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**AXEON**  
**Delivering clean mobile power for electric vehicles, cordless power tools and mobile power applications**

**PROJECT SUCCEEDS IN DEVELOPING ELECTRIC CAR BATTERY WITH GREATER RANGE**

A project led by advanced battery manufacturer Axeon and co-funded by the Technology Strategy Board has been successful in developing a new battery for use in electric cars that offers over a 35% improvement in range compared to existing technologies, for the same weight.

In 2009, the Technology Strategy Board awarded over £680k of funding to the consortium led by Axeon (bringing the total project funding to over £1.3m), with the aim of developing an innovative high energy density battery system for an emission-free electric vehicle.

The battery uses Nickel Cobalt Manganese (NCM) electrochemistry which theoretically requires 50% less volume and 30% less mass when compared to Lithium Iron Phosphate chemistry (at cell level).

A key goal of the project was to confirm that these cell level benefits pass through to the battery pack level when taking into account overall packaging, cell retention, cooling and interconnects, Battery Management System (BMS) components and overall system functionality.

The project included subjecting the battery to automotive environmental validation testing and the learning from this has been incorporated into the final design to ensure a robust solution.

Axeon and its partners, Ricardo and Allied Vehicles, have now delivered an advanced demonstrator that has been deployed into a test vehicle, increasing its range, functionality and performance. The project has confirmed that it is feasible to replace Lithium Iron Phosphate technology with NCM and that the majority of cell level benefits migrate to battery pack level.

The demonstrator pack uses NCM "pouch" cells (a relatively new technology for electric vehicles) that have been innovatively packaged in modular building blocks which additionally support a range of thermal management options and additionally allow Axeon to support rapid prototyping into a range of other vehicle types with significantly reduced development lead times.

Added benefits of the new system, which was tested on a vehicle platform from Allied Vehicles, include increased ground clearance, better driver experience due to improved weight distribution and more power giving better drivability.

The new battery also integrates an automotive BMS developed by Ricardo. This works with multiple cell chemistries, has active balancing and delivers diagnostic and prognostic information to the vehicle control system.

The partners are now in active discussions on commercialisation of the new technologies.

Lawrence Berns, CEO of Axeon said: "This project has been a remarkable success and reinforces Axeon's position as a leading provider of advanced battery technology. This new battery represents a real step forward in the development of electric vehicles and is highly versatile, being suitable for applications for many vehicle manufacturers and across a wide range of platforms."

John Laughlin, the Technology Strategy Board's Low Carbon Vehicles programme manager, said: "We are delighted that our investment in this consortium's project has yielded such impressive results, as the size and weight of batteries relative to their capacity has been a barrier to the wider take-up of electric and plug-in hybrid vehicles. Investing in such cutting-edge development helps to put the UK at the forefront of low carbon vehicle technology."

Ricardo chief technology and innovation officer, Professor Neville Jackson, said, "Ricardo is proud to be involved in this landmark project, which has allowed us to supply and develop our expertise in advanced battery management. The new battery will improve the potential for more widespread vehicle electrification, a process that has the potential to significantly reduce global dependence on fossil fuels and minimize carbon dioxide emissions."

Allied Vehicles' Managing Director, Paul Nelson said: "We are very excited about the possibilities afforded by this new battery technology and what this can offer our customers. We are now actively looking at opportunities to deploy this technology into our vehicles."

## **ENDS**

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## **About Axeon**

Axeon is one of Europe's foremost producers of Li-ion battery systems for electric vehicles (EVs) and Hybrid electric vehicles (HEVs). Axeon's battery and charger systems are designed and manufactured to full automotive standards, incorporating all the exacting requirements of packaging design, cooling and electronics and vehicle integration. Axeon works with many of the world's most advanced cell manufacturers. Currently Axeon's EV batteries give a range of up to 140 miles from a single charge, with stored capacity ranging from 5 kWh to 180 kWh. Axeon's Battery Management System is a market-leading technology for managing lithium-ion batteries, delivering safe, durable performance.

Axeon's mainland European business designs and manufactures batteries and battery management systems for portable power tools and innovative mobile power solutions.

Axeon is fully owned by AG Holdings Ltd, which is backed by funds managed by Ironshield Capital Management LLP.

For more information, please see [www.axeon.com](http://www.axeon.com).

## About Ricardo plc

Ricardo plc is a global, world-class, multi-industry consultancy for engineering, technology, project innovation and strategy. With almost a century of delivering value, we employ over 1600 professional engineers, consultants and staff. Our people are committed to providing outstanding value through quality engineering solutions focused on high efficiency, low emission, class-leading product innovation and robust strategic implementation. Our client list includes the world's major transportation original equipment manufacturers, supply chain organizations, energy companies, financial institutions and governments. Guided by our corporate values of respect, integrity, creativity and innovation and passion, we enable our customers to achieve sustainable growth and commercial success.

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## About Allied Vehicles

Allied Vehicles is the UK's leading supplier of specialist vehicles. These include wheelchair accessible cars, MPVs and minibuses; the UK's widest range of purpose-built taxis; secure custodial vehicles; community safety vans and an exciting new range of electric powered light commercial vehicles. Built in partnership with Peugeot, these include all-electric vans, crew cabs, people carriers and minibuses which combine the features, comfort and familiarity of modern, mass-produced production vehicles with leading-edge lithium ion battery technology. Allied Electric vehicles also offer unique reliability and tracking benefits, thanks to the onboard and online zWebT remote electronic diagnostic and management system.

For more information, visit [www.alliedvehiclesltd.com](http://www.alliedvehiclesltd.com)

## About the Technology Strategy Board

The **Technology Strategy Board** is a business-led government body which works to create economic growth by ensuring that the UK is a global leader in innovation. Sponsored by the Department for Business, Innovation and Skills (BIS), the Technology Strategy Board brings together business, research and the public sector, supporting and accelerating the development of innovative products and services to meet market needs, tackle major societal challenges and help build the future economy.

For more information please visit [www.innovateuk.org](http://www.innovateuk.org)