Advanced Propulsion Centre

Impact Report 2020

ADVANCED PROPULSION CENTRE UK

Accelerating Progress

Delivering on a world-leading commitment from the UK

In 2019, the UK became the first major economy in the world to commit to end its contribution to global warming by 2050.[1]

The transport sector is currently the biggest contributor to greenhouse gas emissions in the UK.

The Advanced Propulsion Centre is at the heart of the UK government's commitment to reduce transport CO_2 emissions and deliver the next generation of low carbon vehicle technologies.

ADVANCED PROPULSION CENTRE UK

APC achievements[2]

6 years into our 10-year journey

2013 — 2023

£1bn
automotive investment

£1bn
invested in APC projects to date

113
low carbon projects

225m
tonnes of CO_2 savings

40,000+
jobs created / safeguarded

290+
project partners

6
Technology Spokes
linking industrial and academic communities

Ensuring we have the automotive technology in place to fulfil our promises

The transport sector accounts for 28% of UK greenhouse gas emissions[3] – with passenger cars contributing 55% of those.[4] Reducing the emissions from transport is a key element in meeting our 2050 commitments.

The Advanced Propulsion Centre (APC) is at the heart of addressing this challenge. Since its foundation in 2013, APC has collaborated extensively with UK government, industry and academia to accelerate the industrialisation of low carbon technologies to significantly reduce vehicle emissions.

APC has identified where investment is most needed, mapping the UK's current capabilities against technology trends and building a coherent industry-wide view of the future for low carbon propulsion technologies.[5]

Saving millions of tonnes of CO_2

APC is ahead of its ten-year goal to save 50 million tonnes of CO_2. The 113 projects funded in its first six years are projected to save over 225 million tonnes of CO_2, the equivalent of removing the lifetime emissions from 8.8 million cars.[6]

28%
of UK greenhouse gas emissions come from the transport sector, almost double the amount produced by UK homes[3]

1 www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law
2 Figures based on project portfolio data as of June 2020, across Core Competitions, NVN, TDAP and Spokes Community activity
3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/863325/2018-final-emissions-statistics-summary.pdf
4 Figure based on 2018 data from DfT Decarbonising Transport Report, March 2020.
5 Low Carbon Automotive Propulsion Technologies – The UK's capability to capitalise upon future technology-led research-to-manufacture supply chain opportunities, published 2016, www.apcuk.co.uk/app/uploads/APC_2016_Capability-Report.pdf
6 Calculation determined from tonnes of CO_2 divided by average CO_2 emissions, annual mileage and average age of car at scrappage, Average used car CO_2 emissions data from SMMT, New Car CO_2 Report 2016. Annual mileage of 4-wheeled cars (weighted) data from National Travel Survey: England 2014 (NTS0903).

Successful collaborative projects

APC's role is not merely to oversee these projects, but to build consortia of complementary skills and ensure that they work effectively together. The results are impressive. The competitions to bid for project funding are over-subscribed by 80%. Recent independent analysis[7] has also shown that APC involvement in consortia-building leads to more ambitious projects with wider and more diverse collaborations.

These highly collaborative projects develop and anchor high-impact technologies and manufacturing processes in the UK. Without APC and its projects, these technologies would otherwise be too early or too risky to fund.

Embracing the UK's expertise

As part of its work building a competitive low carbon UK supply chain, APC ensures that in addition to the major automotive sector players, a mix of SMEs and Tier 1 suppliers are involved. Project consortia report that, in many cases, projects start more quickly and deliver more value than they would without APC support.

The UK's remarkable academic and industry expertise has also been leveraged through the APC Spoke Community; comprising over 600 organisations and 60 key academic institutions which share best practice, expertise and facilities.

Helping UK-developed technology get to market

APC supported projects typically last between 2 and 4 years, and with an average further 2 years before the resultant technologies go into production, it is perhaps too soon to expect to see mass deployment in vehicles. Despite this, a 2019 analysis showed 150,000 UK-produced vehicles and over one million produced outside the UK benefit from APC-funded technology.

Generating economic benefit

Despite the long time between funding a technology project and realising its impact, there have been some positive effects on the economy through vehicle sales and jobs attributable to the projects funded so far. The independent analysis conducted in mid-2019 showed the following results:

17%
Gross Value Added uplift

14-17%
Turnover increases

8-10%
Employment uplifts

Interestingly, the analysis of the geographic area close to major grant recipients showed an average employment uplift of 17% and turnover increase of 22%. The receipt of funding also tends to attract firms and business activity to the area, anchoring jobs and supporting regional clusters.

Enabling rapid R&D progress

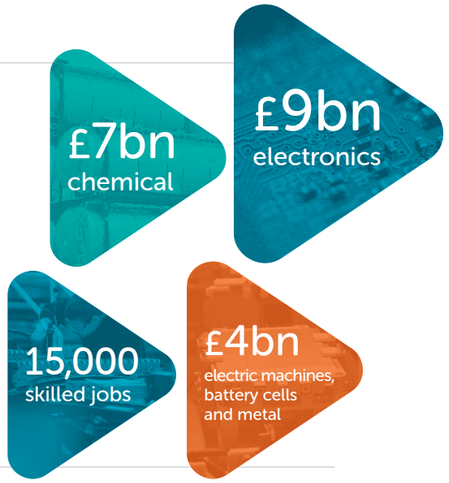
One of APC's ambitions is to stimulate additional R&D investment in the automotive industry. Here we have not seen a measurable effect yet. This is perhaps not surprising when considering that APC funding represents only 2% of total UK automotive sector R&D expenditure.[8] What is demonstrable is that the projects are making rapid progress, advancing on average three levels of technology readiness.

APC's commitment to building strong consortia and providing hands-on support to projects has ensured that within the portfolio of completed projects, 88% are already in production or very close to production.

Developing a low carbon supply chain in the UK

APC is using its knowledge and insight to ensure that UK suppliers will benefit from the transition to net zero vehicles. It has led a comprehensive assessment of the UK electric vehicle supply chain, quantifying global opportunities and identifying critical gaps in capability and capacity. It has used this insight to develop a series of interventions to support those priority areas which will deliver greatest economic benefit.

Moving to net zero presents significant opportunities for the UK. APC analysis has identified a potential £20 billion market for the UK's automotive, chemical and electronic supply chains.



7 Independent survey and analysis mid-2019
8 ONS Business Enterprise Research and Development, November 2018, and APC Average Annual Grant Award 2013-2019

Bridging the gap

Technology Readiness Levels (TRL) are the industry standard measurement system used to assess the development level of new technologies.

APC can help organisations bridge the gap between level 6 (a working prototype) and level 8 (having a product ready for commercialisation). This is a key part of the product development process where new innovations are turned into real products.

APC-funded projects can help us transform promising technologies into practical real-world solutions for our customers. The support we have received has accelerated our ongoing work in the UK to develop efficient new products and improve city air quality.

Mark Harvey | Director, Commercial Vehicle Mobility, Ford Mobility

'The APC saw an opportunity to match a technology partner with a manufacturing partner. The resulting joint venture has led to the development of one of the UK's largest independent battery manufacturing facilities. Without APC's awareness of the aims of each partner, the technical need and market potential for the venture, this collaboration would not have happened.'

Andy Davis | Business Development Director, Unipart Manufacturing and Director, Hyperbat

Hyperbat is a new joint venture between Unipart and Williams Advanced Engineering, which supplies UK-manufactured electric vehicle batteries. The innovative technology is being used to power a number of premium automotive brands.

Helping UK companies plan for the future

In addition to supporting individual projects, APC has also developed a series of 'roadmaps' to help UK firms plan for the future.[9] The roadmaps detail the predicted development of a range of vehicle technologies, allowing organisations to diversify from older technologies and identify new opportunities. The roadmaps have been downloaded over 21,000 times and are widely used to guide portfolio and investment planning in the UK and overseas.

Widening influence

Positioned at the centre of the emerging UK low carbon powertrain sector, APC has been able to add value beyond its original remit. It has used its insight, knowledge and network to support the establishment of adjacent initiatives which will further accelerate decarbonisation; including the Faraday Institution for battery research, the UK Battery Industrialisation Centre, the Driving Electric Revolution programme and Zenzic, which is accelerating the transition to self-driving vehicles.

Zenzic is at the centre of the development of the UK's connected and self-driving vehicle ecosystem. Zenzic was created to focus on key areas of UK capability in a sector predicted to be worth £907 billion by 2035.

A 'once in a generation' opportunity

The transition to zero emission technologies represents a 'once in a generation' opportunity. The UK has done the groundwork. It has built considerable expertise and capability and is now well placed to benefit from the growth in this market around the world.

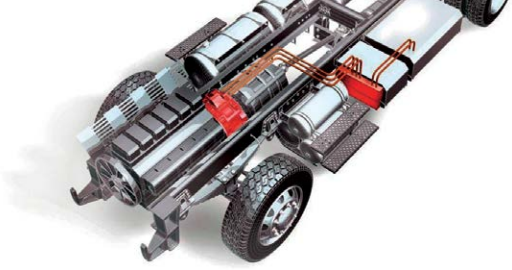
APC has, in only six years, made an important contribution to the development of these exciting technologies; driving collaboration between UK government, industry and academia, ensuring action is taken where needed and helping to build a stronger and more confident UK supply chain.

Looking to the future – the challenges to come

APC plans to make an even greater contribution in the future, continuing to address the tail-pipe emissions from light and heavy duty vehicles. In addition, it intends to extend its focus to the zero carbon lifecycle goal, ensuring the long-term security of the supply chain for electric vehicles.

Meeting the UK's 2050 commitments will require continued effort to reduce the emissions of the UK transport sector. Our ability to develop the required technology will be dependent on focussed, well-managed collaboration. There are significant opportunities for the UK to maintain its global position in the transition to net zero carbon transport. APC has the track-record and credibility to help the UK to realise and maximise these opportunities.

9 The Roadmap Report, published 2018, www.apcuk.co.uk/app/uploads/2018/06/roadmap-report-26-6-18.pdf



APC areas of focus

- Accelerating net zero technologies from R&D into production
- Anchoring production of net zero vehicles in the UK
- Building a vibrant UK supply chain
- Promoting the transition of the automotive supply chain to net zero

APC has coordinated 113 projects involving over 290 partners throughout the UK

APC projects drive cross-sector collaboration between OEMs, Tier 1s, SMEs and academic institutions. Our targeted portfolio supports low carbon vehicle research and development programmes which strengthen supply chains and build economic prosperity across the regions and nations of the UK, leading us to a cleaner world. Below are a few of the diverse range of partners working with APC.

Ford, Nissan, Jaguar, Land Rover, BMW, JCB, Williams Advanced Engineering, Caterpillar, Cummins, Catapult, Loughborough University, WMG, Unipart Manufacturing, YASA Motors, Ashwoods Electric Motors, Echion Technologies, Brill Power, Hyperbat, Ghofer powertrain, Composite Braiding

Find out more at apcuk.co.uk
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