Technology Strategy Board
Driving Innovation

# Low Carbon Vehicles

## INTEGRATED DELIVERY PROGRAMME COMPETITION 2
## JUNE 2009

LOW CARBON VEHICLES INNOVATION PLATFORM

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## INTEGRATED DELIVERY PROGRAMME COMPETITION 2


## Summary

This competition is focused on developing robust industry-led consortia capable of developing vehicle-centric technologies that will encourage the advancement of mass market adoption of low carbon vehicles.

Up to £15 million has been allocated to fund highly innovative collaborative research and development projects and proof-of-concept studies, with the aim of accelerating the development and delivery of mass market low carbon road transport in the short to medium term.

The competition has two innovation focus areas which will work to separate timescales:

**Innovation Focus Area 1 – Up to £5m funding**

- To support collaborative proof-of-concept studies that will help accelerate short-term research priorities
- Projects should be a maximum of 1 year in duration and must be completed by the end of March 2011
- Each project will need to physically demonstrate proof of concept.

**Innovation Focus Area 2 – Up to £10m funding**

- To support collaborative R&D projects that will help accelerate medium-term research priorities
- Projects are likely to last 1–3 years
- Each project will need to demonstrate that it helps to advance medium-term research priorities with a view to supporting mass market readiness circa 2016 or earlier.


## Background and challenge

The Technology Strategy Board's challenge-led innovation approach sees the societal, economic and environmental challenges of the future not as threats, but rather as opportunities for innovative solutions that enhance the quality of life and increase wealth.

The Low Carbon Vehicles Innovation Platform (launched September 2007) delivers the Government's R&D funding on low carbon vehicles.

With initial funding from the Technology Strategy Board, the Department for Transport and the Engineering & Physical Sciences Research Council, the platform aims to promote low carbon vehicle research, design, development and demonstration in the UK to deliver:

- Carbon emission reduction in domestic and international vehicle markets
- Faster introduction of low carbon vehicle technology and vehicles (compared with a purely market driven process)
- A UK automotive sector benefiting from growing demand for low carbon vehicles – in domestic and international markets.

This is the second competition under the 5-year Low Carbon Vehicles Integrated Delivery Programme which will integrate the innovation chain, from the science base, through collaborative R&D to fleet level demonstration. The programme has secured over £100m of public sector funding from the Technology Strategy Board, the Department for Transport, the Engineering & Physical Sciences Research Council, Advantage West Midlands and One North East, which will support 3 competitions in 2009 with further competitions in the future.

The Low Carbon Vehicle Innovation Platform has been working with key stakeholders to understand the research priorities needed to support the future developments of road vehicles to help reduce carbon emissions and therefore meet UK and EU climate change targets. The Integrated Delivery Programme industry-led Advisory Panel has assisted in the development of the scope of this competition. Its input has been informed by the recently published New Automotive Innovation and Growth Team (NAIGT) report 'An Independent Report on the Future of the Automotive Industry in the UK' (www.berr.gov.uk/files/file51139.pdf).

The report contains a Consensus Product Roadmap (page 97) from which a Common Research Agenda Summary was developed (page 116). Prior to submitting an application it is recommended that each consortium reviews this document. Both of these elements have been used to support the Integrated Delivery Programme Advisory Panel in helping scope this competition and in particular the two distinct innovation focus areas, which are aimed at all types of mass market road-based vehicles.

## Scope

The scope of this competition is for projects that accelerate research and development leading to the reduction of carbon emissions from mass market road vehicles. We have divided the competition into two innovation focus areas to reflect the two distinct project timescales (see NAIGT Consensus Product Roadmap) and the related research agenda priorities in Figure 1 opposite.

Each project will need to demonstrate:

- Clear potential for mass market adoption
- Quantified $CO_2$ savings expected from the project's outcome relative to its target mass market application when compared to current best-in-class and/or a clear contribution relating to customer acceptance of low carbon vehicle technology
- Durability, integrity and safety – in line with industry expectations
- A clear route to a viable market and ability to demonstrate that these innovations are economically advantageous compared to current equivalents.

## Funding allocation and project details

Up to £15m has been allocated to fund highly innovative collaborative research and development projects and proof-of-concept studies aligned to the research agenda necessary to develop and deliver mass market low carbon road transport in the short to medium term.

We anticipate that most of the funding will be allocated to proposals working on applied research activities (attracting 50% public funding), but any project has the potential to include elements of experimental development (25% public funding) or industry-orientated basic research (75% public funding).

Applicants must make a robust case to support the requested level of funding against each element of the proposed project. Our 'Guidance for Applicants' defines these categories of research and is available on our website www.innovateuk.org through the Competitions link.

**Figure 1 – Common Research Agenda Summary (as amended for the scope of this competition)**

| | SHORT TERM<br>5 – 10 years from production | MEDIUM TERM<br>7 – 15 years from production | LONG TERM<br>10 – 20 years from production |
|---|---|---|---|
| | INDUSTRY | | UNIVERSITIES |
| **Propulsion** | • IC engine optimisation<br>• Boost systems for downsizing<br>• Flexible valve/actuation for engines/transmissions<br>• Low cost compact e-motors | • Higher efficiency IC engines<br>• Capacitive boost systems<br>• All electric actuation systems<br>• Optimised range extender engine<br>• Lower cost e-motor<br>• Heat energy recovery (e.g. E-turbine) | • Super high efficiency motors (superconducting)<br>• New IC engines with 70%+ thermal efficiency<br>• Advanced heat energy recovery (e.g. thermoelectric)<br>• Motor/Fuel Cell materials |
| **Energy Storage** | • Improved quality / durability 200+ Wh/kg & $800/kW.h cost battery systems<br>• Low cost power electronics | • Next gen batteries 300+ Wh/kg and $500/kW.h cost<br>• Flexible power elec. modules<br>• Other forms of energy recovery (mechanical/chemical etc) | • 3rd gen batteries 400+ Wh/kg & $200/kW.h cost<br>• New low cost solid state power conversion systems<br>• Hydrogen storage technology |
| **Vehicle Efficiency** | • Lightweight structures and interiors<br>• Low rolling resistance tyres / brakes | • New vehicle classes and configurations<br>• Combination of function to reduce weight / cost<br>• Minimised weight / losses | • Flexible re-configurable multi-utility vehicle concepts<br>• 50% weight reduction from 2008<br>• Advanced aerodynamic concepts |
| **System Control** | • Information enabled control (Topology, V2V, V2I, traffice etc.)<br>• Otimised vehicle energy mgmt.<br>• Intelligent thermal managment | • Advanced information enabled control<br>• Intelligent P/T and HVAC mgmt. | • Autonomous P/T and vehicle control integrated with active safety |
| **Energy Fuel + Supply** | • Optimised 1st gen biofuels processes<br>• New 2nd gen biofule processes | • Intelligent energy / re-fueling infrastructure (e.g. fast charge)<br>• Industrial sclae demonstration of new 2nd gen biofuel processes | • 3rd gen biofuel processes<br>• 2nd gen industrial scale biofuel production infrastructure |
| **Processes + Tools** | • Process + delivery tool development and connectivity | • Auto-optimisation methods using virtual systems | • Artificial Intelligence to deliver complex multi-criteria system optimisation |

NB For clarity, the areas which are **outside** of the scope of this competition are in grey shading, IC = Internal combustion.

**Figure 2 – Summary of the two innovation focus areas**

| | **Innovation Focus Area 1 – scope** | **Innovation Focus Area 2 – scope** |
|---|---|---|
| **Market readiness timeline** | Accelerating the delivery of Short-term Common Research Agenda topics (reference NAIGT Consensus Product Roadmap and research agenda) | Accelerating the delivery of Medium-term Common Research Agenda topics (reference NAIGT Consensus Product Roadmap and research agenda) – in support of mass market readiness circa 2016 or earlier |
| **Target** | Short-term research priorities | Short to medium term research priorities |
| **Funding available** | Up to £5m | Up to £10m |
| **Project timing** | Completed by March 2011 | Aligned to project duration |
| **Project duration** | Up to 1 year | About 1–3 years |
| **Focus areas included in the competition** | Propulsion, energy storage, vehicle efficiency, system control, processes & tools | Propulsion, energy storage, vehicle efficiency, system control, processes & tools |
| **Focus areas excluded from the competition** | The 'Energy + Fuel Supply' category and information vehicle control listed in Figure 1 – these are not the principal technology targets of this competition scope.<br><br>$H_2$ fuel cells/fuel cell vehicles – this technology focus area does not align to the market readiness target of circa 2016 as defined by the NAIGT Consensus Product Roadmap. | The 'Energy + Fuel Supply' category, information vehicle control, and advanced information vehicle control listed in Figure 1 – these are not the principal technology targets of this competition scope.<br><br>$H_2$ fuel cells/fuel cell vehicles – this technology focus area does not align to the market readiness target of circa 2016 as defined by the NAIGT Consensus Product Roadmap |
| **Funding per project** | We expect per project funding will be in the region of £500,000 | We expect to invest in 6 to 12 projects, fairly reflecting the likely scale of interest and varied breadth of technology focus |
| **Application process** | Fast track, single stage application process | Expression of interest leading to full stage applications process |
| **Other** | Innovation Focus Area 1 is aimed at collaborative projects leading to a physical demonstration of a proof of concept | |

## Application process

The competition opens on **15th June** and is split into two streams reflecting the two types of project:

**Innovation Focus Area 1 – Fast Track Collaborative R&D**
The proof-of-concept projects falling within Innovation Focus Area 1 will be collaborative fast track projects using a single stage application process. The competition opens on **15th June** and applicants need to submit their applications by **6th August 2009**. Applicants will be informed of the outcome of their applications by **21st August 2009**.

**Innovation Focus Area 2 – Mainstream Collaborative R&D**
The application process for this competition is in line with Technology Strategy Board's general collaborative R&D policy, which gives applicants the opportunity to make an initial optional Expression of Interest (EOI) prior to their compulsory EOI application. We will look at the optional EOI and aim to provide feedback to applicants within 3 working days. Applicants may take advantage of this up to one week prior to the deadline for the submission of the compulsory EOI.

Projects that fall within Innovation Focus Area 2 (collaborative R&D projects) will use the Technology Strategy Board's full stage collaborative R&D application process.

This process for Innovation Focus Area 2 will run in two stages:

**1. Compulsory EOI stage** – where an outline version of the project application is assessed. An independent panel will recommend projects to be called forward to the full stage by the Technology Strategy Board.

**2. Full stage** – a complete full stage application form including annexes and finance forms.

As this competition runs across the summer, the full stage will not begin until **1st September 2009**.

The 'Guidance for Applicants' explains the process in detail. In short, applicants need to submit their compulsory EOI by **6th August 2009** and this will be reviewed and feedback given on **21st August 2009**. Following an independent panel review, the Technology Strategy Board will then invite applicants, whose proposal fits firmly within the scope and the criteria of the competition, to the full stage. For these applicants, in the week beginning **24th August 2009**, there will be the opportunity to discuss the feedback with the Technology Strategy Board by telephone. Details can found at www.innovateuk.org under Competitions.

There will be a briefing day specifically for this competition in Manchester on **24th June 2009**. Whilst this briefing is optional, potential applicants are strongly advised to attend if possible. Applicants invited to submit a full stage proposal will need to send at least one representative of their consortium to the compulsory briefing on **7th September in London**. They will also need to register their intention to apply to the full stage by **8th October 2009** and submit their full application by **15th October 2009**. Applicants will be informed of the outcome of their applications by **16th November 2009**.

## Key dates

| | |
|---|---|
| **Fast Track collaborative R&D applications (Innovation Focus Area 1 – Proof of concept)** | |
| Competition opens | **15th June** |
| Briefing day (optional) | **24th June Manchester** |
| Compulsory fast track application deadline | **6th August** |
| Decision and feedback to applicants | **21st August** |
| **Mainstream collaborative R&D applications (Innovation Focus Area 2)** | |
| Competition opens | **15th June** |
| Briefing day (optional) | **24th June Manchester** |
| Compulsory Expressions of Interest deadline | **6th August** |
| Feedback on Expressions of Interest provided | **on 21st August** |
| Feedback discussion in week beginning | **24th August** |
| Full stage (for invited applications) opens | **1st September** |
| Applicants' briefing (compulsory) | **7th September London** |
| Registration of intent to submit (compulsory) | **8th October** |
| Deadline for receipt of full applications | **15th October** |
| Decision and feedback to applicants | **16th November** |

## Further Information

For more information about this and other events and details on how to register and apply visit www.innovateuk.org under Competitions.

## Competition Helpline: 01355 272155

## Email: competitions@tsb.gov.uk

*The Technology Strategy Board is a business-led executive non-departmental public body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve quality of life.*

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