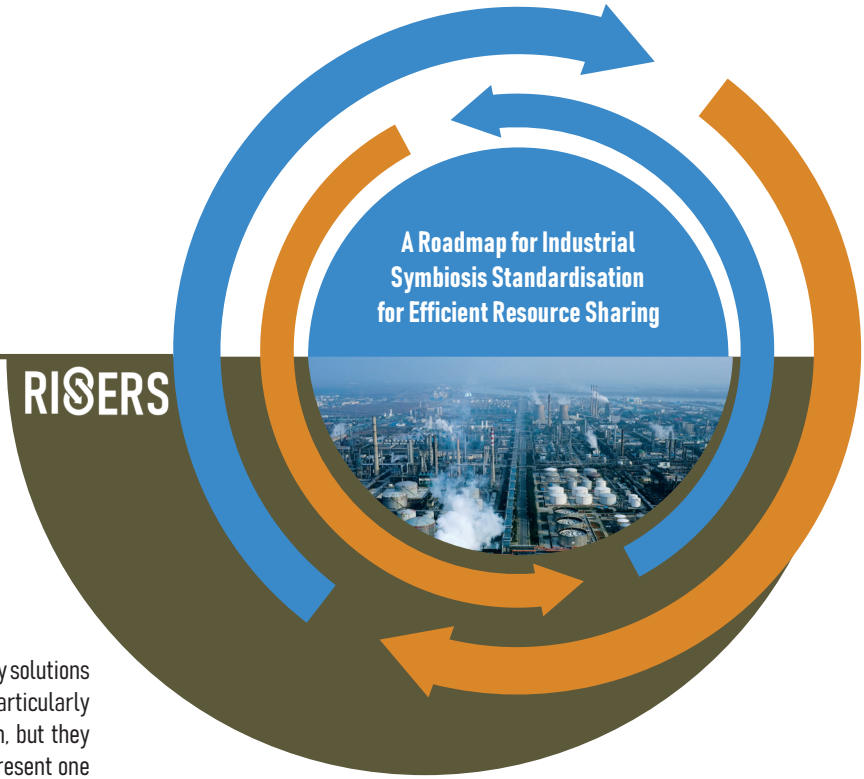
Synergy Fact Sheet

EV-BATTERIES

Recover Lithium and other rare earth elements, reuse for energy storage



Introduction

The shift towards electrified transport and the increasing use of clean energy solutions is changing the global energy landscape. Electric vehicle batteries, particularly lithium-ion batteries, play a crucial role in the broader energy transition, but they are not the sole or central element driving this change. Instead, they represent one of many complementary technologies contributing to greater sustainability. As the market for electric vehicles continues to grow, efficient life cycle management for these batteries is becoming increasingly important. Reuse and recycling are essential strategies to reduce the environmental impact of EV batteries while ensuring the sustainable use of critical resources such as lithium and rare earths (Jose et al., 2024). Rare earth elements (REEs), which are an essential component of energy conversion technologies such as EV batteries and wind turbines, are both scarce and difficult to extract and recycle. With demand growing at 10% annually, recycling rare earths is becoming an important addition to traditional mining practises. However, current recycling rates are extremely low — only 2% — highlighting the urgent need for advanced technologies to improve separation and processing efficiency (Patil et al., 2022). By addressing these challenges, the industry can promote a circular economy, reduce reliance on newly mined materials and minimise the environmental damage associated with mining and disposal.

Supplying sector(s)

Transport

Transport

Receiving sector(s)

Energy

Minerals

Energy, Minerals

TECHNICAL FEASIBILITY

Industrial scale: The reuse and recycling of electric car batteries can be extended to a significant amount of end-of-life devices. This scalability ensures that the growing demand for sustainable resource management in the transport and energy sectors can be effectively met.

High technical requirements: The recovery of valuable materials such as lithium and rare earths requires sophisticated technologies. Processes such as hydrometallurgical extraction and solvent-based separation require advanced equipment, precision and technical expertise to achieve high recovery rates while protecting the environment.

PPP IMPACT – EU wide potential

Profit

Wins in industry

The reuse and recycling of electric car batteries has significant economic benefits, generating around EUR 2 billion annually for the EU economy. These practises reduce material costs, improve supply chain resilience and create new market opportunities in energy storage and materials (Drabik et al., 2018)

Planet

Environmental gains

The recycling and reuse of EV batteries offer significant environmental benefits, avoiding an estimated 1.5 million tonnes of CO_2 equivalent per year. By 2030, approximately 130 GWh of lithium-ion batteries are expected to reach the end of their life, requiring a recycling capacity of 700 kt to manage this volume effectively. This capacity is projected to grow further, with an estimated 400 GWh of batteries requiring recycling by 2040 (ADlittle, 2022). This approach aligns with EU climate goals as it conserves natural resources, reduces landfill waste, and mitigates the environmental impact of mining (Drabik et al., 2018).

People

Wins for society

The expansion of electric car battery recycling initiatives is expected to create over 20,000 direct jobs across Europe. These efforts support skills development, encourage innovation and strengthen local economies, contributing to a more sustainable and equitable future for all (Drabik et al., 2018)

REFERENCES

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About this factsheet

This fact sheet is based on the findings of the RISERS project. Led by Ghent University with the support of project partners, the study involved a systematic assessment of 600+ industrial symbiosis (IS) cases across urban-industrial and cross-sectoral clusters in Europe. These cases formed the basis for the mapping of over 300 MES (Materials, Energies, Services) streams, categorised by output (source) and input (sink) sectors.

The fact sheet provides a detailed overview of a high-potential and high-impact IS synergy, evaluating its implementation feasibility and sustainability impact. Supported by data from public databases (MAESTRI, SCALER, EPOS, AIDRES, etc.) and literature, it offers a generalised insight into the economic, environmental, and social benefits per synergy.

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For more information and access to the full reports, please visit https://risers-project.eu

About the RISERS project

RISERS is a Horizon Europe project aimed at developing an Industrial Symbiosis Standardisation Roadmap supporting the uptake of high impact synergies and resources considering:

- identification of the needs, gaps and opportunities,
- revision of current standards and standardisation efforts relevant for CE and the priority synergies and resources,
- initiating the process of new standards development (especially for newer technologies and pilot-scale synergies).

The RISERS project was launched in January 2024 with a duration of 3 years.

For more information visit: https://risers-project.eu

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