

# Renewable Energy & Low-Carbon



 **GREEN  
IS  
GREAT**

BRITAIN & NORTHERN IRELAND



*Agrivert,  
Anaerobic digestion facility*

# Introduction

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The UK has long been committed to addressing climate change and supporting the shift to a cleaner, low-carbon economy in the UK and around the world. The UK's recent Industrial Strategy made clean growth one of our four 'Grand Challenges', areas of economic and political priority.

We have wide-ranging expertise encompassing everything from research into innovation, through to the manufacturing, construction and deployment of energy efficient buildings, renewable energy technologies and electric vehicles, as well as the policy and regulatory expertise required to support these.

We are, for example, world leaders in offshore wind with 7.6GW of installed capacity<sup>1</sup>- the largest globally - and have a significant future pipeline.

206,000 British businesses already export<sup>2</sup> £622 billion of goods and services<sup>3</sup> globally every year and this continues to grow. With a growing and skilled workforce, business-friendly environment, competitive tax regime, advantageous time zone, English as the world's dominant business language, a strong legal and regulatory environment, global links, and supportive stance for innovation, there are many reasons why any international business seeking to source the best in low-carbon capability would benefit from working with the UK.



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1. Source: The Crown Estate: [www.thecrownestate.co.uk/media/2661/offshorewindprojectlisting.pdf](http://www.thecrownestate.co.uk/media/2661/offshorewindprojectlisting.pdf)

2. Source: ONS Annual Business Survey, Great Britain Non-Financial Business Economy: 2016 Exporters and importers

3. Source: ONS Second Estimate of GDP (January to March 2018)





*Offshore Renewable Energy Catapult,  
Turbine blade testing*

## Innovation

From hydrogen fuel cells to lithium-ion batteries and recently the world's first floating offshore wind farm, the UK is home to world leading innovations in low-carbon. Today, the UK ranks 4<sup>th</sup> on the Global Innovation Index<sup>4</sup> and between 2015 to 2021 the government alone is investing more than £2.5 billion in low-carbon innovation<sup>5</sup>.

In transport, the Advanced Propulsion Centre (APC) - the UK's centre of excellence for low carbon propulsion development and production - has embarked on a £1 billion, 10-year programme to develop world-leading technologies.<sup>6</sup> This will ensure the UK remains at the forefront of global automotive progress, allowing it to build upon nationwide industry expertise.

In power, the Offshore Renewable Energy Catapult (OREC) is working with ACT Blade to develop and test next-generation engineered textile wind turbine blades.<sup>7</sup> These modular blades, made from lightweight recycled carbon fibre, will be lighter, longer and easier to install in countries where transport of large blades is difficult. Solaris Photonics are also developing a novel technology - the Solaris Photonics Multiplier (SPM) - that can be added to both new and existing solar panels to absorb more of the sun's output. Even in low-light conditions, the SPM aims to increase output by 25% making solar power even more competitive.<sup>8</sup>

In energy from waste, Grundon's have developed an innovate process that uses specialist compaction and gas handling technology to safely recycle every component from aerosol cans.<sup>9</sup>

4. Source: World Intellectual Property Organisation

5. Source: UK Clean Growth Strategy 2017

6. Source: [https://warwick.ac.uk/newsandevents/pressreleases/1631\\_billion\\_advanced/](https://warwick.ac.uk/newsandevents/pressreleases/1631_billion_advanced/)

7. Source: <https://ore.catapult.org.uk/stories/act-blade/>

8. Source: <http://www.solaris-photonics.com/energy-systems>

9. Source: <http://www.recyclingtoday.com/article/grundon-hazpak6000-aerosol/>

# Solution Development

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The UK is home to Europe's second largest consultancy sector<sup>10</sup> and some of the best-known brands in low-carbon advisory services offering specialist services, as well as smaller boutique consultancies with in-depth knowledge. Through a combination of industrial know-how, scientific expertise and an innovative approach to solution design, UK environmental and engineering consultants are proven global leaders.

Mott MacDonald, for example, have worked in remote towns in Colombia to develop waste management strategies that reduce litter and pollution, benefit tourism and all while being sustainable, affordable and environmentally friendly.

From policy development, through behaviour change programmes to hard engineering solutions, the UK's advisory services have a reputation for quality and finding solutions to difficult problems across energy, transport, industry, the built environment and beyond. This extends to the design and implementation of underpinning policy frameworks and mechanisms.

UK consultancy firm Ricardo Energy & Environment, for example, has been appointed as the National Atmospheric Emissions Inventory Agency by the UK Government. The consultancy is tasked with gathering and compiling air quality data and presenting it in a way that can be easily leveraged by both UK Government departments and international bodies to check among others if current conditions within the UK meet standards and policy targets.

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10. Source: <https://www.consultancy.uk/consulting-industry/united-kingdom>



# Engineering Excellence

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*Design engineering and regulatory and professional services generate revenues of £510 million in the UK, part of a £12.3 billion global market,<sup>11</sup> while civil engineering in the UK is worth £3.13 billion of a global market worth £70.1 billion.<sup>12</sup> The UK focuses on delivering quality solutions with a careful eye on environmental impact. UK solutions provide high quality results wherever they are deployed.*

*As at February 2018, 53% of new offshore wind capacity brought online was in the UK.<sup>13</sup> This scale of deployment has given the UK a highly skilled and experienced supply chain that continues to grow. For example, construction of the Dudgeon windfarm saw individual turbine installations undertaken in a record sub 18-hour time frame.<sup>14</sup>*

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11. Source: <https://www.gov.uk/government/publications/water-and-treated-water/water-and-treated-water>

12. Source: <https://www.gov.uk/government/publications/water-and-treated-water/water-and-treated-water>

13. Source: Wind Europe Annual Offshore statistics 2017, published February 2018

14. Source: <https://www.offshorewind.biz/2017/09/07/statoil-dudgeon-comes-in-on-time-and-under-budget-all-turbines-now-producing/>





# Offshore Wind

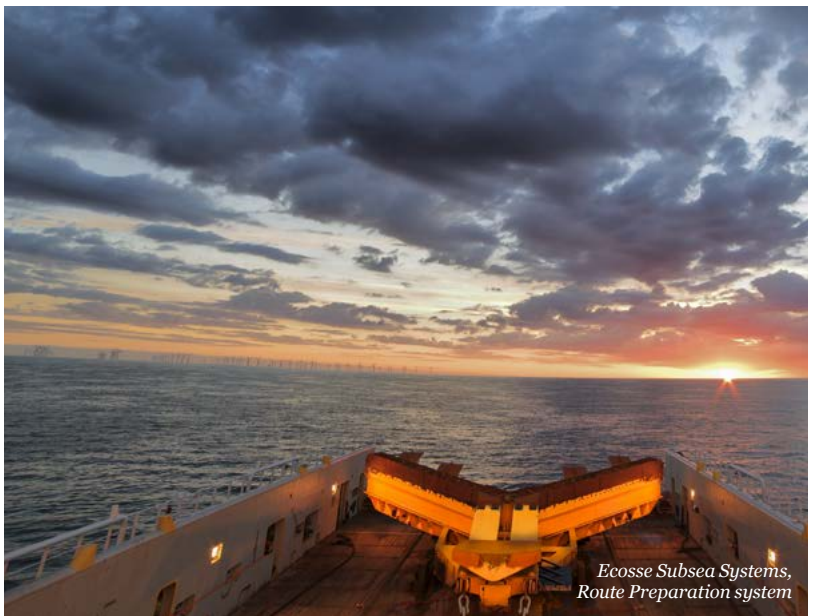
## *Why offshore wind?*

*Offshore wind provides clean, sustainable and predictable energy at scale, rapidly making it a leading renewable energy solution in Europe – in 2017 alone, 3GW was installed with more to follow. This at-scale deployment has quickly brought down costs and enabled new innovations that drive up efficiency and reduce maintenance. Offshore wind is an excellent choice for large scale renewable energy generation.*

## **Why buy from the UK?**

The UK is a world leader in offshore wind with 7.6GW of installed capacity,<sup>15</sup> with an industry ambition to deliver 30GW of operational capacity by 2030. As a result of this at-scale deployment, the UK has developed world-leading expertise in all areas of offshore windfarm design, development, installation and O&M.

This expertise is supported by an ever-increasing supply chain that offers high quality, cost-competitive components and services. Add to this UK Export Finance (UKEF)<sup>16</sup> support for financing and the offer is a compelling one.



*Ecosse Subsea Systems,  
Route Preparation system*

15. Source: The Crown Estate: [www.thecrownestate.co.uk/media/2661/offshorewindprojectlisting.pdf](http://www.thecrownestate.co.uk/media/2661/offshorewindprojectlisting.pdf)

16. UK Export Finance is the UK Government's Export Credit agency





*JDR Cable Systems Ltd  
Cable Storage and Processing*

## What can we offer?

- Policy, regulation and support mechanisms;
- Consultancy, engineering, consenting, surveying and due diligence services;
- Installation, commissioning and operations and maintenance;
- Extensive expertise in marine and port operations;
- Componentry including foundations, towers, inter-array cables, substations, transitions pieces and more;
- Specialist offshore financial, legal and insurance services, plus offshore/marine software expertise.

## Case Study

Hartlepool's JDR Cables manufacture high-quality inter-array cables for offshore windfarms, supplying numerous UK and European projects. In August 2018, JDR were appointed to deliver 100km of 66KV cable for Orsted's Hornsea 2 project, the first of Orsted's UK projects to use 66KV cable, which has an increased voltage and therefore lower losses over 33KV cable.<sup>17</sup>

17. Source: <https://www.windpoweroffshore.com/article/1491568/jdr-cables-awarded-hornsea-two-contract>



# Smart Grids

## Why smart grids?

***Smart grid technologies allow for the more efficient and automated running of electrical grid systems at any scale. A range of baseload and intermittent generation technologies can be integrated and managed as an integral system, alongside demand side response mechanisms, automated fault location, management, remote monitoring and operation. With integrated storage, smart grid technologies and services can significantly improve the stability, reliability and quality of any electrical grid system.***

## Why buy from the UK?

The UK has one of the most mature and sophisticated national grid systems in the world and, through its long-term evolution, the UK has developed a wealth of expertise in the design, delivery, operation and maintenance of grid systems.

The UK's regulatory framework - which emphasises and incentivises innovation, competition and transparency - has led to the growth and deployment of a wide range of smart technologies and services, all with applications that can be scaled and applied globally. Whatever the scale of project, the UK has expertise and suppliers that can deliver.





## What can we offer?

- Policy, regulation and incentive design;
- Whole system design and implementation;
- Technical innovations (e.g. new storage mediums);
- Remote system monitoring and control systems.



## Case Study

In partnership with Kenya Power, Lucy Electric installed Kenya's first 11kV distribution automation system (DAS), which was a major undertaking. It covered 1,661 square kilometres and was part of the country's wider infrastructure development programme. Support for the development of this scheme was provided by UK Export Finance. The turnkey solution developed by Lucy Electric also included the end-to-end design, manufacture, delivery and installation of all the contract-specified equipment.<sup>18</sup>

18. Source: <https://www.lucyelectric.com/en/press-news/company/lucy-switchgear-helps-kenya-power-reduce-average-customer-interruptions-2-hours-20-seconds/>





# Energy from Waste

## ***Why energy from waste?***

***Energy from waste is a highly scalable solution to two problems – managing residual waste and generating sustainable energy. There are technologies that can address all types of waste ranging from agricultural by-products to household refuse, generating electricity, heat and biofuels. The size of facility can be adapted to everything from individual farm waste management to grid-scale electricity generation.***

## **Why buy from the UK?**

The UK has extensive expertise across the entire energy from waste value chain, from designing and implementing relevant policy frameworks and incentivisation mechanisms, to the design, build and operation of at-scale facilities. This experience and expertise extend into newer technologies and processes, including gasification and pyrolysis, allowing for more efficient plants and less residual waste. Whatever the scale of project, the UK has expertise and suppliers that can deliver.





*Grundon  
Grundon - New DAF Waste Wheeler*

## What can we offer?

- Waste management policy/incentives design and implementation;
- Design, engineering, construction and operations services;
- Collection vehicles, sorting and incineration equipment;
- Expertise in anaerobic digestion, pyrolysis and gasification.

## Case Study

Coventry-based company, Organics, has developed over 300 low carbon projects in 21 countries around the world. These include Covered Lagoon Bioreactors (CLBR); anaerobic digestion facilities that are used to treat agricultural wastewater from cassava mills and sustainable palm oil facilities to produce power. One such facility recently developed by Organics in south Sumatra for a large tapioca conglomerate treats wastewater from a 200 tonne per day starch facility and generates 1500 m<sup>3</sup>/hour of biogas for use in the milling process. It also has the benefit of avoiding pollutants entering the environment and reducing greenhouse gas emissions. The company designed and installed the project including the generation of power from biogas.



# Solar

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## ***Why solar?***

***Photovoltaic solar is one of the cheapest and most scalable renewable energy technologies available today. Its applications range from grid-scale generation through to individual panels and everything in between. Increasingly, the commercial sector is seeing solar, integrated with storage technologies, as a means to reduce energy costs and reliance on national grid services and improve resilience.***

## **Why buy from the UK?**

The UK is now home to a number of developers with experience in delivering solar installations at all scales, in the UK and overseas, in developed and developing markets. Coupled with UK Export Finance support, UK developers can offer an end-to-end solution at a range of scales that, when integrated with storage, can offer a compelling energy solution.



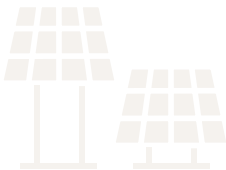




*Solarcentury,  
Dorta Carmen' solar project La Ligua, Chile*

## What can we offer?

- Policy, regulation and incentive design;
- Design, build, own and operate solutions;
- Storage integrated solutions;
- National-grid, off-grid and commercial level solutions.



19. Source: <https://www.solarcentury.com/solarcentury-crossboundary-build-east-africas-first-tracking-hybrid-solar-plant/>

## Case Study

In April 2018, Solarcentury were contracted to build a 600kWp solar power plant on a Unilever tea farm in Kenya. The project is a first under the Solarcentury Cross-Boundary Energy partnership entered into in 2017 to boost solar uptake in African markets.<sup>19</sup>

The ground mount photovoltaic tracking system will continuously orient the solar panels toward the sun, which will increase the amount of energy produced from the system. It is the first time this technology is being deployed in a commercial solar installation in East Africa.



# Hydro

## Why hydro?

***Modern hydroelectric technologies offer a cost effective, adaptable solution to clean energy generation. Hydroelectric turbines come in many forms and can be used at a range of scales, from a single 'run of river' machine to a large-scale multi MW dammed installation. Reversible turbines allow for the storing of energy in reservoirs, extending their flexibility.***

## Why buy from the UK?

The UK has a long history in the hydroelectric sector built on excellence in engineering and design. As an early pioneer in the hydro sector and more recently leading the way in community scale hydro deployments, the UK has a wide offer across the world.

Gilkes has been selling hydroelectric turbines since 1856, now exporting to over 85 countries around the world from its factory in the UK's Lake District. Leading UK Global engineering companies such as Mott MacDonald continue to be involved in providing engineering, design and management solutions for global hydro projects.



Gilkes,  
Hydro Powerhouse USA



*Hydroplan,  
Rannoch dam*

## What can we offer?

- Design and technical engineering at all scales;
- Small and medium scale installation and operation;
- Hydroelectric turbine technologies for small scale installation;
- Related grid and electrical systems.

## Case Study

Working as the project owner, engineers Mott MacDonald provided quality design engineering to help deliver a 73MW, £500 million hydro project in Banja, Albania. The reservoir covers the area of 2,000 football pitches and will generate 356GWh of energy annually.<sup>20</sup>

20. Source: <https://www.mottmac.com/releases/banja-hydropower-project-officially-inaugurated-albania>





# Geothermal

## ***Why geothermal?***

***Once a reliable resource has been found, geothermal offers one of the cheapest renewable energy sources available and, given that it is not intermittent, is suitable for use as baseload. Their relatively small footprint also makes geothermal plants suitable for more urbanised areas.***

## **Why buy from the UK?**

The UK has a small number of geothermal developers that specialise in front-end exploration and resource verification, as well as structuring workable financing and securing long-term off-take contracts. Finding and proving a resource is the highest risk and most expensive stage of geothermal development, so experience and knowledge is essential. UK company GEG also specialises in small-scale 'well head' turbines.





## What can we offer?

- Policy design and incentives structuring;
- Exploration and geological surveys;
- Plant design, operation and maintenance;
- Small-scale well head turbine manufacture.

## Case Study

UK developer Hotspur Geothermal secured exploration rights for a geothermal site (Fantale) in Ethiopia. They have just completed the initial exploration phase and are in discussions over a power purchase agreement for what is planned to be a 150 MW power plant (50 + 100 MW phases). The Fantale plant will be one of, and possibly the first, large-scale geothermal power plant in Ethiopia.



# Marine

## Why Marine?

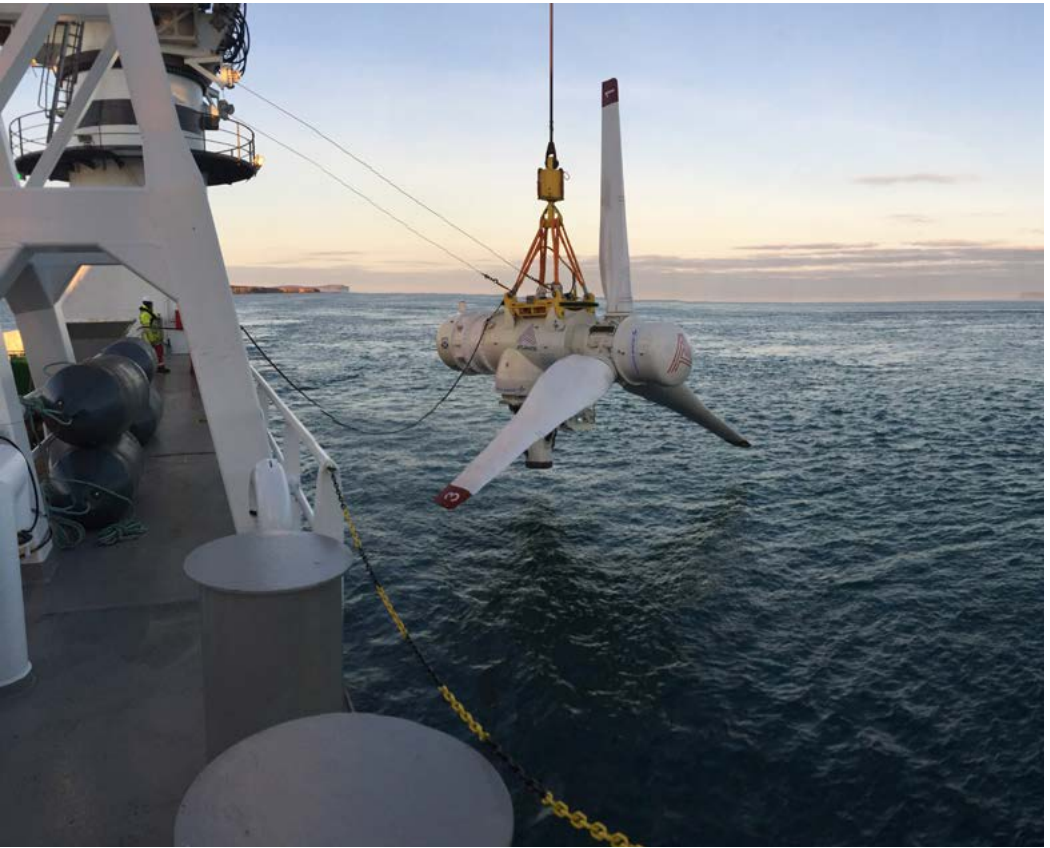
***Marine technologies are technologies that capture the power of the waves and tides, with tidal the more advanced of the two. Tidal barrage captures energy from the ebb and flow of tides using large dam structures, similar to hydroelectric. Tidal stream uses seabed-anchored or free-floating machines to capture tidal power directly. Both offer predictable, clean energy, with tidal stream additionally having little visual impact on the installation site.***

## Why buy from the UK?

The UK is a world leader in the development of tidal-stream technology with several companies offering machines from the kW to MW scale. Though still new, several successful demonstrations have proven UK capability in this technology. Coupled with the UK's experience and expertise in engineering, design and delivery, tidal stream can offer an effective, clean energy solution.





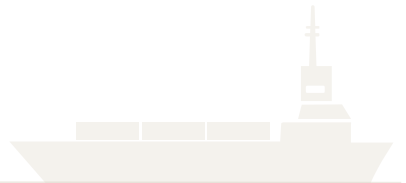


## What can we offer?

- End-to-end implementation of tidal stream technology;
- Manufacture and supply of tidal stream machines;
- Environmental studies and related consultancy services;
- Related grid and storage technology solutions.

## Case Study

SIMEC Atlantis Energy's MeyGen project in Scotland is the world's largest tidal-stream array and has 392MW of further development capacity under its seabed lease. MeyGen has generated over 8GWh of energy for the grid to date, exporting a world record 1.4GWh of electricity to the grid in a single month in 2018.





# Construction of Energy Efficient & Smart Buildings

## ***Why building energy efficiency?***

***Ensuring that buildings are energy efficient, not only through construction but the entirety of their operation, goes a long way to reducing an asset's carbon footprint and in turn its impact on climate change. It can also result in lower operating costs, benefiting all structures from domestic dwellings through to large-scale commercial facilities. Smart technologies can take these benefits even further.***

## **Why buy from the UK?**

The UK is home to some of the world's leading engineering and architectural firms, such as Foster + Partners and Arup, which have been involved in many of the world's most high-profile low-carbon projects such as Masdar City.





## What can we offer?

- Engineering and architectural services for efficient design;
- Modelling and software tools for more effective project design;
- Lighting solutions and supply of HVAC equipment;
- Project management and logistics for the construction process and site laser scanning;
- Design and consultancy services related to district heating;
- Products and services related to post occupancy.

## Case Study

In 2017, Arup was appointed as head engineering company responsible for developing a sustainability plan for the Mexico City New International Airport (NAICM). The terminal design is underway in collaboration with Foster + Partners (UK based) and FR-EE (Mexico based). The goal is for the NAICM to be environmentally sustainable and to be the first airport in the world to obtain LEED Platinum certification v4 at its main terminal.<sup>21</sup>

21. Source: <https://www.prnewswire.com/news-releases/arup-is-appointed-to-develop-the-sustainability-masterplan-for-the-mexico-city-new-international-airport-naicm-300482562.html>



# Electric & Hybrid Vehicles

## *Why electric and hybrid vehicles?*

*Transport is a large contributor to global greenhouse gas emissions, responsible for a quarter of UK CO<sub>2</sub> emissions and the country's largest source of air pollution.<sup>22</sup>*

*Technologies to compete with internal combustion engines are increasing and include Battery Electric Vehicles (BEVs), Plug-in Hybrid Vehicles (PHEVs) and Hybrid Electric Vehicles (HEVs). Costs for these new technologies are also falling, making them increasingly viable alternatives.*

## **Why buy from the UK?**

In 2017 the UK was the second largest market for Ultra-Low Emissions Vehicles (ULEVs) in the EU and is a global leader in their development and manufacture. In the first half of 2018, 1 in 5 battery electric cars sold in Europe was made in the UK. The UK has long been a pioneer of automotive innovation and is increasingly a leading manufacturer of electric vehicles.



22. Source: <https://www.environmental-protection.org.uk/policy-areas/air-quality/air-pollution-and-transport/>





*100% Electric Nissan LEAF*

## What can we offer?

- Manufacture of core automotive component;
- Manufacture of lighter body structures;
- Provision of maintenance and repair services for E&HVs;
- R&D for battery cell components;
- Charging station installation and maintenance;
- Development of mobile apps/information management systems.

## Case Study

The Nissan Leaf car plant in Sunderland currently has the capacity to manufacture 50,000 electric vehicles (EV) per year. Sunderland currently builds Leafs to supply 23 markets, including Western Europe, Argentina and Israel. Nissan recently announced a £26.5 million investment in the Sunderland plant, partly to prepare for production of larger battery packs for the next-generation Leaf.



# Green Finance

## ***Why green finance?***

***Green finance is a means of mobilising capital in support of projects that have a positive impact on the environment or climate. For investors, green finance mechanisms ensure that funding is channelled into sustainable and environmentally-friendly projects. For developers, it ensures that financial structuring takes account of risks and issues associated specifically with such undertakings.***

## **Why buy from the UK?**

The UK is a world leader in finance and has the fourth largest number of green bonds globally, with UK banks playing a vital role in the global green finance market. UK pension funds are among the most active in integrating ESG (Environmental, Social and Governance) criteria into their investments. The UK's capability in financial innovation and products - including green finance - combined with legal expertise and deep experience in the emerging world is unrivalled.





## What can we offer?

- Financial and professional services;
- UK legal structure/English contract law;
- Providing mechanisms for mobilising green investment;
- Integration of ESG (environment, social and governance) considerations into investment strategies;
- Structuring, underwriting, verifying and listing of green bonds;
- Financing climate mitigation and adaptation;
- Development of disclosure and reporting of climate risks.

## Case Study

The London Stock Exchange (LSE) demonstrates how sustainable and green solutions can be integrated into both investment and capital raising. The LSE's sustainable finance offering is focused on two key areas: green finance for issuers (both debt and equity) and information services (including indices and analytics). Its global benchmark business, FTSE Russell, serves institutional and retail investors globally, with around \$15 trillion being benchmarked to its indices.



# Civil Nuclear

## Why nuclear?

***Nuclear energy is a secure, reliable, low-carbon and long-term source of electricity. A series of studies have shown that without nuclear energy, the challenge of reducing global CO<sub>2</sub> emissions will be significantly more expensive and difficult to meet.***

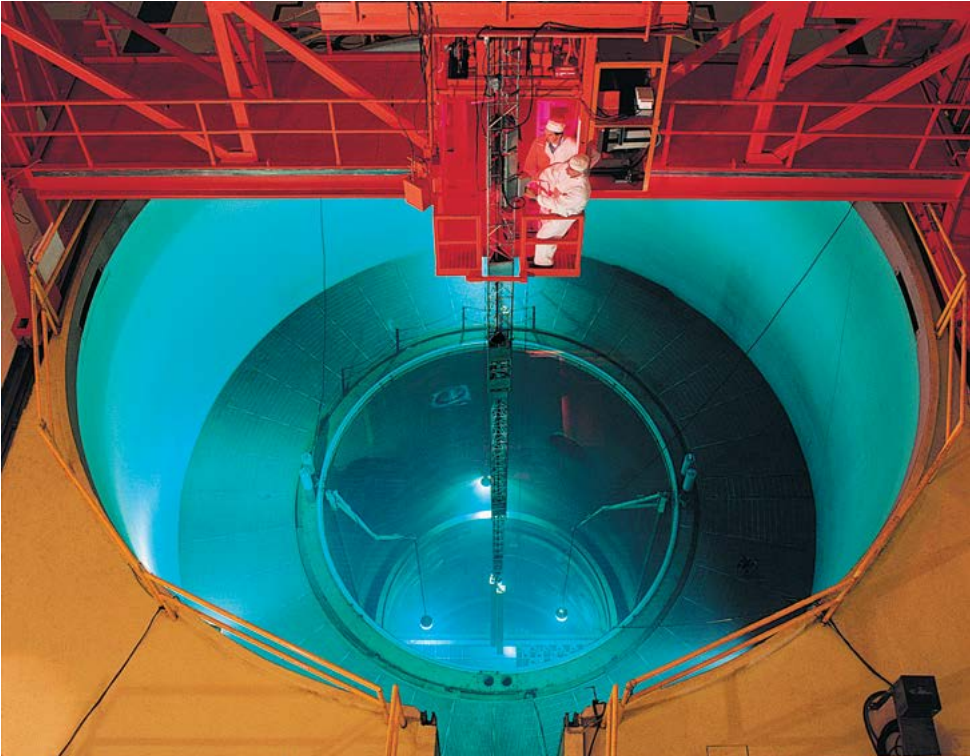
## Why buy from the UK?

The UK is a pioneering force in nuclear energy and was the home of the first commercial nuclear reactor, which opened in 1956. The UK has capabilities and expertise across the full nuclear plant and fuel life cycle and is at the cutting edge of nuclear innovation and the development of next generation technologies, including fusion.

The UK is world leading in regulatory and licensing support, project management, and waste and decommissioning services. The UK also has strong capability in the front end of the fuel cycle and engineering consultancy. The UK has a well-established nuclear R&D community, and some of the best research facilities in the world.







## What can we offer?

- Civil engineering;
- Programme management and technical support across entire life cycle;
- Development of safety management arrangements;
- Advising on legislative and regulatory frameworks, site selection, and infrastructure design;
- Planning and environmental consultancy;
- Delivering post-operational decommissioning and waste management services;
- Plant life-time extension projects;
- Front end of the fuel cycle, including mining;
- Research and Development.

## Case Study

The decommissioning of the Fukushima-Daiichi power plant following the 2011 incident is one of the most complex challenges facing the nuclear industry today, but one where UK capability is on full display. The Nuclear Decommissioning Authority (NDA) has been working with its counterpart, the Decommissioning Facilitation Corporation of Japan, using its experience in decommissioning the UK Sellafield site to help the Japanese authorities tackle similar problems at Fukushima. In addition to these services, the University of Manchester's Dalton Institute is working on new robots to explore the site, Createc is developing bespoke radiation sensors, and Cavendish Nuclear contributing engineering services to the fuel retrieval process.



# Bioenergy & Biofuels

## ***Why bioenergy & biofuels?***

***Bioenergy is renewable energy derived from biomass. The energy in biomass can be converted to transport fuels, heat, power or gas; making bioenergy a flexible energy resource. Furthermore, bioenergy has great potential to produce negative carbon emissions when used in combination with carbon capture and storage (CCUS) technologies.***

## **Why buy from the UK?**

In the UK, multiple biomass feedstocks are undergoing research, or are used for conversion to energy. They include (but are not limited to) crops, such as wheat; waste products, such as used cooking oil; woody grasses, such as miscanthus; and micro/macroalgae. The UK has strong capabilities in crop development and selection across different feedstocks. The UK has a strong R&D base for advanced biofuels conversion.





## What can we offer?

- Cultivation and harvesting, and crop development and selection of woody/grassy crops and supply of waste feedstocks such as Used Cooking Oil;
- Conversion of Used Cooking Oil to biodiesel;
- Design and engineering of advanced conversion components;
- Power generators and combustion equipment for biopower and using biomass for cofiring/ coal conversion;
- Undertaking life-cycle assessments for carbon intensity of biofuels;
- Crop-based biodiesel and bioethanol production and supply;
- Anaerobic digestion for bio-methane production.

## Case Study

Doosan Babcock are able to convert coal firing power plants into biomass boilers for renewable energy generation. In 2015, Doosan Heavy industries & construction won a contract from Korea South-East Power to convert Unit 1 (125MW) of the Yeong Dong thermal power plants to pure biomass firing. The plant is able to run on a combustion of wood pellets (95%) and wood chips or palm kernel shells (5%). In order for this conversion to be commissioned, the essential technology was provided by Doosan Babcock in the UK.



# Carbon Capture, Utilisation & Storage (CCUS)

## ***Why CCUS?***

***Carbon Capture, Utilisation and Storage offers a sustainable solution to dealing with a significant greenhouse gas. Through mechanical, chemical or other means, CO<sub>2</sub> can be captured from a range of industrial processes and energy generation plants before reaching the atmosphere. This CO<sub>2</sub> can then be used in other processes or stored in geological formations.***

## **Why buy from the UK?**

The UK currently has a firm R&D and engineering base for key capture technologies including post-combustion and oxyfuel technologies, with the potential to develop strong expertise in next generation capture technologies.







## What can we offer?

- Development and engineering of post-combustion and oxyfuel capture technologies;
- Offshore transport and storage (contingent on leveraging oil industry expertise);
- Ancillary services (e.g. legal advice, regulatory advice, planning, etc.);
- Power plant and process engineering;
- R&D for novel capture concepts.

## Case Study

In 2017, Carbon Clean Solutions LTD launched an innovative unsubsidised CCUS project in Chennai, India. The project deploys CCSL's patented drop-in 'APBS' solvent, and this system is capable of capturing 60,000 tonnes of carbon dioxide per annum from the flue gases of a 10MW coal-fired power plant. The captured and purified carbon dioxide is utilised as a feedstock for soda ash production.



# Hydrogen & Fuel Cells

## ***Why hydrogen & fuel cells?***

***Hydrogen can be converted to various forms of energy, such as power, heat and transport fuels. It has a wide range of potential decarbonisation uses across the whole energy system – in electricity storage, industry, residential and commercial heat and transport.***

## **Why buy from the UK?**

Although hydrogen is a small but growing sector globally, the UK has a number of leading businesses in the hydrogen economy, both innovative SMEs and FTSE100 chemicals companies. The UK has world leading activity in distribution, hydrogen for heat, fuel cell engineering and manufacture. Hydrogen is also an area of significant innovation investment from the UK government due to its potential usages in a number of sectors including industry, heat and transport, as there's scope for hydrogen to form a major component of a future low carbon energy system.





## What can we offer?

- Hydrogen production through PEM electrolysis and the design of methane reformers;
- Manufacture of components for fuel cells (i.e. Membrane Electrode Assemblies) by Johnson Matthey;
- Potential to excel in fuel cells for large stationary power;
- Potential fuel cell application in the bus sector.

## Case Study

The £20 million Refhyne project will see the deployment of the world's largest PEM electrolyser from ITM Power at Germany's largest refinery, the Rhineland Refinery operated by Shell. ITM Power will export technology and expertise to provide a 10MW electrolyser that will generate high quality hydrogen in an industrial refinery environment.



# Agri-Tech

## Why agri-tech?

*The agri-tech sector offers a broad range of technologies, innovations and approaches that help increase agricultural output whilst using less and having a lower environmental impact. In other words, it offers solutions to 'sustainable intensification'.*



## What can we offer?

- Plant science research (breeding and crop protection controls, cultivation in farm management);
- Animal health research and innovative technological development (breeding, management, treatment, companion animals, and aquaculture);
- Precision technology development;
- Use of technological applications.

## Why buy from the UK?

The development and growth of the UK agri-tech sector has been facilitated by the UK's strong foundation in research, science and application of technologies across the supply chain. The UK has institutes and universities at the forefront of agricultural R&D, a dynamic agri-food supply chain and the capacity and expertise to export technology, science and farming practises.

The UK is considered to have world leading R&D in animal health and plant science and very strong capability in developing innovative precision technologies.

## Case Study

UK company Exosect develops products for the protection of food from pests and disease. Since 2001 it has been building a large patent portfolio of innovative crop protection technologies. Exosect has recently partnered with Lancaster University and the University of Greenwich to develop a novel virus-based pesticide formulation for caterpillar pests. Exosect is actively out-licensing its products to multi-national companies around the globe.



# High quality products and services deserve competitive finance support

Flexible financing solutions from UK Export Finance make buying from the UK easier and more attractive for buyers and sponsors.

We are the UK's export credit agency, we provide finance solutions and award-winning support that help international buyers trade with the UK. Here are some of the many reasons to work with us:

## Competitive finance

- Loans or loan-guarantees with competitive rates of interest and payment terms
- Range of flexible financing structures including project financing, capital market support and Islamic finance
- Support available in 40 currencies
- Single finance package for mix of UK and non-UK supplies

## Affordable payment terms

- For smaller contracts, we can help your UK trade partners give you time to pay by insuring your payments

## Access to high quality suppliers

- UK suppliers are attracted by opportunities backed by UK Export Finance
- We will work with our partners to connect buyers directly with the UK supply chain

## Source with confidence from a UK supplier

- We can support finance for your new UK trade partners to ensure a reliable supply chain
- We can help your new UK trade partners provide contract bonds, such as warranties, advance payment guarantees or performance bonds, and secure working capital to deliver orders

# £15bn

Over the past five years, we have supported approximately £15 billion of export contracts in over 50 countries across a wide range of sectors, including healthcare, water, engineering, aerospace, oil and gas, construction and infrastructure.

# £50bn

We have a total capacity of £50 billion to support exports to more than 200 countries around the world.



UK Export  
Finance

To find out how we can help you, talk to UK Export Finance today.

[internationalenquiries@ukexportfinance.gov.uk](mailto:internationalenquiries@ukexportfinance.gov.uk)

+44 (0)20 7271 8010

[www.gov.uk/uk-export-finance](http://www.gov.uk/uk-export-finance)

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Department for  
International Trade

[great.gov.uk](https://great.gov.uk)

#### **DIT**

The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government body with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward-looking trade diplomacy strategy.

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