

North East England

Electric dreams - 21st Century
Low Carbon Vehicle reality



North East
Local Enterprise Partnership



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Electric dreams 21st - Century

Low Carbon Vehicle reality

North East England is on a journey towards our vision of clean and smart passenger vehicle technology, connecting people and the economy to tackle one of the great environmental challenges of our age.

We aim to be a leading test bed and demonstration area for the low carbon vehicles that are transforming the way we live our lives, changing the infrastructure of our cities and impacting our planet.

North East England led the world in the development of rail passenger travel, engineering and scientific discovery in the Industrial Revolution.

It is doing so again, in a cleaner, quieter but no less impactful way.

Where once we had Stephenson's Rocket, Swan's electric light bulb and Armstrong's first hydro-electrically lit home, we now have electric vehicle (EV) charging networks, battery powered cars and fleets of vans and a transport infrastructure promoting new ways of reducing our carbon footprint. In just a few short years, North East England has taken up the societal

challenge of finding solutions to provide a cleaner, greener future for our transport systems, homes and cities. Cleaner, sustainable travel is one of the planet's greatest challenges. North East England is ideally placed to meet it.

It is home to Nissan in Sunderland, Europe's most productive car manufacturing plant, the home of the electric Nissan LEAF and EV battery production. Nissan also confirmed a further £100million investment by announcing that the new generation Nissan Juke will be produced here.

The North East is home to exceptional academic research into low carbon vehicle and fuel cell technology. The Transport Operations Research Group (TORG) at Newcastle University is central to research in areas such as road user charging and smart cards, developing policy ideas and new technologies.

Northumbria University, is leading a study to better understand the electric vehicle battery life cycle and to find ways to harness its power for domestic use or

for feeding back into the grid. And Gateshead College is training the next generation of skilled workers needed to seize the employment opportunities advancements in LCV development present.

Our public authorities are fully engaged with our low carbon vision – focused on becoming the UK's first fully integrated transport system across all modes led by the North East Combined Authority. And with Hitachi Rail Europe set to begin making carriages for the Government's Intercity Express programme from a new high tech base in Newton Aycliffe, this clustering of capability is set to grow and diversify.

North East England is once again on the first page of the next chapter in the development of the UK's rail network. Innovation, facilities, academic research and a highly skilled workforce with the in-built work ethic which has fuelled the pioneering spirit of the North East economy for hundreds of years.



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Facilities and expertise

North East England has the LCV environment to supercharge business investment and growth in the region.



Facts and figures

Milestones along the electric highway.



- ▶ North East universities. All five universities in the region are carrying out research into LCV technology. From intelligent transport systems and driver behaviour, through to smart power distribution and zero emission vehicle concepts, they are pushing back the boundaries of LCV knowledge and impact.
- ▶ Durham University is heading up research into smart grids and power monitoring.
- ▶ Newcastle University is at the cutting edge of research into intelligent transport systems, providing world-leading services to the automotive and low carbon vehicle industry.
- ▶ AMAP – the Institute for Automotive and Manufacturing Advanced Practice. Based in the University of Sunderland, it is leading projects examining hybrid electric vehicle technology, fuel cells and research and development.
- ▶ Northumbria University is leading research into how electric vehicles impact power distribution networks and smart grid solutions.

The work of the universities is complemented by...

- ▶ International Advanced Manufacturing Park (IAMP). Based in Sunderland and South Tyneside, a 100 hectare site to house automotive, offshore and other high-tech companies.
- ▶ A19 Ultra Low Carbon Vehicles Corridor. More than 32 acres of land in Sunderland designated as an enterprise zone for LCV development.
- ▶ UTMC – Urban Transport Management Control Centre. The Newcastle-based centre helps innovative planning and intervention to react to major events on the North East's roads.
- ▶ Newcastle Science Central, Sunderland Software City and the Centre for Process Innovation – world class academic knowledge and research in sustainable sciences, housing elite catapult centres to propel new business growth.



Newcastle upon Tyne internationally recognised as Britain's most sustainable major city two years running.

- ▶ North East England is home to the UK's most comprehensive regional electric vehicle recharging network.
- ▶ North East Plugged in Places saved 232 million grams of CO2.
- ▶ North East England has the highest percentage of LCV drivers in the country.
- ▶ Newcastle-upon-Tyne internationally recognised as Britain's most sustainable major city two years running.
- ▶ The Switch EV project placed 44 electric cars on the road to understand their impact and charging patterns. The vehicles travelled a total of 403,000 miles – equivalent to driving around the world 16 times.
- ▶ Switch EV vehicles were charged 19,900 times providing the biggest study of electric vehicle use in Europe.



10% of electric vehicles registered in the UK are on the North East's roads.



A total of 1,163 electric vehicle charging points were installed in the North East.



Asset base - our friends electric?

The partners, projects and networks putting the North East in the LCV fast lane.

Zero Carbon Futures

The Sunderland-based low carbon technology company Zero Carbon Futures (ZCF) was created in 2011 to exploit opportunities in low carbon transport development and smart home technology.

Making sure that electric vehicle drivers in North East England are never far away from a charge point was a key priority for the team who successfully manage the North East's Plugged in Places project.

Over 1,000 charge points have now been installed in the region – on streets, in shopping centres, in workplaces and in driver's homes.

The team have extensive experience of all aspects of installing EV infrastructure – sourcing charge points, developing standards and managing and overseeing a back office system including introducing a payment system for charge points.

It is this experience which is now being used nationally to support other UK regions to introduce charge point networks.

In 2012, Zero Carbon Futures entered into a joint venture with Elektromotive to expand the existing Charge Your Car network to create a recharging network with 10,000 public access pay-as-you-go charge point locations across the UK.

The successful network is now operating under the Charge Your Car brand. Zero Carbon Futures is also project managing the Rapid Charge Network project on behalf of four partners – Nissan, BMW, Renault and VW.

The project aims to install a network of 74 multi-standard, rapid charge points across the UK and Ireland and will study its impact.



“Over 1,000 charge points have now been installed in the region – on streets, in shopping centres, in workplaces and in driver's homes.”





“The Future Technology Centre can work to accelerate the UK’s ongoing integration of these technologies.”



The Future Technology Centre

Based next to the former Nissan test track in Washington, the centre has a bold vision to be a world class base for low carbon technology excellence.



The centre is located in the heart of the A19 Ultra Low Carbon Vehicle Corridor Enterprise Zone. It is owned and managed by Gateshead College, which has invested more than £2m to match a grant from the Government’s Regional Growth Fund.

Centre tenants include Smith Electric Vehicles, which manufactures and develops zero-emission commercial vehicles.

Smith has a long-standing relationship with the college and the two organisations have developed an electric vehicles apprenticeship programme.

Other tenants include low carbon vehicle electronics and powertrain specialist Hyperdrive Innovation; charge point installation experts ELM EV; technology company Zero Carbon Futures and Tadea’s Effective Transport Solutions, with a dedicated team of experts and simulators to train drivers in the best use of EVs.

“The Future Technology Centre can work to accelerate the UK’s ongoing integration of these technologies,” said Judith Doyle, Principal and CEO of Gateshead College.

“Through its partnerships and collaborative projects the centre will become a home to academic research, automotive supply chain operations, skills and training provision to act as a springboard to real-world adoption of new and emerging technologies.”

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Transport Operations Research Group

Electric vehicles and public charging points on trial in groundbreaking tests.

One of the leading centres of transport technology in Europe, the Transport Operations Research Group (TORG) at Newcastle University is central to key research in areas such as road user charging and smart cards, developing policy ideas and underlying technologies.

The group is running a world leading trial in electric vehicles and public charging infrastructure in North East England that is informing policy, international standards development and the impact on energy demand and environmental emissions.

TORG has also developed a low-cost wireless sensing technology – Motes - which is being used commercially by several local authorities to monitor traffic pollution and help develop strategies to manage traffic demand and reduce emissions.

This world leading technology is being assessed for deployment in a number of high profile international cities.



North East Automotive Alliance

Working together to put new technologies and skills centre stage.

Formed in 2014 to support the sustainable growth of the automotive sector in the North East, the NEAA is an industry led and membership based network aiming to overcome barriers to growth.

It undertakes a range of activities providing access to research and intelligence, benchmarking and skills practice. It provides a focal point to drive innovation and adopt new technologies and processes through collaboration, business advice and access to funding.



North East Combined Authority

Regional councils working together
to link transport across the North East.



Plugged in Places

Charge up your electric vehicle on
the North East's plugged in highway.



As the North East's transport authority, the Combined Authority has a critical role to play in fostering innovation in the transport system.

With the aim of creating the UK's first genuinely integrated transport system across all modes, the Combined Authority, working closely with the North East LEP, has already developed a strong programme of work to ensure that transport systems support the development of the North East's economic priorities.

This includes nurturing innovation in projects to support adaptation of low carbon vehicles and to reduce carbon emissions across the transport system.



Over 1,000 charge points were installed during the project. This included the introduction of twelve quick charge points along the main spine routes of the region giving North East England the UK's first quick charge point gateway. Zero Carbon futures project managed the initiative which they branded 'Charge your Car'.

The Government provides funding to the Plugged In Places programme and offers match funding to consortia of businesses and public sector partners to install electric vehicle charging points.

This successful first phase is being followed up with analysis of data generated from the programme about how drivers wish to use and recharge their electric vehicles.

The data will provide the evidence base to help the industry create a UK network of recharging points that meets the needs of plug-in vehicle drivers. The Plugged-in Places programme has been instrumental in supporting the uptake of EVs in the region and has supplemented charging points installed by some councils across the UK and by private sector providers.



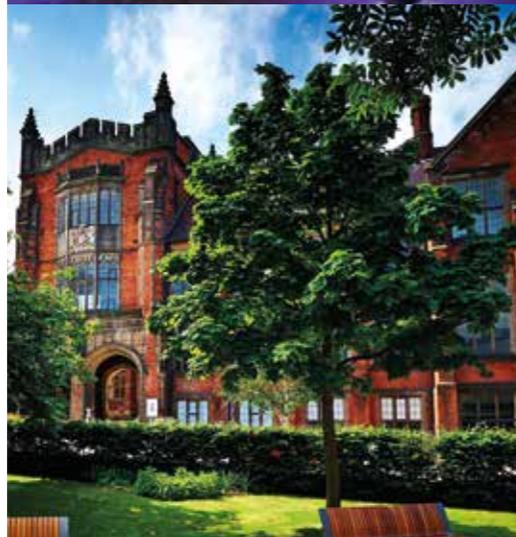
Rapid Charge Network

Funded by the European Union's Trans-European Transport Network programme, the project covers over 1,100km of major UK and Irish roads which link with five major ports and five international airports.

Launched in October 2013, each activity will be documented and the results made available across Europe. The project assesses the creation, use and business feasibility of a transnational network of EV rapid charge points. The end result of the project will be a strategy which will be shared with other EU towns, cities and countries.

Regional funding for the Rapid Charge Network project is being led by Nissan and Newcastle University. The university research team will study the impact of the project on the driver population. The team will analyse driving data and charging patterns to inform future transport infrastructure and best practice for the rest of Europe.

Using data loggers, the Newcastle University team will look at how often people re-charge, how far they travel between charging points, total distance travelled and other indicators of driver behaviour and efficiency.



Electric Workforce

Ensuring the North East workforce has the training and skills necessary to take advantage of the opportunities LCV development presents, is essential.

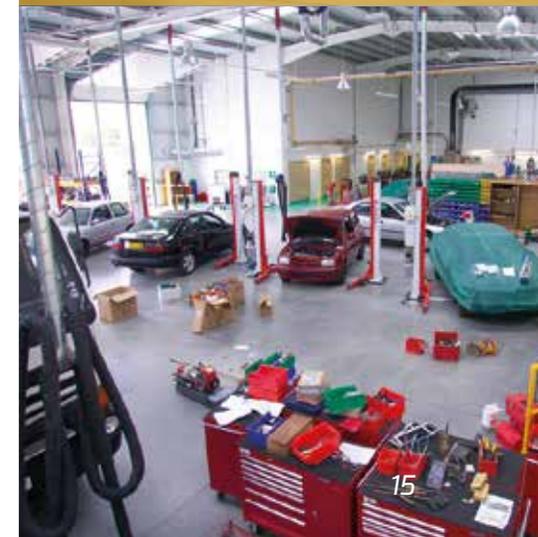
That's where Zero Carbon Futures and Gateshead College step in. Skills and training underpin all the work of Zero Carbon Futures and remain a key focus for the team.

Working with their parent organisation Gateshead College – Europe's leading trainer in all areas of low carbon vehicles – ZCF are constantly developing new training and development courses to ensure students benefit from new technology. Opportunities range from routine maintenance and repair activities, hazard management, EV and battery manufacture and hydrogen safety.

The facility is providing world-leading training to apprentices and people seeking emerging jobs in the industry. The academy is the first of its kind in the UK and will take trainees through all the essential elements of working with low carbon technologies.

The Skills Academy for Construction and its newly developed Zero Carbon Future's Renewable Technology Zone will also be home to training and development of low carbon technologies to develop smart homes, including vehicle to home equipment, PV panels and ground source heat pumps.

“The new £9.8m Skills Academy for Sustainable Manufacturing and Innovation is at the heart of skills development in the sector.”



Electric Avenue opened up by LCV development

The region's rapid progress in developing LCVs and its recharging network, has opened the door to researching a wider, fully intelligent transport system.



Integrating LCVs to share energy resources with our homes and cities is at the heart of exciting new projects exploring a smarter way of harnessing power for future generations. The ground breaking 'My Electric Avenue' project is designed to help understand the demand on the electricity network when electric cars are commonplace. More than 50 people across four residential areas and one business cluster signed up to take part in the 18-month long trial.

It will assess the impact on the electricity supply of a cluster of EVs in daily operation in a neighbourhood or business.

My Electric Avenue, led by EA Technology, an innovation technology deliverer, and hosted by Scottish and Southern Energy Power Distribution, with the support of Zero Carbon Futures, offers an insight into what the electric vehicle street of the future could look like. Its findings will provide essential learning about managing the local electricity network for this 'real life' scenario.

The Zero Carbon Futures team signed up groups of ten or more neighbours in South Gosforth, Newcastle upon Tyne, Wylam, Northumberland, as well as two groups from the same estate in South Shields, which is set to boast the largest number of EV drivers in one neighbourhood anywhere in the UK once all residents take delivery of their Nissan LEAF trial vehicles. Under the technical trials programme, each individual will lease an all-electric Nissan LEAF at a subsidised rate for 18 months, with the aim of trialling 'Esprit', a new technology developed by EA Technology to monitor and control the electricity used when the car is being charged.

Your Homes Newcastle, responsible for managing council homes on behalf of Newcastle City Council, has also signed up and will become one of only two business clusters in the UK to take part in the trial. Lois Warne, technical advisor at Zero Carbon Futures, said: "Crucially, the recruitment for the trials has succeeded because of 'cluster champions' in local communities taking up the challenge of recruiting at least nine other neighbours through leaflet dropping, door knocking, and even holding community coffee mornings to drum up support.

"It is essential that we are prepared for when electric cars become commonplace in years to come. "The technology that is being trialled through the project will monitor and control the electricity demand from charging electric cars and, in the long-term, will save expensive and potentially disruptive work being carried out to upgrade the electricity network."

My Electric Avenue is focusing on the potential problems that can arise when a large number of EVs charge in the same street at the same time. It is the first trial that directly controls domestic EV charging to prevent underground cables, overhead lines and substations being overloaded.



Public services swap diesel for high voltage power

Gateshead Council is one of the UK's leading adopters of electric vans.

The council purchased ten 'Smith Edison' all-electric vans, for assessment in operations across its commercial vehicle fleet.

Produced by Smith Electric Vehicles in nearby Washington, the Edison has a range of up to 100 miles on a single charge, making it ideal for urban operations.

With substantially lower fuel costs and maintenance requirements, the Edison delivers much lower running costs than a conventional van.

Gateshead Council's Transport Manager, Alasdair Tose, said:

"Gateshead Council is committed to playing a lead role in the roll-out of electric vehicles and infrastructure."

"Our fleet of electric vehicles is the largest local authority fleet in the region, delivering key services to Gateshead residents whilst reducing carbon emissions and saving money at the same time."



"Gateshead Council is committed to playing a lead role in the roll-out of electric vehicles and infrastructure."



Gateshead Council purchased the vans through the UK Government initiative, the Low Carbon Vehicle Procurement Programme (LCVPP). Under the programme, the Department for Transport paid the difference between the purchase price of a standard diesel panel van and the new technology electric vehicle.

This allows local authorities like Gateshead to buy small fleets of electric and hybrid vans, to fully assess and understand their technology.



The businesses flicking the switch to EV integration

They are the world leaders, working from North East England to transform everyday life through electric vehicle development.



Nissan

Nissan's Sunderland plant is the home of production of the electric Nissan LEAF.

The car giant has built a £200m plant in Sunderland to manufacture lithium-ion batteries for electric vehicles, creating 350 jobs in the process.

The facility will produce up to 60,000 batteries a year for the car giant's electric vehicles.

Hitachi Rail Europe

The company will produce the next generation of high speed trains, commuter trains and metro train fleets - comprising electric and bi-mode trains - from its new Newton Aycliffe base.

The company is a total railway system supplier offering rolling stock, traction equipment, signalling, traffic management systems and maintenance depots. Hitachi draws on many years of experience as a leading supplier of metro, commuter and high-speed trains such as the Shinkansen (Bullet Train) for the Japanese and international markets.

The company is part of the Agility Trains consortium awarded a £5.8bn contract to finance, design, manufacture, maintain and service the next generation of intercity carriages to improve the UK's mainline rail services.

Nearly 900 new carriages will be made at its Merchant Park factory, representing an £82m investment and creating 730 new jobs. The site will also be home to a research and development facility and test track.

Sevcon

Gateshead-based Sevcon manufactures high quality motor controllers and system components for electric vehicles - impacting the way people around the world travel, work and live.

It offers a diverse range of products for electrically powered vehicles from fork lift trucks to electric cars and bikes.

The components for on-road and off-road vehicles are constructed to perform reliably in the most severe conditions.

Smith Electric

Smith Electric Vehicles is a global leader in commercial fleet electrification.

The Washington-based company makes zero-emission vehicles that deliver a superior performance to traditional diesel trucks, at greater operational efficiency and significantly lower cost.

Smith has more than 80 years experience in selling and servicing electric vehicles in the UK.

The Smith mission is to be the leading producer of high efficiency, zero-emissions vehicles in the commercial transportation industry, partnering with world class brands to transform their entire fleets, help them operate more profitably and return energy to the grid.

AVID Vehicles

The Cramlington-based business focuses on the development of electric and hybrid vehicle power train systems, electric engine ancillaries and thermal management systems.

AVID is enjoying success with its eFan Micro Hybrid System, fitted into buses and mining vehicles, increasing their efficiency and performance.

The eFaN tackles some of the major issues impacting buses and heavy earth moving machinery, such as breakdowns due to overheating and excessive time spent on cooling system maintenance.



Looking to the future

The future of low carbon vehicle development is exciting and one the North East is ideally placed to exploit.

Automated driving – vehicles that drive themselves – is an area of technology being pioneered using DriveLAB and instrumented vehicles at Newcastle University and at the region’s performance test track.

Northumbria University has teamed up with Sevcon to take forward smart charging. They are researching and developing a smart electric vehicle charge controller that reduces the degradation of a battery, allowing charging from available renewable energy sources and the potential to supply power into the grid system.

Partners are coming together to support new initiatives to drive this agenda – in particular the collaborative ‘Go Ultra’ programme which aims to deliver a tenfold increase in the number of ULEV vans and cars registered in the region.

It aims to expand and integrate air monitoring, modelling and response systems and showcase innovation internationally across the ULV agenda. Hydrogen fuelled vehicles are being lined up as the next major advancement in transport.

North East England with its huge chemicals complex at Tees Valley and industry expertise within the Centre for Process Innovation (CPI) and North East Process Industry Cluster (NEPIC) is ideally placed to lead development in this area.

“A total of 50% of the UK’s hydrogen is produced in the Tees Valley chemicals complex, making the region the prime location for demonstrations in hydrogen fuel cell vehicle development.”





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