition.

The first session continued with a keynote speech from Professor **Vito di Noto**, from the Department of Industrial Engineering of the University of Padova, on the topic of electrochemical energy storage and conversion systems with a focus on the Venetian Region. He highlighted that Veneto is one of the highest industrialized regions in Europe today, providing a picture of the production of secondary and redox flow batteries and of the practical implementation of the green hydrogen economy in the region.

**Ivan Matejak**, SUPEERA's coordinator and Operations Director from EERA, after giving a brief overview over the Project's objectives and partnership, presented the purpose, aims and expected results of the workshop. He also brought to the audience's attention the dynamism of the R&I in the energy transition by reminding of the rich European regulatory framework that has been produced in the latest years, i.e. EU Set Plan, European Green Deal, the Recovery Plans and the recent REPowerEU plan.

Next, **Maria Oksa**, Senior Scientist and Project Manager at VTT, expanded on the contents of the REPowerEU plan based on the two Energy Storage and Hydrogen. Maria Oksa presented the key findings on NECPs' best practices (regional cooperation in research, regulation, projected storage capacity, remote areas and circular economy) and gaps in energy storage among Member States. Emphasis was finally placed on the EU Clean Hydrogen Partnership and to the calls for proposals under its scope that have been launched this year.

## Collaboration between research and industry: best practices, barriers and replicability potential

**Myriam E. Gil Bardají**, Manager of the Joint Programme (JP) Energy Storage, followed with an overview on the JP's structure, mission and activities, underlining the importance of collaboration and mobility among European Universities and other research institutes in order to encourage the involvement of students in the activities of the JP and to foster the JPs' ability to usefully influence industry.

The workshop continued with **Stephen Mc Phail**, outgoing coordinator of the JP Fuel Cells & Hydrogen, who gave an introduction on the JP's positioning in the Hydrogen Panorama of research and development and its collaboration with industry in Europe. In his closing remark he underlined the need to "preserve research freedom while maintaining scientific acumen and upholding unbiased investigation into the role of hydrogen in our society".

After the first round of contributions coming from the research sector, the perspective of the industrial sphere was delivered by representatives of the two main Italian energy suppliers: ENI and ENEL.

**Andrea Bernardi**, Head of Solar Storage & Bioenergy technologies at ENI, illustrated ENI's vision and approach to energy storage and underlined that ENI has adopted an open innovation model thanks to which the applied technology derives both from internally born ideas and from the external network, made up of universities, academies, and research centers. One successful example of this collaboration can be traced to the cooperation between ENI and the [Polytechnic of Milan Joint Research Center](#) aimed at elaborating a Battery Energy Storage System Modeling and Monitoring.

Going from a global energy sector leader to another, ENEL's best practice in the field of renewables was presented by **Paolo Prevedello**, Hydrogen Innovation Project Engineer at ENEL Green Power, who, after introducing the company's aims and work, described the [NextHy Initiative](#) on how to foster green hydrogen competitiveness with an Open Innovation Approach. NextHy is an innovation platform whose goal is to speed up the commercial maturity of all technologies that allow to produce green hydrogen sustainably and competitively. The new platform will take full advantage of the Catania Innovation Hub&Lab, one of the largest and most advanced industrial innovation districts for renewable technologies worldwide.

### Panel discussion and Q&A

The first section of the workshop prompted an active Q&A session and panel discussion, both on-site and online, which was moderated by Ivan Matejak. **Adelbert Goede** from DIFFER commented that safety aspects of H2 technologies need to be taken into consideration both at a regulatory and implementation level. Linking back to Mr Goede's observation, **Prof. Bertuccio** first underlined that the community should only support *green* H2 technologies. He mentioned challenges from transporting H2 underlining that comprises a great solution when it is produced and consumed locally. In response to Prof. Bertuccio's comment, **Mr Bernardi** added that in the short term we should instead leverage on blue Hydrogen as a means to start

the transition towards a H2 economy. The first session was wrapped up by **Myriam E. Gil Bardají**, who underlined the importance of fostering mobility schemes between industry and university, in a perspective of structured collaboration and enhanced improvement of both sectors.

### **Cross-sectoral dialogue for system solutions towards the CET objectives**

The second session of the workshop focused on cross-sectoral dialogue for system solutions towards the CET objectives. **Spyridon Pantelis**, Project Manager at EERA, highlighted the importance of facilitating the dialogue on cross-cutting issues (e.g. policy, regulation, education etc.), presenting the outcomes of the [analysis and categorization](#) of these issues that was performed in the framework of the SUPEERA project.

The floor was then given to **Dina Lanzi**, Head of Technical Business Unit Hydrogen at SNAM, who displayed the role of SNAM as an enabler of the hydrogen value chain. Ms Lanzi explained SNAM's 10-year view, by outlining the potential of SNAM's existing gas pipelines in the future distribution of Hydrogen with the aim of creating an efficient energy system and to connect Italy to the EU H2 Backbone.

The session continued with **Stefano Passerini**, [StoRIES](#) Project Coordinator at KIT, who, following an introduction on the Project's main objectives and outcomes, reinstated that energy storage must be prioritized being the key to renewable energy, energy independence and decarbonization.

**Alessandro Romanello**, ETIP (European technology and innovation platform) on Batteries coordinator, presented Batteries Europe, undertaking the role of shaping the EU battery ecosystem in Europe to effectively support the industrial uptake of innovative energy storage technologies. Mr. Romanello explained the actions through which Batteries Europe can contribute to accelerate innovation and to support the industry, underlining the strong collaboration between the different entities and stakeholders across Europe (i.e. Industry, academia and Member States representatives).

**Maidor Zarrabeitia Ipina**, Postdoctoral Researcher at KIT, wrapped up the second session presenting two best practices in the field of R&I: the [SIMBA](#) Project, whose aim is to develop a highly cost-effective, safe sodium-ion batteries and the SPIRIT Project, started in October 2022 with the purpose of creating sustainable and cost-competitive potassium-ion batteries.

### **Panel discussion and Q&A**

Throughout the second Q&A session, the discussion was framed around the economic feasibility of the battery storage systems. **Alessandro Romanello** mentioned that the research arena is hosting a discussion in order for all green energy production to be economically feasible. In the same line, **Manuel Baumann** from KIT (JP ES) raised the issue of the increasing prices of raw material for batteries with a parallel increase of their demand, which drives up the prices of battery storage. There was a consensus among the attendees that the economic feasibility of ambitious projects is a decisive success factor towards CET.

### **Towards EU's strategic autonomy: The crucial role of energy storage and hydrogen**

The third and last part of the workshop was moderated by the two Joint Programs' coordinators, Stephen McPhail and Stefano Passerini and it aimed at investigating the crucial role of Energy storage and Hydrogen within EU's strategic autonomy.

**Linda Barelli**, Associate Professor at the University of Perugia, gave a presentation on Chemical Energy Storage with a focus on an Italian case study. She also presented the SBAM Project, funded by the Italian Ministry of Ecological Transition with the objective of fostering research on energy storage through salt-water batteries.

An interesting perspective was then given by **Vincenzo Mulone**, from University of Rome Tor Vergata, who presented the potential role of biomass in linking energy storage and hydrogen, by underlining the benefits linked to the exploitation of biomass, which other than being cheap and abundant, is also a resource from which H<sub>2</sub> can be synthesized without combustion.

**Giovanna Cavazzini**, from Interdepartmental Center Levi Cases at the University of Padova (UNIPD), focused on hydropower and energy storage, underlining the lack of R&D funds for hydropower. After presenting UNIPD's research on innovative design and control strategies in collaboration with industries, she shared her concern for the fact that hydropower, being considered a mature technology, has not been allocated any funds for R&I in the latest years. In light of this, Ms. Cavazzini underlined that in order to effectively face the new emerging challenges, hydropower will need more attention from the Academia, the institutions and the industry.

**Klaus Taube**, Representing Director of the Institute of Hydrogen Technology, introduced the topic of underground storage, liquid organic hydrogen carriers and compression, presenting the [H2CAST](#) project, focusing on the adaptation of existing gas caverns and relevant surface facilities as part of the transition process to an H<sub>2</sub> economy.

**Xavier Granados**, Senior Scientist at CSIC-ICMAB, presented the role of magnetic field and superconductors in energy storage and the concrete ways to use them, highlighting the availability of these materials in the market.

Afterwards, **Paulo Ferreira**, Group Leader of the Atomic Structure-Composition of Materials at INL, took over with a presentation on the potential of advanced instrumentation, in particular microscopy and spectroscopy, for monitoring and understanding fuel cells.

Lastly, **Madalina Rabung**, Scientist and Project Manager at Fraunhofer IZFP, provided an overview of the upcoming calls of Horizon Europe for 2023-24, of particular interest to the members of the JP ES and JP FCH.

### **Panel discussion and Q&A**

In the panel discussion that followed, two interesting issues animated a fruitful exchange of views between audience and speakers: the first would refer, again, to the costs of the implementation of some of the aforementioned green technologies and the second about what would be the optimal geographical distribution of different kinds of energy storage technologies in Europe, taking into account each area's distinctive features in terms of potential production of green energy solutions.

### **Conclusions**

Promoting the uptake of new technology in the Energy Storage and Fuel Cells and Hydrogen sectors demands a steady collaboration between Academia and Industry in order to be able to materialize and concretely implement what has been designed at a more theoretical level.

By organizing this kind of events, the SUPEERA Project aims at boosting connections among different areas of the sustainable energy production sector and several categories of actors involved within each area. One of the next SUPEERA workshops of the series will focus on Energy Storage and Concentrated Solar Power, and it will take place in Almeria, Spain between 15-17 November 2022 with the participation of the respective EERA Joint Programmes.

The recording of May's workshop will be available at [this link](#).