Innovate UK

Results of Competition: **Seeding tomorrow's vehicle technologies today - IDP12 FS**
Competition Code: **1509_FS_TRANS_IDP12**

Total available funding for this competition was £4.37M from Innovate UK

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
JD Norman Lydney Ltd The Manufacturing Technology Centre	Camshaft Lightweighting through Advanced Manufacturing (CLAMP)	£245,952	£183,426
Project description - provided by applicants			
The Camshaft Lightweighting through Advanced Manufacturing (CLAMP) feasibility study compares two novelmethods for manufacturing hollow camshafts with the current state of the art. Innovation combiningtraditional and state of the art manufacturing processes for camshaft production with the aim of reducingvehicle emissions and while achieving improved engine performance.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Johnson Matthey PLC University of Cambridge	Moisture Resistant Lithium Air (MORELAB)	£245,402	£182,688
Project description - provided by applicants			
The project will involve Johnson Matthey Technology Centre and the University of Cambridge in a collaborationon Lithium Air batteries. The project will investigate a novel approach to improve the tolerance of Li-Airbatteries to operation on 'real air' containing water and carbon dioxide contaminants, using new lowervolatility electrolytes with redox mediators The approach will enhance solvation and diffusion of reactants andreaction intermediates for the Li-O2 reaction and hence improve reversibility. The project will optimise robustcathode structures for enhanced capacity and increased current density (target > 10mA/cm2) and assessscaleability of cathode preparation routes . Partners will investigate methodologies to protect the Li anodefrom adverse surface reactions during long term cycles on 'real air'. A full cell validation under a range oftesting conditions will complete the project and allow assessment of the simplifications to air purification,reduction in system balance of plant (and increase in usable Wh/L) that might be achieved via this technology.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Simpact Engineering Ltd University of Warwick Ariel Ltd	Lightweight Innovative Flexible Technology (LIFT)	£246,325	£181,373
Project description - provided by applicants			
LIFT (Lightweight Innovative Flexible Technology) is an exciting one year feasibility project that will investigate acompletely new and highly disruptive lightweight automotive suspension system concept. The project partnerswill make use of the latest materials and structures to combine the necessary elasticity and damping propertieswith durability and wheel control within a significantly simplified system. Eliminating discrete suspensioncomponents and developing an integrated system will provide superior performance and deliver considerableweight and cost savings.The project partners, Simpact, Ariel and University of Warwick, will adopt an advanced CAE modellingapproach, coupled with correlation against real-world road and track data for a baseline vehicle, providing theability to deliver rapid, validated design iterations. On completion of the project the virtual prototypedemonstrating the feasibility will be progressed into a physical prototype for road testing.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AVL Powertrain UK Ltd	Optimal Energy Management for Connected Vehicles with Electrified Powertrains	£222,394	£111,197
Project description - provided by applicants			
Vehicle emission regulations are becoming increasingly more stringent. A new EU directive becomes effectivein September 2017, mandating that vehicles are tested under real-world driving conditions to measure theiremissions. AVL's optimal energy management strategy for connected vehicles with electrified powertrains willcontribute to the reduction of CO2 and NOx emissions in the real world. The proposed technology optimisesthe energy management by accurately predicting the vehicle's future speed and by taking into accountavailable and up-to-date information on GPS position and planned route, traffic and driver behaviour. Thenovelty of this technology is partly in the use of the optimisation algorithm (dynamic programming) which willlead to the global optimal solution when accurate information is available and in the multivariable optimisationthat reduces both CO2 and NOx at the same time. AVL's solution will help reduce emissions in urban areas, willoffer reduced fuel costs for drivers and will enable OEMs to meet future emission targets and avoid increasingfines by the regulators.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Zagres Ltd	Feasibility assessment of a low-cost light-weight Gallium Nitride traction inverter through build and testing of a 30 kW prototype	£248,620	£174,034
Project description - provided by applicants			
Zagres has developed a unique GaN traction inverter technology incorporating a disruptive gate drive design and acompact, light-weight, integrated inverter design with patented thermal management that eliminates the need for asecond cooling loop. This project aims to prove the feasibility and quantify the economics of Zagres' GaN invertertechnology through design, build and testing of a 55 kW prototype inverter for the EV traction drive system.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Dukosi Ltd Imperial College London	Diagnostics and Prognostics for Lithium-ion battery systems	£239,135	£203,111
Project description - provided by applicants			
The growth in electric vehicles and renewables is placing greater demands on energy storage and energymanagement. Much of these applications are dependent on large Lithium-ion battery packs. TheElectrochemical Science and Engineering group at Imperial College London are world leaders in modellinglithium-ion cells to estimate the pack state of charge, and the advanced techniques that can be used todiagnose and predict degradation and failure. Dukosi Ltd has developed an innovate and disruptive BatteryManagement System technology that can implement these advanced techniques. The project will implementand demonstrate the best available techniques within a battery pack. This Feasibility Study will potentially leadto the development of the worlds most intelligent BMS system with unique diagnostics and prognosticscapabilities.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
HiETA Technologies Ltd University of Bath Axes Design Ltd	Advanced Inverted Brayton Cycle exhaust heat recovery with Steam Generation	£249,794	£198,834
Project description - provided by applicants			
The project builds on the technology development work being carried out in Innovate UK iBranch project, andwill assess the technical feasibility of an Additive Manufactured complex multi-fluid multi-phase heat exchangerfor use within an Inverted Brayton waste heat recovery system. The system converts waste exhaust energyfrom an internal combustion engine into useable power, either electrical or shaft. The heat exchanger aims tosignificantly increase the energy harvest potential of the system using phase change and multiple coolant loopsto optimise the thermal management, and is expected to reduce CO2 emissions by 10%. The partners are HiETATechnologies Ltd, the University of Bath and Axes Design Ltd.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Omnia(CS) Ltd NCC Operations Ltd University of Exeter	Light weight and cost effective composite structural core from recyclate	£249,460	£211,780
Project description - provided by applicants			
Omnia are specialists in delivering new material solutions and intelligent products. Its focus is on thermoplasticpanel technology and the supply of its unique range of composite sandwich panels. These not only offerexcellent strength to weight characteristics, but also durability, innovation and sustainability.Over the last decade Omnia has provided its customers with intelligent solutions based on sound engineering,economic and socio-economic principles. Some of its clients include, PepsiCo International, Williams F1, BP,Northgate Group, Royal Mail, DHL and TNT.Omnia (CS) Ltd is investigating the ways in which its innovative, lightweight composite materials can becombined with cutting edge technology that deliver exciting developments to the transport sectors. Thesedevelopments will ultimately improve operation efficiency and payload capability as well as reshoringmanufacturing capacity and capabilities to the UK.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Oxford Advanced Surfaces Ltd University of Manchester	Rescued Carbon Fibre for use in the Automotive Industry	£219,261	£170,207
Project description - provided by applicants			
The project will investigate the upscaling of low cost recycled carbon fibre bur surface treatment. The endobjective is to improve the interaction of various resin systems with the recycled carbon fibre in order toimprove the overall composite strength and modulus. This will deliver a low cost, low weight but high strengthmaterial which is ideal for use in the mass automotive market.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Johnson Matthey PLC Loughborough University	Solid INTERface Batteries - SINTER	£224,473	£161,758
Project description - provided by applicants			
Project SINTER, Solid INTERface Lithium Ion Batteries, will investigate novel materials and processes to formsolid state batteries and optimise their interfaces. Partners Loughborough University and Johnson MattheyTechnology Centre will utilise a synergistic theoretical and experimental approach to investigate a range of Liconducting glass-ceramic electrolyte materials and consequently the effect of dopants on the Li mobility, andthus performance and thermal stability. Loughborough University will use computer modelling studies to studystatic lattice simulations of project materials, MD and Ab initio methods to identify Li'ion transportmechanisms across electrolyte bulk, surfaces and electrode'electrolyte interfaces and a combinatorialapproach to mapping the phase space to explore the transition from glassy to crystalline phases JohnsonMatthey will fabricate the novel electrolytes defined by modelling work and investigate various approaches tointegrate the solid electrolytes with different electrode materials, including assessement of feasibility of thenew materials for tape casting and 3D printing deposition methodologies.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
HiETA Technologies Ltd University of Bath	Additive Manufacturing for Cooled High-Temperature Automotive Radial Machinery (CHARM)	£249,298	£209,319
Project description - provided by applicants			
This project will assess the technical feasibility of using Additive Manufacturing to make high-temperature air-cooled nickel superalloy radial turbine componentry for automotive applications. This is expected to enableturbine operating temperatures of ~1050C, enabling more extreme downsizing of engines, removing the needfor integrated cooled exhaust manifolds and leaving more thermal energy for waste heat recovery post-turbine. The project partners are HiETA Technologies Ltd and the University of Bath's Powertrain and VehicleResearch Centre (PVRC) and Turbomachinery Research Group (TRG).			

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Faradion Ltd	sodium-ion battery performance over an extended temperature range	£221,651	£155,156
Project description - provided by applicants			
Faradion Limited is being supported by Innovate to develop and optimise sodium-ion batteries which canoperate over the wide range of ambient temperature conditions which can be experienced by electric andhybrid vehicles. These range from -20C to +60C.			

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Hexcel Reinforcements UK Ltd Imperial College London Huntsman Advanced Materials (UK) Ltd Prodrive Composites Ltd	Affordable Composites for Lightweight Vehicles (ACLIV)	£263,000	£187,500
Project description - provided by applicants			
Manufacturing lightweight vehicles from carbon fibre reinforced composites significantly lowers fuelconsumption and therefore reduces CO2 and other emissions. Currently, the high cost of carbon fibrecomposites is a barrier to the inclusion of these materials in mass-produced vehicles. This project aims todevelop a low cost composite manufacturing technique that will make composites a feasible alternative tometals in family cars and other road vehicles. The innovative manufacturing route developed in this projectaims to reduce cost through two factors: 1) eliminating waste during composite production; 2) using cheaperstarting materials without compromising the properties of the finished components. The consortium for thisproject includes industrial and academic partners. Combined they have a wealth of experience in developingcomposite materials and together have the ability to create an effective solution to reducing harmful vehicleemissions.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Tata Motors European Technical Centre PLC University of Brighton	LOOP hEat pump ciRcuit (LOOPER)	£162,564	£121,760
Project description - provided by applicants			
The LOOP hEat pump ciRcuit (LOOPER) project will study the benefits of integrating passive Loop Heat Pipesinto a Heat Pump System for passenger cabin cooling of Battery Electric Vehicles [BEV]and Plug-in HybridElectric Vehicles [PHEV]. The project seeks to understand the potential for integrating Loop Heat Pipecondensers and bladeless cooling fans in a novel and aerodynamically enhanced way for road vehicles. It willanalyse the implementation of a low-cost Loop Heat Pipe, a technology which at present is too expensive forwidespread automotive adoption, although it has previously been applied to aerospace apllications.The virtualfeasibility study will be conducted using a novel combination of advanced Computer Aided Engineering (CAE)software tools/techniques by Tata Motors European Technical Centre (TMETC) and University of Brighton[UoB]. These partners offer the skills required to complete the feasibility study. A successful outcome will leadto future collaborative R&D opportunities for a consortium of technology providers and component suppliersthat will aim to develop the LOOPER concept towards eventual market readiness.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
SR Technology Innovations Ltd Newcastle University	Unlocking the Potential of a Free Piston Engine Range Extender	£249,798	£202,371
Project description - provided by applicants			
The project will show it is feasibly to unlock the theoretical potential of innovative Free Piston Engine (FPE)technology to deliver increased efficiency and significanly reduced CO2 emissions for hybrid electric vehicles.Free Piston Engines are disruptive technology offering the potential of a 30% efficiency improvement overconventional reciprocating engine based range extenders but until now this has largely only been shownthrough simulation and desk-based analysis.This project will demonstrate the feasibility of FPE technology for vehicle range extender applications by: Development of an FPE control strategy that delivers the high efficiency and low CO2 emissions Specification and design of an innovative power electronics drive for controlling and optimising theelectrical energy generation from FPE linear motor/generators identifying the most appropriate vehicle applications and the market potential for FPE range-extenders			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Equipmake Ltd Capoco Design Ltd	Cost Effective Electric Bus (Celeb)	£249,880	£174,916
Project description - provided by applicants			
The biggest issues for electric buses to overcome before mass adoption are range and cost, with the biggestbarrier being the cost and weight of the batteries. The ability to run for 18 hours and 200 miles is thebenchmark against which electric buses will be measured if they are to move beyond being niche productswithin the bus industry. Equipmake and Capoco believe that the solution to this problem is a ground upredesign of the vehicle, to significantly reduce the unladen weight, along with the introduction of new, nonelectrical, energy storage technologies and management systems to reduce the battery requirement for thevehicle. Existing electric buses have reduced passenger capacity compared with their diesel poweredequivalents due to the weight of the batteries required for 150 ' 200 mile daily range. The result of this projectwill be a cost effective electric bus with a real world range which will meet the needs of bus operators, withoutthe need for in service recharging.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
NetComposites Ltd University of East Anglia Element Materials Technology Hitchin Ltd Westfield Sportscars Ltd	Towards fully sustainable high-performance biocomposites for lightweight vehicles	£361,710	£285,179
Project description - provided by applicants			
Cellulose fibres hold a potential to provide a sustainable alternative to glass and carbon fibres. However, theirapplication on a commercial scale is limited by the challenges around durability, water resistance, andstructural strength/engineering performance. In the automotive industry, there is interest in replacing glassand carbon fibre, plastic and metal elements with biomaterials. Such substitution will result in the reduction ofvehicle weight, leading to increased fuel efficiency and lower carbon footprint. Some success in this matter hasbeen reported concerning the elements of car interiors, yet application of biocomposites for external partsremains a challenge. In this project we examine a novel modification of cellulose fibres in order to improve thewater resistance and the strength/engineering performance related characteristics. Modified cellulose fibreswill be used to produce samples that will subsequently undergo testing according to the specifications providedby car manufacturers. If successful, it will be a significant step towards 100% bio-based materials to be used ina car body.			

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The Institute of Spring Technology Force Technology Ltd Northern Automotive Alliance Ltd University of Warwick	Specialist Polymer Lighweight springs: Innovative processing using Conventional Equipment (SPLICE)	£244,090	£193,319
Project description - provided by applicants			
SPLICE seeks a step change in weight reduction for springs by using bespoke reinforced polymers to replace oiltempered silicon chrome steel springs for applications with medium to high stress & fatigue levels.The feasibility study will deliver tested demonstration springs with an application relevant materialspecification that have been produced via a lab-level polymer wire and spring manufacturing process. This willenable follow-on projects to be developed based on an understanding of the performance of the material andfully researched relevant applications for this new technology in automotive applications.This project will also enable the UK spring machine manufacturers and other UK spring manufacturers tobenefit by the development of analytical design & process software. Long term this could lead to a full UKsupply chain at the forefront of reinforced polymer springs technology.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Optare Group Ltd	Modular battery for Electric bus applications	£235,784	£117,892
Project description - provided by applicants			
This project intends to prove the technical and commercial feasibility of a lightweight, modular batteryapplication for an EV bus which is adapted specifically for bus infrastructure and usage characteristics. Inparticular the main objectives of this project are:1) To evaluate technical and commercial feasibility for a lightweight modular battery unit for an EV application2) To optimise efficient battery module stowage and weight distribution in an Optare bus structure3) To reduce battery weight4) To significantly reduce battery (and associated circuitry) costs5) To maintain the highest levels of battery safety (including in-vehicle battery isolation)And overall, to achieve significant reductions in CO2 and NOX emissions by developing an Optare EV bus whichis an affordable like for like replacement for conventional diesel powered buses, which has the capability toaccelerate EV uptake.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Teer Coatings Ltd Intelligent Energy Ltd University of Warwick	CAEPAC - Coated Aluminium Electrode Plates for Air-Cooled (AC) PEMFC	£249,779	£161,498
Project description - provided by applicants			
CAEPAC will establish the feasibility of coated electrode plates of lightweight alloy substrates for PEM (ProtonExchange Membrane) fuel cells. PEM fuel cells display the highest power densities of any of the fuel cell types,which makes them particularly attractive for transportation & portable applications where minimum size andweight are required. Air cooled fuel cells significantly reduce balance-of-plant complexity, hence weight (andcost), making Intelligent Energy's AC (Air Cooled) technology particularly suitable for lower power automotiveapplications such as primary and range extender drives for lightweight vehicles. Conventional PEM fuel cellsutilise electrode plates which are made from graphite (bulky and expensive to machine) or, particularly fortransport, stainless steel. For automotive applications, 100s of cells are needed within a multi-kW stack, hencea relatively small weight saving per plate will be significant for the whole system, provided such componentscan be manufactured cheaply and with similar performance and longevity. CAEPAC will develop novel, coatedlighweight alloy plates, and investigate their performance in cells & stacks, with detailed post-mortem analysis.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
FAR-UK Ltd Loughborough University	Painting in the Sky: freedom for manufacturing lightweight engineered structures	£240,990	£204,662
Project description - provided by applicants			
Lightweight materials are the next pit-stop in the challenge of reducing mass, and therefore curb reduceemissions, to improve fuel economy in the vehicle industry. But it has to be done economically. This projectwill develop a breakthrough cost-effective continuous extrusion process for composite beam manufacturing.The innovative continuous extrusion process will move away from traditional high-waste compositemanufacturing methods. It will offer flexibility in the dimensions of the beam along its length, width and height,supporting end-users' needs. The tailored and bespoke structural beams will require minimal tooling. Thistechnology could also work for other sectors e.g. heavy goods vehicles and rail. The main project outputs arethe continuous low-waste and affordable extrusion process. The sonication process developed atLoughborough University allows microscture development that gives the required properties. The underlyingmaterials science has been demonstrated but requires some development in the area of transport. This projectwill take this and show that components can be manufactured, moving the technology from low to mid TRLs.			

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Riversimple Movement Ltd University of Manchester	Highly automated, scaleable, low energy consumption process for complex, lightweight, hollow CFRP structures	£249,950	£204,956
Project description - provided by applicants			
Riversimple aim to prove the feasibility of a highly automated, repeatable & scaleable method of creatinglightweight, closed section CFRP automotive body structures; with complex geometries; without thecost/energy consumption of 5-Axis robots, autoclaves or High Pressure Resin Transfer Molding. Utilisingtechnical textiles expertise from the University of Manchester the process targets to achieve the level ofcomplexity found in automotive pressed steel panels but in addition aims to demonstrate that multiple pressedpanels utilised in common vehicle structures could be efficiently replaced with one single hollow braidedstructure.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
AVID Technology Group Ltd	Mild Hybrid Medium Commercial Vehicle Proof of Concept	£248,924	£174,247
Project description - provided by applicants			
Mild Hybrid Truck Powertrain Proof of Concept.AVID will apply its electrified anciliary systems and crank assist generator system to a medium duty truckplatform in order to research the feasibility of this technology to deliver significant fuel efficiency and emissionsreduction benefits under real world driving conditions.			

Note: you can see all Innovate UK-funded projects here
https://www.gov.uk/government/publications/innovate-uk-funded-projects Use the Competition Code given above to search for this competition's results

Innovate UK

Results of Competition: Seeding tomorrow's vehicle technologies today - IDP12 FS
Competition Code: 1509_FS_TRANS_IDP12

Total available funding for this competition was £4.37M from Innovate UK

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
MAST Carbon International Ltd	High energy density supercapacitors for hybrid applications	£173,521	£121,115
Project description - provided by applicants			
With extreme power capabilities, life-times and efficiencies the supercapacitor seems tailored to energystorage in hybrid applications. Unfortunately the low gravimetric and volumetric energy density stifles theiradoption and results in the supercapacitor market being just 5% of the lithium battery market. Through aInnovate funded Technical Feasibility study MAST Carbon Intl. looks to have developed a process to drasticallyincrease this energy density, allowing the supercapacitor to now compete on volume, weight and ultimatelycost, when all requirements of the hybrid vehicle are reviewed in combination. By removing the current bottleneck the current energy storage systems bring, the new supercapacitor has the capability of accelerating hybridcar adoption, paving the way to improved environmental credentials all whilst offering a cost saving to both theconsumer and to the UK in general. As it stands the UK has little involvement in both the $1bn supercapacitormarket and the $20bn lithium ion battery market. Successful development of this technology will offer asuperior product in both categories and will accelerate peripheral R&D in numerous areas.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
IDIADA Automotive Technology UK Ltd Mazaro NV Idiada Automotive Technology SA	Improving EV efficiency through the use of a continuously variable transmission	£227,902	£64,300
Project description - provided by applicants			
There's a growing consensus among powertrain experts that EVs need to evolve multi-speed transmissions ifthey are to realize their full potential" This is the tagline from a recent article in "Transmission TechnologyInternational" which reports that industry has recognised the need for a transmission within an electric vehicle.This project is to investigate the overall efficiency gains that can be achieved by including a variabletransmission into an electric vehicle instead of the normal single speed transmission. A variable speedtransmission would overcome drawbacks such as energy loss during shifting and passenger discomfort. This willallow significant improvements in energy efficiency to be made as well as potentially allowing the electricmotor to be downsized. Initial modelling studies have indicated that improvements of 16% could be achieved.The improvements will be quantified during the project to prove the increase in EV range The project will utilisea Mazaro Variator transmission fitted to an electric Nissan Cabstar. The Mazaro transmission has a novelapproach, which produces a very high mechanical efficiency at all speed ratios and so is ideal for this project.			

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