

Battery Innovation will Power the Clean Energy Transformation



One of the fundamental elements of renewable energy transition is storage: the manufacture, innovation, and maintenance of battery systems is a critical success factor.

Decarbonization is also a driver of green energy transformation; this is reflected by consumer behavior. According to the International Energy Agency, by 2030, electric mobility sales are forecasted to reach approximately 29.5% of all new car sales. The battery value chain is a key contributor to this large-scale adoption of electric vehicles (EVs).

The application of batteries is no longer restricted to passenger vehicles. To help curb emissions, organizations are also decarbonizing their industrial fleets; this includes locomotives, heavy mobile equipment and other assets.

Sustainable and rapid production of batteries is critical for mass adoption of electric mobility and supply chain improvement. Driving growth in this space are four key factors: availability of raw materials from sustainable sources; evolution in battery technology; production capacity and gigafactories; regulation and battery recycling.



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International Energy Agency

Battery Engineering at its Best

Akkodis, your partner and battery expert

Development of high voltage batteries is an integral part of the energy and clean technology transition. From home energy storage to electric mobility, effective, efficient, and modular solutions are essential to the battery value chain. Integrated systems that enable interoperability and transparency are the drivers.



Electric vehicles are dependent on charging infrastructure and must meet specific vehicle-to-grid requirements. Interoperability between vehicles and charging stations, and secure rapid charging processes, are essential: vehicle and charging stations must communicate. To enable effective and efficient e-mobility systems it is important to think holistically about electric vehicles and their ecosystem. Akkodis supports end-to-end solutions across the e-mobility value chain.

We Are Shaping the Future of e-mobility – from Concept to Realization

1,000+

experts and mobility enthusiasts

20+

locations

250+

ongoing projects at OEMs and tier 1 suppliers

10+

labs and workshops

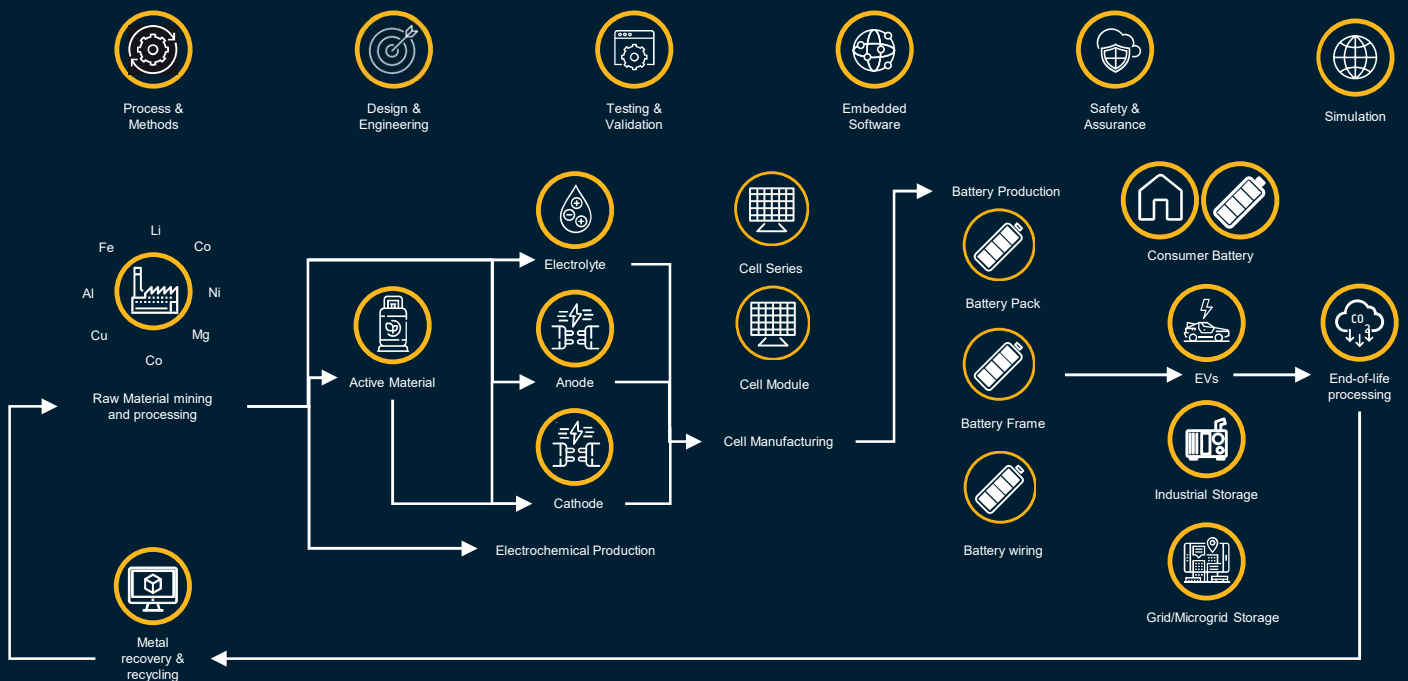


HV-Battery Expertise & Competencies

Akkodis has expertise in cell module and battery pack technologies and the entire battery ecosystem.

- Requirement engineering
- Battery management systems
- Embedded software
- Thermal simulation
- Vehicle integration
- Supplier management
- Mechanical testing of cells
- Modules and battery packs

Energy Storage & Battery Systems





Processes and Methods

- Professional project management skills (gpm certified)
- Process control and reporting throughout the entire qualification process
- Requirement management from system level to component level.
- Change management
- Supplier management
- Supplier validation and qualification
- Release management
- Aspice iso / iec 15504.



Design and Engineering

- Definition and selection of suitable components for each customer requirement
- 3D packaging of the HV and LV wiring harness, including all necessary supports
- Prototyping HV / LV harness
- Design of the battery housing
- Development of the cooling layout including all necessary components and constructive implementation of the battery cooling system
- HVB battery cell series development
- Material Lab.



Embedded Software

- Strong development process knowledge to support during the development of the BMS
- SW Design of BMS Safety features
- Implementation of ASIL-B / ISO26262
- Competence in AUTOSAR Classic Platform
- Project BaTMan
- Embedded Software for HV-Battery 2nd Life device.



Simulation

- Thermal simulation of battery systems
- Thermal analysis and optimization of battery systems with 3D models (CFD)
- Evaluation of different load profiles
- Simulation (aging, EE, cooling, thermal)
- Simulation of the behavior of a battery cell pack during charge/discharge cycles
- Point out recommendations for optimized cooling system
- Thermal evaluation of HV cable sets
- Development of simulation environments according to customer requirements.



Safety

- Component development according to LV123 and ECE-R100
- Development of HV safety concepts
- Tracking of product validation activities and review of product validation reports of HV components
- Functional Safety development in accordance to ISO26262
- Achievement of quality improvements through standardization of supplier management
- Cyber Security management according to ISO 21434.



Test and Validation

- Test management throughout lifecycle
- Test case creation to specification
- Commissioning of test benches
- Evaluation of cell test reports regarding testing standards
- Planning, execution and analysis of tests
- Power- and cooling measurements (characteristics map / values)
- HVB Test-Infrastructure
- Test levels (ISO 26262): full vehicle, vehicle, test bench.

Akkodis Battery Innovation Services

Concept Development

Starting with the idea, we steer the requirements management for you. Our experience in relevant norms and standards saves time until the final basic concept. From the very beginning we think about topics like recycling and battery 2nd life.

Design

The selection of the right hardware components and the associated hardware design are an important part of battery development. Our many years of experience in high-voltage safety is a clear advantage here.

Construction

For a 2D or 3D design of the development object we use tools such as: NX, Catia, Creo, etc. We also carry out geometrical design studies and are responsible for geometrical integration.

Simulation

Simulation offers a perfect opportunity to investigate issues before the component is manufactured. As your partner in simulation, we can support you in the topics FEM, CFD, Cell aging, Thermal Simulation. For an even faster development process, we can access our Akkodis High Performance Cluster with 3000 cores and use our efficient tool chain.

Functional Development

With our knowledge, we support our customers in the development of their battery management system

and also, the implementation of relevant BMS safety functions. You will also benefit from our expertise in ISO26262 and with AUTOSAR.

Prototyping

Prototypes allow early identification of design challenges. Akkodis has the possibility to make its own prototypes and use them for test or show purposes.

Test & Validation

A good test management & test execution is a mandatory requirement to ensure an error-free start of production. We are able to support you with topics such as test planning and test execution. Akkodis also has access to its own test benches such as battery & EMC test benches. As well as adhesive and material laboratory.

Supplier Management

If you already have a supplier in the selection process, we can take over the supplier qualification for you. We implement a supplier guidance program, support the project management, the internal synchronization and the implementation of the qualification process.

Our Added Value

- >300 Battery Enthusiast & Experts
- First to market with Akkodis
- Full end to end service for your project
- Beginning from cell up to battery packs
- From concept to series production
- >10 Years of experience in various battery projects
- Reduced development time due to combined expertise in different technology sectors
- Series start-up and series support.

Akkodis Smart Battery

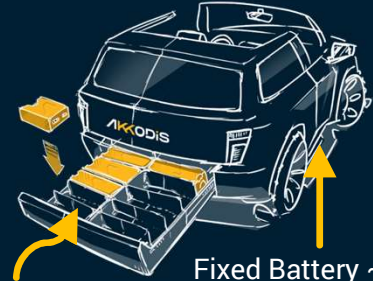
Powerbank



Home storage



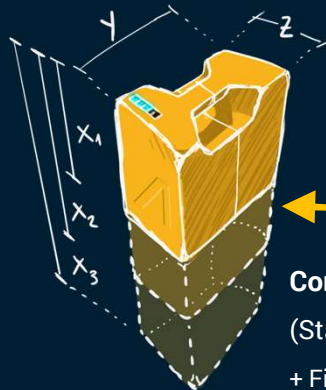
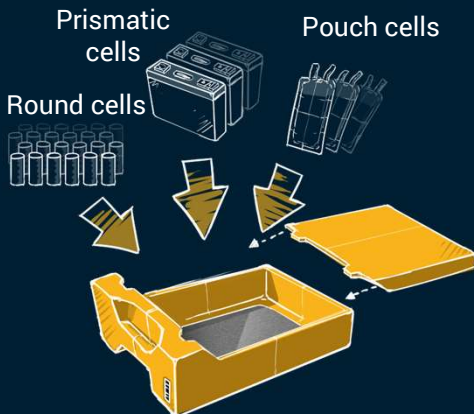
Add up to
10 modules



Fixed Battery ~200 km

Goal:
+ 5 kWh for 25-30 km
+ 4 modules for 100 km range

Cell types



Core module
(Standardized)
+ Fixed size
+ 20 kg max.
+ Fixed interface
+ Communication interface

Different cell chemistries



Soon, range anxiety is going to become a thing of the past. But, are increasing battery capacity and size the only solution?

Akkodis is developing swappable modular batteries with various cell types (round prismatic, pouch etc.), chemistry (NMC, LFP, LTO etc.), and standard module sizes to power houses, electric mobility and powerbanks.

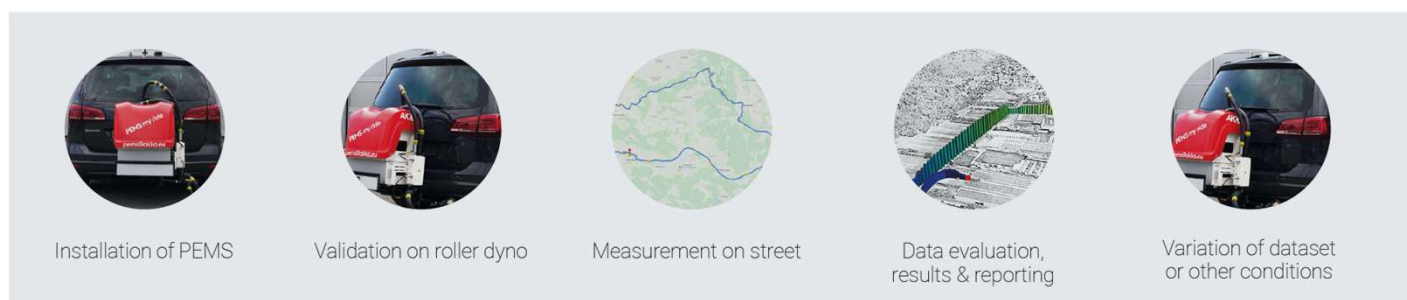
The module comes with inbuilt power and comms connector, controls, cells, thermal isolations cooling plates with CMC, BMS & battery Cloud on the way.

Vehicle Emission & Engineering

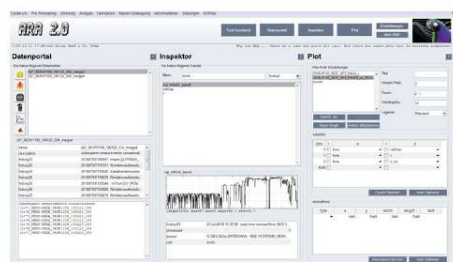
In our journey towards decarbonization and energy transformation it is imperative to manage emission. Co2 emission from both commercial and passenger vehicles constitute a large part of global GHG emission. Measuring, monitoring, and optimizing emission is going to be key in achieving the net zero future.

Akkodis automotive engineering and consulting experts have been providing a variety of services including Portable Emission Measurement System (PEMS) development, testing, characterization, combustion engine emission measurement, engine calibration, vehicle controls, exhaust gas treatment and many more. Our core competencies are:

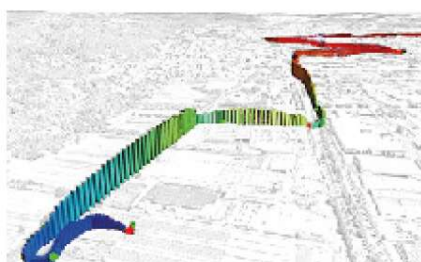
- Design, development, and integration of PEMS applications to all vehicle types (passenger & commercial vehicles – car, van, truck, bus)
- PEMS setup, measurements & validation
- PEMS RDE validation testing and certification
- Post processing and calibration recommendation
- Data capture and storage and reporting.



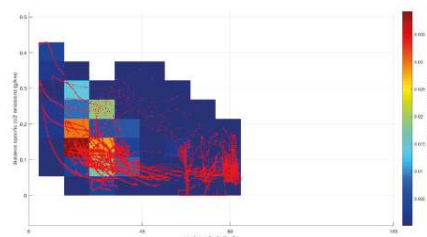
Akkodis also provides additional support in areas such as mobile service vehicle, in-house tools (evaluation tool ARA, Drivability tool R.I.D.E.) for driver variation, support and evaluation, benchmark analysis, reporting and visualization of emission data using custom dashboards like exhaust gas emission over speed, Emission over vehicle trips displaying using geospatial maps etc. Below are some examples.



Inhouse evaluation tool ARA



Visualization of e.g. emissions over the trip in Google Maps



Specific CO2 emissions over speed

Portable Emission Measurement System (PEMS) Packaged Solution

Akkodis provided a complete packaged solution starting from individual PEMS unit setup to on road RDE measurement to post processing and engine calibration. The packaged service consists of primarily four components and related services as described in the table below.

TEST PRE-PROCESSING

- Basic set up & customized piping on the vehicle
- Technical approval of setup
- Correlation of PEMS and exhaust gas measurement system
- (CVS-bag) on certified exhaust roller dynamometer test bench

RDE MEASUREMENT ON THE ROAD

- Testing on different RDE-compliant routes + out of the regular limits
- Variation of driving and gear shifting dynamics (inhouse driveability tool R.I.D.E. etc.)
- Variation of boundary conditions: misuse cases, cargo trailer, tire pressure, soiling of air filter, dilution of AdBlue fluid
- Support vehicle with mobile workshop ava

POST-PROCESSING

- Customized evaluation & reporting
- Test analysis & classification tool (driver, traffic, emissions, etc.)
- Statistical cycle analysis – inhouse tool ARA 2.0 Recommendation for calibration
- Possible parameter adjustment and test repetition

MEASUREMENT & TESTING

- PEMS set up for PN, CO, CO₂, NO / NO₂ & O₂
- FID Module with 2 channel for THC and CH₄
- EFM exhaust flow meter
- Vehicle connection
- GPS tracking
- Relative humidity and temperature
- Different hybrid modes RDE Testing

Below images shows light and heavy vehicles fitted with Akkodis PEMS kits.





Empowered by a culture of inclusion and diversity, our 50,000 tech experts in 30 countries across North America, EMEA and APAC, combine best-in-class technologies and cross industry knowledge to drive purposeful innovation for a more sustainable tomorrow.

Engineering a Smarter Future Together

For further information, please contact:

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About Akkodis

Smart Industry is connecting people, data and machines, creating opportunities for new and improved business models, optimized and automated processes, informed decision making, and new user experiences.

Akkodis is a global Smart Industry leader, with digital, engineering and R&D capabilities that leverage the power of connected data to accelerate innovation and digital transformation.

We co-create and pioneer solutions that help solve major challenges, from accelerating the clean energy transition and green mobility, to improving user and patient centricity.

This combined IT and engineering expertise brings a unique end-to-end solution offering, with four service lines – Consulting, Solutions, Talent, and Academy – to support clients in rethinking their product development and business processes, improve productivity and minimize time to market.

Akkodis is part of the Adecco Group.

Engineering a Smarter Future Together

Leveraging the power of connected data to accelerate innovation and digital transformation.



AUTOMOTIVE & TRANSPORTATION

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