Introduction on PTR22_24 Project 1.2 on Electrochemical Energy Storage.

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Ricerca di Sistema (RdS) funding scheme has been promoting R&D activities on the battery field in Italy since early 2000s. The integrated project "Electrochemical and thermal storage technologies" involves CNR, ENEA and RSE in the three-year plan PT 22-24 for the achievement of the decarbonisation by 2050. RdS mainly aims at technical and technological innovation of general interest for the electricity sector which has as its objective the improvement of economy, safety and environmental compatibility, to ensure Italy the conditions for sustainable development. The approach is aimed at the technological development of storage systems along the entire value chain, embracing the various sectors or constituent segments from raw materials to advanced materials, systems and recycling.

Energy storage is a key element in the decarbonization process, and batteries are playing an important role and will be beneficial for the green energy transition goals. New chemistry should flank the Li-ion batteries in fulfilling all the different energy storage applications to achieve more flexibility, reliability and more environmental, economic and social sustainability.

Particular attention is paid to material R&D aspects, as they are responsible for 60% of the total cost of the technology and closely related to battery's safety. The greatest effort is directed towards less expensive and more sustainable active materials from an environmental point of view. This discussion is aimed both at more mature technologies, and at frontier technologies, with the aim of consolidating and validating their performance with a view to developing the sustainable battery of the future. Furthermore, studies on cell and battery eco-design are proposed, working on the production processes of components, thinking about disposal, reuse and recycling with a view to circularity and sustainability. Finally, sustainability analyses are proposed through LCC, LCA and socio-economic impact studies, as well as chemical-physical modeling activities on materials, interfaces and the complete cell and simulation modeling activities of the entire storage system.

In this temathinc workshop will be presented results from the entire consortium involved in the project: 11 Italian Universities and 3 national research organizations.