

PROJECT

ESTRELIA

Energy Storage with lowered cost and improved Safety and Reliability for electrical vehicles

Funding: European (7th RTD Framework Programme)

Duration: May 2011 - Oct 2014

Status: Complete with results

Total project cost: €6,870,559

EU contribution: €4,359,989



Call for proposal: FP7-2011-ICT-GC

[CORDIS RCN : 99270](#)

Background & policy context:

For a significant improvement of full electric vehicles' (FEV) safety and comfort as well as the improvement of the energy efficiency and extended driving range an innovative battery management and control solution is essential. Clearly, what is needed is a focused approach on the battery management system on the one hand but also the cost effective system integration into the vehicles on the other hand.

The ESTRELIA consortium concentrates on the value added-chain to guarantee a wide acceptance to the industry and attract the end-users, which are people of the European community. Only when it is possible to mitigate the constraints for the user of the FEVs will a wide acceptance and broad adoption be guaranteed of these new effective, innovative solutions for future mobility. The Consortium of this project has the full range of industry-leading capabilities to ensure a significant improvement of FEV in terms of performance, long term reliability, safety and comfort.

Objectives:

Development objectives with the target to provide verified prototypes:

- develop an integrated flexible battery management system (BMS) for ultracapacitor cell balancing
- provide new ultracapacitor power cell pack design targeting for 50% higher energy density and verify enhanced reliability
- assess power pack in accordance with new standards and guidelines for robustness validation and lifetime cycle (ILCD)
- provide automotive environment verified prototypes for integrated flexible battery management system BMS for Li-Ion energy packs allowing simultaneous cell measurement and active Li-Ion battery cell balancing
- develop and characterize optimized and cost reduced BMS communication ICs with galvanic isolation up to 2.5kV
- target to reduce the electronic component costs for integrated Li-Ion battery management system BMS by 1/3rd
- provide new gas safety sensors with high sensitivity and fast response for advanced energy storage systems
- develop new high voltage (several kV) capable test and characterization equipment

Research objectives to evaluate further cost reduction and safety improvement potential:

- develop and evaluate new advanced MEMS based spark detection sensor to improve safety monitoring of energy storage systems
- verify new advanced Li-Ion BMS reliability and improved long-term stability
- investigate future BMS ICs technology integration and cost improvement potential
- develop new cost effective power antifuse for dynamical configuration of energy storage units
- Investigate gassensor hot plate and CMOS integration potential for cost reduction

Methodology:

ESTRELIA is defined in four phases to meet the targets of developing advanced new and cost effective building blocks to improve energy storage, reliability, safety and offer new battery management solutions for FEVs.

Parent Programmes:

[FP7-ICT - Information and Communication Technologies](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Ams Ag

Address:

Tobelbaderstrasse
8141 Unterpremstaetten
Austria

Organisation Website:

<http://www.ams.com>

EU Contribution: €1,133,922

Partner Organisations:

Abr Battery Research Laboratory Gmbh

Address:

Thomas A Edison Strasse 2
7000 Eisenstadt
Austria

EU Contribution: €280,800

Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.v.

Address:

Hansastrasse 27C
80686 MUNCHEN
Germany

Organisation Website:

<http://www.fhg.de>

EU Contribution: €928,248

Commissariat A L Energie Atomique Et Aux Energies Alternatives

Address:

RUE LEBLANC 25
75015 PARIS 15
France

Organisation Website:

<http://www.cea.fr>

EU Contribution: €299,823

Active Technologies Srl

Address:

Via Bela Bartok 29/b
44124 Ferrara
Italy

EU Contribution: €327,258

E4V Sas

Address:

Boulevard Jean Mermoz 10
92200 Neuilly Sur Seine
France

EU Contribution: €374,556

Corning Sas

Address:

Avenue De Valvins 7 Bis
77920 Samois Sur Seine
France

EU Contribution: €333,117

Appliedsensor Gmbh

Address:

GERHARD KINDLER STRASSE 8
72770 REUTLINGEN
Germany

Organisation Website:

<http://www.appliedsensor.com>

EU Contribution: €197,847

Valeo Equipements Electriques Moteur Sas

Address:

2 Rue Andre Boulle
94000 Creteil
France

EU Contribution: €484,418

Technologies:

Electric vehicle batteries (and energy management)
Battery management system module

Development phase: Research/Invention

Key Results:

Based on several inputs from car manufacturers the IC specification and design for the Battery Management ICs can provide now firsts engineering samples for evaluation. A detailed concept using self-triggered power antifuses to bypass faulty battery cells has been developed strongly supported by device simulation. This is a first step to provide a cost effective solution to single cell failure for the future.

Also the development of the very important safety sensors for EV's is on schedule. For the new gas sensor the first modified samples for battery testing have been provided and for the MEMS based spark detection sensor, the appropriate piezo-resistive concept has been selected, the design has been defined and technological development batches are running in clean rooms.

First samples of the ultracapacitor cell samples with high energy densities in the range of 7-9 Wh/L have already been investigated. By the end of the project, up to 50% higher energy density in the power pack is an intended innovation of the ESTRELIA project.

E4V is providing a full solution including battery and BMS, both by its local engineers in Bordeaux and Le Mans (France). Strongly experienced, mainly due to its president background and experts support, the company offers its partnership in the development of a large range of dedicated energy storage solutions. E4V as a battery pack maker is in charge of the definition of the energy pack based on LiFePO₄ cell chemistry. E4V's participation to the ESTRELIA project aims to show the advantages of using new technologies to improve the security and reliability actual Lithium battery pack solution for EV, by the integration of the new BMS integrated circuits with improved capabilities, spark detectors, gas sensor and antifuses.

The energy pack is intended to be used in full EV configuration, where the energy demand from the EV is compatible with the use of LiFePo₄ cells, and as a permanent energy source to power the EV.

The energy pack must be able to supply the engine for the traction of the EV, in RUN mode, but also to store the energy available during regenerative braking phases, in REGEN mode. The choice of LiFePO₄ for the battery cell chemistry ensures the best trade-off between safety and performance for such application.

Some of the major results of ESTRELIA project will lead to energy efficiency and extended driving range of the FEVs and this will mitigated constrains for the user of the FEV versus the Internal Combust

Strategy targets

Innovating for the future: technology and behaviour

- Promoting more sustainable development

Documents:

 [Final Publishable Summary ESTRELIA \(Final report\)](#)

STRIA Roadmaps: Transport electrification, Low-emission alternative energy for transport

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Geo-spatial type: Other