SOLMATE

Reuse of **SOL**ar PV Panels and EV Batteries for low cost decentralised energy solutions and effective Recycling of critical raw **MATE**rials from their EoL products

General Presentation

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Project overview

Grant agreement no: 101138374

Coordinator: VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (VITO)

Funding Scheme: Horizon Europe IA (Innovation Action)

Participants:

🌍 **16** partners from **6** countries

Belgium, France, Germany, Italy, Luxemburg, Spain

⏳ **Duration:** 1st January 2024 to 31st December 2027

💵 **Project budget:** EUR 7.4 Million with a EU contribution of EUR 6.1 Million

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Consortium

- 4 research centres
- 10 SMEs
- 2 Large enterprises
- From 6 EU countries

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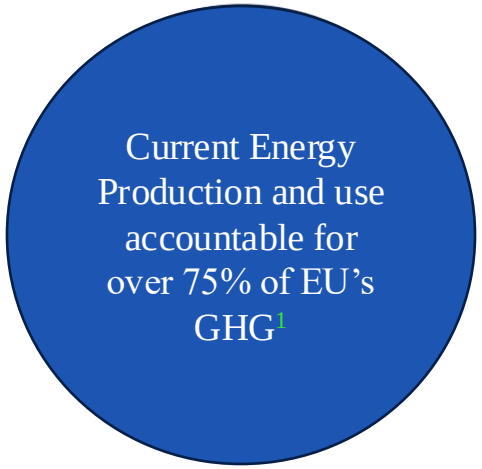
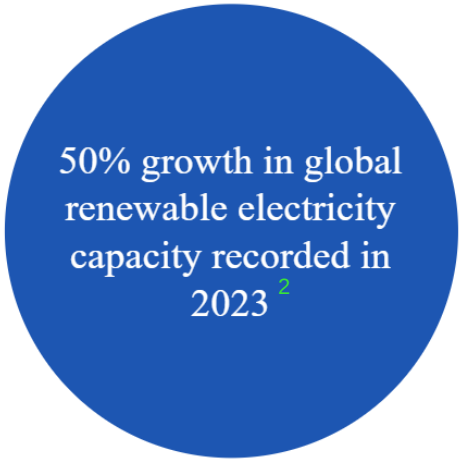
Key drivers of our initiative

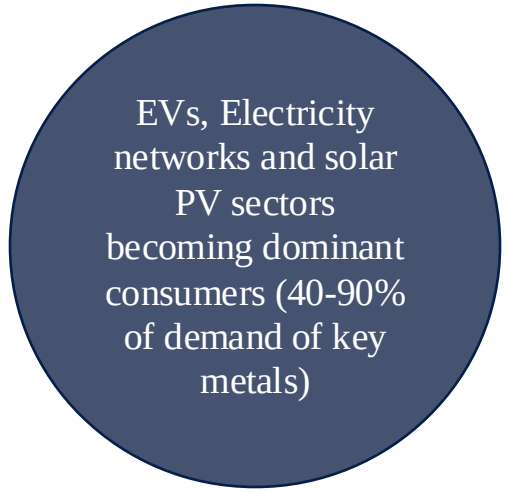


Importance of addressing energy-related emissions



Increasing reliance on clean energy sources

Projected 2x global metal consumption by 2050[3]



Urgency for sustainable resource management in the face of increasing demand fuelled by the energy transition

1. Energy and the Green Deal (europa.eu)
2. Executive summary – Renewables 2023 – Analysis - IEA]
3. Executive summary – The Role of Critical Minerals in Clean Energy Transitions – Analysis – IEA

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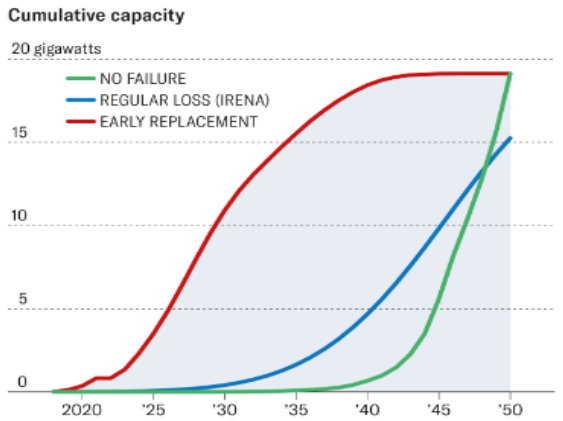
Motivation

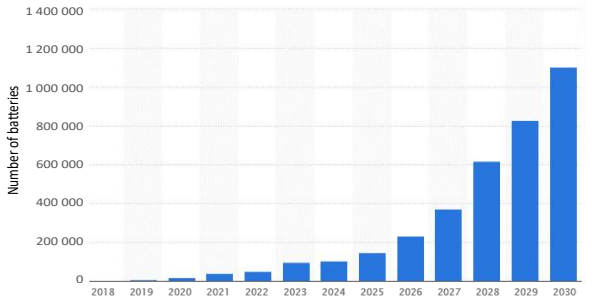
- **EU's green transition** is putting pressure on the **availability of CRMs** that are needed for manufacturing **batteries** for energy storage and **PV panels** for energy generation

- Market developments in PV technologies and EV are making large quantities of secondary resources available, generating **resources and waste management challenges**

- SOLMATE introduces a **circular approach** through **extending the lifetime** of 'retired' PV panels and EV batteries and **resource recovery** when repurposing is not possible.



Higher efficiency of new PV modules are pushing owners to replace pre-maturely their PV.[1]



EV batteries available for recycling in the EU between 2018 and 2030 are projected to increase rapidly.[2]

1 Atasu, A. et al., (2021). "The dark side of solar power", Harvard Business Review. (URL)
2. EV batteries: expected end-of-life stock EU 2018-2030 | Statista

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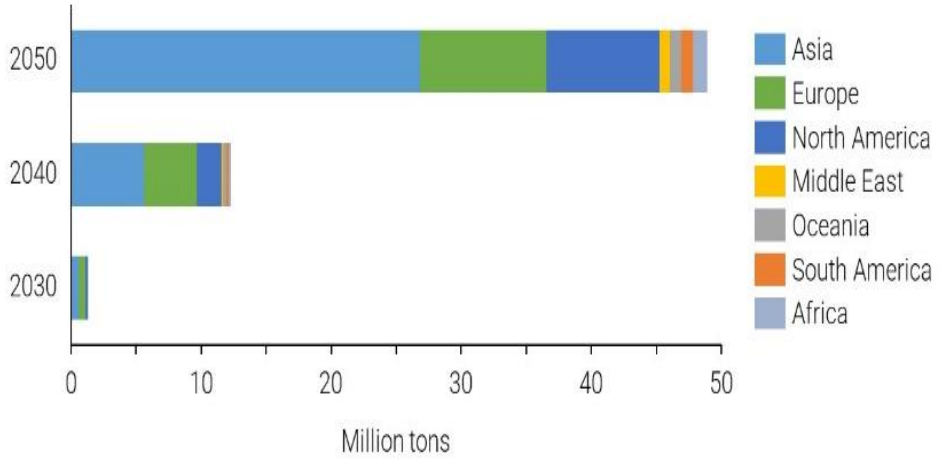
Challenges and opportunities

Challenges for using PV panels and EV batteries in 2nd life applications:

1) **Assessing and sorting** the **massive amount of used PV panels** with low-cost techniques/methodologies for different business

2) Developing low-cost test and associated **certification procedures** for PV panels and EV batteries in 2nd life applications to gain **customers trust and improve the market penetration.**



Estimated PV waste volumes by continent in the coming decades (URL).

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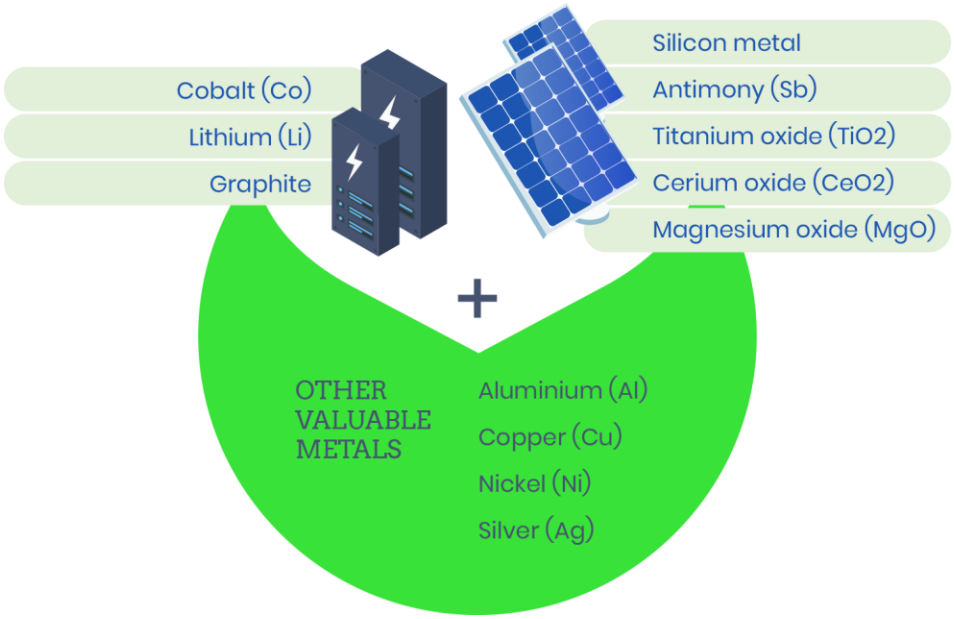
Challenges and opportunities

Challenges for using PV panels and EV batteries in 2nd life applications:

3) Developing **solid business models with unique value proposition** for 2nd life decentralised energy demonstrators for different categories of end-users based on thorough techno-economic and life cycle assessments.

4)Building a **new value chain that can manage sustainably** all aspects related to the reuse and recycling of PV panels and EV batteries in EU and the rest of the world to fight illegal shipment and leakage of resources.



SOLMATE 2nd life applications keeps valuable materials in use (source: SOLAMTE GA)

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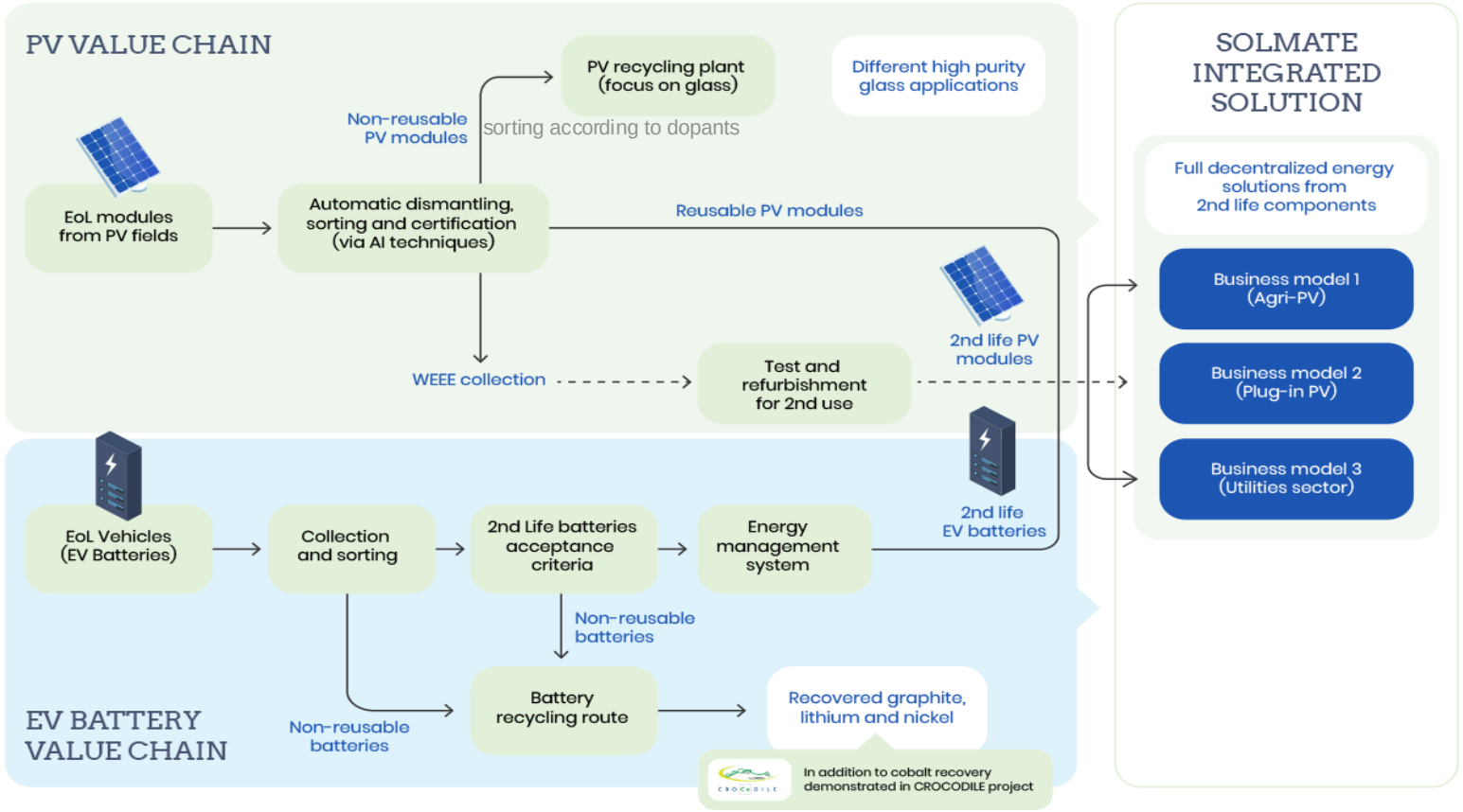
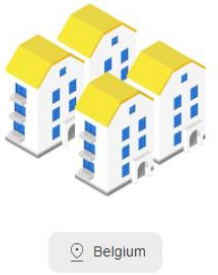
CONCEPT

Develop and demonstrate viable and guaranteed low-cost **decentralised energy systems for different emerging markets** based on the **reuse of batteries from End-of-Life (EoL) EV and used PV solar panels** (i.e., repowering from PV farms), including technologies that **improve the purity and increasing the recovery of (critical) raw materials** from EoL EV batteries and PV that cannot be reuse.



3 Demo sites



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Objectives

SOLMATE project aims to set up solid foundations of a new value chain for the sustainable reuse and recycling of PV solar panels and EV batteries in interesting emerging markets and high added value applications.

Specific Objectives:

SO1. Cost objectives for the main components of a decentralised energy system (PV and battery): achieving around 40-50% lower CAPEX of decentralised energy systems guaranteed for 10+ years, targeting the selected emerging markets.

SO2. Develop methodologies and reliable autonomous and smart integrated technologies to reduce the cost (<2 €c/Wp) of inspection, characterisation, certification, dismantling and sorting of PV panels.

SO3. Reduce the cost of EV batteries for 2nd life to 60€/kWh, and warrantee performances for 10+ years in stationary applications.

SO4 Integrate sorting and purification technologies for PV glass containing CRMs from EoL industrial PV panel recycling lines. Impurities in the glass as low as 0.01% will be detected by XRF within less than 1 minute.

SO5. Refining and purifications of CRMs from the recycling of EoL EV batteries focus on Li, Ni, and graphite as sellable products.

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Waste Hierarchy as guide in SOLMATE

- Waste hierarchy guides sustainable waste management by prioritizing actions:
  - Prevention: Avoid waste by extending product life and using resources efficiently.
  - Reuse: Repurpose items in their current form to extend their utility and delay waste.
  - Recycling: Recover valuable materials to reduce demand for new resources.
  - Recovery: Extract energy or resources from non-recyclable waste.
  - Disposal: The last resort; minimize landfill or incineration without energy recovery.
- This approach supports resource efficiency, environmental protection, and a circular economy.

The expected outcomes of SOLMATE are technologies and knowledge that will empower the first 4 steps of the “waste hierarchy” and reduce to minimum the last step (disposal).

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Expected Impacts

- Knowledge and technologies designed **to empower the first 4 steps of the waste hierarchy**
- **Enable industry-driven value chains**
  - Decentralised energy pilot for different markets and locations (Agripv, etc.)
- **Reduce Europe's dependence** on metals usually sourced from third countries
- **Pioneers low-cost decentralised energy solutions** for diverse markets, promising solutions not only to sustainable energy but also resource management:
  - 10-year extension for PV module lifetime demonstrates minimising environmental impact
  - low-cost decentralised energy solutions to economically challenged communities

The expected outcomes of SOLMATE are technologies and knowledge that will empower the first 4 steps of the "waste hierarchy" and reduce to minimum the last step (disposal).

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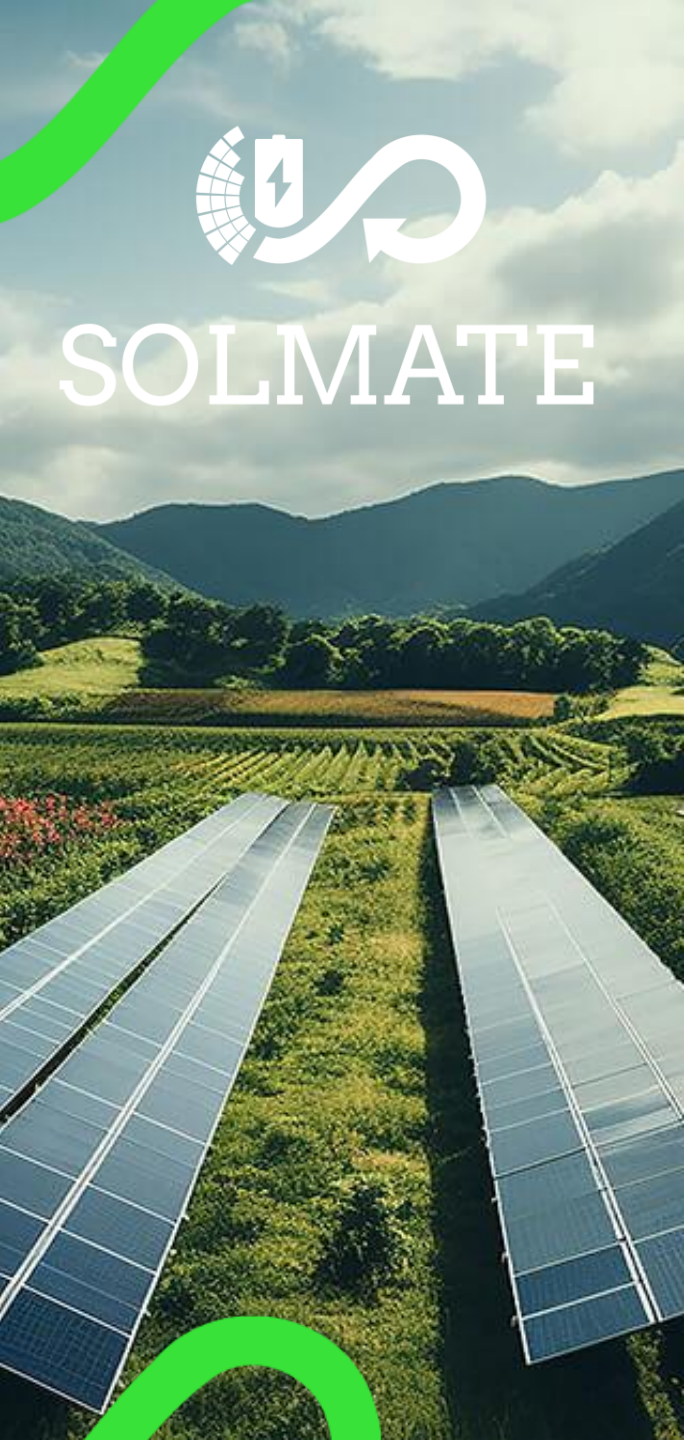

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https://www.solmate-project.eu/

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SOLMATE Horizon Europe

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