Department for Business & Trade

UK Automotive Industry

The UK is leading the charge towards a net zero future

> Our mission is to put the UK at the forefront of the design and manufacturing of zero emission vehicles and for all new cars and vans to be effectively zero emission by 2030.

- The UK is the first major economy to commit to a net zero target.
- As part of the 10 Point Plan for a Green Industrial Revolution, we will invest £12bn by 2030.
- We are ending sales of new petrol and diesel engine vehicles in 2030. All new cars and vans will be zero emission by 2035.
- We are accelerating electrification, investing over £6bn across infrastructure, manufacturing and R&D
- Thanks to our policies and investments, almost 1 in every 6 cars sold in the UK now has a plug

The UK Industry at a glance

£71bn
UK automotive turnover

£3bn
UK automotive R&D spend

£4.5bn
Battery Supply Chain Opportunity

166,000
Directly employed in manufacturing

Over 775,000
Vehicles built in the UK in 2022

33%
UK built cars Electric or Hybrid 2022

78%
UK built cars exported

344,000
Passenger cars made by Japanese VM

The UK is investing heavily into electrification

£541m
Faraday Battery Challenge ZEV battery development

£1.3bn
Advanced Propulsion Centre

£80m
Driving the Electric Revolution – power electronics, electric drivetrains

£3.5bn
OZEV funding across R&D, infrastructure and purchase grants

Up to £1bn
Automotive Transformation Fund

£466m
Connected Automated Vehicle Technology

The UK Government has invested over £6.5 billion in infrastructure, R&D, driving demand and supply-side support

- Creating the right regulatory environment including 2030 Phase Out, ZEV mandate, infrastructure provision
- Learning from industry to understand and develop supply chain plans for key areas
- Encourage innovation, efficiency and keep costs low through funding

5

Providing certainty to the market

Government & Industry working together

	What we're doing	What we expect from Industry
Affordability	Providing Grants, tax reductions and a clear, long-term regulatory framework	Provide a growing selection and number of ZEVs into the market, passing savings onto customers as costs decrease
Infrastructure	Significant, long-term support committed for on-street residential and rapid charging	Build and maintain a convenient, affordable, reliable charging network, at pace
Supply Chain & Manufacturing	Supporting the transformation of the auto industry & building a robust supply chain	Source local parts & batteries, build Zero Emission cars and vans in the UK
Energy	Building a resilient, low carbon energy network for the future to meet our aims for reduced whole life-cycle of emissions from vehicles	Embrace the fuels of the future
Regulation	Creating a business-friendly regulatory environment	Unleash the forces of innovation and support the more effective use of vehicles already on the roads
Jobs & Skills	Readying the workforce of today for the jobs of tomorrow	Nurture and train employees to be leaders of tomorrow

Competitive operating environment for the auto sector

Sector-specific funding focusing on Research, Development and Innovation together with industrialisation and scale-up support through the Advanced Propulsion Centre

- **R&D Grants to support development of low-carbon on-vehicle propulsion systems – Three funding rounds per year to match industry's pace**
- **Capital Grants to support scale-up and industrialisation through the Automotive Transformation Fund**

Additionally, the UK's wider offer is highly competitive for this sector

Full expensing – 100% cost deduction of certain plant and machinery from profits before tax; 25p saving for every £1 invested

50% first-year allowance extended for 3 years until 31 March 2026 – deduct 50% costs of other plant and machinery from profits during year of purchase

R&D Tax Credits for UK activity

Patent Box allowances for 10% Corporation Tax Rate for profits generated through exploitation of UK-developed IP

No withholding tax on dividends remitted overseas from UK subsidiary

Exemption of up to 100% of policy-related costs & other charges on electricity bills for Energy Intensive Industries – includes battery manufacturing and supply chain

UK Export Finance can support with trade financing and export credit guarantees

Freeports and Enterprise Zones offer relief variously from employment-related costs, business rates (on buildings) and duties as well as enhanced capital allowances

Competitive long term cost entitlement

7

APC

Government assistance to the automotive Industry

Delivering Substantial Impact

ADVANCED PROPULSION CENTRE UK

199+
low-carbon projects

450+
project partners

55,000+
jobs created / safeguarded

350 million+
tonnes of CO_2 savings

1 million+
vehicles use APC-funded technology

£1.3bn+
investment facilitated

8

ATF

Government assistance to the automotive Industry

Automotive Transformation Fund

- Launched in July 2020 - £850m funding announced
- Secure the transformation to electrification of the UK automotive sector at pace
- Capital investment support for factory equipment, land, buildings and set-up costs
- Support for economic and technical compatibility feasibility studies leading to industrial investment
- ‘Portfolio’ fund, targeted at addressing key areas of need in the zero emission vehicle supply chain

Supporting industrialisation and scale-up of

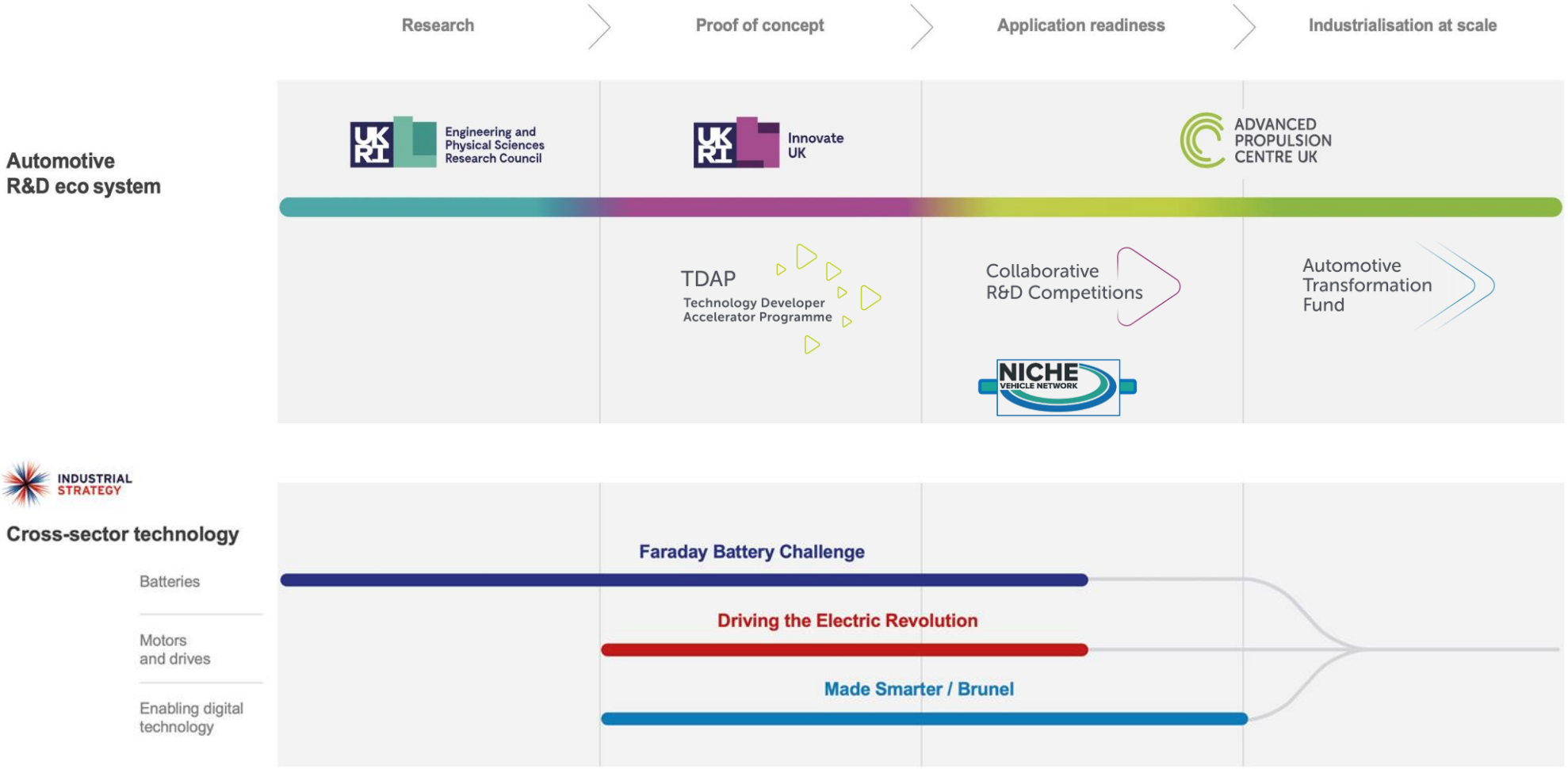
- Batteries
- Motors and drives
- Power electronics
- Fuel cells
- Upstream supply chain

APC & ATF in context

Automotive and the key enabling cross-sector technologies are supported

Funding Landscape

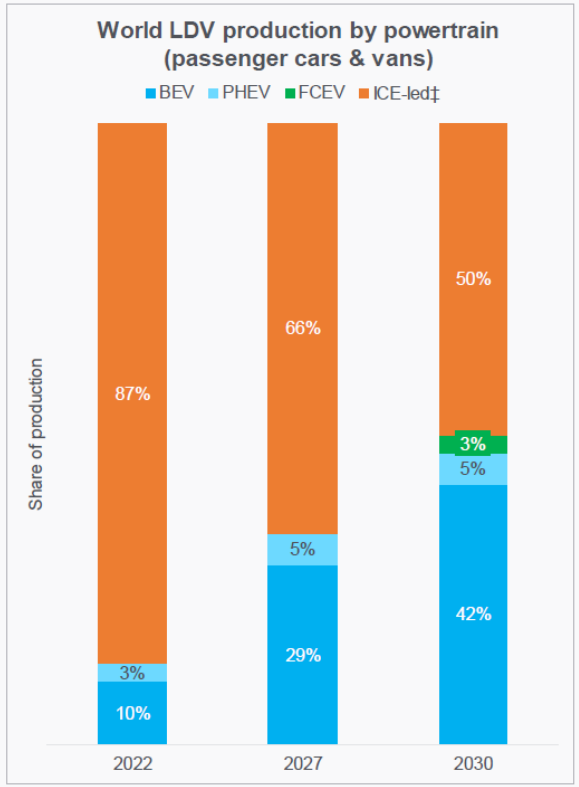
The UK has a cohesive funding landscape from ‘end-to-end’

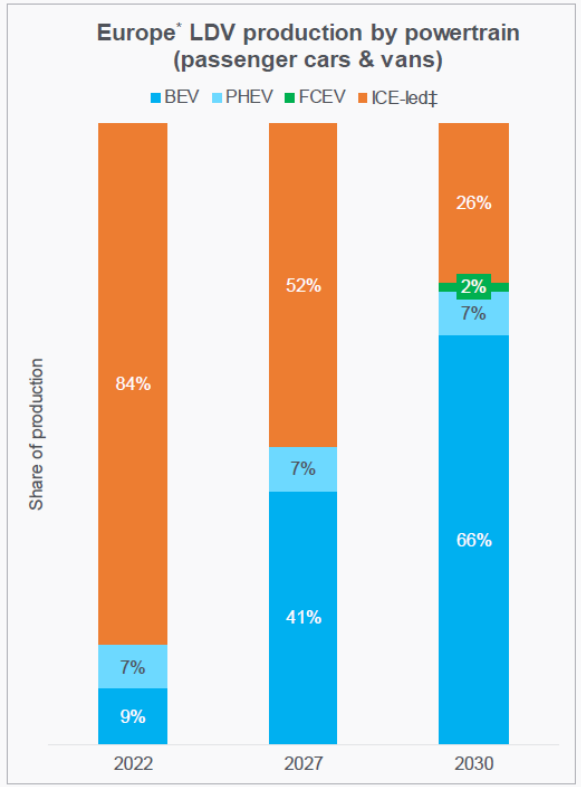


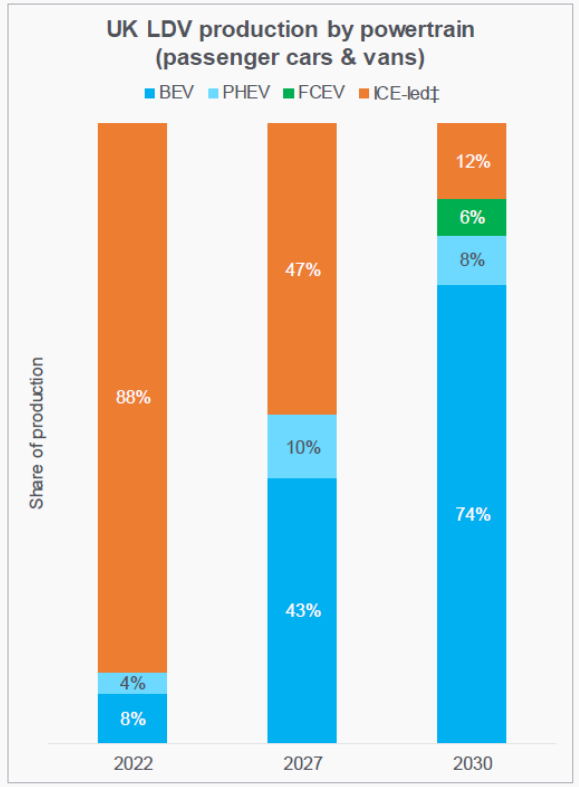
UK Auto Sector electrification shift

UK growth in EVs is rapid

The UK has a relatively very rapid industry transformation due to its premium and specialist vehicle OEM base







Source: APC Demand Databases using S&P Global AutoTechInsight (Mar, 2023), BNEF forecasts (2023)
*Note: Passenger cars & Light Commercial Vehicles < 3.5t only, *European forecast includes non-EU countries such as Turkey, ‡Includes non plug-in HEVs & ICE*

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UKRI

UK Governments

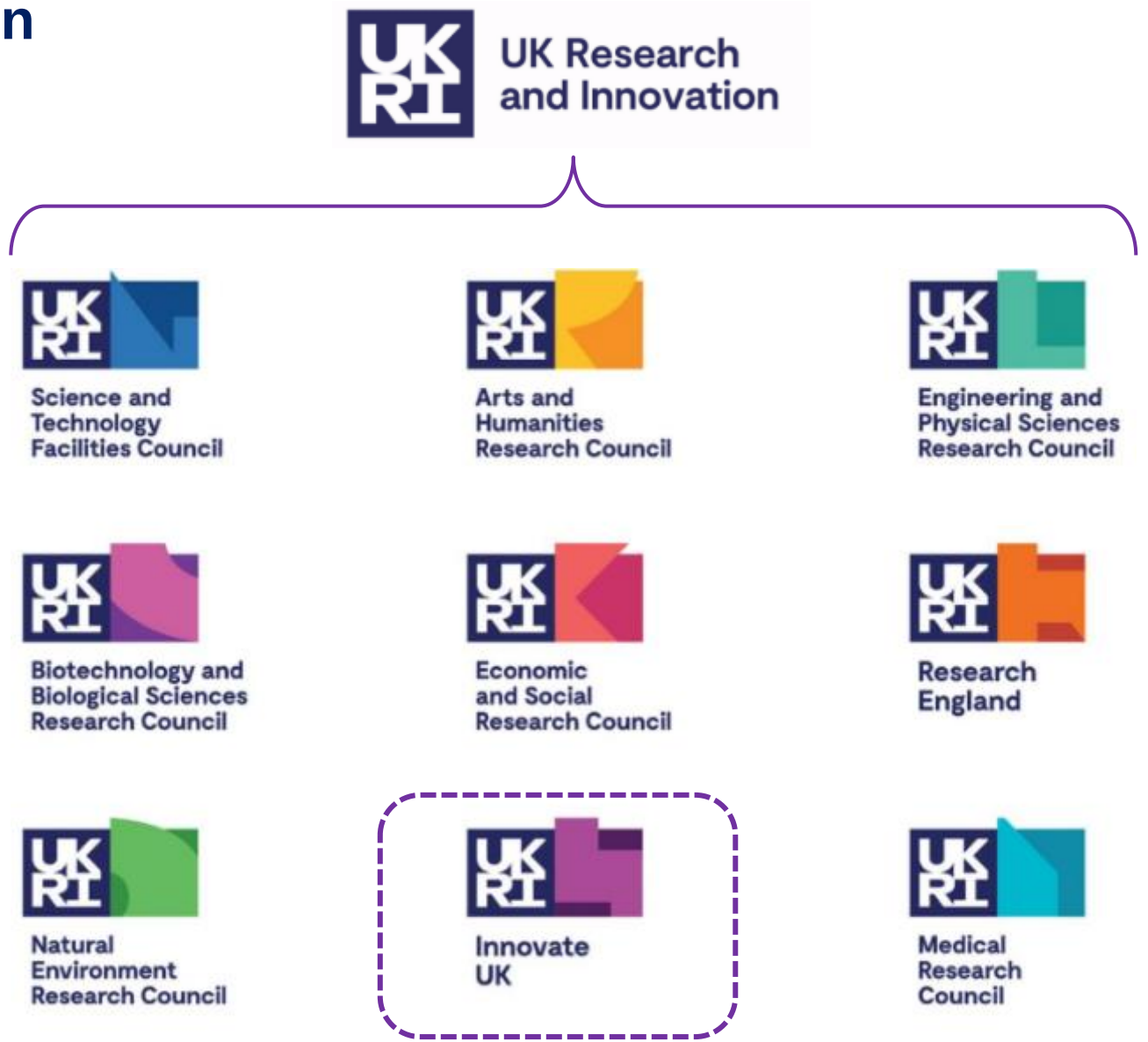
Primary

Funding agency

UK Research and Innovation

We work with the government to invest over £7 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create **knowledge with impact**.

Innovate UK supports business-led innovation in all sectors, technologies and UK regions

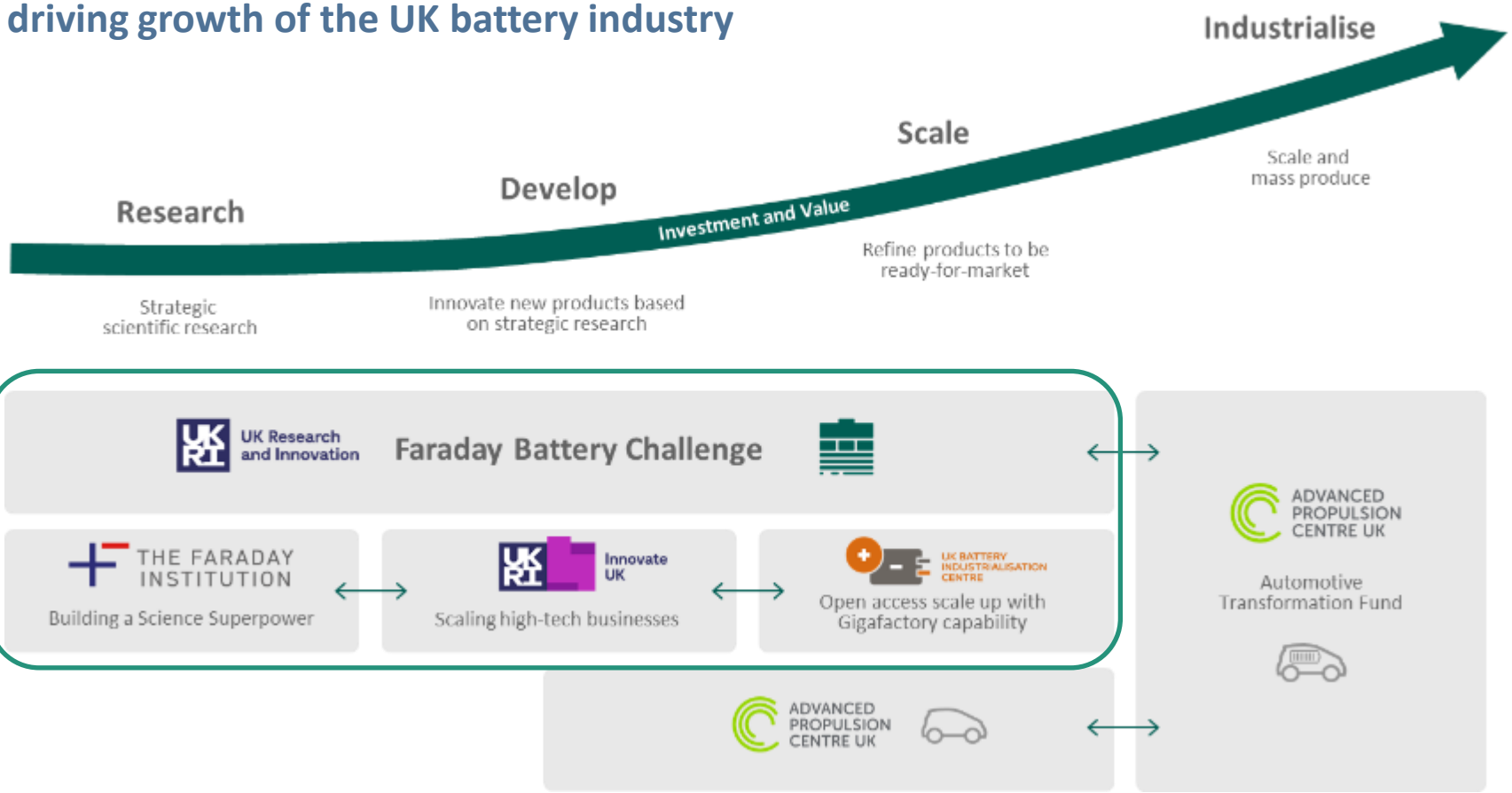


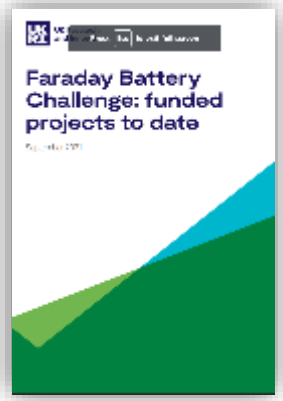
[UKRI – UK Research and Innovation]

The Faraday Battery Challenge

UK Research and Innovation

is investing £541m in research and innovation projects, facilities, and skills, driving growth of the UK battery industry from lab to factory





FBC Project Booklet

The Faraday Battery Challenge

UK Research and Innovation

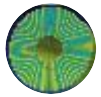
THE FARADAY INSTITUTION

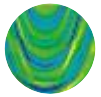
UK's independent institute for:

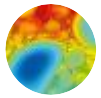
- Electrochemical research
- Skills development
- Market analysis
- Early-stage commercialisation

10 major multi-disciplinary research programmes addressing battery related scientific challenges at scale:


Battery Degradation

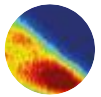

Multi-scale Modelling


Battery safety


Electrode Manufacturing


Recycling & Reuse


High-Ni High Performance Cathode Materials


Low-cost earth abundant cathode materials


Solid State Batteries


Sodium Ion Batteries


Lithium Sulfur Batteries

85+ Industry partners

27+ Academic partners

500+ Researchers from many disciplines

Innovate UK

UK's national innovation agency supporting business-led innovation in all sectors, technologies and UK regions,

Delivery lead for the Faraday Battery Challenge and responsible for mid-TRL interventions

- Collaborative R&D programme
- Building the Ecosystem
- National & Regional Skills Initiatives
- De-risking Private Investment
- Policy, Regs & Standards
- International Engagement

>149 Organisations funded £ across **98** projects

UK BATTERY INDUSTRIALISATION CENTRE

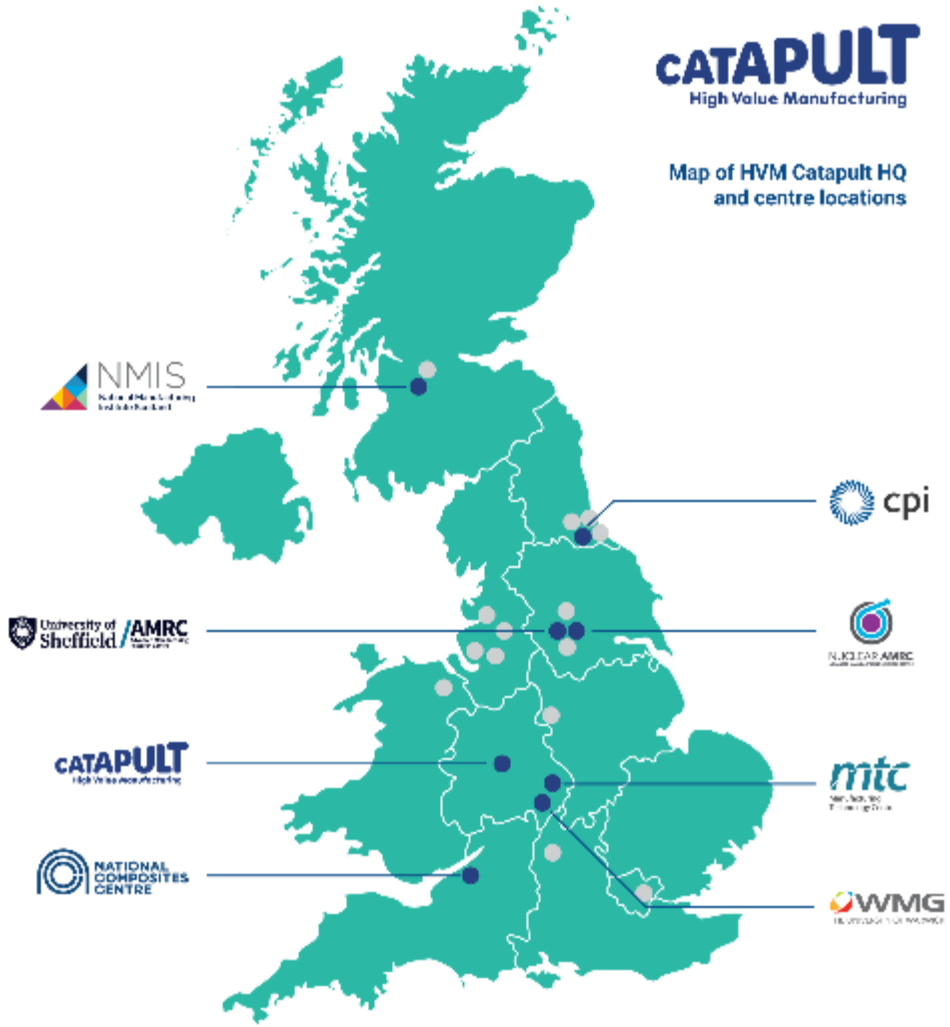
20,000 m² national manufacturing and development facility providing UK battery manufacturing scale-up and skills support

- Gramme Scale: University scale Research
- Kilo Scale: Corporate R&D of specialist Uni facilities
- Tonne Scale: Manufacturing process development at industrial rates
- Kilotonne Scale: Full scale, high volume manufacture

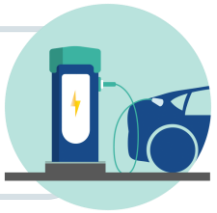
- Reducing Risk
- Open Access
- Developing
- Prototyping
- Own your IP
- Up Skilling

High Value Manufacturing Catapult

Accelerating manufacturing innovation across a broad range of manufacturing technologies, from advanced assembly to material formulation



HVMC Electrification – Batteries (Key Centres)



WMG

HVMC lead for electrification (inc. batteries).
Specialism – strategy, electrochemistry, electrode development, cell scale up, cell / module / pack engineering, modelling, BMS, testing, characterisation, safety & recycling.

cpi

Material synthesis & process scale up with strong links to chemicals supply chain. Feeds into WMG electrode development.

mtc Manufacturing Technology Centre

Battery manufacturing technologies, module / pack and recycling.

Adjacent linked organisations
Energy systems CATAPULT
UK Battery Industrialisation centre

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DER

Driving the Electric Revolution

Power Electronics, Electric Machines and Drives (PEMD)
Identify key gaps in the UK PEMD supply chain and **help industry** fill them enabling delivery of **Net Zero**

Funding for industry
Investing **£80m of ISCF funding** for R&D projects, **accelerating and de-risking** business innovation

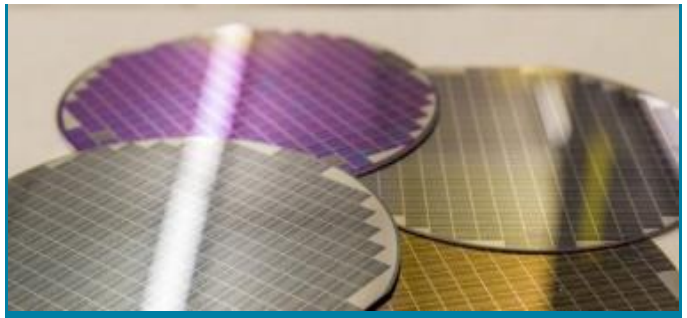
Networking and collaboration
Connecting industry, academia, RTOs & the government to ensure **cooperation & collaboration** to efficiently use solutions across the UK

Industrialisation and manufacturing
Leverage the **UK's world leading research** capability in PEMD to **create the supply chains necessary to manufacture PEMD** products

Talent growth
Define & **fill the PEMD skills gap** by **training, upskilling & reskilling** to **grow an evolving diverse & inclusive PEMD workforce** across all levels

der@iuk.ukri.org | https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/driving-the-electric-revolution/

Driving the Electric Revolution – Supply Chain



Power Electronics

Development of semiconductors (Si, SiC, GaN) and their packaging to enable switching of high power (voltage and/or current) whilst minimising loss

Electric Machines

Conversion between electrical energy and kinetic energy through electromagnetic, mechanical & thermal design optimised for each application

Drives

Intelligent digital control systems embracing power electronics, passive components, thermal management, mechanical design and the overall system

Materials processing

Component manufacture

Manufacturing supply chain

System integration

Re-use and recycling

Delivered by Innovate UK

Driving the Electric Revolution – Industrialisation Centres

University of Strathclyde Glasgow

Propulsion and powertrain systems validation capability at MW scale with hardware in the loop.

UNIVERSITY OF BIRMINGHAM

A production line to for recycled sintered magnets with 'end to end' supply chain to enable UK supply of recycled rare earth magnets from processed oxides for more secure UK supply.

CATAPULT Compound Semiconductor Applications

A facility to prototype ceramic and copper elements and sub-assemblies within highly integrated PE modules..

Swansea University Prifysgol Abertawe

A Wide Bandgap Power Electronics Component Industrial Pilot Line.

Newcastle University

Reconfigurable **Power Electronics assembly line** for semi or fully integrated high-power density drives. **Flexible electric machines assembly line** which includes stator, rotor assembly, chemical dispensing, automated machine assembly line end of line testing.

University of Nottingham UK | CHINA | MALAYSIA

A High Frequency Coil Manufacturing and Magnetic Test Characterisation capability to develop and manufacture electrical Machines to operate at higher frequencies.

WARWICK THE UNIVERSITY OF WARWICK

A Power Electronics reliability and failure analysis facility.

WMG THE UNIVERSITY OF WARWICK

A Winding Centre of Excellence facility to manufacture all types of windings at production quality; specialising in hairpin stators.

DER Driving the Electric Revolution Industrialisation Centres
North East | South West & Wales | Midlands | Scotland

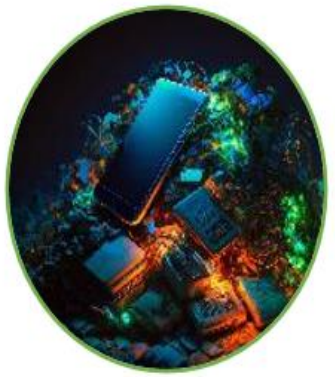
Circular Critical Materials Supply Chains (CLIMATES) Programme

Extraction and Processing

Novel and sustainable mining & up-stream processes, sustainable mid-stream processes, sustainable routes to rare earth alloys

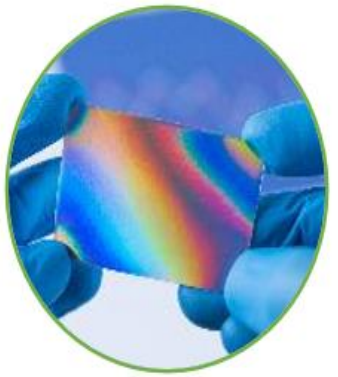
Magnet Manufacture

Sustainable manufacturing routes to high performance magnets, increased specification of high-performance magnets



Circular Economy

Collection and sorting of REE containing products, sustainable routes for processing recovered rare earth metals



Alternatives

Novel materials for high-performance magnets, substitution for high-performance magnets

This £15 million programme will support the development of a resilient UK-based supply chain for rare earth elements, with a focus on primary (mine to magnet) and circular (end of life to magnet) value chains

Circular Critical Materials Supply Chains (CLIMATES) Programme

Innovation

Enabling innovation to grow a resilient supply chain.

Standards & Policy

Ensure innovation environment is supported by appropriate standards policy and legislation.

International

Identify and develop key international relationships for collaboration and cooperation.

Investment

Unlocking private investment to grow the emerging sector.

Skills & Talent

Stimulate skills and talent development to grow a diverse workforce to enable a UK-based magnets supply chain

Leadership & Community Building

UK's V2X Innovation Programme (2022 – 2025)

Programme Funding:	Up to £ 12.6 million
Programme Timing:	September 2022 – March 2025
Phase 1:	17 research & development projects Awarded £3.2 million funding Running September 2022 - August 2023
Phase 2:	£ 9.4 million funding available for small-scale demonstration projects Competition closed = 10th May 2023

The V2X (Vehicle to Everything) Programme is part of the up to £65m Flexibility Innovation Programme, funded from the Department for Energy Security & Net Zero's £1 billion Net Zero Innovation Portfolio (NZIP)

UKRI Innovate UK

Department for Energy Security & Net Zero

https://www.gov.uk/government/publications/v2x-innovation-programme

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TV HTH

De-risking Hydrogen transport use and refuelling

Tees Valley Hydrogen Transport Hub

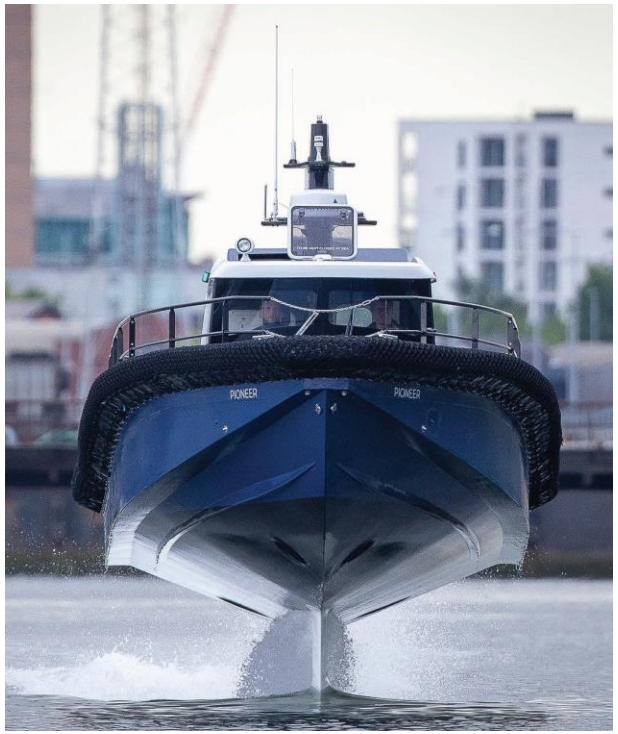
- The Hub aims to work towards a long-term sustainable demand for hydrogen from transport and to de-risk hydrogen's adoption for transport owners and operators.
- Investment of up to £20 million for innovative projects funded by the UK Governments Department for Transport working with Innovate UK.
- This will support demonstrations of infrastructure and hydrogen powered vehicles across transport modes in real world operational settings across the Tees Valley.
- Projects are expected to run from Summer 23 to March 25 and are to include fixed refuelling infrastructure.
- This follows a smaller £2.5 million demonstration competition with projects running for 7 months to March 2022.

Innovate UK

HM Government

Maritime decarbonisation

- UK Department for Transport's UK Shipping Office for Reducing Emissions (UK SHORE) has £206m budget to accelerate research into and development of clean maritime technologies
- Innovate UK is delivering the £100m Clean Maritime Demonstration Competitions (CMDC) and the £77m Zero Emission Vessels and Infrastructure competition
- Funded technology includes battery electric vessels, alternative fuel vessels (hydrogen, ammonia, methanol), wind assistance and infrastructure
- Research funding is for low to high Technology Readiness Levels



Innovate UK

HM Government

23

ZERFD

Driving Net-Zero in heavy good sector

Zero Emission Road Freight Demonstrations

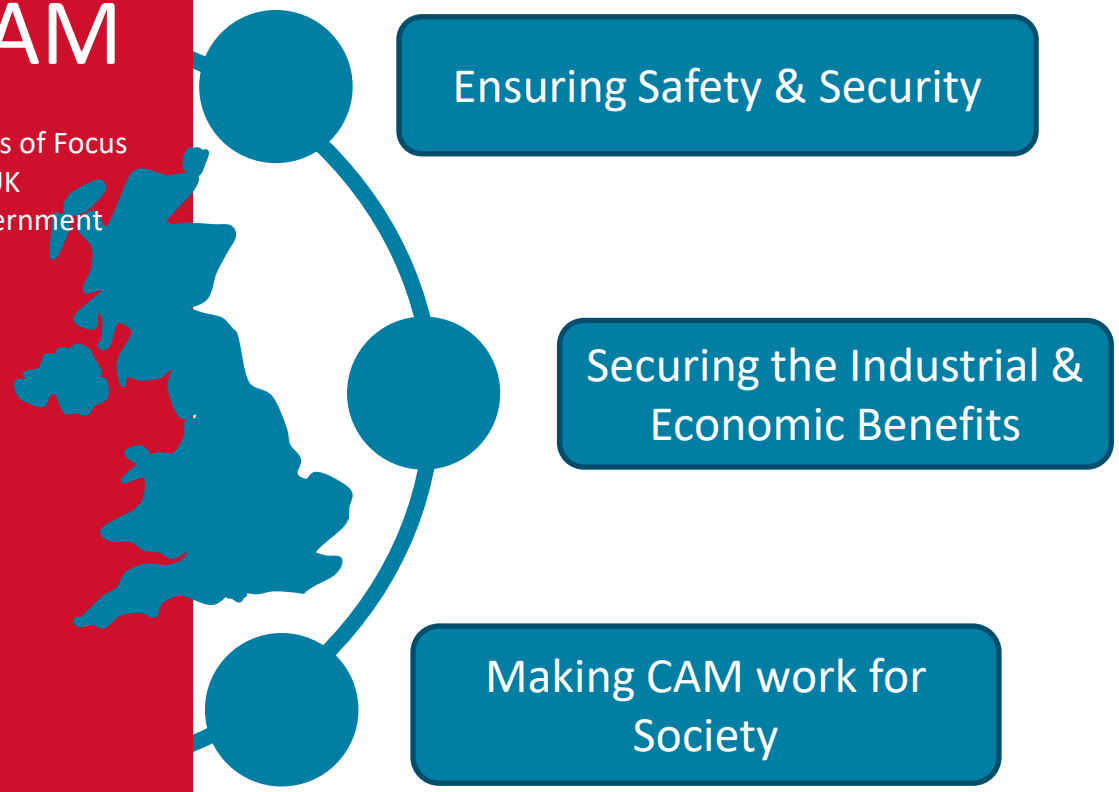
- The UK was the first country in the world to commit to phase out non-zero emission Heavy Goods Vehicles by 2035 and 2040, depending on weight classification
- £200m partnership between Innovate UK and the Department for Transport, focused on decarbonizing Heavy Goods Vehicles
- The UK will demonstrate battery electric and hydrogen fuel cell vehicles and state of the art infrastructure
- This will be the largest comparable zero emission HGV demonstration in the world
- It will help industry and will support government decision making around technology choices and infrastructure role out

UKRI Innovate UK

HM Government

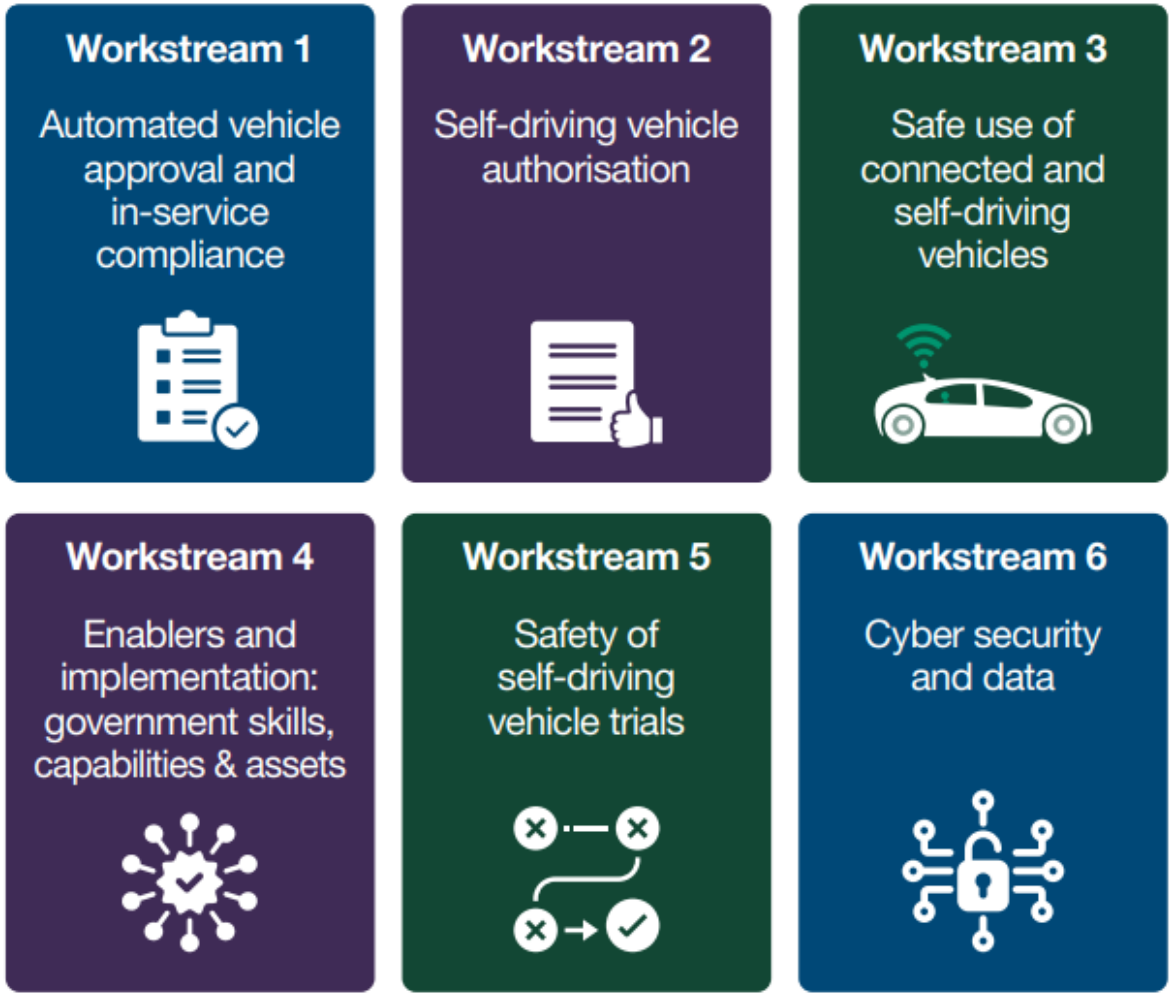
UK Connected and Automated Mobility 2015 - 2022

Centre for Connected & Autonomous Vehicles



- **Safety and Security is fundamental to the UK's vision for CAM. Focus on getting the technology and its deployment right first time.**
  - Enabling Advanced Trials – inc. removing the safety driver
  - Transport Bill – Responding to the Law Commissions recommendations
- **Securing global leadership in CAM will deliver new jobs, investment, growth and productivity in a cross-cutting sector touching the physical, digital and artificial intelligence domains**
  - Deploying Advanced Trials – developing trials into commercial deployment opportunities
  - Securing UK Supply Chain opportunities, co-funding new and novel solutions in support of CAM capabilities and services
- **Ensuring that the public (and business users) embrace CAM technologies and services, trusting the capability and benefiting from improvements in safety, efficiency and accessibility**

- **CAVPASS considers the full range of government processes and systems that contribute to safety assurance throughout the whole life of a vehicle.**
- **The objectives of CAVPASS are to:**
  - develop technical standards and regulations to ensure the safe and secure trialling, adoption and ongoing roadworthiness of self-driving vehicles
  - develop processes to authorise a vehicle, thereby permitting the vehicle to drive itself, and ongoing requirements to maintain the validity of this authorisation
  - develop and/or adapt rules on the safe use of self-driving vehicles, such as through the Highway Code, driver, vehicle and service licencing, and insurance
  - ensure the government has the skills, capabilities, and access to assets to deliver safe and secure use of self-driving vehicles
  - support safe trialling of prototype self-driving vehicles on our roads and ensure the UK is industry's trialling destination of choice, building on the Code of Practice: automated vehicle trialling
  - design and implement processes to ensure that self-driving vehicles have resilience and can respond to cyber-attacks, and that the data they hold is secure



UK CAM 2022 to 2025 and onwards

Centre for Connected & Autonomous Vehicles

Safety and security assurance

Approved → Authorised

Vehicle Approval

Ensuring safety and security of whole vehicle

Authorisation

Transfer of liability away from vehicle occupant, due diligence and data/equality duties

In-Use Monitoring

Safety and security assurance ongoing throughout life of vehicle using key data and metrics

Comprehensive legal framework

New Primary Legislation

Considering Law Commissions' recommendations and bringing forward new comprehensive legislation on self-driving vehicles

Commercialisation

£40m "Deployments" Programme to 2025

Private Land

Safety, efficiency and decarbonisation

Freight & Logistics

Safety, efficiency and decarbonisation of on-road logistics

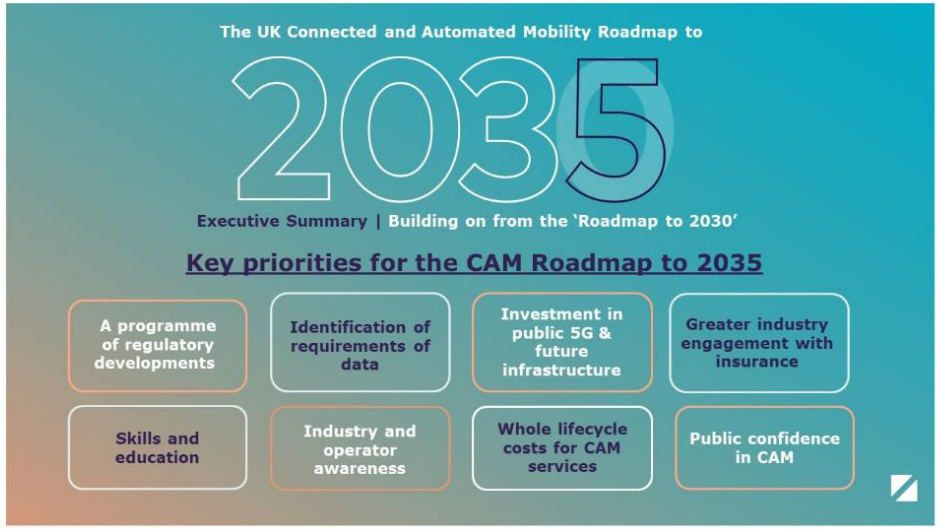
Passenger services

Accessibility, reliability, efficiency and decarbonisation of passenger

An early, commercially sustainable CAM market

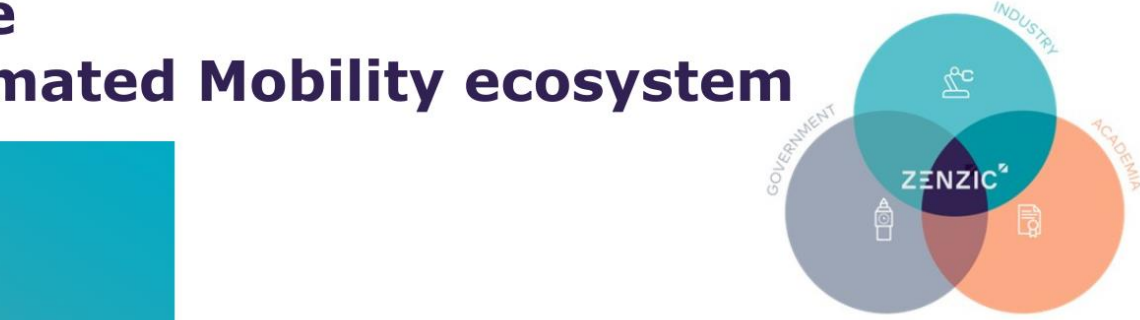
"By 2025, the UK will begin to see deployments of self-driving vehicles, improving ways in which people and goods are moved around the nation and creating an early commercial market for the technologies. This market will be enabled by a comprehensive regulatory, legislative and safety framework, served by a strong British supply chain and skills base, and used confidently by businesses and the public alike."

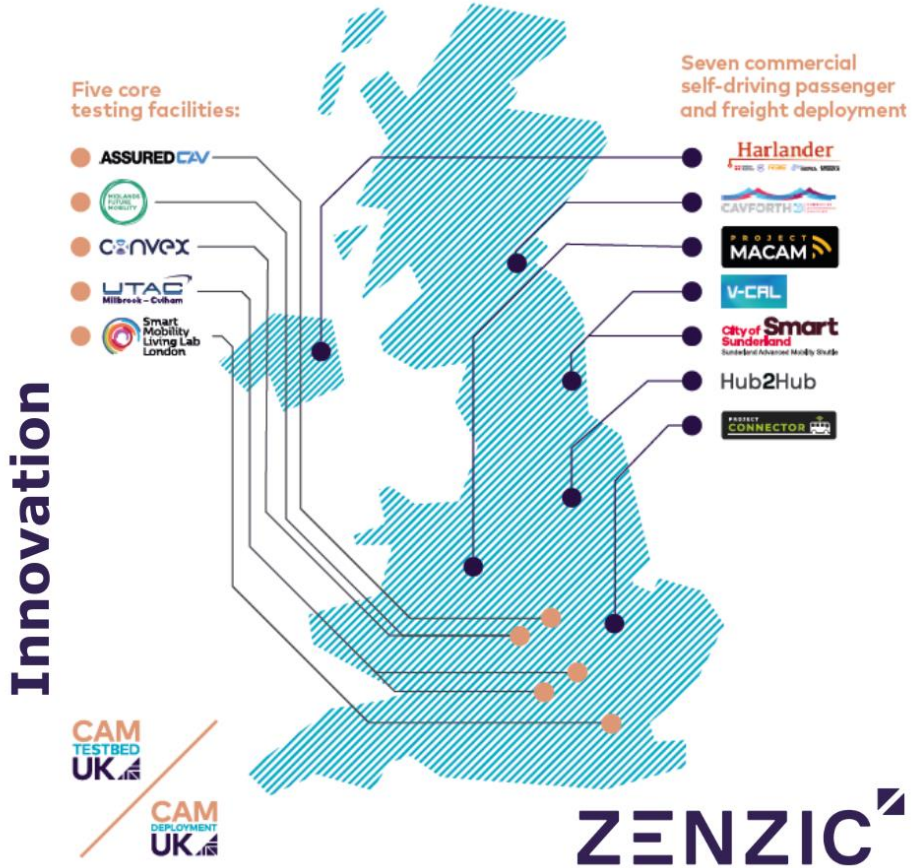
Zenzic: Championing the UK Connected and Automated Mobility ecosystem



Insight

Collaboration





The Compound Semiconductor Applications Catapult

CSA Catapult
Purpose and Mission

£53 million
Funding over 5 year

Established
April 2018

90
Staff & Growing

ABOUT US

The Compound Semiconductor Applications Catapult's purpose is to deliver long-term benefit to the UK economy and **accelerate UK economic** growth in industries where **applying compound semiconductors creates a competitive advantage** and enables new products or end markets.

OUR VISION IS FOR THE UK TO BECOME A GLOBAL LEADER IN DEVELOPING AND COMMERCIALISING NEW APPLICATIONS FOR COMPOUND SEMICONDUCTORS

Net Zero | Future Telecoms | Intelligent Sensing

CATAPULT
Compound Semiconductor Applications

- **Thank you – any question?**


Department for
Business & Trade