Department of Energy & Climate Change

CLT CARBON LIMITING TECHNOLOGIES

Company	Location	Company and Project Summary	DECC ENERGY ENTREPRENUERS FUND
SolaQuaGen	Aylesbury	The project leverages the experience and knowledge gained by SolaQuaGen™ (SQG) during a highly successful TSB supported project during 2012. This developed a new technology for desalination using waste heat and this project extends the application to the treatment of waste or dirty water. The project is based at a SITA UK landfill site in north west of England where the company plan initially to treat leachate outflows and demonstrate the commercial viability of the technology. Initial analysis has indicated potential returns on investment to landfill operators that create a financial incentive to adopt the technology in addition to its environmental benefits.	
Industrial Phycology	Bath	Industrial Phycology has designed a novel process to capture and recover excess nutrients in wastewater effluent. The process would provide final stage effluent treatment and the algal biomass produced can potentially be combusted or digested to produce renewable low carbon electricity or biogas with very little waste. The process has the potential to reduce the carbon impact of water treatment and allow wastewater operators to emit effluents that meet legal frame works for water treatment, and provide a fuel or energy feedstock all in one process.	
Yorkshire Water & Intervate	Bradford	The project will be run by the partnership of Intervate Ltd and Yorkshire Water Services Ltd with the specific objective of building a commercial scale Close Coupled Configuration Gasification module that will be designed to provide an innovative treatment template for the processing of both primary and secondary sewage sludge and other waste water treatment works' residues such as screenings, fats, oils and greases. The facility will process blends of sewage sludge with other waste feed-stocks, such as low grade waste wood and refuse derived fuels to produce renewable electricity and renewable heat. The renewable electricity generated will be used to power the process and export to the grid, whereas the renewable heat generated will be used in a closed loop system to dry sewage sludge to a level at which it can be blended to create a homogeneous gasification feedstock of the required physical characteristics	
Avalon Sustainable Energy Solutions (ASES)	Brentwood	Avalon Sustainable Energy Solutions (ASES) in collaboration with University College London (UCL) are proposing an innovative solution to drastically reduce the cost and disruption of insulation for up to 800,000 properties in the UK. Avalon Sustainable Energy Solutions in partnership will be insulating narrow cavities with a material that has insulation properties well advanced of anything on the market used for cavity wall insulation – a material in a league of its own for cavity fills. We propose to take a product which has been tested and used on a small scale elsewhere in a different context for buildings; and bring it to the UK to address our narrow 'hard to treat' cavity walled properties. We estimate this could bring savings of hundreds of millions of pounds to energy efficiency programmes at no compromise to standards and with improvements in processes and disruption.	

HTIP	Cambridge	The project involves the demonstration of a voltage limiter that is low cost, highly efficient and compact, so it is suitable for unobtrusive installation such as in the meter box or as an energy saving module for electrical equipment and smart meters. The voltage limiter maintains stable output voltage regardless of supply fluctuations. HTIP calculates that based on savings of 10-12% and a carbon factor of 0.43kg of CO2 per unit of electricity, some 200-300 kg of carbon could be saved annually per household.
Zagres Limited ZAGRES	Cambridge	Zagres, spun out from Cambridge University Engineering Department, has developed a patented brushless induction motor technology for use in industrial variable speed drive (VSD) applications, such as pumps and fans. Its unique electromagnetic design and control operation enables substantial cost reductions, projected as high as 25% as compared to existing VSD products by utilising a partially rated AC/AC power electronics converter. It hence opens up new opportunities, in a market projected to be £85b in 2020, by enabling a far greater proportion of motor applications to benefit from the energy efficiency and improved environmental impacts.
Fault Current FAULT CURRENT LTD	Cardiff	FaultCurrent Ltd are developing a series of magnetic fault current limiter (mFCL) protection products for installation within electricity distribution networks to facilitate the connection of more distributed and renewable generation on existing network assets. The innovation is a unique mFCL based on intellectual property developed over a number of years within the specialist Wolfson Centre for Magnetics at Cardiff University in the UK. This technology results in a completely passive low cost ferrite permanent magnet device. The primary advantages are: there is no requirement for a back-feed scheme (there will be a short interruption in power only whilst the mFCL is connected): saving between £250k and £500k per installation and potentially avoiding network upgrade costs in some situations. The cost of a mFCL, installation and commissioning can be treated as a capital expense, there are negligible maintenance costs (it is a 'Fit & Forget' system), and the technology does not require a power source so no running costs are incurred.
Clearflow	Cardiff	Clearflow Energy Efficiency exists to develop a complete cleaning and control solution for volume emitters of carbon such as power stations and large burners and boilers. The alpha prototype will shortly be complete and Clearflow are planning to construct three beta prototypes for initial market applications in industrial power, shipping and light commercial applications. Clearflow's system runs continuously on-site and does not use water. It is not necessary to stop the operating process to clean the application unlike existing solutions. The technology offers a dry and green cleaning method which minimises carbon release by enabling more efficient fuel burn.

EnMODUS Ltd 	Chepstow	Smart appliances, lighting and heating controls offer significant potential for untapped carbon and energy savings. Unfortunately, the development of smart appliances and controls that can realise these savings is currently limited by high cost and technical constraints in available smart appliance connectivity technologies. The goal of the Wattwave Embeddable Module is to remove these barriers and thus accelerate the penetration of mainstream markets by smart appliances, lighting and heating controls. EnMODUS have already demonstrated (using a shoe box sized prototype) that Wattwave, a two-way, low bit rate powerline communications protocol doesn't suffer from the key technical issues of connectivity range and stability suffered by some existing home and local area network communications. The challenging OEM cost targets for mainstream appliances will be met through the design of a purpose-designed embeddable module comprising an off-the-shelf microprocessor running the Wattwave firmware and an analog ASIC.
Harvest Quest (UK) Ltd 	Chester	Biomethane produced by Anaerobic Digestion (AD) of organic material has a very small share of the renewable energy market. This project aims to develop and significantly grow the share of biogas in the renewable energy market by increasing the amount of methane gas produced per Tonne of digested organic material, as well as by expanding the types of organic materials that can be effectively used in AD. The project will involve the development of the Technology from a proven laboratory scale unit to full scale pilot demonstration. In addition to quantifying the maximum biogas production for standard organic waste sources - water, food and industrial, alternative waste stream materials will be tested to check their potential for AD.
ANVIL SEMI-CONDUCTORS 	Coventry	Anvil Semiconductors has developed a unique technology to enable the production of Silicon Carbide (SiC) power switches at a similar cost to conventional Silicon semiconductor devices by growing thin layers of SiC on Si wafers rather than using expensive bulk SiC. When this world-leading production technology is brought to fruition it will be utilised in high efficiency, carbon saving, power electronic systems for mass market applications (such as lower voltage power convertors and invertors) where savings can have a large impact on overall energy use and emissions.
X-Windpower 	Cowes	X--Windpower is aiming to reduce the carbon footprint of electrified railways by up to 70% using wind energy generators distributed adjacent to the tracks and depots. The project will take advantage of Network Rail's land assets to validate X--Wind innovative vertical axis wind turbine technology for performance, economics and safety, specifically when operating in narrow corridors and in proximity to trains. The 2-year project consists of the design and development of an 80kW wind turbine based on a recently validated 6kW small-scale generator design. The project includes structural integrity evaluations and extensive field-testing of prototypes at a relevant site. Successful completion will lead to regional trials on Network Rail land before moving to a comprehensive rollout which could lead to the generation of 2,200 GWh of carbon--free electricity annually to part-supply the railway power system.

Carbon Cut UK Ltd	Dorset	Carbon Cut has developed a retrofit cavity wall tray which will enable retrofit cavity wall insulation to be placed in continuous cavities to an unlimited height, in "hard-to-treat" mid/high rise accommodation blocks. It also can replace damaged cavity trays so to enable retrofit cavity wall insulation in mid/high-rise buildings. An advantage with this system/product is that flats within older accommodation blocks can be individually insulated/or not as required or desired by the owners. Every building insulated can save 40%+ on heating/cooling costs, and carbon emissions. Retrofit cavity wall insulation is by far the cheapest way to insulate existing buildings and is ¼ the cost of other retro-insulation processes such as external cladding. This innovative low-cost cavity tray and installation method broadens the range of older buildings in which cavity wall insulation can be installed.
Celtic Renewables Ltd	Edinburgh	Celtic Renewables is commercialising an innovative patented process technology, based on proven ABE fermentation, which converts sugars into biofuels (butanol and ethanol), and three other high value commodities, acetone, animal feed and hydrogen. Butanol has recently been recognised as an advanced biofuel with significant advantages over ethanol both as a fuel and as a blending component. Initially the company is focusing on converting problematic by-products of the whisky industry, which present significant disposal and environmental issues, due to annual production of millions of tonnes of these residues. The purpose of the project is to complete the industrial-scale process blueprint for the innovative fermentation technology so that it is commercially and technically robust, and to develop the strategic partnerships in order to establish the first industrial production plant by 2015.
Kite Power Solutions Limited	Essex	Kite Power Solutions is developing a novel high altitude wind power generating system that uses kites to capture wind energy from the stronger and more consistent winds that blow above conventional wind turbines. By generating more power, with compact, inexpensive machinery, KPS has the potential to transform the economics of wind power generation, especially in offshore environments. Aerodynamic performance has been validated during instrumented tow tests and a 10kW prototype system has already demonstrated the core principals of the technology including autonomous flight control. The company has recently commissioned a second generation 40 kW prototype system, and in this project will develop a highly capable platform to demonstrate continuous power generation for extended periods of operation. This will bring autonomous launch and landing system mast, clamping and wing control subcomponents into operation.
Frigesco Ltd	Exeter	The aim of this project is to develop a low-carbon frozen food retail display cabinet (RDC) based on recently patented defrost technology (the Frigesco™ system). Frozen food RDCs in UK supermarkets account for 30% of total refrigeration power consumption and defrosting accounts for about 30% of that power. Supermarkets aim to maintain frozen food at below -18°C. Air is circulated around the cabinet using a fan that blows air through a cold heat exchanger (evaporator) where refrigerant boils at below -32°C. Moisture in the air freezes on the evaporator surfaces leading to loss of heat transfer efficiency and increase in product temperature. This ice has to be removed on a regular basis and in UK RDC's this is done using electrical resistance heaters. Only 20% of the heat supplied by the electrical defrost

		system is used to melt ice, the rest is transferred to cabinet components, the air in the cabinet and the food. This wasted heat then has to be removed after each defrost, to bring the cabinet and its contents back below -18C. The Frigesco™ defrost system is virtually energy-free and rapid with much less unwanted heat entering the cabinet; tests have shown it can reduce total refrigeration power consumption by at least 25% is possible. If all the freezers in UK supermarkets were fitted with the system the associated reduction in grid carbon is estimated at 230,000 tonnes pa.
Proair ProAir	Galway	The ProAir Advanced Indoor Climate Control System (PAICCS) is an innovative, high performance, energy efficient system which heats, cools, controls humidity and always delivers fresh air to create a healthy indoor environment with high indoor air quality. The small, modular, prefabricated wall unit (approx. 1m sq) will be used mainly in housing but will also have applications in offices, shops, restaurants and any indoor space up to 250m2 / unit. Led by Proair, the project will assemble the skills of 3 leading UK companies, CARDIFF University and the Building Research Establishment (BRE) to develop a refined design with control software which optimizes system performance. Five pre-production prototypes will be laboratory tested and monitored in occupied dwellings for twelve months providing the data for an 'ex-post facto' report on their performance.
Gaia Wind Gaia-Wind GENERATING BETTER VALUE	Glasgow	The Gaia-Wind 133-11kW turbine was developed in Denmark in the 1990's. Up to the year 2000, only 100 of these turbines had been manufactured, predominantly in Denmark. Since 2007 when the company relocated to the UK, sales have rapidly accelerated and the current installed base is approaching 1000 turbines, the majority of these in the UK. The factors driving the success of this product are: the reliability of the turbine and the high annual energy yield. The size of the turbine, highly appropriate for use on farms and in rural communities, guarantees the electricity produced is predominantly used 'on site' and therefore competes with low volume retail electricity prices. This project will develop design, production and assembly methods for cost reduction and efficiency improvement.
Naked Energy Limited naked energy®	Guildford	Naked Energy has developed an innovative hybrid solar technology providing combined heat and power. Virtu integrates standard photovoltaic cells into an evacuated tube solar thermal collector with novel heat transfer mechanism. For any given area more of the sun's energy is converted into heat and electricity than existing products enabling higher sunlight conversion per square meter of roof space and "single visit" installation. In laboratory testing 90% of the sun's 1000W/m2 has been captured and converted into heat and power. The versatile, modular design provides distributed energy generation for commercial and domestic applications regardless of climatic or geographic conditions. The key innovation is a highly efficient heat transfer mechanism that has been extensively tested and validated by Imperial College London and has wider applications beyond solar. This project will develop the next generation of trial and test prototypes for on-going environmental tests being conducted with the UK's largest utility company prior to an integrated pilot with a leading supermarket group.

Fern Howard	Hampshire	Fern Howard is an established leading UK manufacturer of lighting products and bulkhead luminaires. This project involves the development of a highly energy efficient edge-lit LED Luminaire with Homogeneous Light Output and Ray Angle Control. It aims to develop an attractive luminaire with a pleasing and uniform light output with an optimised distribution, without compromising the inherent efficiency that the LED light source provides. The luminaire features will reduce the energy requirements for lighting a given area by at least 33% when compared with the most energy efficient lighting systems currently available. The potential energy and CO2 reductions increase to 75% when compared with luminaires with opal diffusers.
Econovate	Hemel Hempstead	Econovate has developed an award winning sustainable low carbon building products. The vision is to take a share of the low-carbon building materials value chain by using low-grade waste paper and cardboard, diverted from landfills to create superior construction products. Their current product the “Greenblok” uniquely combines technologies from different industries to manufacture fibre-cellulose based breeze block, engineered to achieve enhanced thermal and acoustic specifications in an affordable and high performing structural block within one product. The use of low tech machinery and the benefit of enhanced product performance will show a significant reduction of energy used both at production and in end-use. The project objective is to set up a small automated manufacturing plant allowing Econovate to gain certification of the product, show the technology to potential licensees, and supply sufficient blocks for exemplar buildings to support product launch in the construction market.
Ceres Power Ltd	Horsham	Ceres Power has developed and trialled a low temperature solid oxide fuel cell and fuel cell stack for domestic and other heat and power applications. This project builds on the Fuel Cell Module (FCM) components, design and layout, that have been enhanced to provide electrical efficiency of >50% (Lower Heating Value) on mains natural gas, delivering up to 1,800kg annual CO2 savings, and over £700 energy cost savings per home per year. Ceres Power’s low heat to power ratio fuel cell module (FCM) is ideally suited to small-scale distributed generation applications such as micro-CHP where efficiency, cost and robustness are key drivers for market uptake. With British Gas, Ceres has developed a design specification for UK micro-CHP (which includes the FCM) that is retrofitable with UK housing stock making installation and operation a relatively simple exercise.
AEL	Lambourn	AEL are an expert in composite materials and manufacturer of components for the renewable energy sector. This project is to design, build and prove a test facility for tidal turbine blades capable of applying the necessary static and cyclic loadings to confirm static strength and stiffness and operational life of pre-production blades. This approach will provide the marine energy industry with the confidence necessary to accelerate the establishment of tidal energy devices as a viable energy source and improve the confidence of financiers to invest in the sector. The facility will be designed to cope with blade performance requirements anticipated out to 2020.

C-Capture 	Leeds	C-Capture Ltd (C-CL) was spun out from Leeds University to commercialise an innovative family of amine-free PCC solvents that can already match the steam requirements of the best 2G amine solvents but also have significantly reduced toxicity, environmental impact and corrosion characteristics. In this project, variants of C-CL's amine-free chemistry will be screened for suitability in the laboratory and scaled-up on the company's dedicated pre-pilot test rig in order to identify optimum candidates. These will then be tested on PCC simulation rigs to confirm their superiority to 2G amine solvents. The results will be used in licensing negotiations with manufacturers of CCS plant and chemicals.
Geothermal Engineering 	London	The project aims to show that deep (2km - 3km) "standing column wells" can be used to sustainably supply heat suitable for district heating networks (~75°C) without the need for a heat pump. The project will test and model an existing 2.4km well to prove that the heat can be sustainably mined from these depths using standing column well technology. The results from the project will inform the feasibility of deep geothermal standing column wells and their suitability to district heating networks.
KiWi Power 	London	KiwiPower work with industry and commercial clients to provide demand response services to National Grid. This project aims to accelerate the adoption of Demand Response across a broader range of UK businesses to cut the overall cost and carbon intensity of the UK's energy supply. The focus will be on developing and implementing technologies that improve automation, create more open standards, and increase choice for potential UK customers. Businesses participate both for the green credentials of helping to avoid use of polluting power stations at peak times, and for the financial compensation provided by grid and network operators for grid balancing services.
Teva Motors Limited 	London	Teva Motors is developing a range-extended electric truck for the urban delivery market that will deliver the operational performance of a diesel vehicle, but with lower emissions and a lower lifetime cost. Teva's truck will be competitive without the need for purchase or operating subsidies, allowing mass adoption by major fleet operators (e.g. courier companies). This project is the first step: to create a working prototype of the Teva's innovative powertrain by integrating this into an existing truck chassis. The prototype will demonstrate the technology and show that it meets the requirements of major fleet operators: be cheaper than diesel, and have more than acceptable range. Teva is working closely with major fleet operators to ensure that its truck meets their needs.
Ventive 	London	As existing buildings are retrofitted and new buildings are built to higher energy standards, they become more airtight, and natural ventilation sources are removed. Based on an innovative and retrofit specific Passive Ventilation with Heat Recovery unit (initially developed with the help of TSB funded feasibility study and utilising passive stack effect and wind assistance), Ventive have designed a reliable ventilation system for all areas, including wet rooms which incorporates a number of inventions around passive extraction boost, extraction period extension, moisture withdrawal and simplified installation. The Ventive PVHR system is designed to overcome a number of challenges of wet room installation and makes the product usable in summer months and warmer climates, greatly increasing its export

		potential. The project will develop the technology to provide a "Green Deal and Energy Company Obligation ready" full house system, a proposition supported by both BRE and LABC.
Sustainable Marine Technologies	London	Sustainable Marine Technologies is developing an innovative deployment platform, PLAT-O, to address two key challenges faced by the tidal energy industry: - Reducing the installation cost and maintenance access costs for tidal arrays - Accessing deeper water tidal zones, where over 2/3 of the UK resource is located The PLAT-O platform will be capable of supporting and deploying any leading horizontal-axis tidal energy converter. The purpose of the project is to deliver a fully-functional prototype of the PLAT-O system which will be deployed and tested at-sea. It will demonstrate the potential that PLAT-O can deliver to the industry.
Q-BOT	London,	Q-Bot is developing an innovative system to enable "hard to access" suspended floors to be insulated from beneath using a remotely controlled robotic device. The device will be inserted under the floor from locations that avoid disruption to the household. Using this system, installation of under-floor insulation can be undertaken by one skilled operative in a day. With the cost of insulation material below £600 per house, but hard to access floors often left un-insulated because of installation costs the system is estimated to install cost savings of approximately £6,000 per dwelling, as well as shortening of Whole House Retrofit duration by up to two weeks and minimising disruption.
VALE WINDOW COMPANY	Mansfield	Vale is an establish supplier of windows to the residential market. The project is concerned with the development of a novel high performance, thermally insulating window made of vacuum glass tubes. Preliminary testing and modelling shows a U-value of 0.6 W/m2K can be achieved equivalent to triple glazing but at potential lower cost. The project involves the design, construction and laboratory testing of prototypes according to BS standards and then field trials in real buildings. Modelling and prototype demonstration will be carried out using low/zero carbon homes and an office building at the University of Nottingham. The project will also evaluate manufacturing techniques, and obtain necessary test certifications involving organisations such as the British Fenestration Rating Council (BFRC), BRE, and BISRA.
PASSIV SYSTEMS	Newbury	Passiv Systems provides home energy monitoring and energy management solutions. This project is to integrate in-home technologies (e.g. storage heaters, heat pumps) with the Passiv platform and backend systems, in an internet-connected solution, and demonstrate that energy use in homes could be managed an aggregated level in response to various energy tariffs and demand side incentives from grid and network operators. Offering aggregated services to manage grid variability needs compelling consumer propositions that integrate tariffs and technology into consumer propositions, and apply knowledge of building performance, current and forecast weather, and likely energy demand.

Natural Technology Developments 	Newcastle Upon Tyne	Natural Technology Developments Ltd (NTD) is developing a novel Hybrid Solar (PV-Thermal) concept; a higher performance and more affordable co-generation panel producing both electricity and heat. This innovation combines advanced heat sink and Photovoltaic (PV) technologies in a unique way to address performance weaknesses in current technologies. If successful this innovative product will be the first of its type and manufactured totally in the UK, with the potential to become a cost effective solution which helps to reduce carbon emissions and ensure security of supply contributing to the UK 2020/2050 low carbon targets. Our aim is to develop this new renewable solar product against a design brief that meets the needs of the energy stakeholders.
Radfan / Heatwave UK radfan	Newcastle Upon Tyne	The Radfan is an innovative fan unit that affixes by magnets to the top of any central heating radiator and redirects flow of warm air horizontally into the room. The company have conducted in-house testing that shows the Radfan can make up to 2degC temperature improvement at seated height i the average UK living room. This testing has been independently peer reviewed by the Resource Centre for Innovation and Design at Newcastle University. The main findings agree the Radfan can have a positive effect on the temperature of an average living room and warrants further testing. The scope of the project is to conduct 3 separate verification tests to quantify the energy savings that Radfan could provide. These tests would be conducted by independent bodies such as BRE or BSRIA.
LINDHURST Lindhurst	Nottingham	Lindhurst Engineering is a mechanical and structural engineering company designing and building equipment for clients in water utility, energy, transport, construction, food production and agricultural industries. This project aims to develop and demonstrate an integrated closed loop “Microbial Fuel Cell system” that will have the capability to take multiple foods and drink industry waste streams and convert these into bio-gas that can then be utilised to produce heating, power and vehicle fuel. The deliverable from the project will be a modularised microbial fuel cell system that; has greater flexibility of operation, is more efficient, easier to transport/install and is easier to maintain than other currently available waste-to-energy technologies on the market.
Anakata Wind Power Resources Ltd Anakata WIND POWER RESOURCES	Oxford	The ANAKATA team has a history of success in Formula 1 motor racing, and are experts in diffuser technology. The company has developed and tested a 2.5kW micro wind turbine to demonstrate the technology is commercially viable, and has filed patents on its technology. During 2013, Anakata has generated revenue from initial sales of its first micro wind turbines. This initial sales success provides a platform to grow the business and access more valuable markets by developing larger medium-size wind turbines. The project will apply the technology to larger turbines by developing a 50 – 100kW demonstration unit. This will require innovative diffuser geometry, structural design, and use of composite materials if it is to produce a commercially viable wind turbine.

WILLIAMS GRAND PRIX ENGINEERING 	Oxford	The project will demonstrate the performance, reliability and robustness of Williams Advanced Engineering's stationary flywheel energy storage technology in an intermittent renewable energy environment. The magnetically loaded composite (MLC) flywheel system will be installed at the UK's National Renewable Energy Centre (Narec) and subjected to 'real world' power profiles typically seen in distributed/islanded weak grids comprising a mix of fossil based and intermittent renewable energy sources. The pilot demonstration programme, in collaboration with the University of Sheffield, will quantify improvements in frequency control and power stabilisation by using flywheel energy storage to smooth irregular and unpredictable power output from renewable sources such as wind turbines. Additionally the test programme will investigate the potential to substitute flywheel energy storage to replace, for example, diesel generation and/or reduce diesel generation capacity and utilisation thereby reducing carbon emission production.
CRESS 	Reading	CRESS aims to apply its flywheel energy storage system to utilise regenerative energy in container handling cranes at shipping ports. Cranes currently waste the braking energy when a container is lowered but this can be recovered and used in raising the next container. The energy saved would reduce both the diesel used to power the cranes and lower carbon emissions. There are around 10,000 container port cranes worldwide. Market feedback shows that existing energy recovery systems do not meet port operators' requirements. In order to capture this opportunity CRESS will develop and test a pre-production prototype in both the laboratory and on a crane operated by its strategic partner Port of Felixstowe. These tests aim to prove that the CRESS system can reliably deliver attractive fuel savings and payback.
Xsilon Ltd 	Reading	The project will deliver a robust communications solution for the smart metering HAN (Home Area Network), suitable for connecting in-home displays, smartplugs and appliances to a smart meter or home energy management system. It will work in all types of home, and everywhere within those homes. The data capacity and network structure will closely match that available from ZigBee wireless products but will provide a solution for linking smart meters to in home devices in the 30% of homes that cannot use ZigBee for this link. Xsilon's Hanadu technology, uses a home's existing electrical wiring to deliver data ("powerline comms" or "PLC") and is designed specifically for the needs of a smart meter HAN. Unlike other solutions, it reaches around the whole home from one end to the other, yet delivering high speeds and consuming very low levels of power. This ability to offer reliable "whole home" coverage overcomes the range limits of other options such as ZigBee without increasing the cost.
PHOTONSTAR 	Romsey	PhotonStar is an award winning supplier of high quality LED lights to commercial and domestic clients. The company is developing next generation intelligent low-energy LED light engines which provide tuneable white light spectra. The project will develop and trial prototype products incorporating Photonstar's high colour quality tunable ChromaWhite technology together with a novel low cost embedded wireless lighting and energy management control system. The ChromaWhite technology tracks the efficiency improvement curves of LED light sources and currently enables energy saving of 90% over halogen sources and 40% over compact fluorescent sources. The next generation products will offer the added benefit of high colour quality tuneable white light emulating daylight, and a low cost wireless control

		system to improve functionality, reduce installation costs, and enable futher energy savings.
Ultramo	Shoreham by Sea	Ultramo is developing a new power generation engine technology capable of the same high efficiency as our most efficient large scale power generation technology today (Combined Cycle Gas Turbines at 60%) but with the advantages of being able to maintain that 60% efficiency at smaller generator sizes down to 1MW. The project will deliver a scale prototype generator with a correlated computer simulation model.
MARINE SOUTH EAST	Southampton	The SAMED project will validate novel anchoring technology for marine structures using helical screw piles. A critical element of this technology is that the subsea tooling for installation of screw piles could avoid the need for large, expensive installation vessels. To achieve this, the project brings together a consortia of subsea installation specialists and a leading helical screw pile provider, under the leadership of marine project coordinator Marine South East. Although screw piles are widely used on land, and even in very shallow water where land-based installation tools can be used, they have not yet been developed for subsea applications. Other land-based technologies, for example cable laying & burial, have successfully been marinised to meet the requirement for reliable remote operation. SAMED will bring together these two areas of existing technology to validate a capability in subsea screw pile anchoring.
SEAB ENERGY	Southampton	MUCKBUSTER® is a fully automated micro-AD system developed to proof of concept demonstration form in a standard 40' shipping container, enabling low-cost delivery and installation, and ease of operation. It provides PAS110 pasteurisation so that certain digestates can be sold as fertiliser or mulch. With a Combined Heat and Power (CHP) unit, and income from UK feed-in-tariffs (FIT) and renewable heat incentives (RHI), the modelled payback is under 3 years using 1.6 tonnes per day of high yielding biowaste such as bakery residue. The project develops a new modular front end feedstock handling system for the MUCKBUSTER® to open up more market opportunities. The project will test the system using a variety of bio-waste feed stocks over a 12 month demonstration period.
Flint Engineering	Sussex	The Flint system is a roofing / cladding product concept, incorporating weather protection, thermal absorption and PV electrical generation. With the Flint system the roof is not just the water proof covering for a building but the energy plant to meet the buildings heating, cooling and hot water needs. Flint is a roofing system that can turn new and existing buildings from CO2 emitters to net energy producers and is a potential enabler for very low to zero-carbon buildings. Key components have been designed, built and lab tested and the project will develop an entire system through to demonstration on several buildings.

Carbon Cycle Limited	Sutton	The aim of this project is to optimize within a large scale test bed a new low energy process to produce ammonium sulphate (a fertilizer that supplies nitrogen and sulphur) and precipitated calcium carbonate (for making bright white paper). Both products have large markets measured in the tens of millions of tons used per annum. Based upon experimental data, if emissions from creating ammonia feed stock are included, this process is anticipated to cut the carbon emissions required to produce these materials by 88%. If the emissions to make ammonia are not counted, the process is strongly carbon negative. Current production routes to ammonium sulphate and precipitated calcium carbonate are very energy intensive. Our new method creates at ambient temperatures materials that others can only create at near 1000 ºC, thus our process represents a new competitive route to these products with a fraction of the carbon footprint compared to the current state of the art technology.
KENSA kensaheatpumps	Truro	Kensa is the only UK manufacturer of heat pumps for space heating and hot water production, and also provides system design services, and remote commissioning. The project will feature a significant further development to Kensa's innovative Shoebox ground source heat pump, launched in 2012. The Shoebox is a unique, ultra-small model which can be conveniently installed within a kitchen cupboard to deliver space heating and domestic hot water to new build apartments and retrofitted to smaller houses. Whilst the standard Shoebox heat pump extracts energy from the ground, the next stage in the product's development will create a hybrid model which can also utilize energy stored in the air. This twin-source design enhances system performance and is expected to be the UK's first hybrid heat pump.
CONCURRENT THINKING Ltd concurrent thinking	Warwick	Concurrent is a provider of data centre energy management software and hardware solutions covering both IT and infrastructure. Typically, energy savings of up to 20% can be achieved without the need for a total rebuild of a data centre. To obtain more dramatic savings, as well as further incremental savings over time, much more automation is needed. This requires software that interacts with building and rack management systems, as well as servers, operating systems and virtual machines, in order to continuously optimise efficiency – much as an avionics system might maintain the optimal trim of an aircraft. This project aims to evolve the state-of-the-art in data centre energy management and demonstrate this in real world environments involving world-leading partners.
KELDA SHOWERS KeldaShowers	Winchester	Kelda Showers is designing and developing Mixer and Digital Mixer shower products utilising Kelda's radical water and energy-saving 'Eco Power Shower' technology. Improving upon Kelda's spray acceleration 'engine' for Electric Showers, this project will develop and demonstrate prototypes to generate a high-pressure spray that results in around a 50% reduction in water flow/heating energy requirement (and carbon produced) without compromising the showering experience.
ANTACO	Woking	The project involves developing a small-scale pilot plant for the production of bio-coal from biowaste using Hydrothermal Carbonization. HTC is a process which replicates the natural process of coal formation. Biowaste is processed using heat and pressure to chemically transform it into a carbon dense material similar to fossil coal. To date

Antaco biomass to energy		the process has not been commercially viable due to technical limitations such as batch processing. Antaco have developed to laboratory scale and patented a potentially cost effective engineering solution which could enable commercial production of biocoal on an industrial scale.
Libertine FPE Limited LIBERTINE FPE	York	Libertine is developing novel electricity generation technology with potential to dramatically improve the efficiency and economics of waste heat recovery, combined heat & power, and small scale biogas power amongst other applications. At the heart of Libertine's technology is an innovative linear expander-generator which integrates a low friction free piston with a high efficiency linear generator. In the first market application, this expander-generator will be incorporated into small to medium scale (10-200kWe) waste heat recovery systems such as those used in industrial processes and on larger CHP systems or biomass boilers. The Libertine unit replaces conventional expander technology (principally turbo-generator based) and enables the conversion of 10-20% of otherwise wasted heat to electricity.