Towards sustainable mobility: next generation lithium batteries, reuse, and recycle

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The battery market is one of the pillars for the growth of the European economy. It is expected that 90% of the cell production capacity from EU gigafactories will supply the automotive industry by 2030, the main application contributing to the reduction of greenhouse gas emissions. The value of the European battery industry will increase from €15 billion to €35 billion by 2030. Battery production is therefore not without cross-compliance issues due to the complex electrochemical and material composition and the associated risks from the use of environmentally hazardous chemicals: GHG emissions per kWh of lithium-ion battery cell production range from 40 to >60 kg CO_2-Eq in 2020.[1]

It has been estimated that more than 700 GWh of LIBs were placed on the market in 2021 and more than 170 GWh went for recycling.[2] Considering that worldwide governments are investing in battery electric vehicles (BEVs) these capacities are inevitably expected to grow. Analysts agree that the penetration of LIBs in the automotive market will lead to an estimated demand >500 GWh energy production in 2025 and >2000 GWh by 2030.[3] This trend makes ever more urgent the development of more efficient and safe batteries, and the boosting of battery recycling for several reasons, e.g., the safe management of a huge amount of wastes including many toxic components, and the securing of healthy supply chains.[4]

In this seminar, I will discuss the most recent developments in terms of battery technology, as well as the possibility of reuse and recycling.

[1] C. Xu et al., *Resources, Conservation and Recycling* **2022**, *187, 106606.*
[2] *Benchmark Mineral Intelligence – Trends for 2021, AABC Europe,* **2021**.
[3] C. Ferrara, R. Ruffo, E. Quartarone, P. Mustarelli, *Adv. Energy Sustainability Res.* **2021**, *2, 2100047.*
[4] A. Yoshino, in *Li-Ion Batteries, Advances and Applications (Ed: G. Pistoia), Elsevier, Amsterdam* **2014**.