

EARPA POSITION PAPER

**HYBRID & ELECTRIC COMPONENTS & SYSTEMS
IMPORTANCE FOR EUROPEAN ROAD TRANSPORT RESEARCH AND FP7
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THE EARPA "HYBRID & ELECTRIC COMPONENTS & SYSTEMS" TASKS FORCE

Founded in 2002, the association EARPA brings together the most prominent independent R&D providers in the automotive sector throughout Europe. At present, EARPA counts 33 members ranging from large and small commercial organisations to national institutes and universities. The position paper is therefore based on the consultation and involvement of a broad spectrum of R&D organisations in the fields of electric and hybrid components and systems.

RESEARCH, DEVELOPMENT AND INNOVATION ON ELECTRIC VEHICLES & SYSTEMS

High efforts on research and development have been made in the last years to push electric and hybrid vehicles and electric mobility forward. Research projects have been performed on national and European level to realise electric components and systems that facilitate new vehicle concepts and contribute to the transformation of mobility. In the last 2 years these research efforts have resulted in an increasing industrial take-up and first market implementation. This provides on the one hand first real-life experiences to further improve electric vehicles and components to meet customer and policy requirements. On the other hand substantial research and development is still required to support mass production. In particular, cost targets are yet not met sufficiently and efficient and automated production processes are still not in place to allow large scale implementation of electric vehicles.

Therefore four main action lines are proposed for further research and development on hybrid & electric components and systems:

1. Continuation of research on breakthrough technologies

Electric energy storage systems are the key component of electric vehicles defining significantly the vehicle's range and performance. Research on the improvement of existing as well as on new battery chemistries with a special focus on high energy batteries is key to improve electric vehicles and their range of applications.

2. Lessons learned

Demonstration and pilot activities are performed all across Europe to test the latest electric vehicle technologies and determine user acceptance and behaviour. A concerted evaluation of these real-life experiences offers substantial feedback and input on future needs for research, development and innovation. Customer requirements and daily life conditions significantly define the frame for the next generation of hybrid and electric vehicles and components. An evaluation of the various national and European pilot activities and the determination of the future need for action from a market-driven point of view is therefore seen as essential to increase customer acceptance and support large scale market implementation.

3. Research towards mass production and a broad application of electric vehicles

As already mentioned, small scale series production of electric vehicles has started in Europe giving the topic of electric mobility new dynamics. However, for large scale mass production measures have to be taken to reduce costs, improve customer acceptance, and investigate new application fields for e-vehicles. In particular the following research topics are proposed:

- development of new concepts for electric components, in particular energy storage components, in line with requirements for (higher) automated production processes
- identification of new integrated approaches for product development and production technologies with emphasis on improving design to cost, productivity and reliability

- assessment of battery switching technologies and their integration into charging infrastructure for a fast mass adoption of FEVs into market
- investigation of end of life utilization of batteries
- increase the utilization of electric drive trains for commercial vehicles

4. From urban application to electric all-rounders

Electric vehicles are currently still seen as a mean for urban mobility only. The limitations in range of the existing electric energy storage systems have to be seen as a major obstacle for a broad market implementation. On the other hand the driveability of electric vehicles in a broad speed range with highest efficiency is not given yet. This calls for new and improved concepts to establish electric vehicles as a full alternative to conventional vehicles:

- Advanced plug-in hybrids and electrical vehicles with range extenders are required for regular customer duty as far as pure electric vehicles do not fulfill customers' range requirements. For this purpose, highly efficient, compact and low cost range extender systems have to be provided with special emphasis on battery charging over longer trips and/or in areas where electric recharge infrastructure is not (yet) available as well as on the improvement over future Euro 6 standards for noxious emissions in order to be consistent with the "zero emissions" label of electric vehicles.
- Powertrain concepts suited for later (optional) integration of fuel cell based range extender systems in electrical vehicles (but w/o fuel cell systems/components research).
- New e-drive, in particular e-machine concepts to improve the long(er) distance driveability at highest efficiency. Such concepts would increase the flexibility to use electric drive trains in a wider range of applications which is seen as important to gain customer acceptance and establish electric vehicles as a full mode for road transportation.

COOPERATIVE RESEARCH, DEVELOPMENT AND INNOVATION

EARPA sees the requirement to identify actual research topics on a European level in close co-operation with all relevant stakeholders. Taking advantage of their expertise, EARPA members can offer support to this identification process on a neutral basis.

RTD programmes should enable all partners with the right skills to participate and offer both the possibility to perform specific, even competitive research on particular topics as well as integrated research projects on a larger scale, which need a strong vertical integration of partners.

Thus, a continuous RTD effort is required to increase progressively the use of the electric power. With their research capacities, EARPA members are playing a key role in EU regarding such development.

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