Internal Combustion Engine

Overview

- The Internal Combustion Engine (ICE) offers the most effective way to reduce CO_2 emissions in the short term while still having a long term future.
- The UK has a strong position in engine manufacturer, combined with the expertise in both motorsport and academia resulting in a dynamic and world leading sector.
- Biofuels are also included within this section.

Automotive Technologies Capability Report

The full UK roadmap and evidence based assessment of UK capability and potential can be found at:
www.innovateuk.org/_assets/pdf/automotive%20technologies%20-%20the%20uks%20current%20capabilities.pdf

Table Key
S = Short term
M = Medium term
L = Long term

Assessment of UK capability
Pale Blue = Lower potential
Light Blue = Medium potential
Dark Blue = High potential
Clear = No significant market requirement at that time

ROI scale 1-5 with 5 being best

Technology Categories	UK capability			Research Area Focus			Indicative ROI
	S	M	L	Short	Medium	Long	
Fuel injection equipment				High pressures, more flexibility, hybrid applications	Design for Biofuels		**4**
Air handling				Boost systems for downsizing	Improved response		**3**
Friction reduction technology				Components, lubricants	Materials, coatings, nano-technology		**3**
Alternative actuation				Electric Actuation	Combined function actuators		**2**
Heat energy recovery systems					E-Turbines, secondary cycles	Thermo-electric devices	**3**
Novel thermo cycles					Alt. Combustion modes (CAI, HCCL)	Novel concepts for very high efficiency	**3**

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Technology Categories	UK capability S	M	L	Research Area Focus Short	Medium	Long	Indicative ROI
Flexible valvetrains				Fully variable mechanical systems	Adv. Combinations w other techs	-	**2**
Engines for HEV/PHEV				Simple, light engines for niche app's	Optimised engines	-	**4**
Integrated engine design & dev't				Flexfuel engines	2/4 stroke switching	Mild hybrid, boosted engines	**5**
Conventional MT/AT							**1**
Advanced DCT/CVT				Lower cost	Improved efficiency		**2**

Technology Categories	UK capability S	M	L	Research Area Focus Short	Medium	Long	Indicative ROI
1st gen biofuels				Improved processes	-	-	**1**
2nd gen biofuels				New 2nd gen processes	Demo 2nd gen processes	-	**3**
3rd gen biofuels				-	-	New 3rd gen processes	**3**

UK academic research centres

Universities Internal Combustion Engine Group

Location: Loughborough University
Loughborough
LE11 3TU
Contact: Dr Andrew Clarke
Phone: +44 (0) 1509 227522
E-mail: a.clarke@lboro.ac.uk
Website: http://www.uniceg.org.uk/site/

UnICEG is an active group of researches that looks to internally circulate research and development on a tri-annual meeting basis. Comprising of roughly 100 members in a 50-50 split between academia and industry, the group encourages collaboration between UK engine research groups as well as organisations such as the EPSRC.

Powertrain and Vehicle Research Centre (PVRC), University of Bath

Location: Dept. of Mechanical Engineering
University of Bath
Claverton Down
Bath
BA2 7AY
Contact: Professor J Gary Hawley,
Phone: +44 (0)1225 386855
E-mail: J.G.Hawley@bath.ac.uk
Website: http://www.bath.ac.uk/mech-eng/auto/

The PVRC is based at the University of Bath. They have extensive facilities, including three Dynamic Engine Research Cells, for the testing and modelling of engines. Their four main research areas are:

- Engine and Powertrain Systems Research.

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- Powertrain Systems Modelling and Simulation.
- Vehicle Systems Research.
- Transmissions Systems Research.

Vehicle Technology Research Centre, University of Birmingham

Location: University of Birmingham
Edgbaston
Birmingham
B15 2TT
Contact: Professor Hong Ming Xu, School of Mechanical Engineering
Phone: +44 (0) 121 414 4153
E-mail: h.m.xu@bham.ac.uk
Website: http://www.birmingham.ac.uk/research/activity/mechanical-engineering/vehicle-technology/index.aspx

The Vehicle Technology Research Centre is home to the Future Power Systems (FPS) Group. The Centre is also home to the Future Engines and Fuels Lab, which contains seven test engines for research purposes. Their current research themes look towards making new combustion and energy conversion technologies, alternative fuels and hydrogen as means to create clean, efficient and sustainable power sources for propulsion and stationary use.

Automotive Research Centre, Bradford University

Location: Automotive Research Centre
Chesham Building
University of Bradford
Richmond Road
Bradford
BD7 1DP
Contact: Nigel Revitt (ARC Programme Manager)
Phone: +44 (0) 1274 232 323
E-mail: n.revitt@bradford.ac.uk
Website: http://www.automotive-research.brad.ac.uk/

The Centre's three main areas of operation are, the Bradford Engineering Quality Improvement Centre (BEQIC), the Centre for Advanced Engineering Systems Optimisation (AESOp), and the Braking Research Centre (BRC). They have completed an extensive investment programme to provide a unique set of world class experimental facilities with associated instrumentation, hardware, and software including Engines, Powertrain, Quality, Design, Modelling, Simulation, and Manufacturing.

Centre for Automotive Engineering, University of Brighton

Location: University of Brighton
Brighton
BN2 4GJ
Contact: Professor Morgan Heikal
Phone: +44 (0) 1273 642 326
E-mail: M.R.Heikal@brighton.ac.uk
Website: http://www.brighton.ac.uk/cae/index.php

The Centre of Automotive Engineering works out of the Sir Harry Ricardo Laboratories at the University of Brighton. These were opened in 2006 and are the base for the Centre's research into ICEs, specialising in the following four areas:

- Optical Diagnostics.
- Modelling and Simulation.
- Engine Performance.
- Heat Transfer.

They have collaborated with many industrial and academic partners including BP, Ford and UCL and have received funding from the EPSRC

and EU FP7. The laboratories extensive testing facilities include a range of different engines as well as optical measurement apparatus.

Centre for Advanced Powertrain and Fuels (CAPF), Brunel University

Location: Brunel University
West London
Uxbridge
UB8 3PH
Contact: Professor Hua Zhao, School of Engineering & Design
Phone: +44 (0)1895 266698
E-mail: Hua.Zhao@brunel.ac.uk
Website: http://www.brunel.ac.uk/sed/mecheng/research/ee/capf

This research group was started in the 1960's. Current research themes include:

- Advanced Gasoline engines and their fuels.
- Advanced Diesel engines, fuels and after treatment.
- Air Hybrid Engines.
- Development and application of advanced optical diagnostics to IC engines.
- Engine simulation and computational fluid dynamics.

Department of Engineering, University of Cambridge

Location: University of Cambridge
Trumpington Street
Cambridge
CB2 1PZ
Contact: Philip Guildford (Director of Research)
Phone: +44 (0) 122 333 2671
E-mail: Pg28@eng.cam.ac.uk
Website: http://www.eng.cam.ac.uk/research/

Relevant research is taking place in a number of Cambridge University departments. Of particular relevance here is the Tribology Group within the Mechanics, Materials and Design Division and the Turbomachinery, Energy and Fluid Mechanics Group with the Engineering Division.

Energy Systems and Engines Group, City University

Location: City University,
London
EC1V 0HB
Contact: Professor Keith Pullen
Phone: +44 (0) 207 040 3475
E-mail: Keith.pullen.1@city.ac.uk
Website: http://www.city.ac.uk/engineering-maths/research/energy-and-transport-centre/energy-systems-and-engines-group

The Energy Systems and Engines Group works out of the Energy and Transport Centre at City University, London. Key research is taking place in the following areas:

- Flow and Combustion in Reciprocating Engines.
- Fuel Injection Systems.
- Piston-ring Lubrication.

They also look at small-scale turbomachinery. They work on several test cells, including single cylinder engines. They also have active research in fuel cells, so do not concentrate solely on ICEs.

Automotive Engineering Applied Research Group, Coventry University

Location: Coventry University

	Priory Street Coventry CV1 5FB
Contact:	Professor S Benjamin
Phone:	+44 (0) 27688 8362
E-mail:	s.benjamin@coventry.ac.uk
Website:	http://wwwm.coventry.ac.uk/researchnet/automotiveengineering/researchareas/EngineEmissions%20Research/Pages/EngineEmissionsResearch.aspx

The Automotive Engineering Department of Coventry University conducts research into the following areas:

- Engine/emissions research.
- Motorsport engineering.
- Vehicle studies.
- Passenger safety.
- Vehicle handling assessment.
- Aerodynamics.
- Cooling systems.
- Intelligent transportation systems.
- Vibro-acoustics.

The Engine/Emissions research is focussed on the development and validation of simulation techniques to predict the performance of after-treatment systems for spark ignition and diesel engines. Collaborative research programmes have been undertaken with major OEMs and suppliers such as Ford and JLR.

Department of Mechanical Engineering, Imperial College

Location:	Imperial College London, South Kensington Campus London SW7 2AZ
Contact:	Professor Peter Lindstedt
Phone:	+44 (0) 207 594 7039
E-mail:	p.lindstedt@imperial.ac.uk
Website:	http://www3.imperial.ac.uk/mechanicalengineering/research

Research activities in Mechanical Engineering are split into three divisions, Applied Mechanics, Mechanics of Materials and Thermofluids. Each of these have extensive research focus areas with automotive applications. The department is also home to the Tribology Group which has research themes including contact mechanics and wear & tear fatigue.

Institute of Engineering Thermofluids, Surfaces and Interfaces, University of Leeds

Location:	University of Leeds Leeds, LS2 9JT
Contact:	Dr Nik Kapur (Institute Director)
Phone:	+44 (0)113 343 2126
E-mail:	n.kapur@leeds.ac.uk
Website:	http://www.engineering.leeds.ac.uk/ietsi/index.shtml

The Institute of Engineering Thermofluids, Surfaces and Interfaces was founded in 2006. It is the largest research institute in the University's department. Their research breaks down into the following 6 topics:

- Tribology and surface Engineering.
- Thermofluids and Combustion.
- Engineering Fluids and Micro/Nano-fluidics.
- Biomimetics and Bioinspiration.
- Engineering Optics.
- Surgical Technologies.

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The Institute also hosts the 2020 Interface Consortium. This Consortium is an international effort to reduce friction in ICEs. They have received €2.6m of funding from the EU's FP7 program.

Thermofluids and Combustion Research Group, Loughborough University

Location: University of Loughborough,
Loughborough, LE11 2TU
Contact: Dr Andrew Clarke,
Phone: +44 (0) 1509 227522
E-mail: a.clarke@lboro.ac.uk
Website: http://www.lboro.ac.uk/departments/mechman/research/groups/thermofluidsandcombustion/

Active in ICE research, Loughborough University brings together staff from both the Department of Aeronautical and Automotive Engineering and the School of Mechanical and Manufacturing Engineering. The Loughborough Thermofluids Group looks at a range of topics including thermodynamics, fluid dynamics, heat transfer and combustion. The group uses optical diagnostics and CFD modelling. They have partnerships with many industrial organisations such as Ford and Lotus.

The Low Carbon Technology Research Group at Loughborough has interests in all aspects of ICEs, from combustion chemical kinetics to engine and combustion modelling with an aim of reducing carbon emissions. They do also look at fuel cell technology as well as hybrid and electric vehicle technology.

Gear Technology Centre (Design Unit), Newcastle University

Location: Newcastle University
Newcastle Upon Tyne
NE1 7RU
Contact: Dr Brian Shaw (Centre Director)
Phone: +44 (0)191 222 6192
E-mail: design.unit@ncl.ac.uk
Website: http://www.ncl.ac.uk/gears

The Design Unit is an independent commercial body attached to Newcastle University. They have a history of design and engineering experience that includes research into mechanical gears. They use a holistic approach and so have knowledge of materials, heat treatment processes, finishing processes and many others. They have a history of researching and designing parts of engines for all manner of applications including defence contracts for submarines and tanks.

Mechanical, Materials and Manufacturing Engineering, University of Nottingham

Location: University of Nottingham
University Park, Nottingham NG7 2RD
Contact: Professor Steve Pickering
Phone: +44 (0)115 951 3785
E-mail: stephen.pickering@nottingham.ac.uk
Website: http://www.nottingham.ac.uk/engineering/departments/m3/index.aspx

The University of Nottingham has a number of departments active in ICE research. The Engine Research Group (ERG) concentrates research into the following areas:

- Performance and operation of engines during cold-start/warm-up.
- Cold-engine friction characteristics.
- Control of emissions to within limits permitted by European and other International standards.
- Development of the new low carbon engine technologies.

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- Development of computer aided engineering tools based on computational and analytical models.
- Optical analysis of combustion characteristics.

The Thermofluids Group have collaborated with Ford and Jaguar to produce advances in the understanding and improvement of automotive engine performance. Recent research themes have included the reduction of inefficiency in engines (windage loss in transmission, rubbing friction in reciprocating engines etc.).

Combustion and Engines Group, University of Oxford

Location: University of Oxford
Parks Road, OX1 3PJ
Contact: Professor Richard Stone, Dept. of Engineering Science
Phone: +44 (0) 1865 273 139
E-mail: richard.stone@eng.ox.ac.uk
Website: http://www.eng.ox.ac.uk/engines/research

The Internal Combustion Engines Group conducts analytical, experimental and modelling research on ICEs. Their main interests are in the following areas:

- Generic combustion analysis and instrumentation for IC engines.
- Direct Injection Spark Ignition (DISI) and Homogeneous Charge. Compression Ignition (HCCI) engines.
- In-cylinder/exhaust emissions measurements.
- Fast-response thermocouple technique and heat flux in IC engines.
- Multi-zone modelling and simulations for spark-ignition engines.

Clean Energies Research Group, Queen's University Belfast

Location: Queen's University,
Belfast
BT9 5AH
Contact: Professor Roy Douglas, School of Mechanical & Aerospace Engineering
Phone: +44 (0)28 9097 4133
E-mail: r.douglas@qub.ac.uk
Website: http://www.qub.ac.uk/schools/SchoolofMechanicalandAerospaceEngineering/Research/ICERG/

The focus of research within the group is mostly in the areas of Engine Modelling, After-treatment Systems and Turbomachinery, but does include other projects and applications associated with ICE design and development.
The main research of ICERG falls into the following areas:

- Catalysis and After Treatment.
- Modelling and CFD.
- Engine Testing and Development.
- Turbomachinery.
- Renewable Energy.

The Leonardo Centre for Tribology, University of Sheffield

Location: University of Sheffield,
Sheffield S1 3JD
Contact: Professor Rob Dwyer-Joyce, Faculty of Engineering
Phone: +44 (0)1142 227736
E-mail: r.dwyerjoycse@sheffield.ac.uk
Website: http://www.leonardocentre.co.uk/

The Leonardo Centre specialises in research and development in tribology and surface engineering. Work aims to reduce friction between moving parts of an ICE and so look at aspects such as the film thickness between cylinders and engine blocks.

National Centre for Advanced Tribology (nCATS), University of Southampton

Location: University of Southampton
Highfield
Southampton
SO17 1BJ
Contact: Sue Berger
Phone: +44 (0)238 059 2871
E-mail: engsci@soton.ac.uk
Website: http://www.southampton.ac.uk/engineering/research/groups/ncats.page?#overview

nCATS is a multidisciplinary tribology centre that aspires to research and solve next-generation tribological design issues and enable surface interactions to occur with minimal energy loss and impact on the environment. It links world-class research groups in key disciplines at the University of Southampton to develop enhanced capabilities in advanced computational and experimental tribology. They have also established strategic research partnerships, with access to facilities, with the National Physical Laboratory, Teddington (NPL) and with the tribology/metrology groups at the universities of Cambridge, Huddersfield, Sheffield and Leeds..

Energy and Environment Group, UCL

Location: University College of London
Torrington Place
London
WC1E 7JE
Contact: Professor Nicos Ladommatos
Phone: +44 (0) 20 7679 3908
E-mail: n.ladommatos@ucl.ac.uk
Website: http://www.ucl.ac.uk/mecheng/research-ian-version/energy-and-the-environment

The Energy and the Environment Group cover a broad range of research activities with a specific emphasis on addressing the key drivers for industry and the environment. The research areas covered by the group include:

- Combustion and new fuel technologies.
- ICEs.
- Turbomachinary and algorithmic development for optimisation.
- Pollution, mixing and chemistry in industrial and environmental flows.
- High performance computations applied to industrial and environmental flows.
- Refrigeration and air-conditioning.

BIOFUELS

BBSRC Sustainable Bioenergy Centre (BSBEC)

Location: BBSRC
Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1UH
Phone: 01793 413200
E-mail: external.relations@bbsrc.ac.uk
Website: http://www.bsbec.bbsrc.ac.uk/index.html

Established in 2009, the Sustainable Bioenergy Centre delivers integrated activity across 6 research programmes that bring together a total of 12 universities and institutes with 14 individual partners. The Centre was funded with an original £24million investment. They also have 14 industrial

partners that provide an additional £4m of investment along with business perspectives to represent industrial interest in the research.

The 6 research programmes with web links are:

- Perennial bioenergy crops.
- Cell wall lignin.
- Cell wall sugars.
- Lignocellulosic conversion to bioethanol.
- Marine wood borer enzyme discovery.
- Second generation sustainable bacterial biofuels.

SUPERGEN, Biomass and Bioenergy Consortium

The SUPERGEN Biomass and Bioenergy Consortium aims to provide a recognised focus for UK biomass and bioenergy activities that unites key stakeholders and academia through leading edge research in renewable energy.

The Bioenergy Consortium is studying the production of different types of biomass and investigating their behaviour in thermal conversion processes, with particular emphasis on the interaction and interface between production and conversion. The bioenergy products are being expanded to include transport fuels and renewable chemicals within the context of a biorefinery.

European Bioenergy Research Institute, Aston University

Location: Aston University
Aston Triangle
Birmingham
B4 7ET
Contact: Professor Andreas Hornung
Phone: +44 (0) 121 204 3391
E-mail: a.hornung@aston.ac.uk
Website: http://www1.aston.ac.uk/eas/research/groups/ebri/

The research at EBRI is investigating novel methodologies for the manufacture of Biofuels. They look towards employing these fuels for the production of hydrogen as well as combined heat power. They have both academic and industrial partners, ranging from power distribution companies to engine manufacturers. They have many University partners including Imperial College London, Birmingham University and Southampton University.

Algal Biotechnology Consortium (ABC), Cambridge University

Location: University of Cambridge
Downing Street
Cambridge
CB2 3EA
Contact: Professor Alison Smith
Phone: +44 (0) 122 333 3952
E-mail: as25@cam.ac.uk
Website: http://www.bioenergy.cam.ac.uk/abc.html

The ABC is a multidisciplinary consortium made up primarily of Cambridge University faculty members. They are looking at the following points of research:

- The development of tools in algal molecular and synthetic biology for accumulation of desired products.
- The production of algal biomass, including sequestration of CO_2 from flue gases, and treatment of wastewater.
- Use of cyanobacteria for the production of bio-photovoltaic panels.
- Photosynthetic and biomimetic hydrogen production and CO_2 reduction.

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Automotive, Cranfield University

Location: Cranfield University
College Road
Cranfield
Bedfordshire
MK43 0AL
Contact: Dr. Raffaella Villa
Phone: +44 (0) 1234 750 111
E-mail: r.villa@cranfield.ac.uk
Website: http://www.cranfield.ac.uk/automotive/research/projects/environment/page24781.html

One of the automotive research themes at Cranfield is Biofuels. Their research is looking into the use of glycerol, a biodiesel waste product. Cranfield is part of the SUPERGEN consortium.

Division of Plant Sciences, University of Dundee

Location: University of Dundee at SCRI
Errol Road
Invergowie
Dundee
Contact: Professor Claire Halpin, Division of Plant Sciences
Phone: +44 (0) 1382 568 775
E-mail: c.halpin@dundee.ac.uk
Website: http://www.lifesci.dundee.ac.uk/research/ps

The division of Plant Sciences at the University of Dundee is active in a number of areas. In terms of Biofuels, their research is mainly conducted at the SCRI, which is attached to the University. The SCRI was awarded £27million for the construction of a Bioenergy Research Centre, funded by the BBSRC to research and develop new fuels for the future. Since then, the SCRI has become part of the James Hutton Institute, an amalgamated research body combining the SCRI with parts of other organisations including the University of Aberdeen.

Biofuel Research Centre (BfRC), Edinburgh Napier University

Location: Edinburgh Napier University
Edinburgh
EH11 4BN
Contact: Professor Martin Tangney
Phone: +44 (0) 8452 60 60 40
E-mail: m.tangney@napier.ac.uk
Website: http://www.napier.ac.uk/randkt/rktcentres/bfrc/Pages/Home.aspx

The BfRC have research projects looking at novel methods of manufacture, including the use of whisky by-products, funded by the Scottish Enterprise's Proof of Concept programme. Their research also focuses on Microbial Biofuels and Butanol as a transport fuel.

Centre of Excellence for Biocatalysis, Biotransformations and Biocatalytic Manufacture (CoEBio3), University of Manchester

Location: University of Manchester
131 Princess Street, Manchester M1 7DN
Contact: Professor Nick Turner
Phone: +44(0) 161 306 5100
E-mail: nicholas.turner@manchester.ac.uk
Website: http://www.coebio3.manchester.ac.uk/

CoEBio3 is an organisation designed to support R&D into new biocatalyst based processes for the future. They have a pilot biomanufacturing facility to host testing for a possible shift towards bio-refineries. They also host a biocatalysis knowledge transfer network for the University of Manchester,

bringing in research grants and supplying industry with feasibility projects. The CoEBio3 also works closely with the National Industrial Biotechnology Facility (NIBF) which is operated by the Centre for Process Innovation (CPI), an open access test facility for the development of any company's biotech products. CoEBio3 also works closely with the Manchester Interdisciplinary Biocentre (MIB).

Bioenergy, Nottingham University

Location: School of Biosciences
University of Nottingham
Sutton Bonington Campus
Loughborough
Leicestershire
LE12 5RD
United Kingdom
Phone: +44 (0) 115 9516637
E-mail: bioenergy@nottingham.ac.uk
Website: http://www.nottingham.ac.uk/bioenergy/contactus.aspx

Nottingham University is part of the BBSRC Sustainable Bioenergy Centre. Expertise includes brewing science and microbial physiology, the breeding of improved crop strains that can promote optimal biofuel production and the science and technology of fuel utilisation.

Southampton University Research Institute for Sustainable Energy and the Environment (SUNRISE), Southampton University

Location: University of Southampton
Room 4069
Southampton
SO17 1BJ
Phone: +44(0) 268 059 5377
E-mail: sunrise@soton.ac.uk
Website: http://www.sunrise.soton.ac.uk/

SUNRISE is a multidisciplinary centre for education and research bringing together groups from across the University of Southampton. Their research themes include topics such as Energy Storage and Renewable Energy. The emphasis of their research is in the following areas:

- Lignocellulosics feedstocks for heat, power and liquid fuel.
- Anaerobic digestion.
- Sustainability of bioenergy systems including life cycle approaches.
- Bioalgae.

A full list of their research projects can be found here. They also have a research theme in Energy and Transport. This is broken down into Fuels and Fuel Storage, Propulsion Systems and Travel sustainability, with a view to developing the next generation of sustainable vehicle technology. Overlap between the staff and research in common.

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The following table pulls together information pertaining to publically funded research and development projects. Information has been sourced from the Engineering and Physical Sciences Research Council (EPSRC), the Technology Strategy Board (TSB) and the European Framework Programme (FP7). More information on each can be found on the relevant websites:

- EPSRC
- TSB
- FP7

In the case of FP7 projects, values are expressed in €million.

This project list is under constant development as we strive to include more projects and information. Please note that the FP7 lists are not exhaustive, but an indication of the size and scope of the FP7 project portfolio in this area. SMMT would welcome any updates, additions or corrections to the list. Contributions should be emailed to Luke Hampton at lhampton@smmt.co.uk.

FUNDER	PROJECT TITLE	Start	End	PROJECT CONTACT	ORGANISATION/ CONSORTIUM	DEPARTMENT	VALUE
EPSRC	A feasibility study of the new concept exhaust gas recirculation (EGR) system for low carbon vehicles	11/10	4/12	Professor H Zhao	Brunel University	Sch of Engineering and Design	£156,293
EPSRC	A Fundamental Study of the Novel Poppet Valve 2-Stroke Auto-ignition Combustion Engine (2-ACE)	10/08	10/11	Professor H Zhao	Brunel University	Sch of Engineering and Design	£495,401
EPSRC	A Fundamental Study of the Novel Poppet Valve 2-Stroke Auto-ignition Combustion Engine (2-ACE)	10/08	09/11	Professor H McCann	The University of Manchester	Electrical and Electronic Engineering	£448,771
EPSRC	A Fundamental Study of the Novel Poppet Valve 2-Stroke Auto-ignition Combustion Engine (2-ACE)	11/08	10/11	Dr E Sazhina	University of Brighton	Sch of Engineering	£250,267

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EPSRC	A Fundamental Study of the Novel Poppet Valve 2-Stroke Auto-ignition Combustion Engine (2-ACE)	10/08	09/11	Professor J Griffiths	University of Leeds	Sch of Chemistry	£17,983
EPSRC	A Fundamental Study on CH* and OH* Flame Emissions as Indicators of Heat Release and AFR at Engine Relevant Conditions of Temperature and Pressure	03/10	09/10	Professor CR Stone	University of Oxford	Engineering Science	£26,395
EPSRC	A New Integrated Approach to Measurements and Modelling of Combustion Generated Particulate Matter	03/11	02/15	Professor M Kraft	University of Cambridge	Chemical Engineering	£541,230
EPSRC	A New Integrated Approach to Measurements and Modelling of Combustion Generated Particulate Matter	03/11	02/15	Professor CR Stone	University of Oxford	Engineering Science	£577,861
EPSRC	Active Sensor Structures for Extreme Environments	10/11	03/15	Horsfall, Dr AB	Newcastle University	School of Electrical and Electronic Engineering	£474,858
EPSRC	Adaptive Cylinder Pressure Reconstruction for Production Engines	07/07	01/11	Dr J Dunne	University of Sussex	Sch of Engineering and Design	£329,097
EPSRC	Advanced modelling for two-phase reacting flows	10/10	09/15	Dr E S Richardson	University of Southampton	School of Engineering Sciences	£598,558
EPSRC	An Experimental and Modelling Approach to Engineering the Stability of Mixed Micro- and Nano-Grain Size Polycrystals to Improve Durability	01/10	12/12	Professor V Randle	Swansea University	College of Engineering	£225,901

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EPSRC	Clean Low Carbon Vehicles - Combustion with Simultaneous Nitrogen and Hydrogen Enrichment	11/10	04/12	Dr T Megaritis	Brunel University	Sch of Engineering and Design	£436,261
EPSRC	Collaborative Research in Energy with South Africa: Fundamental Characterisation of Autoignition and Flame Propagation of Synthetic Fuels	10/09	03/13	Dr G Sharpe	University of Leeds	Mechanical Engineering	£396,550
EPSRC	Collaborative Research in Energy with South Africa:Scale-up modelling to answer "Pyrolysis Challenge"	11/09	10/12	Dr S Gu	University of Southampton	School of Engineering Sciences	£426,844
EPSRC	Collaborative Research Opportunities in Energy with South Africa: Ab-Initio development and testing of fuel cell catalysts	10/09	04/13	Professor A Kucernak	Imperial College London	Dept of Chemistry	£618,602
EPSRC	Combustion dynamics of turbulent swirl flames with hydrogen addition	01/10	12/12	Dr R Balachandran	University College London	Mechanical Engineering	£276,240
EPSRC	Control For Energy and Sustainability	10/09	09/14	Professor RB Vinter	Imperial College London	Electrical and Electronic Engineering	£5,490,974
EPSRC	Demonstrating the Fuel Economy Benefit of Exhaust Energy Recovery	09/10	02/12	Professor RK Stobart	Loughborough University	Aeronautical and Automotive Engineering	£392,871
EPSRC	Design and assessment of suitable surrogate fuels for diesel fuel modelling	06/09	09/12	Dr T Lovas	Queen Mary, University of London	Engineering	£417,908
EPSRC	Design and assessment of suitable	04/09	03/12	Professor M	University of Cambridge	Chemical	£374,683

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	surrogate fuels for diesel fuel modelling			Kraft		Engineering	
EPSRC	Designer Catalysts for High Efficiency Biodiesel Production	10/09	06/12	Dr K Wilson	Cardiff University	Chemistry	£285,898
EPSRC	Designer Catalysts for High Efficiency Biodiesel Production	02/09	08/12	Dr AP Harvey	Newcastle University	Chemical Engineering & Advanced Material	£91,133
EPSRC	Designer Catalysts for High Efficiency Biodiesel Production	04/09	10/12	Dr J Sadhukhan	The University of Manchester	Chem Eng and Analytical Science	£87,008
EPSRC	Development of a laser induced incandescence high vacuum system for the measurement of soot or nanoparticulate, size, mass and morphology.	06/08	10/10	Professor D Greenhalgh	Heriot-Watt University	Sch of Engineering and Physical Science	£436,254
EPSRC	Development of a new quantitative kinetic model for the analysis of heating and evaporation processes in complex hydrocarbon fuel droplets	04/10	04/13	Professor S Sazhin	University of Brighton	Sch of Engineering	£141,550
EPSRC	Development of a Novel Energy Efficient Magnetic Scroll Air Motor	03/11	06/12	Wang, Professor J	University of Warwick	Sch of Engineering	£89,068
EPSRC	Development of procedures for reduced mechanism generation for prediction of particle formation in turbulent reacting flows	05/08	10/11	Dr T Lovas	Queen Mary, University of London	Engineering	£302,083
EPSRC	Development of scalar dissipation rate based reaction rate models for the large eddy simulations of premixed flames	01/12	06/15	Swaminathan, Dr N	University of Cambridge	Department of Engineering	£156,288
EPSRC	Development of scalar dissipation rate based reaction rate models for the large eddy simulations of	10/11	03/15	Chakraborty, Professor N	Newcastle University	School of Mechanical and Systems Engineering	£158,407

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	premixed flames						
EPSRC	Development of the full Lagrangian approach for the analysis of vortex ring-like structures in disperse media: application to gasoline engines	04/13	03/16	Sazhin, Professor S	Brighton university	School of Computing, Engineering and Mathematics	£346,506
EPSRC	Development of Unified Flame Surface Density Based Reaction Rate Models for the LES of Turbulent Premixed Flames	07/09	12/12	Dr AM Kempf	Imperial College London	Dept of Mechanical Engineering	£129,149
EPSRC	Development of Unified Flame Surface Density Based Reaction Rate Models for the LES of Turbulent Premixed Flames	08/09	01/13	Dr N Chakraborty	University of Liverpool	School of Engineering	£137,051
EPSRC	Diesel Engine Emissions During High EGR Operation	10/08	09/11	Professor CP Garner	Loughborough University	Sch of Mechanical and Manufacturing Eng	£270,122
EPSRC	Electrochemical Oxidation of Low Molecular Weight Alkanes to Liquid Fuels at Molecular Interfaces	12/12	05/15	Fermin, Dr DJ	Bristol University	School of Chemistry	£271,685
EPSRC	Electrochemical Oxidation of Low Molecular Weight Alkanes to Liquid Fuels at Molecular Interfaces	10/12	03/15	Dryfe, Professor RAW	University of Manchester	School of Chemistry	£251,417
EPSRC	Enhanced Mixing by Vortex Dynamics	10/07	09/12	Dr JR Dawson	University of Cambridge	Engineering	£662,970
EPSRC	Green Tribology	09/11	09/16	Wood, Professor RJK	University of Southampton	Faculty of Engineering and the Environment	£1,200,359
EPSRC	Green Tribology	09/11	09/16	Wood, Professor RJK	University of Southampton	Faculty of Engineering & the Environment	£1,185,147

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EPSRC	High Performance Low Temperature Direct Ethanol Fuel Cells	03/10	03/13	Professor C Hardacre	Queen's University of Belfast	Sch of Chemistry and Chemical Eng	£504,103
EPSRC	High Speed Dual Fuel Direct Injection Engines With Advanced EGR And Injection Strategies To Reduce The Carbon Dioxide Emissions	10/10	03/12	Dr A Clarke	Loughborough University	Sch of Mechanical and Manufacturing Eng	£148,622
EPSRC	Impact of DMF on Engine Performance and Emissions as a New Generation of Sustainable Biofuel	02/09	08/12	Professor H Xu	University of Birmingham	Mechanical Engineering	£509,584
EPSRC	Influence of molecular structure of various hydrocarbons on soot formation	02/11	07/14	Ladommatos, Professor N	UCL	Mechanical Engineering	£176,715
EPSRC	iTurbo: Exhaust Energy Recovery in Low Carbon Vehicles by Intelligent Turbocharging	07/10	01/12	Dr R Martinez-Botas	Imperial College London	Dept of Mechanical Engineering	£192,416
EPSRC	Laminar Burning Velocity Measurements Over Wide-Ranging Temperatures and Pressures for Renewable and Conventional Fuels	11/10	06/14	Stone, Professor CR	University of Oxford	Engineering	£139,187
EPSRC	Large Eddy Simulation of Diesel Engine Combustion with Detailed Chemistry	05/07	10/10	Dr A Marquis	Imperial College London	Dept of Mechanical Engineering	£352,073
EPSRC	Micro-explosion of Fuel Blends in Low Carbon Diesel Engines: Experimental and Modelling Study	11/12	04/15	Megaritis, Professor T	Brunel University	School of Engineering and Design	£522,050
EPSRC	Mixed lubrication, wear and contact fatigue of rough surfaces	04/09	09/12	Professor RW Snidle	Cardiff University	Sch of Engineering	£423,043

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EPSRC	Modelling NOx Reduction by Selective Catalytic Reduction (SCR) appropriate for Light-Duty Vehicles under Steady State and Transient Conditions	09/08	02/12	Benjamin, Professor S	University of Coventry	Engineering & Computing	£323,882
EPSRC	Modelling of breakup processes in transient Diesel fuel sprays	02/09	06/12	Sazhin, Professor S	University of Brighton	Sch of Computing, Engineering & Maths	£268,768
EPSRC	Molecular dynamics simulation of complex molecules using quantum-chemical potentials: application to modelling fuel droplets	09/12	09/15	Sazhin, Professor S	University of Brighton	School of Computing, Engineering and Mathematics	£335,057
EPSRC	Multi-projects on flow, turbulence and combustion using PIV systems	06/09	05/14	Choi, Professor KS	University of Nottingham	Mechanical, Materials and Manufacturing Engineering	£623,786
EPSRC	New Control Methodology for the Next Generation of Engine Management Systems	09/12	09/15	Xu, Professor H	University of Birmingham	School of Mechanical Engineering	£563,195
EPSRC	New Control Methodology for the Next Generation of Engine Management Systems	09/12	09/15	Wang, Professor J	University of Warwick	School of Engineering	£304,653
EPSRC	NONLINEAR DYNAMIC ANALYSIS OF OIL-FREE TURBOMACHINERY	07/11	07/14	Bonello, Dr P	The University of Manchester	Mechanical Aerospace and Civil Eng	£289,661
EPSRC	NONLINEAR DYNAMIC ANALYSIS OF OIL-FREE TURBOMACHINERY	07/11	07/14	Bonello, Dr P	The University of Manchester	School of Mechanical, Aerospace and Civil Engineering	£289,661
EPSRC	Novel Compact Aftertreatment Systems for Simultaneous Reduction of Diesel Engine NOx, PM, CO and	11/09	10/12	Dr T Megaritis	Brunel University	Sch of Engineering and Design	£209,216

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	HC Emissions						
EPSRC	Novel Compact Aftertreatment Systems for Simultaneous Reduction of Diesel Engine NOx, PM, CO and HC Emissions	01/10	10/13	Dr A Tsolakis	University of Birmingham	Mechanical Engineering	£406,864
EPSRC	Numerical Characterization of Effects of Addition of H2, CO, CO2 and H2O in High-Pressure Premixed Turbulent Flames	04/10	06/11	Muppala, Dr SPR	Kingston University	Faculty of Science Engineering & computing	£100,468
EPSRC	ON-LINE AND ON-ENGINE CATALYST CHARACTERISATION - A DIAGNOSTIC TECHNIQUE TO DESIGN A BETER CATALYST	10/07	11/10	Professor ST Kolaczkowski	University of Bath	Chemical Engineering	£499,108
EPSRC	Quantitative Characterisation of Flame Radical Emissions for Combustion Optimisation through Spectroscopic Imaging	01/09	04/11	Dr G Lu	University of Kent	School of Engineering and digital Arts	£205,002
EPSRC	Rapid Pulse Discharges: A New Approach to Particulate Filter Regeneration	05/10	05/13	Professor CP Garner	Loughborough University	Sch of Mechanical and Manufacturing Eng	£500,249
EPSRC	Rate-controlled constrained equilibrium: A basis for effective coupling of comprehensive chemical kinetics and CFD	01/10	01/13	Professor W Jones	Imperial College London	Dept of Mechanical Engineering	£105,183
EPSRC	Real time and in-situ holistic study of engine tribofilm formation kinetics	10/10	10/11	Dr A Morina	University of Leeds	Mechanical Engineering	£100,792
EPSRC	Refinement of Engine in-cycle losses of Parasitic and Errant Dynamic Nature (Encyclopaedic)	03/09	02/13	Dr M Teodorescu	Cranfield University	Sch of Engineering	£482,915

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EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Professor JR Nicholls	Cranfield University	Sch of Applied Sciences	£957,486
EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Dr P Denman	Loughborough University	Aeronautical and Automotive Engineering	£285,582
EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Professor P Xiao	The University of Manchester	Materials	£723,186
EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Professor N Green	University of Birmingham	Metallurgy and Materials	£308,126
EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Professor P. G. Tucker	University of Cambridge	Engineering	£1,454,127
EPSRC	SAMULET Project 1 - High Efficiency Turbomachinery	06/09	05/13	Professor L He	University of Oxford	Engineering Science	£1,287,826
EPSRC	SAMULET_Project_2_Combustion Systems for Low Environmental Impact	06/09	05/13	Professor JJ McGuirk	Loughborough University	Aeronautical and Automotive Engineering	£734,149
EPSRC	SAMULET_Project_2_Combustion Systems for Low Environmental Impact	06/09	05/13	Professor S Hochgreb	University of Cambridge	Engineering	£994,551
EPSRC	SAMULET_Project_2_Combustion Systems for Low Environmental Impact	06/09	05/13	Professor AM Korsunsky	University of Oxford	Engineering Science	£207,186
EPSRC	Study of Interacting Turbulent Flames Using Direct Numerical Simulation and Laser Diagnostics	10/08	09/11	Dr N Swaminathan	University of Cambridge	Engineering	£336,339
EPSRC	The Effects of Multiple Spark Discharges and Future Fuels during Hybrid SI-CAI Combustion	10/11	12/12	Cairns, Dr A	Brunel University	Sch of Engineering and Design	£99,643

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EPSRC	Towards In-Combustion-Event Feedback (ICEF) Control by Laser Ignition	08/12	01/16	Dearden, Dr G	University of Liverpool	Centre for Materials and Structures	£824,177
EPSRC	TRIBOEMISSION AND BOUNDARY FILM FORMATION	10/11	09/16	Reddyhoff, Dr T	Imperial College London	Dept of Mechanical Engineering	£719,805
EPSRC	Turbo-Discharging: Reducing CO2 Emissions from Current and Future Vehicles	07/10	01/12	Professor CP Garner	Loughborough University	Sch of Mechanical and Manufacturing Eng	£121,031
TSB	2/4CAR 2/4 - Stroke Switching Carbon Reduction Vehicle	01/09/2008	31/08/2010	neville.javeri@ricardo.com	Ricardo UK Ltd, Jaguar Cars Ltd, Denso Sales Uk Limited, University of Brighton		£1,360,067.00
TSB	Aeristech's power-dense high transient motor/generator and control technology for enhanced engine downsizing and hybrid/electric vehicle applications	01/11/2011	30/09/2012	nicholas.gill@aeristech.co.uk	Aeristech Limited, Imperial College London		£72,612.00
TSB	Bladeboost	01/11/2009	28/02/2011	nick.owen@ricardo.com	Ricardo UK Limited, Ford Motor Company Limited, Lontra Limited		£587,679.00
TSB	Clean Cool Combustion (CCC)	01/10/2011	31/03/2012	chris.whelan@wdlpower.com	WDL Limited		£69,750.00
TSB	CO2 Reduction through Emission Optimisation (CREO)	01/09/2010	31/08/2013	ascarisb@ford.com	Ford Motor Company, Land Rover, Johnson Matthey, ITM Power Limited, Revolve Technologies Limited, Cambustion Limited, University of Bradford, University of Bradford, University of Birmingham		£175,722.00

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TSB	CoolR split cycle engine	Not started	Not started	marc.vigar@ricardo.com	Ricardo UK Limited, University of Brighton		null
TSB	Demonstration of Aggressive Downsizing a Truck Engine with Epicam Supercharger - ESTED (Epicam Supercharger Truck Engine Downsizing)	01/02/2010	31/01/2011	tony@rpce.demon.co,uk	EPICAM LIMITED, JC Bamford Excavators Limited, T.Baden Hardstaff Limited, University of Birmingham		£504,279.00
TSB	Dualcore Lightweight Engine	01/01/2012	30/06/2013	scarlin@jaguarlandrover.com	Jaguar Cars Limited, GE Precision Engineering Limited, Integral Powertrain Limited		£1,320,900.00
TSB	EDS TurboClaw	01/11/2009	31/10/2010	pamela.bolton@avl.com	AVL Powertrain UK Limited, Dynamic Boosting Systems Limited, Turbocam Europe Limited		£79,000.00
TSB	Engine optimisation for reduced parasitic losses	01/07/2008	30/06/2011	ascarisb@ford.com	Ford Motor Company Ltd., Mahle Powertrain Limited, Lubricants UK Limited		£18,002.00
TSB	Feasibility study of 2-stroke uniflow for extreme downsizing of DI gasoline engine	01/10/2011	30/09/2012	shawn.baker@saicmotor.co.uk	SAIC MOTOR UK TECHNICAL CENTRE LIMITED, University of Brunel, Mahle Powertrain Limited		£74,656.00
TSB	HeatWave	Not started	Not started	marc.vigar@ricardo.com	Ricardo UK Limited, QinetiQ Group PLC		null
TSB	Hyboost	01/09/2009	30/11/2011	antonio.mariani@ricardo.com	Ricardo UK Limited, Valeo Engine Cooling UK Limited, Ford Motor Company Limited, Imperial College London, European Advanced Lead-Acid Battery Consortium EEIG,		£1,504,681.00

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					Controlled Power Technologies Limited		
TSB	Libertine FPE powertrain generator	01/09/2011	31/03/2012	sam.cockerill@libertine.co.uk	Libertine FPE Limited, University of Newcastle Upon Tyne		£86,291.00
TSB	Lightweight Ultra Low Emissions Delivery Van	01/09/2010	29/02/2012	lindsay.savage@intelligent-energy.com	Intelligent Energy Limited, Revolve Technologies Limited		£30,035.00
TSB	Low CO2 High Efficiency Diesel Fuel Injector Nozzle (LOCOFIN)	01/01/2010	31/12/2010	sarah.cordery@delpi.com	DELPHI Limited, University College London		£189,654.00
TSB	MU2IC	01/11/2009	31/01/2011	andrew.barnes@ptech.co.uk	Ptech Engines Limited, Tickford Powertrain Test Ltd, MUSI Engines Limited, Concept Group Internaltional		£430,178.00
TSB	Opti-Diesel	01/11/2009	31/10/2010	nick.owen@ricardo.com	Ricardo UK Limited, Johnson Matthey Fuel Cells Limited		£476,860.00
TSB	Power Unit for Range Extension (PURE)	Not started	Not started	null	Productiv Limited, MIRA Limited, Electronica Products Limited, RVT Powertrain Limited		£0.00
TSB	Range Extension & Reduced Emissions via Heat Energy Augmentation & Thermal Storage (RE-RE-HEATS)	01/10/2011	30/09/2012	susan@sunamp.co.uk	Sunamp Limited		£75,000.00
TSB	Syner-D - Integration of Synergistic Cost Effective CO2 Technologies for Diesel	01/03/2010	31/05/2012	pnewma12@jaguarlandrover.com	Jaguar Cars Ltd, Ricardo UK Limited, Shell Research Ltd, Lontra Limited, SKF (UK) Ltd, Valeo Engine Cooling UK Limited		£50,000.00

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TSB	Ultra Boost For Economy	01/09/2010	31/08/2013	ccarey19@jaguarlandrover.com	Jaguar Land Rover, GE Precision Engineering Limited, Lotus Cars Ltd, Shell Research Ltd, Computational Dynamics Limited, University of Bath, University of Leeds, Imperial College of Science		£22,425.00
TSB	Ultra Compact Micro Turbine Range Extender for Battery Electric Vehicles	01/11/2011	31/05/2012	ian.foley@equipmake.co.uk	Equipmake Limited		£75,000.00
TSB	Ultra Lightweight Range Extender for Electric Vehicles ("ULRE")	01/05/2010	31/01/2012	gary.lamb@bladonjets.com	Bladon Jets (UK) Limited, Switched Reluctance Drives Ltd, Jaguar Cars Ltd		£24,500.00
TSB	Ultra-compact 15kW microturbine range extender	01/09/2011	31/03/2012	nick@delta-motorsport.com	Delta Motorsport Limited		£87,661.00
TSB	Validation of Automotive Micro Turbine Range Extender (VAMTRE)	Not started	Not started	gary.lamb@bladonjets.com	Bladon Jets (UK) Limited, Jaguar Cars Limited, University of Warwick		£426,636.00
FP	2020 INTERFACE: Tailoring of tribological interfaces for clean and energy-efficient diesel and gasoline power trains	12/09	11/12	Ms Jacqueline Kidd	www.leeds.ac.uk	9 partners incl, Volvo Technology AB, Bekaert Advanced Coatings NV	2.6
FP	2NDVEGOIL: Demonstration of 2nd generation vegetable oil fules in advanced engines	08/08	07/11	Prof Peter Pickel	http://www.deere.com/de_de/homepage/static/index.html	9 partners incl. Lubrizol Ltd, Waldland Vermarktungsges.M.B.H	2.2
FP	AFFORHD: Alternative fuel for heavy duty	01/02	04/05	Dr Lars-Goran Moberg	Volvo Powertrain Corporation	7 partners incl. BP plc	1.8

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FP	BEAUTY: Bio-thanol engine for advanced urban transport by light commercial vehicle and heavy duty	01/09	04/11	Dr Massismo Casali	Centro Ricerche Fiat SCPA	9 partners incl. Exxonimobil Research and Enginnering Company, Daimler AG, E4TECH SARL	2.97
FP	BIOME: Production of DME from biomass and utilisation as fuel for transport and for industrial use	09/08	08/12	Mr Per Salomonsson	www.volvo.com	7 partners incl. Delphi Diesel Systems Ltd, Chemrec AB	8.1
FP	BURNQUEST: Transfer of knowledge towards a world class combustion chemistry centre	09/05	08/09	Prof. John Simmie	www.nuigalway.ie	National University of Ireland and Univeristy of Karlsruhe	0.7
FP	CLEANENGINE: Advanced technologies for highly efficient clean engines working with alternative fuels and lubes	01/07	12/09	Ms Flavia Gili	www.crf.it	12 partners incl. Fuchs Petrolub AG, Fundacion Tekniker	2.0
FP	CLEAN-ICE: Detailed chemical kinetic models for cleaner internal combustion engines	12/08	11/13	Ms Anne Florence Remy	Centre National de la Recherche Scientifique (CNRS)	No other partners listed	1.87
FP	CO2NTROL: Integrated solutions for noise and vibration control in vehicles	09/09	08/12	Mr Maximillian Steiert	www.fraunhofer.de	8 partners incl. University of Southampton, Volkswagen AG	2.8
FP	COMETNANO: Technologies for synthesis, recycling and combustion of metallic nanoclusters as future transportation fuels	05/09	02/12	Prof. Costas Kiparissides	Centre for Research & Technology Hellas	5 partners incl. Neo Performance Material (Europe) Ltd	1.74
FP	CORE: CO2 reduction for long distance transport	01/12	12/15	Johan Engstrom	Volvo Technology	16 partners inc. Ingenieurgesellschaft	9.0

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						fuer Auto und Verkehr, Johnson Matthey Plc., Joint Research CENtre (EC)	
FP	EPONIMOS: Exhaust particle number and mass measurement and sampling system	09/08	08/12	Ms Christina Besta	www.auth.gr	Aristotelio Panepistmio Thessalonikis and Dekatioy	0.26
FP	FUEREX: Multi-fuel range extender with hig efficiency and ultra low emissions	01/11	12/12	Mr Van Der Zweep	www.uniresearch.nl	8 partners incl. Altra Spa, Volvo Personvagnar	2.4
FP	GREEN: Green heavy duty vehicles	03/05	05/08	Prof Edward Jobson	www.volvo.com	27 partners incl. Cummins Turbo Technologies Ltd, Ricardo UK Ltd, Johnson Matthey plc	12
FP	HI-CEPS: Highly integrated combustion electric powertrain system	09/06	09/11	Dr Ezio Volpi	www.crf.it	24 partners incl. Ricardo UK Ltd, Peugeot Citroen Automobiles SA	9.8
FP	HYICE: Optimisation of hydrogen powered internal combustion engines	01/04	01/07	Hans Fickel	BMW Forschung und Technik GMBH	10 partners inc. Volvo Technology Corporation AB	5.0
FP	HYMAR: High efficiency hybrid drive trains for small and medium sized marine craft	05/09	04/12	Mr Tony Rice	www.icomia.org	9 partners incl. Enersys Ltd, Brunton Propellers Ltd, E-Motion Special Projects Ltd	2.0
FP	LIBRALATO: Libralato engine prototype	12/11	05/14	Dr Raymond Kent	http://www.lboro.ac.uk	8 partners inc. Techmarine SRL,	1.8

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						Universitatea Politehnica din bucuresti, Dolomiti Cad SRL	
FP	NICE: New integrated combustion system for future passenger car engines	01/04	02/08	Dr Frank Otto	Daimler AG	29 partners incl. Cambridge Uni, Brunel Uni, Volvo, Volkswagen	1.27
FP	OPTFUEL: Optimised fueld for sustainable transport in Europe	01/09	06/12	Mr Frank Schuh	http://www.volkswagen.de/	10 partners include. Ford, Nissan, Indian institute of technology Delhu	13.5
FP	OPTIMORE: Optimised Modular Range Extender for every day customer usage	10/12	09/14	Alexander HOLLEIS	http://www.avl.com/	8 partners inc. AVL, Chalmers Tekniska Hoegskola, Volvo	2.7
FP	PAGODE: Post-treatment for the next generation of diesel engines	11/06	10/09	Dr Xavier GLIPA	www.psa-peugeot-citroën.com	7 partners incl. Johnson Matthey plc	1.59
FP	ULYSSES:Future Propulsion as ONE System	06/06	01/15	Eugenio Faggioli	www.ca-ulysses.eu	CRF, META, Daimler, VW, AVL, FEV, IFP, OMV	1.2
FP	VITAL: EnVIronmenTALly Friendly Aero Engine	01/05	03/10	Dr Jean-Jacques Korsia	www.snecma.com	53 partners incl. Nottingham Uni, Rolls-Royce plc, PCA Engineers Ltd, Oxford Uni, Cranfield Uni, Southampton Uni, GKN Aerospace Services Ltd	50.7