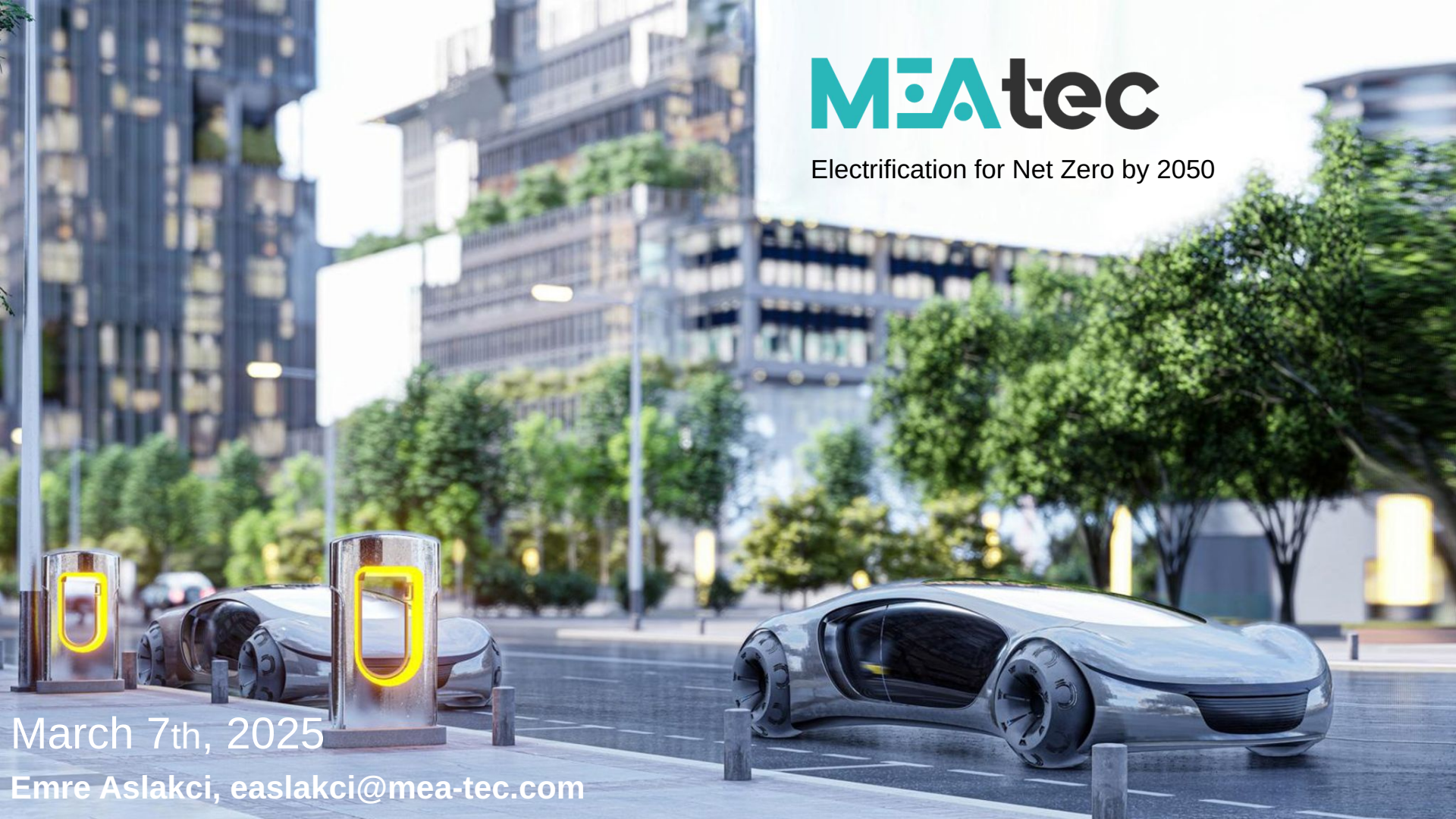


MEAtec

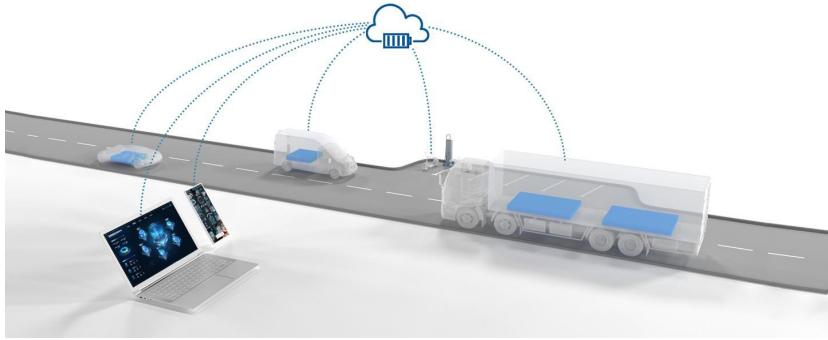
Electrification for Net Zero by 2050

March 7th, 2025

Emre Aslakci, easlakci@mea-tec.com

About MEATEC

- Turn key projects for automotive and stationary batteries
- Expertise for **Battery Management Systems**



2021 Q3

First Customer

FARASIS Germany

*BMS software is developed for **mass production**.*

International Team (15 members)

University Collaborations and Networks

- Bilkent University
- Sabancı University
- Southern Denmark Uni.
- Imperial College London
- Fraunhofer IAO

EUREKA

HORIZON EUROPE

TÜBİTAK

5 Approved Grant-Funded Projects

Other Customers

MAGNA Austria

Nidec Germany

Ankara /TR
R&D Center

Stuttgart /DE
Engineering & Sales

London /UK
R&D Center

Worldwide Offices

2025 Q1

MEAtec

Our Expertises

DIGITAL TWIN

1

- Physics-Informed Cell Modeling
- Reduced-Order Cell Modeling
- Advanced Equivalent Circuit Models (ECM)

BATTERY CLOUD ANALYTICS

2

- Machine Learning Models for SOC, SOH, RUL, and Early Fault Prognosis
- Integrated Cloud Solutions Compatible With Platforms Like Aws and Azure

BATTERY MANAGEMENT SYSTEM

3

- High-Performance Hardware Design
- Wireless BMS Technology
- Model-Driven Software Development

SMART FAST CHARGING

4

- Anode-Controlled Predictions
- AI Algorithms and Cloud Integration
- PID Controller Design for Charge Optimization

SECOND-LIFE BATTERY APPLICATIONS

5

- End-Of-Life Battery Diagnostics via Cloud Analytics and Battery Passport Integration
- Decision-Making Tools For Second-Life Applications Of Batteries

DIGITAL BATTERY PASSPORT PLATFORM

6

- Implementation Of EU Regulations For Transparent Data Management
- Real-Time Data Integration with BMS Connectivity
- Blockchain-Based Secure Data Exchange

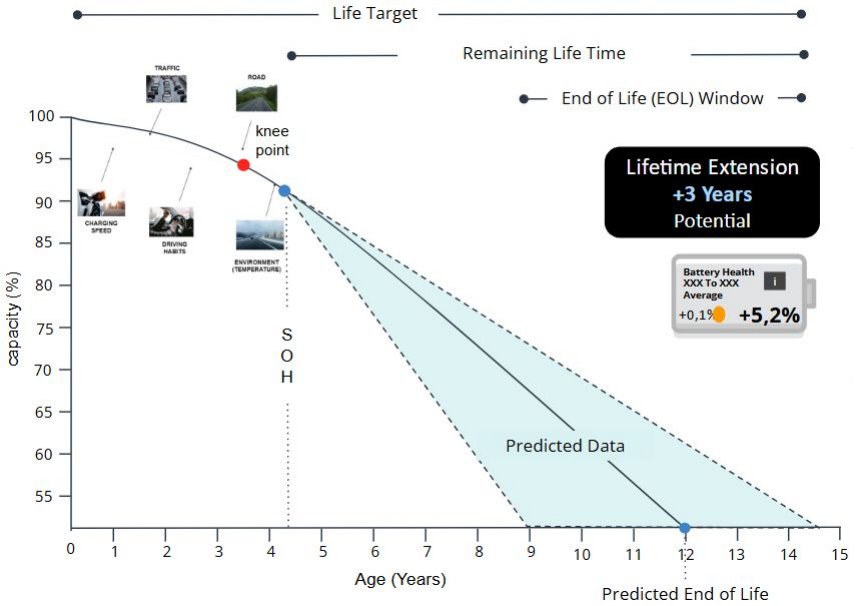
MEAtec

D2-01: Development of Sustainable and Design-to-Cost Batteries with (Energy-) Efficient Manufacturing Processes and Based on Advanced and Safer Materials

Call Scope

- Adapting Sensing solutions to improve lifetime and state of health detection.
- Quantification of degradation mechanisms at early stage to determine the best strategy for beyond the first life.

Our Contribution



- **Machine learning** and **predictive modeling** quantify early degradation trends (e.g., capacity fade, resistance increases) to develop accurate SOH models. Combined with **physics-based methods** that provide deep insights into battery chemistry, this approach effectively handles large-scale data and predicts subtle degradation, enhancing battery lifetime and health detection.

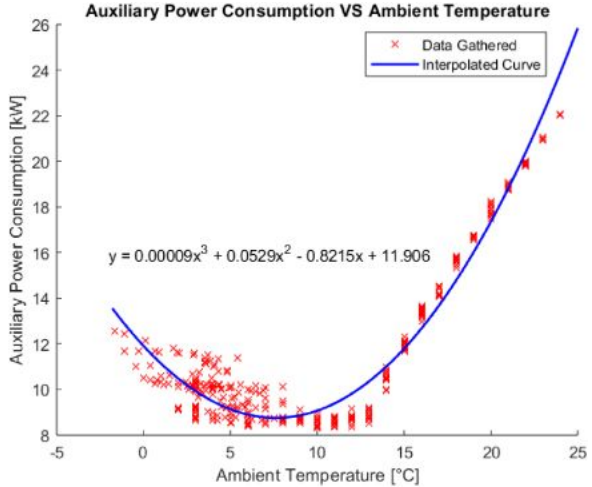
D2-02: Cost-effective next-generation batteries for long-duration stationary storage

Call Scope

- Battery technologies with minimal required auxiliary services, storage in a wide range of State-of-Charges (SOCs), and minimal voltage slippage.
- Projected lifetime of 20 years with minimised self-discharge in operating and ambient conditions typical of the selected application.
- Minimum round-trip efficiency of 50% at energy storage system (AC) level and 75% at cell level.

Our Contribution

- MEATEC can implement **AI-driven predictive models** and **smart BMS** solutions can significantly **reduce auxiliary loads** by **optimizing operations** and **reducing idle consumption**.
- MEAtec can implement **advanced control algorithms** to prevent the risks of deep discharging or overcharging by accurately estimating the **State of Charge (SOC)** and ensuring it remains within the safe operational limits.
- The approach is not only enhances system efficiency but also reduces **operational costs by 30%** and extends **battery life by 20%**.

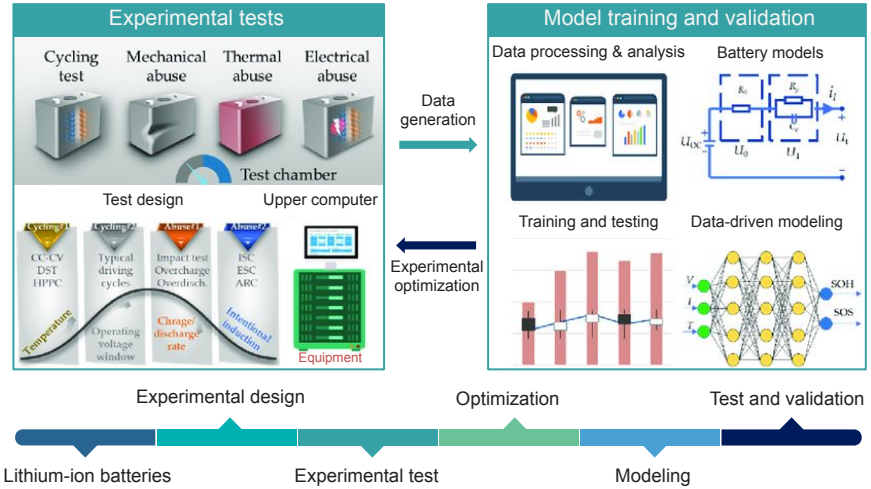


D2-05: Accelerated multi-physical & virtual testing for battery aging, reliability, safety evaluation

Call Scope

- Shortened development time of battery cells and battery systems by minimising the experimental testing effort, thus reducing the overall costs and the time to market;
- Increased battery reliability and safety through better understanding of ageing, and safety-relevant (deactivation, degradation, failure) mechanisms;
- New multi-physical test strategies supplemented by virtual testing are required taking into account the most impactful parameters on ageing, reliability and safety and their dependencies.

Our Contribution



- Meatec can combine modeling approaches to deeply understand **aging** and **safety-related** degradation mechanisms (e.g., particle cracking, SEI formation, lithium plating at cell level; thermal runaway, mechanical vibrations, internal short circuits), using these insights to drive **predictive maintenance** strategies and enhance **battery safety**.
- Meatec can integrate **virtual testing** with targeted experimental validation to devise **multi-physical test** strategies that address the key parameters affecting aging, reliability, and safety and their interdependencies.