




Science Landscape Seminar Series: Representative UK Energy Infrastructure

Notes to reader

This document is to inform discussion only and is subject to the following caveats:

- Inclusion, non-inclusion or otherwise is not intended to reflect on the standing of any organisation or infrastructure.
- We did not include classified defence and intelligence assets.
- 'Energy' is defined as the generation and supply of power to meet the UK's needs. It includes the systems, networks and technologies needed to deliver this power.
- Assignment of Research Areas, Eight Great Technologies and Industrial Strategy sectors was based on desk research and may be subject to error. Categories are designed to inform the general discussion and not reflect on individual organisations or infrastructure. Absence of icons in category tables indicates that (in the project team's opinion) a piece of infrastructure cannot be easily categorised.
- If any mistakes have been made, please inform the seminar secretariat on cstinfo@go-science.gsi.gov.uk.

Logo key

Location		Research Area	Eight Great Technologies		Industrial Strategy
	UK	 Arts and humanities	 Energy Storage		Life Science
	EU	 Biological and medical sciences	 Big Data		Aerospace
	Global	 Earth sciences	 Satellites		Professional Business Services
Funding		 Engineering	 Robotics and Autonomous Systems		Education
	Research Councils	 Physical, mathematical and computer sciences	 Synthetic Biology		Nuclear
	Departmental	 Social and economic sciences	 Regenerative Medicine		Oil and Gas
	Private Sector		 Agri-Science		Automotive
	Charity		 Advanced Materials		Offshore Wind
	Academic		 Quantum Technologies		Information Economy
	European				Construction
					Agri-tech

List of infrastructure

The infrastructure identified has been categorised in to the lists below. There will be instances when items could fit in to multiple lists and in these cases we have tried to place the infrastructure in the most appropriate list.

Industry

Alstom
BP
Centrica
Dong Energy
E.ON
EDF Energy
Infinis
National Grid
Renewable Energy Systems (RES)
RWE
Siemens
SSE
UK Power Reserve
UK Sustainable Energy Ltd

Facilities

Carbon Capture and Storage
Central Laser Facility
Culham Centre for Fusion Energy (CCFE)
Diamond Light Source
Energy Technologies Institute (ETI)
European Marine Energy Centre
Institute of Food Research, Biorefinery Centre, Norwich
ISIS Neutron Source
National Nuclear Laboratory
Offshore Renewable Energies Catapult
Power Electronics Centre
Thomas Young Centre
UK CCSRC Pilot-scale Advanced Capture Technology (PACT)
UK Energy Research Centre (UKERC)
Wave Hub

Networks and groups

ADNet – Anaerobic Digestion Network
Battery and Electrochemical Energy Devices Global Challenge Network
BioVale
British Geological Survey
Carbon Trust
Energy Community of Knowledge Transfer Network
Energy UK
Environmental Radioactivity Global Challenge Network
Industrial Biotechnology Innovation Centre (IBiolC), Scotland
National Nuclear User Facility
Nexus Network

Norstec Academy
Nuclear Fission and Fusion
RenewableUK
Smart Grid GB
United Kingdom Atomic Energy Authority

University centres

Biorenewable Development Centre
Centre for Renewable Energy Systems Technology
Centres for Doctoral Training
Dalton Nuclear Institute, University of Manchester
Global Research Priorities: Energy, University of Warwick
Energy @ Cambridge
Energy Futures Lab, Imperial College London
Energy, Power and Intelligent Control, Queen's University Belfast
Energy Systems Research Unit, University of Strathclyde
Flowave
Food and Biofuel Innovation Centre, Nottingham University
Lancaster University Renewable Energy Group
Manchester Energy, University of Manchester
Midlands Energy Consortium
Miscanthus Collection
Stevenson Institute for Renewable Energy, University of Liverpool
Sussex Energy Group, University of Sussex
Synthetic Biology Research Centre, Nottingham
University of Birmingham – Birmingham Energy Institute

Funding

EPSRC Energy Storage Capital Investment
GROW: Offshore Wind
SUPERGEN Energy Programme

Learned societies

Institute of Material, Minerals and Mining (IOM3)
Institute of Physics
Royal Academy of Engineering

UK energy generation and supply

The United Kingdom energy needs are provided by a wide range of traditional and renewable fuel sources, with the energy industry contributing 3.3% of the UK's Gross Domestic Product in 2013. Primary oil (crude oil and NGLs) accounted for 39% of total production of primary fuels in 2013, followed by natural gas at 32%, primary electricity (consisting of nuclear, wind and natural flow hydro) at 16%, coal at 7%. Bioenergy and waste accounted for the remaining 6%. Due to decline in oil and gas output, 47% of energy used in the UK in 2013 was imported.

Of the energy obtained from low carbon sources, 60% was from nuclear power. The second largest component of low carbon was bioenergy, accounting for around a quarter of the total.

Coal

Imports of coal accounted for 79% of total UK coal supply in 2013 and UK coal production fell to an all-time low of 13 million tonnes. Russia accounted for 41% of imports followed by USA (25%) and Colombia (23%).

Oil and Gas

Indigenous oil and gas production derives from the UK Continental Shelf, which principally refers to the North Sea. Examples of onshore and offshore oil fields are Wytch Farm, Dorset and Auk oilfield, southeast of Aberdeen.

Nuclear

The UK operates 16 nuclear reactors at nine plants, as well as a nuclear reprocessing plant at Sellafield. Major nuclear power stations in the UK include Hinkley Point B and Wylfa Nuclear Power Station. In 2013, it was announced that EDF Energy had been awarded a nuclear site licence for construction at Hinkley Point C, the first such licence since 1987.

Wind

The UK has a mature offshore and onshore wind sector, accounting for 21.8% of total renewable energy fuel use in 2013. There are a number of on-going proposals for new wind farms. The London Array wind farm is the largest offshore wind farm in the world, while Clyde wind farm near Abington in South Lanarkshire, Scotland is the largest onshore wind farm in the UK.

Biofuels

Bioenergy accounts for largest proportion of renewable energy use at 70.5%. Sources of bioenergy include landfill gas, plant biomass, waste combustion and domestic wood among others.

Hydro (Natural Flow)

Hydro and shoreline wave/tidal energy accounted for 3.6% of total renewable energy use in 2013. Sources of this energy include wave and tidal stream power and large scale hydro stations such as Foyers in Scotland.

Sources:

Digest of United Kingdom energy statistics (DUKES) 2014:

www.gov.uk/government/statistics/digest-of-united-kingdom-energy-statistics-dukes-2014-printed-version

UK Energy in Brief 2014:

www.gov.uk/government/statistics/uk-energy-in-brief-2014

Industry

Alstom



Alstom is a French multinational company, headquartered in Levallois-Perret, which holds interests in the electricity generation and rail transport markets. Alstom produces equipment which is used in approximately half of the UK's power stations and was named by EDF as the preferred supplier for the conventional islands at Hinkley Point C nuclear power station. (More info: www.alstom.com).

Location



Global

Funding



Private Sector

Research area



Engineering

Eight Great



Nuclear



Oil and Gas

Industrial Strategy

BP



BP plc. is one of the world's six "supermajor" oil and gas companies, headquartered in London. In 2012, it was the world's sixth largest energy company by market capitalisation and the sixth largest oil and gas company. BP is a vertically integrated company that operates in all areas of the oil and gas industry, including exploration and production, refining, distribution and marketing, petrochemicals, power generation and trading.

Its renewable energy projects are in biofuels and wind power. (More info: www.bp.com).

Location



Global

Funding



Private Sector

Research area



Earth Sciences



Engineering

Eight Great



Energy Storage



Oil and Gas



Construction

Industrial Strategy

Centrica



Centrica plc is a British multinational utility company who supply electricity and gas to businesses and consumers in the United Kingdom and North America. It is the largest supplier of gas to domestic customers in the UK, and one of the largest suppliers of electricity, operating under the trading names Scottish Gas in Scotland and British Gas in the rest of the UK. It is also active in the exploration and production of natural gas; electricity generation; and the provision of household services including plumbing. (More info: www.centrica.com).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great



Energy Storage



Oil and Gas

Industrial Strategy

DONG Energy



DONG Energy is an integrated energy company based in Fredericia, Denmark. It is Denmark's largest energy company. In the United Kingdom DONG Energy operates Barrow and Burbo Bank offshore windfarms and will construct Walney Island and Gunfleet Sands I and

II http://en.wikipedia.org/wiki/DONG_Energy_-_cite_note-4cUKgs-13 wind farms.

DONG also owns the Langeled pipeline from Nyhamna terminal in Norway to Easington in the UK. (More info: www.dongenergy.co.uk).

Location



Global

Funding



Private Sector

Research area



Earth Sciences

Eight Great



Energy Storage

Industrial Strategy



Oil and Gas



Offshore wind

EDF Energy



EDF Energy is an integrated energy company in the United Kingdom, with operations spanning electricity generation and the sale of gas and electricity to homes and businesses throughout the United Kingdom. It employs 13,000 people and handles 5.7 million customer accounts. Following the acquisition of British Energy in 2009, EDF Energy's portfolio includes eight nuclear power stations. (More info:

www.edfenergy.com).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great



Energy Storage



Oil and Gas



Nuclear



Offshore wind

E.ON



E.ON is one the UK's major power and gas companies, generating electricity as well as retailing power and gas. Part of the E.ON group, E.ON employs around 12,000 people in the UK and over 79,000 worldwide. The company currently has around five million customers in the UK. Their electricity generation strategy involves improving current fossil fuel stations to increase cleanliness and efficiency, as well as

operating and developing renewable sources such as onshore wind and biomass. (More info: www.eonenergy.com).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great



Energy Storage



Oil and Gas



Offshore wind



Construction

Infinis



Infinis group is a British generator of renewable power, and the largest generator in the UK landfill gas-to-electricity market. Infinis operates a portfolio of landfill gas (LFG) and onshore wind plants across the UK. The group operates across 137 sites that have an aggregate generating capacity of 592 megawatts. Infinis has a number of other onshore wind projects currently in the pipeline. (More info: www.infinis.com).

Location



UK

Funding



Private Sector

Research area

Eight Great



Energy Storage

Industrial Strategy



Construction

National Grid



National Grid is an international electricity and gas company based in the UK and north-eastern US. It owns and operates the National Grid high-voltage electricity transmission network in

England and Wales. Since 1 April 2005 it also operates the electricity transmission network in Scotland. It also owns and operates the gas transmission network and has part ownership of two interconnectors between the UK and mainland Europe. Research areas include carbon capture and storage technologies. (More info: www.nationalgrid.com/uk).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great

Industrial Strategy



Oil and Gas

Renewable Energy Systems (RES)



Renewable Energy Systems (RES) is a major renewable energy company with expertise in providing global services to develop, construct and operate projects contributing to low carbon, sustainable futures. RES have operated for over 30 years and across a range of innovative low-carbon energy technologies with

capabilities from project inception to energy generation and operation. (More info: www.res-group.com).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great



Energy Storage

Industrial Strategy



Offshore wind



Construction

RWE



RWE AG (*Rheinisch-Westfälisches Elektrizitätswerk*) is a German utilities company based in Essen. RWE npower is one of the UK's 'big six' energy firms supplying over 6.5 million customers. The company develops, generates, supplies and distributes electricity from a variety of sources including coal, lignite, pumped storage, gas and nuclear power. (More info: www.rwe.co.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 Global	 Private Sector		 Energy Storage	 Oil and Gas  Nuclear  Offshore wind

Siemens



Siemens AG is a German multinational conglomerate company headquartered in Berlin and Munich. The principal divisions of the company are *Industry, Energy, Healthcare, and Infrastructure & Cities*. Siemens have previously worked on upgrading all six turbines at Drax power station. It has recently been announced that Siemens is investing £310m in Green Port Hull, a high-tech turbine assembly site. (More info: www.siemens.com/businesses/uk/en/).






Location	Funding	Research area	Eight Great	Industrial Strategy
 Global	 Private Sector	 Earth Sciences  Physical, Mathematical and Computational Sciences  Engineering	 Energy Storage	 Oil and Gas  Offshore wind

SSE



SSE plc. (formerly Scottish and Southern Energy plc.) is a "big six" British energy company based in Perth, Scotland. With operations in both the UK and Ireland, it is involved in the generation and supply of electricity and gas, as well as gas storage, connections and metering. SSE operates

several types of renewable energy technologies including onshore and offshore wind, hydropower and biomass. (More info: www.sse.co.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Private Sector		 Energy Storage	 Oil and Gas  Offshore wind  Construction

UK Power Reserve



UK Power Reserve is an independent developer and operator of flexible power, operating a portfolio of over 100 megawatts of flexible power plants to act as a standing reserve and ensuring security and supply for consumers and businesses. UK Power Reserve works with the National Grid's Balancing Services to achieve its experience in acquisition and new-build growth. (More info: www.ukpowerreserve.com).

Location



UK

Funding



Private Sector

Research area



Engineering

Eight Great



Energy Storage

Industrial Strategy

UK Sustainable Energy Ltd



UK Sustainable Energy Ltd (UK-SE) was formed in 2008 in partnership with the Government-funded National Renewable Energy Centre to offer renewable energy solutions to industrial and commercial clients. UK-SE works with some of the largest UK corporations, as well as advising local authorities and renewable energy developers. Its directorship has advised on energy standards at international levels. (More info: www.uk-se.com).

Location



UK

Funding



Private Sector

Research area

Eight Great



Energy Storage

Industrial Strategy



Professional Business Services

Facilities

Carbon Capture and Storage



The UK Carbon Capture and Storage Research Centre (UKCCSRC) is supported by EPSRC as part of the Research Councils UK Energy Programme, with additional funding from the Department of Energy and Climate Change (DECC). It coordinates a programme of research in all aspects of carbon capture and storage. (More info: www.ukccsrc.ac.uk).

Location



UK

Funding



Research Councils

Research area



Earth Sciences

Eight Great

Industrial Strategy

Central Laser facility



The Central Laser facility is located in the Research Complex at Harwell and works closely with other RcaH residents and the academic community to promote high-impact interdisciplinary research that requires access to the latest technology and expertise in laser imaging and ultrafast spectroscopy. The facility carries out research to investigate a broad range of science areas, spanning physics, chemistry and biology. Developments at the facility have impacted on the development of solar cells and fusion as an energy source. (More info: www.stfc.ac.uk/clf/default.aspx).

Location



UK

Funding



Research Councils

Research area



Biological and medical sciences



Physical, mathematical and computer sciences

Eight Great



Advanced Materials

Industrial Strategy



Nuclear

Culham Centre for Fusion Energy (CCFE)



CCFE is the UK's national laboratory for fusion research based in Oxfordshire, and owned and operated by the United Kingdom Atomic Energy Authority. The fusion research programme is funded by EPSRC and the EU under the Euratom treaty. The UK fusion programme is centred on the innovative MAST (Mega Amp Spherical Tokamak) experiment. CCFE also hosts the world's largest magnetic fusion experiment, JET (Joint European Torus), on behalf of its European partners. The JET facilities are collectively used by European fusion scientists, co-ordinated by a programme management unit at Culham. (More info: www.ccf.ac.uk/).

Location



UK

Funding



Research Councils



European

Research area

Eight Great



Advanced Materials

Industrial Strategy



Nuclear

Diamond Light Source (DLS)



DLS is the UK's Synchrotron and is operated by Diamond, a not-for-profit limited company funded as a joint venture by the UK Government through the Science & Technology Facilities Council (STFC) in partnership with the Wellcome Trust. The synchrotron is free at the point of access through a competitive application process, provided that the results are in the public domain. Energy specific research areas include structural and electronic characterisation of radioactive materials and structures of new porous materials used for hydrogen storage. (More info: www.diamond.ac.uk/Home.html).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Research Councils	Departmental Engineering	Physical, mathematical and computer sciences	Advanced Materials Nuclear Oil and Gas

Energy Technologies Institute (ETI)



The ETI is a public-private partnership between global energy and engineering companies and the UK Government. ETI's role is to bring together engineering projects that accelerate the development of affordable, secure and sustainable technologies that help the UK address its long-term emissions reductions targets as well as delivering nearer term benefits. (More info: www.eti.co.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Private Sector Departmental	Engineering		

European Marine Energy Centre



The European Marine Energy Centre (EMEC) is an accredited test and research centre based in the Orkney Islands, focusing on wave and tidal power development. With 14 full-scale test berths, it has the largest deployment of grid-connected marine energy converters in the world. EMEC also provide independently-verified performance assessments, a wide range of consultancy and research services, as well as working closely with Maritime Scotland. (More info: www.emec.org.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Departmental	Earth Sciences	Energy Storage	

Institute of Food Research, Biorefinery Centre, Norwich



The Biorefinery Centre is located within the Institute of Food Research and has a Cambi™ Steam Explosion Pilot Plant and yeast screening and propagation facility for R&D into production and commercialisation of biofuels and fibrous material from lignocellulose (biomass). The key areas of use of all the facilities are around the biodegradation and exploitation of biomass and development and testing of yeast strains for ethanol production and more recently for high value chemical production. (More info: <http://biorefinerycentre.ifr.ac.uk/>).

Location



UK

Funding



Research Councils



Academic

Research area



Biological and medical sciences

Eight Great



Agri-Science

Industrial Strategy

ISIS Neutron Source



ISIS is a world-leading centre for research in the physical and life sciences at the STFC Rutherford Appleton Laboratory near Oxford. Their suite of neutron and muon instruments

gives unique insights into the properties of materials on the atomic scale. Their scientists are developing materials for clean energy technologies, and researching new materials for energy production and storage which can contribute a clean energy future. (More info: www.isis.stfc.ac.uk/index.html).

Location



UK

Funding



Research Councils



Academic

Research area



Physical, Mathematic and Computational Sciences



Biological and medical sciences

Eight Great



Advanced Materials

Industrial Strategy

National Nuclear Laboratory



The National Nuclear Laboratory (informally NNL) is a nuclear services technology provider covering the whole of the nuclear fuel cycle owned and operated by the Department of Energy and Climate Change (DECC). The NNL plays a key role in the UK and global nuclear industry by operating in three core areas as a business: waste management and

decommissioning; fuel cycle solutions; and reactor operations support. (More info: www.nnl.co.uk).

Location



UK

Funding



Departmental

Research area



Physical, Mathematic and Computational Sciences

Eight Great



Energy Storage

Industrial Strategy



Nuclear

Offshore Renewable Energies Catapult



The Offshore Renewable Energy (ORE) Catapult is a not-for-profit UK technology innovation and research centre for offshore wind, wave and tidal energy. The ORE Catapult combines research, development, demonstration and testing facilities with leadership, industrial reach and engineering expertise to accelerate the design, deployment and commercialisation of renewable energy technology innovation. (More info: <http://ore.catapult.org.uk>).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Departmental	Earth Sciences	Energy Storage	Offshore wind

Power Electronics Centre



The EPSRC Centre for Power Electronics aims to be the UK's provider of power electronics research. It is focusing on sustaining and growing power electronics in the UK by delivering transformative and exploitable new technologies, and by providing long-term strategic value to the UK power electronics industry. The Centre's activities are divided into three main strands: research, community and pathways to impact. EPSRC is investing a total of £23M in the Centre for Power Electronics over the next 6 years. (More info: www.powerelectronics.ac.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Research Councils	Physical, Mathematic and Computational Sciences		Nuclear Offshore wind

Thomas Young Centre



The Thomas Young Centre (TYC) is an alliance of London researchers which operates to address the challenges of society and industry through the theory and simulations of materials, or materials modelling. The TYC is currently made up of around 100 research groups from Imperial College London, University College London, King's College London and Queen Mary University London. Their work on materials modelling has direct applications for energy infrastructure such as power station and fuels. (More info: www.thomasyoungcentre.org).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Physical, Mathematic and Computational Sciences	Advanced Materials	Oil and Gas Nuclear

UK CCSRC Pilot-scale Advanced Capture Technology (PACT)



The UKCCSRC Pilot-scale Advanced Capture Technology (PACT) facilities are national specialist R&D facilities for combustion and carbon capture technology research, encompassing advanced fossil-fuel energy, bioenergy and carbon capture and storage/utilisation technologies for power generation and industrial applications. The purpose of PACT is to support and catalyse industrial and academic R&D in order to accelerate the development and commercialisation of novel technologies for carbon capture and clean power generation. (More info: www.pact.ac.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Earth Sciences		

UK Energy Research Centre (UKERC)



The UK Energy Research Centre (UKERC) carries out research into sustainable future energy systems. It is a focal point of UK energy research and a gateway between the UK and the international energy research communities. They undertake interdisciplinary, whole systems research that informs UK policy development and research strategy. UKERC is supported by EPSRC, NERC, and ESRC. (More info: www.ukerc.ac.uk/).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Earth Sciences	 Energy Storage	

Wave Hub



The Wave Hub is a £28 million wave power project located 16km off Hayle on the north coast of Cornwall and was installed in 2010. The Project has four berths for testing offshore renewable energy technology, as well as a purpose built, grid connected infrastructure with a 30-megawatt export capacity, upgradeable to 48 megawatts. Wave Hub was funded by the Government and the European Regional Development Fund Convergence Programme. It is owned by the Department for Business, Innovation and Skills. (More info: www.wavehub.co.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Departmental	 European	 Earth Sciences	 Energy Storage

Networks and Groups

ADNet – Anaerobic Digestion Network



This academic/industry network addresses scientific and technical challenges in the development of anaerobic biotechnology. Their aims include dissemination of expertise through collaborative events, as well as providing access to funding to support anaerobic digestion innovation. (More info: www.anaerobicdigestionnet.com).

Location



UK

Funding



Research Councils

Research area



Biological and medical sciences

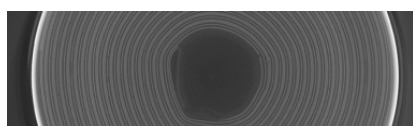
Eight Great



Synthetic Biology

Industrial Strategy

Battery and Electrochemical Energy Devices Global Challenge Network



The STFC Global Challenge Network in Batteries and Electrochemical Energy Devices brings together leading researchers in industry and academia with a shared interest in the application of large scale user

facilities to address key challenges in battery science and technology. The main objectives of the network are to bring together an international community of researchers, establish cross-technique linking between different users of large scale facilities, standardise new techniques, establish best-practice methods and promote engagement of industry with large scale facilities. (More info: <http://stfcbatteries.org/>).

Location



UK

Funding



Research Councils

Research area



Physical, Mathematic and Computational Sciences

Eight Great



Energy Storage

Industrial Strategy

BioVale



BioVale is an innovation cluster that will support development of the Yorkshire and the Humber's bio-based economy, facilitating interactions between private, academic and public sectors. The BioVale innovation cluster is aiming to develop a local economy based on biorenewable raw materials and promote the region nationally and internationally as a place to do business and R&D in the bio-based economy. (More info: www.biovale.org/).

Location



UK

Funding



Departmental



Academic

Research area



Biological and medical sciences

Eight Great



Agri-Science

Industrial Strategy



Agri-tech

British Geological Survey (BGS)



British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

The BGS is a partly publicly funded body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and

research. Their energy research focuses on science that seeks to understand and maximise the recovery of dwindling fossil fuel reserves, as well as helping the development of renewable energy such as geothermal power. The BGS is also a centre for research into unconventional hydrocarbon and coal resource development. (More info: www.bgs.ac.uk).

Location



UK

Funding



Research Councils

Research area



Earth Sciences

Eight Great

Industrial Strategy



Oil and Gas

Carbon Trust



The Carbon Trust is an independent partner of leading organisations around the world to contribute to, and benefit from, a more sustainable future through carbon reduction, resource efficiency strategies and commercialising low carbon technologies. Their work involves offering tailored services to meet the needs of businesses, governments and the public

sector, which include advice, monitoring and deployment of low carbon technologies and solutions. (More info: www.carbontrust.com).

Location



UK

Funding



Private Sector

Research area

Eight Great



Energy Storage

Industrial Strategy



Professional Business Services

Distinctive



The EPSRC funded DISTINCTIVE (Decommissioning, Immobilisation and Storage solutions for NuClear waste InVenories) programme will link a set of 32 world-leading

research projects within the broad area of nuclear waste management, decommissioning and disposal. The programme is a multi-disciplinary collaboration of ten universities and three industry partners. They aim to build a greater capacity for research and development to underpin the strategic needs of the UK by; consolidating and expanding academic nuclear related R&D, developing collaboration with nuclear industry stakeholders, providing routes to innovative technology developments and training the next generation of UK researchers and potential employees in the sector. (More info: <http://distinctiveconsortium.org/>).

Location



UK

Funding



Research Councils

Research area



Earth Sciences

Eight Great

Industrial Strategy





Nuclear

Energy Community of Knowledge Transfer Network



The Energy Community of the Knowledge Transfer Network aims to simplify the UK Energy Innovation landscape by providing a clear and focused vehicle for the rapid transfer of high-quality information on technologies, markets, funding and partnering

opportunities. The Offshore Wind Group plays roles in setting up workshops, networking events, improving understanding with external stakeholder groups and other activities designed to tackle issues identified by Innovate UK. (More info: <http://connect.innovateuk.org/web/energyktn>).





Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Departmental			 Offshore wind

Energy UK



With over 80 members, Energy UK is a trade association for the energy industry, representing developers and gas and electricity suppliers, as well as other businesses operating in the energy industry. Energy UK's members together generate over 90 per cent of the UK's total electricity output. Energy UK provides advice on industry matters and work to enhance

the industry's reputation with customers and the communities it serves. (More info: www.energy-uk.org.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Private Sector		 Energy Storage	 Professional Business Services

Environmental Radioactivity Global Challenge Network (Env-Rad-Net)



The Env-Rad-Net is an STFC-funded global challenge network aimed at engaging the UK scientific research community to develop the underpinning science required to meet the challenges associated with nuclear decommissioning, radioactive waste disposal, and

accidental or deliberate release of radioactive materials. They aim to do this by developing the use of STFC facilities, in particular, synchrotron, neutron, laser, and computing techniques. (More info: www.envradnet.co.uk/).







Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Engineering		 Nuclear

Industrial Biotechnology Innovation Centre (IBioIC), Scotland



IBioIC promotes collaboration within industry and academia to drive innovation, find commercial application for new technology and ideas, and offer support for projects that bring biotechnology closer to industrialisation. IBioIC's industry

partners have identified five main themes that they organise their research by; Sustainable Feedstocks, Enzymes and Biocatalysis/ Biotransformation, Cell Factory Construction and Process Physiology, Downstream processing, and Integrated Bioprocessing. (More info: www.ibioic.com/).




Location	Funding	Research area	Eight Great	Industrial Strategy	
 UK	 Research Councils	 Biological and medical sciences	 Engineering	 Synthetic Biology	 Agri-Science

National Nuclear User Facility (NNUF)



The National Nuclear User Facility (NNUF) is part of the HM Government's Nuclear Industrial Strategy announced in 2013. The aim of the NNUF is to provide greater accessibility to world leading technologies as a

collaborative effort from four complimentary hubs within the UK: the Central Laboratory of the National Nuclear Laboratory (NNL), the Culham Centre for Fusion Energy (CCFE), the Dalton Cumbrian Facility (part of The University of Manchester) and the University of Lancaster. (More info: www.nnl.co.uk/science-technology/national-nuclear-user-facility/).









Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Departmental	 Earth Sciences		 Nuclear

Nexus Network



The Nexus Network is a three-year initiative to foster debate, innovative research and practical collaborations across the linked 'nexus' domains of food, energy, water and the environment. Participation in the network is open to researchers from all disciplines, and to decision makers in government,




business and civil society. The network is funded by the Economic and Social Research Council (ESRC) and is being coordinated by a team from the University of Sussex, University of East Anglia and Cambridge Institute for Sustainability Leadership. (More info: <http://thenexusnetwork.org/>).

Location	Funding	Research area	Eight Great	Industrial Strategy			
 UK	 Research Councils	 Earth Sciences	 Biological and medical sciences	 Energy Storage	 Agri-Science	 Offshore wind	 Nuclear

Norstec Academy







The Norstec Academy is a virtual community showcasing the offshore renewables industry. Opportunities, information and how to become part of the sector are given by offering a portal to the offshore renewables industry, promoting the industry to occupational and professional interests, and providing experiences and career development opportunities for existing employees and students. (More info: www.norstecacademy.org).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK				 Information Economy  Offshore wind

RenewableUK



Formerly known as the British Wind Energy Association (BWEA), RenewableUK is a trade association for wind, wave and tidal power industries in the UK. Their goals and activities include maximising the opportunity for growth in the renewable energy sector, acting as a central point of information to represent its members, and leading collaboration between independent companies and international corporations and manufacturers. RenewableUK also carries out research and coordinates statistics and intelligence on marine and wind power in the UK and its surrounding waters. (More info: www.renewableuk.com).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Private Sector		 Energy Storage	 Offshore wind

Smart Grid GB



SmartGrid GB is an independent, cross-industry stakeholder group acting as the national champion for smart grid development in Britain. They provide the Department of Energy and Climate Change and Ofgem with an industry view smart grid technologies to meet Britain's needs and how it might be achieved. SmartGrid GB is a techUK initiative supported by member companies from across industry. (More info: www.smartgridgb.org/).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Private Sector	 Engineering		

United Kingdom Atomic Energy Authority



The United Kingdom Atomic Energy Authority is a UK government research organisation responsible for the development of nuclear fusion power. It is an executive non-departmental public body of the Department for Business, Innovation and Skills. The authority focuses

on UK and European fusion power research programs at Culham in Oxfordshire, including the world's most powerful fusion device, the Joint European Torus. The research aims to develop fusion power as a commercially viable, environmentally sound energy source for the future. (More info:

www.gov.uk/government/organisations/uk-atomic-energy-authority).

Location



UK

Funding



Departmental

Research area



Engineering

Eight Great

Industrial Strategy



Nuclear

University Centres

Biorenewable Development Centre (BDC)



The BDC bridges the gap between the science base at the University of York and the needs of industry to develop and scale-up new greener processes and products. The Biorenewables Development Centre has been set up to enable work on diverse projects, such as: breeding new types of plants; extracting valuable chemicals from waste; turning biomass into energy or finding new ingredients for cosmetic products. The facilities are open-access so any qualified clients or academics may use the equipment for testing and research. (More info: www.biorenewables.org).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	European	Biological and medical sciences	Agri-Science

Centre for Renewable Energy Systems Technology (CREST)



Set up 20 years ago at the University of Loughborough, CREST has overseen research and development in to progressive renewable energy technologies. Research activities at CREST cover a range of technical applications, including wind power, solar PV, energy in buildings, grid connection and integration, and energy storage (including hydrogen). (More info: www.lboro.ac.uk/research/crest/about/).

Location	Funding	Research area	Eight Great	Industrial Strategy	
UK	Academic	Earth Sciences	Engineering	Energy Storage	Offshore wind

Centres for Doctoral Training (CDTs)



Based at universities around the country, CDTs provide training for students within focused research areas, often defined strategically by the Research Council funder(s) from the outset. Centres can be focused on academic or industrially relevant research topics, or a mix of both. Examples of relevant CDTs are the CDT in Bioenergy at Leeds University and the CDT in Energy Storage at The University of Sheffield.

Location	Funding	Research area	Eight Great	Industrial Strategy					
UK	Research Councils	Academic	Engineering	Earth Sciences	Advanced Materials	Energy Storage	Oil and Gas	Education	Nuclear

Dalton Nuclear Institute, University of Manchester



The Dalton Nuclear Institute at The University of Manchester has established the most advanced academic nuclear research capability in the UK and is a leading centre for higher learning in nuclear science and engineering. Through academic and industrial interdisciplinary collaboration, they play a key role in providing the knowledge and skills needed to deliver a low-carbon future through nuclear energy. The Institute maintains a number of strategic partnerships with industry, government and academia, ensuring that their research programmes have direct relevance to the nuclear sector. (More info: www.dalton.manchester.ac.uk/).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Engineering		Nuclear

Energy @ Cambridge



The Energy @ Cambridge initiative was established in 2010 as a University-wide initiative and brings together the activities of over 300 academics working in energy-related research. They split their research under the headings supply, conversion and demand. These are then supported by a number of cross-cutting themes, including energy efficiency and smart systems & device design. The group has a number of industry partners including Boeing and Shell. (More info: www.energy.cam.ac.uk/).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Earth Sciences	Physical, Mathematic and Computational Sciences	Engineering
			Energy Storage	Oil and Gas
				Offshore wind
				Nuclear

Energy Futures Lab, Imperial College London



The Energy Futures Lab at Imperial College London is a focal point for multidisciplinary research in coordinating research support, education programmes and an extensive network of energy researchers. The Lab builds on research across Imperial in areas including energy efficiency, nuclear power, renewable energy, transport, electrical networks, economics and policy development. (More info: www.imperial.ac.uk/energyfutureslab).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Physical, Mathematic and Computational Sciences	Energy Storage	Education
				Nuclear

Energy, Power and Intelligent Control, Queen’s University Belfast



The Energy, Power and Intelligent Control (EPIC) cluster was formed in January 2012. EPIC’s Energy and Power work includes focusing on problems related to distributed sources of energy and their integration into power networks, enabling better collaboration with national and international academic/industrial research centres. (More info: www.qub.ac.uk/research-centres/EPIC).

Location



UK

Funding



Academic

Research area



Physical, Mathematic and Computational Sciences

Eight Great



Energy Storage

Industrial Strategy

Energy Systems Research Unit (ESRU), University of Strathclyde



The Energy Systems Research Unit (ESRU) of the University of Strathclyde provides knowledge and high quality software for students and practitioners interested in energy efficiency and new and renewable energy systems deployment at both the strategic and urban scale. Information provided includes publications on results from research projects; open source programs for energy systems performance assessment at various scales; consultancy services to architectural/engineering practices, local authorities and industries; and teaching and learning material for students and practitioners. (More info: www.esru.strath.ac.uk).

Location



UK

Funding



Academic

Research area



Physical, Mathematic and Computational Sciences

Eight Great



Energy Storage

Industrial Strategy



Information Economy

FloWave Ocean Energy Research Facility at Edinburgh University



The FloWave Ocean Energy Research Facility at Edinburgh University is the world’s most sophisticated ocean simulator. The circular FloWave test tank combines complex wide-area multidirectional wave simulation with fast tidal flows. FloWave is the world’s only ocean research facility able to simulate combinations of real-sea currents and waves at 1/20th scale or larger. Although for academic research, it is also a tool for commercial developers to ensure their technologies are de-risked as much as practical before use. (More info: www.flowavett.co.uk/).

Location



UK

Funding



Research Councils

Research area



Academic



Earth Sciences

Eight Great Industrial Strategy

Food and Biofuel Innovation Centre, Nottingham University



The Food and Biofuel Innovation Centre contains pilot plant facilities for feedstock production and fermentation in addition to microbiological and testing laboratories. The dedicated equipment combined with a range of expertise assists the development of new and efficient ways to turn waste and non-food agricultural products into alcohol for use as fuel. (More info: www.nottingham.ac.uk/fbic/index.aspx).

Location



UK

Funding



European

Research area

Eight Great



Agri-Science

Industrial Strategy

Global Research Priorities: Energy, University of Warwick



ENERGY

The University of Warwick's Global Research Priorities (GRP) programme is a research-intensive mandate to respond to the world's most challenging problems and provide a focus for multidisciplinary research in key areas of international significance. The Energy GRP has a current grant portfolio of over £20 million that focuses on key areas including power electronics, solar energy, thermal energy, energy management, low carbon transport and energy storage. (More info: www2.warwick.ac.uk/research/priorities/energy).

Location



UK

Funding



Academic

Research area



Engineering

Eight Great



Energy Storage

Industrial Strategy

Lancaster University Renewable Energy Group (LUREG)



Lancaster University Renewable Energy Group (LUREG), based in the Department of Engineering, carries out research into conversion of energy from water sources, including waves and tides of the sea and land-based hydro power. (More info: www.engineering.lancs.ac.uk/lureg/).

Location



UK

Funding



Academic

Research area



Earth Sciences



Physical, Mathematic and Computational Sciences



Engineering

Eight Great



Energy Storage



Oil and Gas



Offshore wind

Manchester Energy, University of Manchester



The University of Manchester

Manchester Energy brings together Manchester University's wide-ranging research and educational activities focused on energy technologies and their societal impact. Research areas include bioenergy, multi-energy systems and energy networks. Facilities include a wave-current flume, the National Grid

Power Systems Research Centre and the Nuclear Advanced Manufacturing Research Centre. (More info: www.energy.manchester.ac.uk/).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Earth Sciences Physical, Mathematical and Computational Sciences	Engineering Energy Storage	Oil and Gas Offshore wind

Midlands Energy Consortium

The Midlands Energy Consortium

www.midlandsenergyconsortium.org

The Midlands Energy Consortium comprises the University of Birmingham, Loughborough University, University of Nottingham, the

University of Warwick and the British Geological Survey. The Consortium has over 200 staff and 900 postgraduate students active in Energy Research. In September 2007 they were chosen to act as host to the Energy Technologies Institute (ETI). The role of the ETI is to lead the UK's efforts in establishing a low-carbon economy based on a secure, affordable supply of energy. (More info: www.midlandsenergyconsortium.org/).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Academic	Earth Sciences Engineering	Energy Storage	Offshore wind

Miscanthus Collection

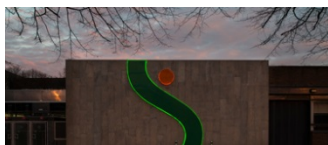


Maintained by a publically funded research institute (IBERS, Aberystwyth University), the Miscanthus Collection delivers both to UK and international efforts to provide sustainable renewable bioenergy through the production of varieties with high net energy yields per hectare that are cheap to establish, harvest and process. This new programme draws on a wide base of expertise






within the institute and combines these with commercial expertise in the UK and the US. (More info: www.aber.ac.uk/en/ibers/research/research-groups/public-good-plant-breeding/plant-breeding-programmes/miscanthus-breeding/).

Location	Funding	Research area	Eight Great	Industrial Strategy
UK	Research Councils Academic	Biological and medical sciences		

Stephenson Institute for Renewable Energy, University of Liverpool



The Stephenson Institute for Renewable Energy at the University of Liverpool explores the future of renewable, clean and sustainable energy technologies. The Institute uses an integrated approach to tap into an interdisciplinary pool of research expertise. Drawing on expertise in chemistry and physics, environmental sciences, and electrical and mechanical engineering, the Institute connects research strengths, technologies and experts from a mix of disciplines to provide a focal point for energy research and development. (More info: www.liv.ac.uk/renewable-energy).




Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Academic	 Earth Sciences	 Engineering	 Offshore wind

Sussex Energy Group, University of Sussex

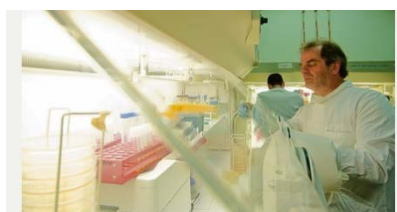


University of Sussex

The Sussex Energy Group is a group of experts focusing on the transition to sustainable low carbon energy systems. Issues that the Group focus on include research on reducing UK energy demand and cutting carbon emissions. The Group is in the process of expanding after receiving a share of £26 million in Government funding to establish the Research Centre on Innovation and Energy Demand, one of five new research centres on End Use Energy Demand (EUED) jointly funded by the Research Councils UK Energy Programme (RCUK). (More info: www.sussex.ac.uk/sussexenergygroup).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Academic	 Physical, Mathematical and Computational Sciences	 Energy Storage	 Education

Synthetic Biology Research Centre, Nottingham



The Nottingham SBRC will use Synthetic Biology to engineer microorganisms that can be used to manufacture the molecules and fuels that modern society needs in a cleaner and greener way. The Centre, funded by BBSRC and the EPSRC, opened in January 2015. (More info: <http://sbrc-nottingham.ac.uk>).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Biological and medical sciences	 Synthetic Biology	

University of Birmingham, Birmingham Energy Institute

UNIVERSITY OF BIRMINGHAM The University of Birmingham has more than 140 academics from four colleges and seventeen schools engaged in energy and energy related research and development. The Birmingham Energy Institute (BEI) is a focal point for the University and its national and international partners to tackle the challenges at the heart of 'Energy systems', 'The Business of Energy', 'Energy and Transport' and 'Breakthroughs in Energy Technology'. (More info: www.birmingham.ac.uk/research/activity/energy/index.aspx).

Location	Funding	Research area	Eight Great	Industrial Strategy			
 UK	 Academic	 Earth Sciences	 Physical, Mathematic and Computational Sciences	 Engineering	 Energy Storage	 Oil and Gas	 Offshore wind

Funding

EPSRC Energy Storage Capital Investment

Energy storage is one of the government's Eight Great Technologies, defined as an emerging technology with the potential of driving UK growth. EPSRC recently invested £30m in new science capital facilities for grid-scale energy storage, to help accelerate the development of national scale electricity storage. Five Centres were supported, covering a wide range of storage technologies including electrochemical, thermal, compressed air, liquid air and grid integration aspects. (More info: www.epsrc.ac.uk/files/funding/calls/2013/capital-for-great-technologies-advanced-materials-robotics-and-autonomous-systems-and-grid-scale-energy-storage/).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Engineering	 Energy Storage	

GROW:OffshoreWind



GROW:OffshoreWind helps offshore wind energy suppliers and prospective suppliers by offering up to £500,000 of funding per company for direct investment. Supported by the Government's Regional Growth Fund, GROW:OffshoreWind also helps with services such as

reviewing commercial opportunities, product development strategy, providing market intelligence and giving access to a national network of technology centres. (More info: www.growoffshorewind.com).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Departmental	 Earth Sciences		 Offshore wind

SUPERGEN Energy Programme



SUPERGEN is led by EPSRC in partnership with BBSRC, ESRC and NERC. The programme is a long-term approach to supporting research to promote a significant step change in sustainable power generation and supply. This includes the involvement of multidisciplinary partnerships working alongside industrial collaborations. A total of 14 consortia are supported with over £98million invested to date. These are:

- **Bioenergy Consortium:** aims to address the need to optimise use of the limited UK biomass resources and support UK industry to develop competitive industry.
- **UK Sustainable Hydrogen Energy Consortium (UK-SHEC):** provides research-based solutions in the generation of hydrogen from biomass fermentation.

- **Marine Energy Research Consortium:** aims to increase knowledge and understanding of device-sea interactions of energy converters.
- **FlexNet Consortium:** addresses the engineering, economic and public acceptance issues of how the electricity network must evolve to meet a low-carbon energy future.
- **PV Materials Consortium ‘PV21’:** focussing attention on thin film photovoltaic (PV) which is the fastest growing PV production technology.
- **Plant Life Extension Consortium:** aims to deliver prediction tools that will facilitate the extension in lifetime of current fossil fuel fired power generation plant.
- **Fuel Cells Consortium:** focusses on the development of novel measurement methods suited to fuel cell application and understanding mechanical failure of fuel cells.
- **Highly Distributed Energy Future Consortium (HiDEF):** develops the evaluation tools required for a future decentralised power system, along with appropriate hardware.
- **Excitonic Solar Cell Consortium:** consolidates the UK’s competitive research position in non-conventional solar cells.
- **Energy Storage Consortium:** developing two technologies; lithium batteries and super capacitors.
- **Biological Fuel Cells Consortium:** develops technologies that exploit biological systems for electrical energy production, focusing on Microbial and Enzyme-based Fuel Cells.
- **Asset Management and Performance of Energy Systems Consortium (AMPerES):** aims to provide platform technologies and tools for integrated network planning and asset management.
- **Wind Energy Technologies Consortium:** undertakes research to improve the cost-effective reliability and availability of existing and future large-scale wind turbine systems in the UK.
- **Delivery of Sustainable Hydrogen Consortium:** addresses the development of emergent hydrogen production technologies.



Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Research Councils	 Engineering	 Energy Storage	 Offshore wind
		 Physical, Mathematic and Computational Sciences		

Learned Societies

Institute of Materials, Minerals and Mining (IOM3)



The Institute of Materials, Minerals and Mining (IOM3) is a UK engineering institution with activities encompassing the entire minerals cycle, from exploration and extraction to finishing and application, as well as recycling and reuse. IOM3 promotes several aspects of materials science related to energy, such as petroleum engineering, and consists of an Energy Materials Group (EMG) which focuses on materials issues in energy supply. (More info: www.iom3.org).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Charity	 Engineering	 Physical, Mathematic and Computational Sciences	 Advanced Materials

Institute of Physics



Established in 1874, the Institute of Physics (IOP) is a scientific charity that works to advance education, research and application of physics. The IOP has actively supported work in tackling current issues in energy such as publications, responses to Parliamentary questions on energy and climate change, and online information on energy harvesting. (More info: www.iop.org).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Charity	 Physical, Mathematic and Computational Sciences		

Royal Academy of Engineering



The Royal Academy of Engineering (RAEng) is the UK's national academy of engineering, consisting of engineers from various sectors. Its activities include providing leadership and promoting excellence across all fields of engineering, to the benefit of society. The Academy is part of a number of key policy collaborations with other organisations that work on how engineering can contribute to the future in areas that include energy infrastructure. Furthermore, the RAEng has also published several articles regarding renewable and sustainable energy for the future. (More info: www.raeng.org.uk).

Location	Funding	Research area	Eight Great	Industrial Strategy
 UK	 Charity	 Engineering		 Education