Batteries and e-mobility: inseparable twins


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Energy is a key requirement for modern societies; it keeps lights on, brings transportation and enables the production of goods. However the balance of supply and demand is increasingly challenging. Several battery technologies are available and can contribute to low carbon solutions and a sustainable future in Europe.

Europe relies heavily on external sources for imports of gas and oil; the transition to greener, independent and sustainable energy system is an absolute need.

In October the European Council decided the principles on the 2030 Climate and Energy Package 2030. The ambition is a shift to renewables, with more and more European electricity being generated by wind turbines, hydroelectric power, solar energy, and other forms of renewable energy. At the same time, green electricity could gradually reduce fossil fuels in the transport sector. This long term transition could benefit the environment, reduce Europe´s dependency on import of fossil fuels but also create jobs and growth: according to "Fuelling Europe´s future", a 2014 report issued by the European Climate Foundation based on economic impact studies and the input of various stakeholders and research institutes. The report forecasts that up to 1.1 million net additional jobs could be generated by 2030 if this transition will take place[1].

As reported in its 2011 White Paper Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system[2], the European Union is committed to reduce CO_2 emissions from the transport sector by 60% by 2050 compared to 1990 level. Batteries have a fundamental role to play in this transition, and can respond to the different needs and demands of a transport sector with an increased degree of hybridization and electrification. The various types of batteries used in vehicles include lead, lithium-ion, nickel-metal hydride and sodium-nickel chloride; each of them has different chemistries and characteristics. Batteries can bring significant benefits to the performance and energy efficiency of traditional combustion engine vehicles, while they are at the core of vehicles with a high degree of electrification.

Advanced lead-based batteries are fundamental for vehicles with initial levels of electrification, whereby conventional combustion engine vehicles are supplemented with start-stop and micro-hybrid technologies, which thanks to innovation and development can improve overall efficiency and performance. Not only is this battery technology used for SLI functions to power a vehicle's starter motor, lighting, and ignition system but also providing power to the vehicle's increasingly demanding on-board electronics. Advanced lead-based batteries now provide

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start-stop functionality, and other micro-hybrid features in a growing proportion of new European vehicles, lowering their fuel consumption by 5-10% as stated in a joint industry report[3]. Thanks to their increased charge recoverability and higher deep-cycle resistance, advanced lead-based batteries can also offer regenerative braking in micro-hybrid and mild-hybrid vehicles, boosting vehicle´s acceleration with stored energy.

For vehicles with a higher degree of electrification, batteries play a more active role: in full-hybrid vehicles (HEVs) it is additionally used for a certain range of electric driving while in plug-in hybrid (PHEVs) and full electric vehicles (EVs), high voltage battery systems provide significant levels of vehicle propulsion, either for daily trips (20-50 km) in plug-in hybrid vehicles, or as the only energy source in full electric vehicles (100 km+). In plug-in hybrid vehicles, the battery must also provide hybrid functions when its capability for electric drive is completed. For these classes of vehicles, nickel-metal hydride (HEVs), lithium-ion (HEVs, PHEvs, EVs) and sodium-nickel chloride batteries (heavy duty PHEVs and EVs) are the preferred battery technologies thanks to their fast recharge capability, good discharge performance and lifetime endurance. At the same time, hybrid and electric vehicles also use a 12Volt electrical system for controls, comfort features, redundancy and safety features which are supplied by a 12Volt lead-based battery.

Looking ahead therefore all the above mentioned battery technologies must be able to play their important role in the decarbonisation of the European transport sector; their differences and their ability to cope with different technical demands are their main strengths. The global and European markets for start-stop and micro-hybrid vehicles are expected to increase significantly over the next decade, driving also an increased demand for advanced lead-based batteries. Also the demand for hybrid, plug-in hybrid and full electric light commercial, buses and heavy duty vehicles is set to increase: the continued development of advanced traction batteries (mainly lithium-ion and sodium-nickel chloride) for hybridised and electrified powertrains is likely to be at the same time cause and consequence of this increase.

The continuation of excellent research & development in Europe will be made possible by retaining a strong European battery manufacturing industry.

European policy making must be coherent and support the industry and its supply chain to increase the learning curve for all battery technologies. The near future benefits of such policies will lead to systems that can deliver higher energy and power density, lifetime and charge acceptance for full hybrid and electric vehicles. At the same time, fuel efficiency requirements will drive improvements in advanced lead-based technologies. Overall, the performances and competitiveness of batteries will improve considerably in the near future, playing a fundamental role for the decarbonisation of the European transport sector and the transition to a greener, independent and sustainable transport system.

EUROBAT, the Association of European Automotive and Industrial Battery Manufacturers, acts as a unified voice in promoting the interests of the European automotive, industrial and special battery industries of all battery chemistries. With over 47 members comprising over 90% of the automotive and industrial battery industry in Europe, EUROBAT also works with stakeholders to help develop a vision of future battery solutions to issues of public interest in areas like e-Mobility and renewable energy storage.

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1 Cambridge Econometrics (CE), in collaboration with Ricardo-AEA, Element Energy etc.: "Fuelling Europe´s future", p. 4.

2 White Paper Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM(2011) 0144

3 EUROBAT – ACEA/JAMA/KAMA – ILA: A review of batteries for automotive applications, 2014, p. 6.