EV Battery – Yesterday’s Scrap is Tomorrow’s Gold
Consortium Project

Start: February 2020
End: September 2020
Status Quo:

- Current batteries & battery systems are only designed for the first phase of their life.
- The aging process of batteries and the State of Health (SOH) after their first use is currently unknown.
- Re-use and recycling of batteries imply high tear down costs and efforts.
- There is no prevailing battery concept which focuses on sustainability and second use both in terms of the product and the process.

Approach & Results:

- Formation of a consortium of 5-12 companies to formulate study hypotheses.
- Disassembly and testing of various battery packs (different manufacturers, cell types etc.), SOH determination, component analysis and assessment.
- Detailed overview of industry benchmarks and a best-practice of various aspects of battery components and their suitability for recycling.
- Profound economic and technological evaluation of the conducted tests and overview of the state of the art of batteries and battery systems on the market.
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Join the consortium project to prepare for future battery innovations

Your Benefits:

• Design and influence the content of the study to acquire specific knowledge according to your needs.
• Get an overview of industry standards and state of the art battery and battery system concepts as well as an assessment of innovations suitable for Re-X.
• Profit from the understanding about upcoming needs and developments in the field of battery engineering.
• Learn from partners along the value chain.

Project Framework:

• Project start: January 2020
• Project duration: 9 months
• Minimum number of participants: 5 project partners
• Costs for consortium participants: 19,980 €
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Within the project, specific questions in four basic focus topics are analyzed

**Design Concepts**
- Integration & case concepts
- Crash design & external protection
- Dominant module & cell design
- Tolerance compensation
- Materials design for recycling
- …

**Remanufacturing**
- Connection concepts (screws, glue)
- Cell housing (pressed, welded)
- Design cell connections
- Cell analytics (SOH, aging)
- Circulation of parts and materials
- …

**Recycling**
- Pre-sorting concepts
- SWOT analysis of existing Li-/Co-recovery concepts and processes
- Zero waste /“green metallurgy®” approaches
- …

**Life Cycle Sustainability Assessment**
- Circular economy concepts
- Environmental performance evaluation
- Social performance evaluation
- Resource efficiency validation
- …

The consortium will complete the list of topics and questions which will then be answered in the project.
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The consortium project offers potential for participants along the whole value chain

Consortium project
- Battery Design Concepts
- Remanufacturing
- Recycling
- Life Cycle Sustainability Assessment

Battery (component) manufacturers
- Manufacturers of cooling system
- Contacting manufacturers
- BMS manufacturers
- Material manufacturers
- ...

Automation, equipment manufacturers
- Process automators
- System engineers
- Testing and sensor equipment manufacturers
- ...

Research institutes

OEMs
- Module and pack assembly
- System integrators
- Users perspective
- ...

Manufacturers of cooling system
Contacting manufacturers
BMS manufacturers
Material manufacturers
...
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Project timeline

Kick-Off Meeting
- First meeting of all consortium partners
- Overview of consortium project
- Input from the consortium partners on preferred focal points
- Decision on the exact project scope

Participation of whole consortium recommended

January

Working Phase I
- Battery disassembly & testing
- Analysis pack & module level
- Concept assessments

Work is done by RWTH Aachen

February - August

1st Intermediate Meeting
- Presentation of intermediate results
- Discussion on current findings
- Discussion on product/process innovations

Participation of whole consortium recommended

Working Phase II
- Battery disassembly & testing
- Analysis pack & module level
- Concept assessments

Work is done by RWTH Aachen

2nd Intermediate Meeting
- Presentation of intermediate results
- Outlook to final report
- Discussion on current findings

Participation of whole consortium recommended

September

Final Presentation
- Presentation of project results

Participation of whole consortium recommended
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Partners who conduct the consortium project are leading experts in their fields

**Research institute of the RWTH Aachen University, Germany**

- Focus: production technologies of electric powertrain & manufacturing-oriented designs
- Optimization of development process from raw materials to Re-X

**IME**

- Research institute of the RWTH Aachen University, Germany
- Active in the fields: extractive metallurgy, electrolysis and recycling of metals & residues
- Leading in field of process design and optimization in terms of resources efficiencies

**NaB**

- Research institute of the RWTH Aachen University, Germany
- Facing the challenge of sustainable development and environmental protection
- Assess and improve sustainability performance for buildings, automotive industry etc.

**PEM Motion**

- Born out of the idea to make electric mobility sustainable and affordable
- Goal: bring new mobility innovations into series production
- One main focus: consulting and development services for lithium-ion batteries
The consortium project offers benefits on various levels

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<thead>
<tr>
<th>As a partner you determine the content of the study</th>
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<td>You define the focus of the project under consideration according to your interests and objectives.</td>
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<th>Partners along the value chain are involved</th>
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<td>Benefit from discussions and benchmarks of other partners.</td>
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<th>The conducting partners have high level of expertise</th>
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<td>Benefit from a productive experience exchange while we guarantee the high professional level of the study.</td>
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<th>Receive an exclusive report of the study</th>
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<td>Besides the official and published report, you will receive an exclusive partner report.</td>
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Your contacts

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