



HM Government

Industrial Strategy

Automotive Sector Deal



Foreword

For decades, the UK's automotive industry has powered our economy forward. Today, automotive firms from around the world choose to set up shop here, citing our history of excellence, skilled workforce and world-leading supply chains.

As ever, partnership will be pivotal. In the next 10 years, the sector will see more change than in the previous hundred. From the engines that power our cars, to the way we control them and our attitudes to owning them, technology is changing what the industry looks like and where money can be made.

New conditions require new thinking and, as a country, we are extraordinarily well-placed to provide this. Our rich history of scientific discovery includes the lithium-ion battery, which was invented in this country and already powers millions of vehicles around the world.

And in the future, the automotive sector will shape our response to the Grand Challenges articulated in our Industrial Strategy, such as Clean Growth and the Future of Mobility – transformations which will forever change how people live, work and travel.

As ever, partnership will be pivotal. This first Automotive Sector Deal builds on the longstanding partnership between the government and industry, brought to life through the Automotive Council and will be followed by further commitments.

As a result of the Sector Deal, both government and industry will invest about a quarter of a billion pounds to develop and manufacture electric vehicles. This includes the Faraday Battery Challenge, which will drive the technologies to power electric vehicles in the future, as well as £80 million for a new state-of-the-art automotive battery development facility in Coventry. This investment marks yet another step forward on our journey towards mass producing electric batteries and vehicles here in the UK.

The deal also aims to create a world-leading testing environment for Connected and Autonomous Vehicles. Using our renowned test tracks, we will improve the safety of these vehicles by pushing them to the limits of their speed and handling.

And, finally, the government is investing in a new industry-led programme to raise the competitiveness of UK suppliers to match the best in Europe.

For over a century, the UK has written the history of the automotive industry. As we open the sector's next chapter, let's work together to make sure the technologies of tomorrow are developed, tested and manufactured right here in the UK.



Rt Hon Greg Clark MP

Secretary of State for Business, Energy and Industrial Strategy



Nigel Stein

Chief Executive GKN plc and Automotive Council Chairman

Industrial Strategy at a glance

We will create an economy that boosts productivity and earning power throughout the UK

Industrial Strategy is built on 5 foundations



We will set Grand Challenges to put the United Kingdom at the forefront of the industries of the future:

AI & Data Economy
We will put the UK at the forefront of the artificial intelligence and data revolution

Clean Growth
We will maximise the advantages for UK industry from the global shift to clean growth

Future of Mobility
We will become a world leader in the way people, goods and services move

Ageing Society
We will harness the power of innovation to help meet the needs of an ageing society

Key policies include:

Ideas

- ▶ Raise total research and development (R&D) investment to 2.4 per cent of GDP by 2027
- ▶ Increase the rate of R&D tax credit to 12 per cent
- ▶ Invest £725m in new Industrial Strategy Challenge Fund programmes to capture the value of innovation

People

- ▶ Establish a technical education system that rivals the best in the world to stand alongside our world-class higher education system
- ▶ Invest an additional £406m in maths, digital and technical education, helping to address the shortage of science, technology, engineering and maths (STEM) skills
- ▶ Create a new National Retraining Scheme that supports people to re-skill, beginning with a £64m investment for digital and construction training

Infrastructure

- ▶ Increase the National Productivity Investment Fund to £31bn, supporting investments in transport, housing and digital infrastructure
- ▶ Support electric vehicles through £400m charging infrastructure investment and an extra £100m for the plug-in car grant
- ▶ Boost our digital infrastructure with over £1bn of public investment, including £176m for 5G and £200m for local areas to encourage roll out of full-fibre networks

Business Environment

- ▶ Launch and roll out Sector Deals - partnerships between government and industry aiming to increase sector productivity. The first Sector Deals are in life sciences, construction, artificial intelligence and the automotive sector
- ▶ Drive over £20bn of investment in innovative and high potential businesses, including through establishing a new £2.5bn Investment Fund, incubated in the British Business Bank
- ▶ Launch a review of the actions that could be most effective in improving the productivity and growth of small and medium-sized businesses, including how to address what has been called the 'long tail' of lower productivity firms

Places

- ▶ Agree Local Industrial Strategies that build on local strengths and deliver on economic opportunities
- ▶ Create a new Transforming Cities fund that will provide £1.7bn for intra-city transport. This will fund projects that drive productivity by improving connections within city regions
- ▶ Provide £42m to pilot a Teacher Development Premium. This will test the impact of a £1,000 budget for high-quality professional development for teachers working in areas that have fallen behind

An independent Industrial Strategy Council will assess our progress and make recommendations to government.

Executive Summary

The Automotive Sector Deal, the first in a rolling series of intended deals with the sector, builds on the partnership between the government and industry that has been in place since the Automotive Council was established in 2009, setting the direction and long-term strategic priorities for the sector.

This partnership has yielded results: vehicle and engine output has increased, productivity has improved and the proportion of UK components in each vehicle produced in the United Kingdom is rising (44 per cent in 2016, up from 36 per cent in 2011¹). For the seventh successive year expenditure in research and development (R&D) by motor vehicle manufacturers has increased, and in 2016 it reached £3.4bn, growing by 20 per cent on the previous year².

These achievements matter not just to the industry but to the country. It is through these successes that the sector is able to provide over 390,000 high-quality, well-paid jobs, both directly in vehicle manufacturing and through the supply chain³, increasing prosperity across the country. The industry is an international success story, generating over £40bn of export revenue in 2016⁴, and helping the UK to maintain a reputation for engineering innovation and manufacturing excellence.

Production levels achieved a 17-year high in 2016 with 1.7 million vehicles rolling off production lines⁵. Today the sector faces a new set of challenges. Significant changes in how cars are

built, powered and driven means the industry must continue to adapt to maintain its position as a global leader. It must take decisions now to ensure it remains both attractive to invest in and central to the UK economy.

The UK automotive industry with its diverse range of products, spanning volume, premium and niche vehicles, has benefited from the European market, with highly integrated supply chains and a significant demand for UK-built cars across the region. In total, half of all UK automotive exports go to the European Union. As the UK leaves the EU, the industry welcomes the government's ambition to achieve a new relationship that is free from tariffs and without friction to trade - factors that are fundamental to the competitiveness of the UK automotive sector.

The proposals contained within this Sector Deal are designed to complement this ambition and are aligned to the foundations set out in the Industrial Strategy - ideas, people, infrastructure, business environment and places. They support its vision for the UK to be the world's most innovative economy; for good jobs



and greater earning power for all; for a major upgrade to the UK's infrastructure; to be the best place to start and grow a business; and for prosperous communities across the UK.

We have prioritised an initial set of proposals, which have been agreed between the Automotive Council and the government. It is intended that this deal is the first of several with the sector.

Ideas

The ambitions set out in the Industrial Strategy White Paper are underpinned by a commitment to world-class innovation. It set out a further increase in R&D investment of £2.3bn in 2021/22, raising total public investment

in R&D from £9.5bn to £12.5bn, as well as a commitment to work with industry to boost spending on R&D to 2.4 per cent of GDP by 2027. This will increase to 3 per cent over the longer term.

This Sector Deal demonstrates how the automotive sector can play an important part in meeting this commitment by investing in the development of the next generation of vehicles.

In recognition of this, the Automotive Council asked Richard Parry-Jones, former Chief Technical Officer and Head of Global R&D Operations at Ford Motor Company, to conduct a sector-led review into accelerating the transition to the manufacture of ultra-low and zero emission vehicles.



The evidence gathered from the review underpinned the rationale for the landmark Faraday Battery Challenge⁶.

Through the Faraday Battery Challenge, the government is investing £246m over four years into a programme of competitions focused on the research, innovation and scaling up of battery technology.

In the coming months the government will publish a strategy for the transition to zero emission road transport, ensuring the UK continues to be a world leader in the development, manufacture and use of these vehicles.

The UK is also pursuing a position in the global vanguard of the development, demonstration and deployment of connected and autonomous vehicle (CAV) technologies, capitalising on our commitment to R&D and

our competitive advantage of being able to test anywhere in the UK today. It is estimated that the CAV sector will be worth £28bn to the UK economy by 2035⁷.

Business Environment

The Industrial Strategy White Paper sets out the government's ambition to make the UK the best place to start and grow a business. A key part of this is our globally competitive corporate tax rate of 19 per cent, our continuous focus on regulatory reform and our ability to attract global talent and disruptive start-ups. Our challenge is to improve how we spread the best practice of our most productive businesses.

Our key policies include launching Sector Deals - and automotive is an early partner. We are also establishing

a new £2.5bn investment fund incubated in the British Business Bank to drive investment in innovative and high potential businesses. A new UK-backed and industry-led brand for CAV - Meridian - was set up to convene UK industry around shared priorities, and showcase our approach internationally. Meridian will cement the UK's status as the go-to destination for the development and testing of CAV and new vehicle technologies.

Manufacturing is crucial to the economy, providing 10 per cent of the UK's Gross Value Added (GVA), generating around 50 per cent of our exports and accounting for 70 per cent of business-led R&D⁸. Advanced manufacturing supply chains are highly complex and globally integrated, with components often crossing borders several times.

Although we have a strong position, there is a major opportunity to deepen the supply chain presence for the sector in the UK. We therefore intend to launch a new supply chain competitiveness and productivity improvement programme targeting areas where key businesses need to improve to match the best in Europe. The programme will provide bespoke training and streamlined business processes to help build the integrated supply chain we need in the UK to manufacture the future generation of vehicles at volume. This will support the industry's ambition to increase the level of UK content by value in domestically-built vehicles to 50 per cent by 2022.

Infrastructure

As we set out in the Industrial Strategy White Paper, having modern and accessible infrastructure throughout the country is essential to our future growth and prosperity.

We have announced an increase in the National Productivity Investment Fund to £31bn, supporting investments in transport, housing and digital infrastructure. We are investing over £1bn in boosting digital infrastructure, including £176m for 5G and £200m for local areas to encourage roll out of full-fibre networks.

Our investments in infrastructure are among the government's most significant interventions in the economy and we are ensuring that they actively support our long-term productivity and drive the growth of emerging industries.

To accelerate the transition to electric vehicles we are creating a new £400m Charging Infrastructure Investment Fund (£200m from the government to be matched by private investors); and providing £200m Office for Low Emission Vehicles R&D funding over the current spending review period; £100m new funding for the plug-in car grant; £40m R&D funding (matched by industry) for new charging technologies including on-street and wireless projects; initiating a £20m vehicle-to-grid R&D competition, a £23m Hydrogen Transport programme and making a commitment that the government will lead the way, making 25 per cent of all cars in the central government fleet ultra-low emission by 2022.

Places

The Industrial Strategy set out our goal of helping prosperous communities to thrive across the UK. We are creating a new Transforming Cities fund that will provide £1.7bn for intra-city transport. This will fund projects that drive productivity by improving connections within city regions. We are also committing to agree Local Industrial Strategies that build on local strengths and deliver on economic opportunities.

The 2017 CAV testbed competition aimed to create the world's most effective CAV testing ecosystem by creating a number of distinct test capabilities which would work together as part of an open testing environment. Collaborative projects supported under this initiative form part of a unique cluster running from our automotive heartlands in the West Midlands, through our innovation centres near Oxford and Milton Keynes, to London.

The portfolio of projects linked to the Advanced Propulsion Centre (APC), a ten-year, £1bn initiative, funded 50:50 by government and industry to support the development of low carbon technologies, include participants spread across the UK, and is supported by a network of Centres of Research Excellence. These centres, the 'APC spokes', are linking industrial and academic communities from Newcastle to Brighton and from Nottingham to Bath.

People

The government set out its vision to create good jobs and greater earning power for all in the Industrial Strategy. To do this, we need to ensure that we are equipping citizens for jobs shaped by next generation-technology.

The growth of the UK automotive sector and the transition to the next generation of vehicles will require people with new skills and a substantial upskilling of the existing workforce. This requires a coordinated national and local approach through established institutions such as the Institute for Apprenticeships and supporting the development of the new T level qualifications. The government and industry are committed to taking forward this agenda through the next phase of Sector Deals.

Under the direction of the Automotive Council, and with initial grant support from the government, the industry has established the Automotive Industrial Partnership for Skills (AIP). The AIP has developed a skills roadmap for the sector, which is guiding steps to tackle critical skills shortages as the sector grows and evolves. A key element is to boost apprenticeships. The automotive sector has been at the forefront of apprenticeship reforms, leading the development and piloting of the new 'trailblazer' standards, and setting up the Apprenticeship Matching Service.

Automotive Sector Deal

Key commitments



Government action to support the automotive sector

Ideas

Advanced Propulsion Centre

- ▶ £500m over 10 years to 2023 to research, develop and industrialise new low-carbon automotive technologies in the UK.

Automotive R&D

- ▶ £225m from 2023 to 2026 to support R&D in the sector⁹.

Transition to ultra-low and zero emission vehicles

- ▶ £246m for the Faraday Battery Challenge to make the UK a world leader in the design, development and manufacture of batteries for the electrification of vehicles. This includes:
 - £78m for the Faraday Institution (100 per cent public funding

to support fundamental academic research);

- £80m for the Faraday National Battery Manufacturing Development Facility; and
- £88m for the Faraday Battery Challenge Innovate UK programme.

Shaping the future of mobility

- ▶ £250m to position the UK as a global leader in the development and deployment of connected and autonomous vehicles (CAVs). This includes:
 - £150m for collaborative R&D projects; and
 - £100m for CAV testing infrastructure.

Business Environment

Supply chain competitiveness and productivity improvement

- ▶ £16m funding subject to business case for an industry-led national supplier competitiveness and productivity improvement programme to support a sustainable and internationally competitive UK supply chain for future volume vehicle production. A robust monitoring and evaluation framework will be set up to measure the success of this programme.

Industry action to support the automotive sector

Ideas

Advanced Propulsion Centre

- ▶ £500m match funding for collaborative R&D projects; and
- ▶ Match funding to support APC and its core activities.

Automotive R&D

- ▶ £225m match funding for collaborative R&D from 2023 to 2026.

Transition to ultra-low and zero emission vehicles

- ▶ £80m funding over the working lifetime of the National

Battery Manufacturing Development Facility; and

- ▶ £59m match funding for the Faraday Battery Challenge Innovate UK programme.

Shaping the future of mobility

- ▶ £56m funding for the CAV collaborative R&D projects to date; and
- ▶ Match funding for the £100m CAV testing infrastructure.

Business Environment

Supply chain competitiveness and productivity improvement

In order to support the industry's ambition to increase the value of UK content in domestically produced vehicles to 50 per cent by 2022, industry will:

- ▶ Implement a single scalable productivity improvement programme; and
- ▶ Match fund at least £16m (contribution in kind) from supply

chain companies participating in the competitiveness and productivity improvement programme.

- ▶ Vehicle manufacturers and Tier one suppliers will take a leading role in identifying key strategic suppliers and take part in the governance of programme.

Government action to support the automotive sector

Business Environment

- ▶ £100m new funding for the Plug-In Car Grant to help consumers buy battery electric vehicles.
 - ▶ From April 2019, Government will exempt zero-emission capable taxis from the VED supplement that applies to expensive cars, consulting in advance on how to define such taxis.
 - ▶ Provide a Benefit in Kind exemption for employees offering free charging for electric vehicles
- at work, to come into effect in April 2018. This will support the roll out of electric vehicle chargepoints at workplaces.
- ▶ 25% of cars in central Government department fleets will be ultra-low emission by 2022, and the Environment Agency will ensure all its cars are ultra-low emission by 2025, and stop buying or leasing diesel cars immediately.

Infrastructure

- ▶ £23m hydrogen transport programme to increase the number of publicly accessible refuelling stations and increase the uptake of fuel cell vehicles.
 - ▶ £20m to support vehicle-to-grid projects in order to create a smarter energy system, while increasing the numbers of electric cars on UK roads.
- ▶ A new £400m electric car Charging Infrastructure Investment Fund (£200m new Government investment to be matched by private investors).
 - ▶ £40m R&D funding from the National Productivity Investment Fund (matched by industry), to support new charging technologies for on-street and wireless charging projects.



Ideas

Moving to ultra-low and zero emission vehicles

Advances in electrification must be made by manufacturers to meet the government commitment to ending sales of conventional petrol and diesel cars and vans by 2040. Currently only one per cent of total automotive production comprises electric vehicles¹⁰ and continued international competitiveness of the manufacturing base is dependent on the sector making the transformation to new ultra-low and zero emission technologies.

The UK produced 1.7 million cars in 2016¹¹. Our engine sector is even larger, producing 2.5 million internal combustion engines for vehicles in the same year¹². UK production of internal combustion engines is worth £7bn per year, the majority of which are exported¹³.

The strategic transition from traditional powertrains - the components and systems that generate the power to move the vehicle, such as fuel tanks, engines and transmissions - to alternatives such as batteries, electric motors and the associated power electronics needed to control them, represents a significant opportunity for the automotive sector. This brings significant benefits, with the value of the electric powertrain two to three times higher than that of the internal combustion engine. However, significant

investment is required to deliver the necessary transformation of automotive manufacturing - including a UK 'giga-factory' capable of producing the quantity of battery cells needed to meet the future demand for batteries from vehicle-makers as well as establishing the requisite supply chains of the future. The UK faces tough competition from Germany and China, which have established themselves as leaders in the development of batteries.

Advanced Propulsion Centre

The Advanced Propulsion Centre (APC) is the coordination hub for managing the transition to ultra-low and zero emission vehicles. This is a £1bn commitment between the government and the automotive industry over 10 years which aims to position the UK at the cutting edge of the development and commercialisation of next generation low carbon technologies.

Richard Parry-Jones's review into accelerating the manufacture of ultra-low and zero emission vehicles

The aims of the review were to:

- ▶ establish the UK as a world leader in R&D in battery and electric traction technologies;
- ▶ support the complete spectrum of electric vehicles (EVs), including hybrids, pure battery EVs and fuel cell EVs;



Case study: the APC

The GKN Hybrid Power flywheel stores energy mechanically in a high-speed carbon rotor. This innovation was first used in top-flight endurance racing, helping to power Audi's R18 e-Tron Quattro to a podium finish in four consecutive Le Mans 24-hour races.

The APC's Gyrodrive project sought to further develop and test this technology for use in the hybrid bus market.

The technology was rolled out to an operational fleet of 35 buses. This project has resulted in increased skills,

capability, additional collaboration for all partners, and the development of the next generation flywheel, with 120 kilowatt peak power output from a 1 kilowatt hour energy storage system that can be manufactured for mass market applications.

The latest design has the potential for cross-sector development, including with the UK Ministry of Defence. Testing has been completed on machinery in the agricultural technology sector. The work has also supported the growth of iNetic, an innovative UK enterprise, which collaborated in the project.

- ▶ leverage R&D expertise to create world-leading battery manufacturing capability in the UK;
- ▶ establish a UK battery cell and module manufacturing facility to support rapidly expanding demand from UK vehicle makers; and
- ▶ leverage automotive batteries to contribute towards the effectiveness and efficiency of the wider energy supply system.

The evidence gathered from the review provided the rationale for the landmark Faraday Battery Challenge.

Faraday Battery Challenge

The Faraday Battery Challenge will support R&D in three stages across the technology spectrum, from

fundamental research to innovation and scale-up. This approach - joining up these three stages to market in a way no other country has done - will drive a significant change in the way the UK turns world-leading research into market-ready technologies.

The Faraday Battery Challenge is a government investment of £246m over four years to help UK businesses seize the opportunities presented by the transition to a low carbon economy. It will ensure the UK leads the world in the design, development and manufacture of batteries for the electrification of vehicles.

This programme will be shaped not just by its projects but also by two new critical national centres. The first of



these, the £78m **Faraday Institution**¹⁴, was announced on 2 October 2017.

The institution brings together the expertise and insight from its seven founding partner universities, industry partners and other academic institutions to accelerate fundamental research to develop battery technologies.

The second of these centres is the **National Battery Manufacturing Development Facility**¹⁵. The government is investing £80m in this independent, open-access, state-of-the-art centre, which will be responsible for taking the most promising early and mid-range battery and development activities to the point of being ready for manufacture.

The facility will also provide support for training and skills development. It will work with partners across UK education and business and, in particular, the Faraday Institution, which has committed to leading the establishment of a national curriculum for training in batteries.

This centre is to be hosted by Coventry and Warwickshire Local Enterprise Partnership in collaboration with Warwick Manufacturing Group. This follows a competition overseen by the APC and Innovate UK.

The final element is the **Faraday Battery Challenge Innovate UK programme**, which has £88m secured from the Industrial Strategy Challenge Fund.

To date, £40m of funding has been awarded to 27 innovative projects involving 66 organisations. These projects will improve production techniques, operational performance and methods for recycling and the recyclability of battery packs.

Shaping the future of mobility

CAVs have the potential to save lives, improve our travel experience and deliver more accessible transport.

The UK has an opportunity to establish a global leadership position in the demonstration and deployment of CAV technologies, building on our competitive regulatory environment. This must evolve with the times to support the emergence of new technologies and new business models. The government will ensure the UK continues to have one of the most open environments in the world for transport innovation and new services.

The government's ambition is that fully self-driving cars, without a human safety operator, will be on UK roads by 2021. We will make our regulatory framework world-leading, including updating our national code of practice for the testing of automated vehicles without a human safety operator, and by working with the Law Commission on proposals for a long-term regulatory framework for self-driving vehicles.

The government is investing £250m through to 2021, matched by industry, in collaborative R&D and developing CAV testbed infrastructure.

Of this funding, £150m is being invested in collaborative R&D and feasibility study projects. This includes self-driving car trials in Bristol, Coventry and Milton Keynes, and in Greenwich in south London, which will conclude in 2018.





Business Environment

Supply chain competitiveness and productivity improvement

UK vehicle makers have worked closely with the government's Automotive Investment Organisation (AIO) since 2013 to increase the production capacity and capability of UK suppliers. Research by the Automotive Council in March 2015¹⁶ identified an additional £4bn per annum of components that UK vehicle makers would consider sourcing from UK-based Tier one suppliers, i.e. those suppliers who supply direct to the vehicle maker - subject to their international competitiveness.

The AIO has been successful in securing investment from strategically important suppliers able to produce the high value components that the UK's world-class vehicle-makers require. This has underpinned the increase in the value of components purchased from UK suppliers from 36 per cent of 1.3 million vehicles in 2011 to 44 per cent of 1.7 million vehicles in 2017¹⁷.

However, there is agreement that coordinated action is required to improve the competitiveness of businesses further down the supply chain. This is of particular importance,

due to the increasing complexity of vehicles whose sub-systems demand the input of multiple suppliers, along with increased customisation, and shorter vehicle lifecycles. Vehicle makers have well established supplier support programmes in place and invest substantial resources in sharing their knowledge and expertise in lean manufacturing and employee development with their strategically important suppliers.

The automotive industry is looking to expand this support, building on the success of its Long Term Automotive Supply Chain Competitiveness (LTASC) programme. It is leading on the development of a national manufacturing competitiveness and productivity improvement programme. This will develop

workforce and leadership skills in companies and implement streamlined business processes to improve operational efficiency.

This single, scalable approach will allow supply chain companies to undertake improvement projects ranging from six months to three years. This will have the double benefit of making UK suppliers more internationally competitive; supporting the industry's ambition to increase the value of UK content in domestically produced vehicles to 50 per cent by 2022 and be more able to win business in growing markets abroad.

The government is committed to investing in an industry-led supplier improvement programme that will be rolled out in 2018.

Future proposals

We have prioritised an initial set of proposals, which have been agreed between the Automotive Council and the government. It is intended that this deal is the first of several with the sector. The Automotive Council is already considering its priorities for 2018. These include for example, new work on digital design and manufacturing.

Digital design and manufacturing

It is not just how a car is powered and driven that will change the industry; it is also how a car is designed and built. The already highly competitive automotive industry is pushing the

boundaries further, and if the UK wants to win in this market it must become more efficient in getting products to market. The rise of digital design and testing has the potential to reduce the cost and time of developing a vehicle, and UK-based firms need not just to keep pace, but to lead in areas where we have a comparative advantage. A formal proposal is being developed by industry and will be presented in 2018. A further range of proposals in other areas are also under consideration in the Automotive Council and its working groups for prioritisation in the year ahead.

Places

Shaping the future of mobility

The government is investing £100m to create a world-leading ecosystem for testing CAVs using existing UK assets and capabilities including communication technologies, virtual environments, controlled environments, and public testing environments. This is being coordinated through the new Meridian industry brand, which will also seek to convene UK industry around a set of long-term strategic priorities.

These projects form part of a cluster that is the first of its kind in the world, running from the UK's automotive heartlands in the West Midlands, through our innovation centres near Oxford and Milton Keynes, to London.

This cooperative approach brings together the best of the UK automotive sector with strong adjacent industries including fintech, artificial intelligence and insurance.

Case study: work on CAVs by Streetwise

The Streetwise consortium, led by the autonomous technology developer FiveAI, secured a government R&D grant of £12.8m to launch a fleet of self-driving passenger service vehicles that will operate alongside London's existing transportation in 2019. FiveAI leveraged this to attract a £14m venture capital investment.

Streetwise will demonstrate that self-driving vehicles are able to safely co-exist with other road users, and operate in complex urban environments.

Many globally leading AI academic research groups are based in the UK. This project establishes the UK as a global leader in the commercialisation of the science in autonomous vehicle technology.



Case study: Advanced Propulsion Centre - APC8

The Advanced Propulsion Centre platform (APC) was established as a 10 year £1bn joint investment between government and industry. The platform, including the new APC8 winning projects supports 36 major R&D projects worth £589m, targeting a saving in excess of 34m tonnes of carbon dioxide and creating or safeguarding 20,500 jobs. In addition to its core competitions, APC supports industry consensus road-mapping, the acceleration of companies developing cutting-edge technology (especially small and medium enterprises), technology-focused academic communities (spokes) and the development of future supply chains.

The three successful projects awarded in the latest competition, APC8, reflect the industry's drive toward greater electrification of future vehicles. Supported by grants worth in excess of £26m, these projects align with Industrial Strategy investments ensuring that the UK continues to reap the benefits from the transition to ultra-low and zero-emission vehicles by continuing to build the agile, innovative and cost competitive supply chain needed

to secure international investment. The APC8 winning projects are:

E-Prime - A project led by Ford's UK based Global Manufacturing Engineering team working with machine tool supply chain partners to develop process and equipment for production of ultra-high volume next generation electrified powertrain systems. This will include the development of new digitisation tools for both the design, operation and monitoring of manufacturing plants.

ACe-Drive - Development of GKN's future generation e-Drive system platforms, utilising high speed electric machines and advanced high speed power electronics. In conjunction with Nottingham University, this project aims to further grow UK capability in the design and manufacture of eMachines and power electronics.

VERBIUS - Development of future state of the art electric hybrid vehicle systems for JLR, in conjunction with universities and businesses across the UK. The project aims to significantly improve the vehicle system efficiency through utilisation of innovative electronic systems and componentry.



- **ELECTRIC MACHINES SPOKE**
Newcastle University
- **POWER ELECTRONICS SPOKE**
University of Nottingham
- **ELECTRICAL ENERGY STORAGE SPOKE**
University of Warwick
- **ICE System Efficiency**
University of Bath
- **DIGITAL ENGINEERING AND TEST SPOKE**
Loughborough University (London)
- **ICE THERMAL EFFICIENCY**
University of Brighton

The Advanced Propulsion Centre 'Spoke Network'

The APC has established communities of excellence across the country centred around key universities with expertise in strategic low carbon propulsion technologies.

This network supports the transfer of technology between our research and industrial base to accelerate the commercialisation of cutting edge ideas.

Implementation plan

Key deal activities

Date	Milestone
Oct 2017	Faraday Institution announced
Nov 2017	National Battery Manufacturing Development Facility announced
	Faraday Battery Challenge Innovate UK programme - phase 1 competition winners announced
Jan 2018	Automotive Sector Deal announced
	Faraday Battery Challenge Innovate UK programme - phase 2 competition opens
	CAV simulation and modelling competition
	APC9 competition opens
Spring 2018	CAV Testbed phase 2
Summer 2018	CAV4 competition
Jan 2019	Annual review of the Automotive Sector Deal



Governance

Implementation of the Automotive Sector Deal will be overseen by the Automotive Council, which will review progress against objectives at each of its quarterly meetings.

Separate governance groups for the Faraday Battery Challenge, Meridian and the Supply Chain Competitiveness and Productivity programme will be established to oversee their respective parts of the Sector Deal and will inform the Automotive Council of progress.

Once Sector Deals enter the implementation phase, bi-annual progress reports will be provided for ministers in the Department for Business, Energy and Industrial Strategy. The Automotive Council will be subject to challenge sessions from government ministers on an annual basis as part of the overall Sector Deals programme.

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Image references

- P17 Flywheel energy storage system
- P25 LUTZ driverless vehicle
- P29 MINI Plant, Cowley, Oxford. Credit: Flickr - SMMT. Photographer: James Lyon



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