

LEADING THE CHARGE:

TRANSFORMING HEAVY EQUIPMENT FOR A ZERO-EMISSION FUTURE

Today, as the world contends with environmental challenges, the European Regional Development Fund (ERDF) is championing an initiative that promises to reshape the future of heavy mobile equipment. The World Class Zero Emission Mobile Equipment project, a collaboration that marries cutting-edge technology with sustainability, aims to create zero-emission vehicles.

Bridging Technology and Sustainability

The World Class Zero Emission Mobile Equipment project is more than just an ambitious endeavor; it represents a vital leap towards addressing the pressing issues of our time—energy transition, digitization, and raw materials scarcity. By focusing on heavy mobile equipment such as the Empty Container Handler (ECH) and the Hooby Narrow Gauge, the project aims to eliminate CO₂, NOx, particulate matter, and noise emissions. This not only positions the initiative at the forefront of environmental stewardship but also sets new standards for industrial performance.

Four Pillars of Innovation

In the pursuit of transforming heavy mobile equipment towards a zero-emission future, the World Class Zero Emission Mobile Equipment project stands on four pillars of innovation. These pillars not only guide the project's objectives but also underscore its commitment to sustainability and technological advancement.



Modular and Scalable Technology

The heart of the project lies in its commitment to developing technology that is both modular and scalable. This approach ensures that innovations can be seamlessly integrated into various types of mobile equipment, broadening the scope and impact of the project. By creating adaptable technology solutions, the project promises widespread applicability and long-term viability.



Revolutionizing the Heavy Mobile Industry

Innovation in the heavy mobile industry is no small feat. The project aims to drive

significant advancements, setting new benchmarks for sustainability and efficiency. By leveraging the latest in technology and research, the consortium is poised to redefine industry standards and pave the way for a cleaner future.



Enhancing Battery Circularity

A critical component of the project is the focus on battery circularity. Enhancing the value chain of battery packs and modules ensures that they are utilized efficiently and recycled responsibly. This not only extends the life cycle of batteries but also reduces the environmental footprint of mobile equipment.



Achieving CO₂ Emission Targets

In alignment with Dutch and European environmental goals, the project is dedicated to drastically reducing CO₂ emissions. This commitment underscores the initiative's role in combating climate change and promoting sustainable practices across industries.

Meet the Innovators Behind the Project



Hyster Yale Nederland BV

As the project leader, Hyster Yale Nederland BV brings its extensive expertise in mobile equipment development to the table. Their industry knowledge and commitment to innovation are crucial in steering the project towards its ambitious goals. By leveraging their experience, Hyster Yale ensures that the project is grounded in practical, achievable solutions that can be implemented across the industry.



Hobelman Halle BV

Hobelman Halle BV specialises in sustainable products and practical field applications. Their role in the project involves integrating cutting-edge sustainable solutions into mobile equipment, ensuring that these innovations are not just theoretical but practical and impactful. Hobelman Halle's expertise in real-world applications helps bridge the gap between research and deployment.



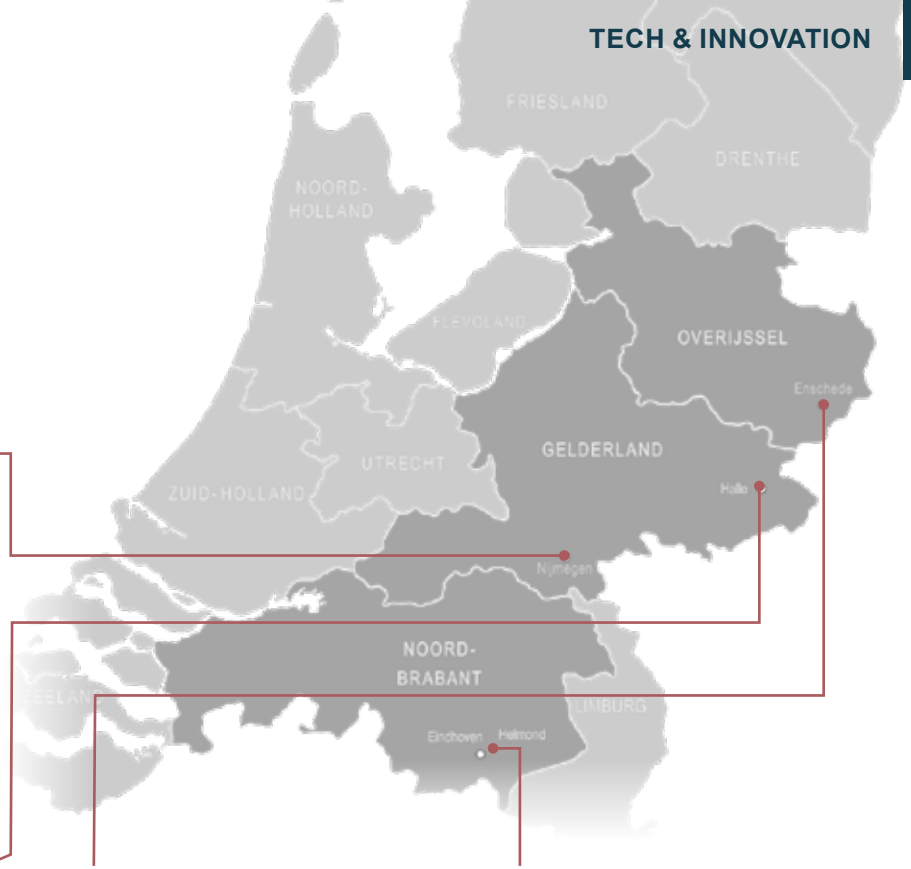
University of Twente

The University of Twente stands at the forefront of the project's research and development efforts. Focused on battery technology and sustainability, the university's contributions are pivotal in advancing the technical aspects of the project. Their research explores novel technologies and methodologies that push the boundaries of what's possible, driving the project towards groundbreaking innovations.



ACE Mobility (part of HAN)

ACE Mobility plays a critical role in bridging automotive education and industry. By facilitating knowledge exchange and driving research initiatives, ACE ensures that the project remains at the cutting edge of innovation. Their involvement helps to foster a collaborative environment where industry and academia can work together to solve complex challenges.



University of Twente: The Research Engine

The University of Twente is integral to the success of the World Class Zero Emission Mobile Equipment project. As a leading research institution, the university plays a crucial role in advancing the frontiers of innovation and sustainability in heavy mobile equipment. Their efforts are concentrated on three key areas:

Innovative Research

The university is committed to exploring cutting-edge technologies that enhance the sustainability and efficiency of heavy mobile equipment. By investigating new designs and processes, they aim to develop solutions that are both effective and practical.

Promoting Circularity

Leading the charge in enhancing battery circularity, the University of Twente focuses on ensuring that battery components are reused and recycled responsibly. Their research into the life cycle of batteries helps to minimise waste and maximise the value of materials.

Knowledge Dissemination

Through active engagement and collaboration with industry partners, the university ensures that research findings and best practices are shared within the consortium. This collaborative approach helps to accelerate the implementation of innovative solutions across the industry.

Pioneering Progress: Current Research Status

The World Class Zero Emission Mobile Equipment project has made significant strides across various research areas. The University of Twente has developed a generic Failure Modes and Effects Analysis (FMEA) for lithium-ion batteries, applicable in both ex-situ and in-situ conditions. This FMEA is currently undergoing validation by industrial partners, ensuring that it meets the practical needs of the industry.

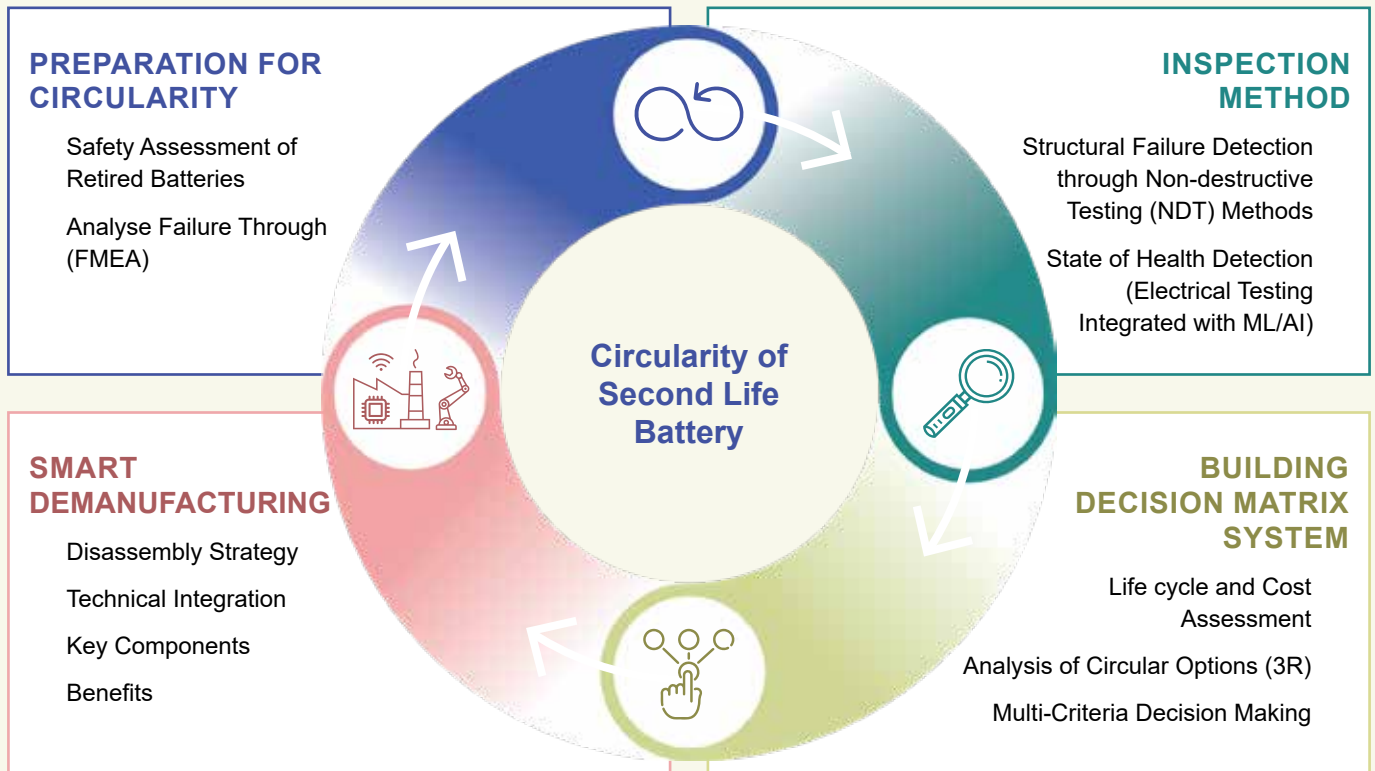
To mitigate safety risks associated with retired battery packs, understanding their internal conditions is crucial. Techniques such as industrial CT

scanning and thermal imaging are being tested to detect anomalies of the battery cells. Currently, SOH (State of Health) tests are being conducted on retired batteries at different C-rates to determine their potential for secondary use based on their current state. To streamline this process, machine learning and deep learning models will be deployed for automation.

Smart disassembly initiatives are also underway, focusing on efficiently breaking down battery packs into individual cells. By identifying structural complexities and optimizing disassembly processes, the project aims to streamline the recycling and reuse of battery components. These efforts are essential for enhancing the circularity of batteries and reducing environmental impact.



The Big Picture: Overview of the Research Topic





The Road Ahead

The World Class Zero Emission Mobile Equipment project is more than just a research initiative; it is a blueprint for the future of the heavy mobile industry. By uniting industry leaders and academic institutions, the project aims to set new standards in sustainability and performance. With a clear focus on eliminating harmful emissions and promoting circularity, this initiative not only aligns with European environmental targets but also leads the charge towards a greener, more sustainable future.

Through research, development, and knowledge sharing, the consortium is poised to make a lasting impact on the industry and the environment. The road ahead is challenging, but with the combined expertise and dedication of its partners, the World Class Zero Emission Mobile Equipment project is well on its way to achieving its ambitious goals. ■



**World Class Zero
Emission Mobile
Equipment**