



Innovate UK

Investing in Clean Growth

Directory of Projects

Innovate UK is part of
UK Research and Innovation

Introduction

“Reducing harmful emissions is one of the greatest challenges of our time. Yet the UK is well positioned to seize the opportunity of stimulating the economy with Clean Growth products, services and jobs. It will require the adoption of innovative low carbon technologies, processes and systems, and the more efficient use of resources. We will see whole new industries created and existing industries transformed.

To date the UK has been one of the leading countries in the world to grow its economy whilst also reducing emissions. However, there is now an urgent requirement to drive a significant acceleration in the pace of decarbonisation. Although this presents major challenges, it also provides exciting opportunities. Developing clean energy, better urban systems for our towns and cities, novel construction approaches and smarter infrastructure are all ways we can drive economic growth for the UK.

With that said, we recognise the challenges businesses and public services face to innovate within these challenging areas. It is not easy to integrate complex and disparate systems, adapt to technological and societal change, and develop the new business models required to deliver novel services. That is why we are here to help.

The vision of our team is therefore to help business with innovation that is risky but has high growth potential; innovations that can have a transformative impact on our society’s essential infrastructure and seize the opportunities which the global low carbon economy presents.

Our aim is to support forward-thinking UK companies to scale and grow by developing the technologies that will address challenges associated with population growth, urbanisation and environmental threats.

We fundamentally offer support in two distinct ways. Firstly we connect businesses to opportunities, customers and/or partners, internationally and nationally; with relationships developed with partner organisations in Asia, Europe and North & South America.

Secondly, we fund the most innovative businesses developing solutions for the present and future challenges our UK economy may face. In 2017/2018, we invested more than £115 million in innovative projects in the fields of clean growth and infrastructure and in core funding for the Catapult network in areas including Offshore Renewable Energy, Future Cities and Energy Systems. Our support aims to drive business innovation and help organisations to test and deploy potential solutions to the challenges we all face, and importantly to exploit the associated opportunities.

The Innovate UK supported companies detailed in this publication, and the consortium partnerships behind them, represent great examples of market-focused UK clean growth and infrastructure innovations. We wish them every success for the next stages of their commercialisation and business growth.”

Ian Meikle

Director of Clean Growth and Infrastructure,
Innovate UK

COFFEE (Coffee Oil for Fragrance and Flavourings through Efficient Extraction from waste)

102399, Recovering Valuable Materials from Waste, 1/10/15 to 31/12/17, £477,038

bio-bean Ltd | UCL

bio-bean believe that there is no such thing as waste, only resources in the wrong place. This project investigated how to create value from spent coffee grounds. The project focussed on the extraction of coffee oil for the flavour & fragrance, cosmetic and personal care markets. As well as the extraction of high value products, bio-bean looked to develop processes that do not create other waste and therefore investigated the repurposing of the exhausted grounds.

Market opportunity

The UK uses approximately 146T of coffee oil annually, worth around £17.2m. With an anticipated growth of 3.7% CAGR, this market is expected to increase in value to £23m by 2022. Recently, there has been a significant increase in demand for naturally-derived products. The current UK supply of coffee oil, natural extracts or flavours is supplied through extraction from virgin coffee beans, using up land and resources. By utilising a more sustainable route to produce these products, this can be achieved more sustainably.

Innovation

By extracting the value out of what was otherwise deemed a waste product, bio-bean are pioneers of innovation and sustainability. The creation of replacement and new products from spent coffee is something that has not been performed at scale. bio-bean are leading the way in the battle against the ever-growing coffee (and food) waste problem. Utilising existing green processes in a novel way shows the innovative nature of bio-bean.

Exploitation route

Proof of concept was achieved through initial work in partnership with UCL to demonstrate feasibility to extract flavour & fragrances from spent coffee grounds. Larger scale trials were completed by bio-bean at 3rd parties to confirm feasibility at scale to produce samples of product for customers. A customer base was created through a market research study with Giract. In 2019, bio-bean will commercialise one product created from this project utilising toll manufacturers with a long-term plan to raise capital for investment in internal production capability.

Outcomes and next steps

bio-bean have new products of high value and have gained interest from industry. The extraction of a natural coffee flavour has been proven at pilot scale. A natural coffee extract has been developed at scale and is anticipated to be sold into the market in 2019. The grant has enabled bio-bean to create new high value products and a long-term pipeline of R&D for continued innovation into products from spent coffee grounds, which will be advanced further through the, hopefully, successful Innovate loan application submitted in November 2018.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=102339>

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Catch! Citizens at the City's Heart

102426, Integrated Transport: Local Authority Solutions, 1/1/16 to 31/3/18, £2,054,283

TravelAi | Coventry City Council | Elgin | Ipswich Borough Council | Leeds City Council | Newcastle City Council | Oxfordshire County Council | Placr | The Behaviouralist | Transport for West Midlands | Transport Systems Catapult | University of Glasgow | University of Leeds

Catch! seeks a data and an evidence-based approach to solving transport related problems. Catch! is a state-of-the-art highly-scalable system to crowdsource, analyse and act upon travel-behaviour data in real time. It provides transport professionals with next-generation data and analyses on travel behaviour, and citizens with a 'living journey planner' that gives frustration-free routing based on travel conditions. The project has tackled significant data-analysis and processing challenges to build a rich set of data and insights to help Local Authorities make informed transport decisions.

Market opportunity

Transport planners and operators rely on models to plan and manage the system and these models require data on how people move around. Yet the data currently utilised in transport is fragmented, expensive, lacking in detail and locked in operator or network silos. The result is inefficiencies baked into our transport systems. No wonder then that transport is cited as the greatest contributor to stress, accounts for 25% of global CO₂ emissions and costs the UK £22bn each year from congestion alone.

Innovation

Transport data is gathered using surveys or sensors at fixed points. Sensors tend to capture flow of a limited number of modes through a single point in the network and cannot reveal route or the full multi-modal journey. Meanwhile surveys suffer from small sample groups, recollection error and long lead times. Both sensors and surveys are expensive. Meanwhile, citizens wish to traverse an integrated system without a care for boundaries of mode or provider. Catch! captures travel behaviour data at the level of the citizen using mobile phones. It is a highly scalable system that requires no additional hardware and produces faster, more detailed, more accurate data.

Exploitation route

Catch! is a software and data service for local authorities, transport operators and transport professionals. The offering can be deployed as a whole, so that a region can offer its citizens a multi-modal journey planner and at the same time gather next generation transport behaviour data. It can also be deployed in a modular fashion. For example the detection technology can be embedded in any existing app under a licensing model and then the data can be accessed via a Data as a Service subscription.

Outcomes and next steps

The project has piloted Catch! in the 5 participating Local Authorities. The pilots confirmed that the data does have the potential to support future policy and decision making given its ability to generate density of use maps, origin, destination, routes and mode of transport information. It is the first time that the routes could be visualised by officers based on actual travel behaviour. Having the data increases the credibility and robustness of the evidence to support wide-ranging decisions.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=102426>

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TwinGen - prototyping of world's most compact heat and power boiler

102815, Infrastructure Systems - Over 12 months or Over £100k, 1/4/17 to 28/2/19, £1,574,329

Samad Power | Cranfield University | Advanced Manufacturing Research Centre (AMRC) | Productiv | The Proving Factory | Baxi Commercial

Samad Power's core areas of expertise are the development of innovative small-scale micro gas turbine, motor/generator, and drive/inverter systems for high-value applications, such as CHP (Combined Heat and Power) and HVAC (Heating, Ventilation, and Air Conditioning). This project is developing 'TwinGen', a domestic CHP system with fast response characteristics similar to Combination boilers. TwinGen utilises a patented technology (owned by Samad Power) and has been designed to be integrated within existing branded boilers, replacing the burner and fan while leaving many of the other component parts in place, thus reducing overall costs and forming an attractive licensing proposition for boiler OEMs. This revolutionary configuration represents a breakthrough for reaching the boiler replacement market and has been welcomed by project partners who will be assisting Samad in development of the technology.

What are the potential benefits?

TwinGen offers the following benefits:

- Increasing the security of electricity supply as microgeneration from Micro CHP tends to coincide with peak demand periods.
- Achieving higher combined energy efficiency, primarily due to savings of power grid distribution and transmission losses.
- Reducing carbon emissions by satisfying the peak electricity demand through microgeneration, thus reducing the need for use of high-CO₂ power plants at those peak periods, saving 0.6 tonnes CO₂ per installation per year.
- Offering significant savings on energy bills, by reducing the need for grid power due to local power generation by a Micro CHP unit.

What approach did you take to address the energy trilemma?

TwinGen is designed to replace burners and fans in existing boilers. It produces up to 10 kW of heat and 2 kW of electricity. For domestic consumers it will mean a dramatic reduction in overall utility bills, by up to 30% - without any 'feed-in tariff' or any other form of government subsidy. For the economy as a whole, it will mean more efficient utilization of natural gas, the UK's principal source of non-renewable energy, and will relieve pressure on the electricity grid - particularly during periods of peak demand.

Next steps

Early stage product development up to TRL5 has been supported by Innovate UK. The company is seeking an additional £1m funding/investment to prepare TwinGen for market entry by Q4 2020. The scope of future work involves taking the technology from TRL5 to TRL8 with the following objectives:

- Improve component and system manufacturability in terms of design, make, cost, and life.
- Manufacture of productionised TwinGen units
- CE type approval certification
- Field trials with interested boiler manufacturers, utility companies, and ESCOs

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=102815>

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SenseCrete – Condition Monitoring System in Concrete

102829, Infrastructure Systems (over 12 months or over £100k), 1/2/17 to 30/4/18, £270,609

Lateral Logic Ltd | Fibre Technology Ltd | TSC Inspection Systems Ltd

Load bearing capacity and condition monitoring in large or critical concrete structures is increasingly desirable in Building Information Management Systems (BIMS) to facilitate real-time building condition monitoring and assessment and to allow competitive advantage through reduced construction cost, reduced cost of building ownership and asset life extension. This project develops a system for the non-destructive evaluation of concrete condition in steel fibre reinforced concretes without embedded sensors.

Market opportunity

The project will be able to address a proportion of the major projects identified in the National Infrastructure Development Plan which reports a total pipeline value of £425 billion based on data from the Infrastructure & Projects Authority, Major Infrastructure Tracking Unit. Energy commands the highest value at £256 billion followed by Transport (£134b), Water (£19b), and Flood Defence (£4b). Social infrastructure is also identified. Within this, SenseCrete is most likely to be of interest where structural integrity needs to be confirmed in critical load bearing structures after exposure to damage (e.g. bridge strikes), or after blast or earthquake damage or as a consequence of in-service ageing and degradation.

Innovation

The innovation is based on the use of steel fibres which are already added to concrete structures to replace or supplement rebar as passive sensors which can be interrogated remotely. The signature of the concrete interrogated by the sensors is altered if its condition changes, for example by microcracking, so the structural health of the concrete can be monitored and validated.

Exploitation route

The developed technique will be rolled out as an inspection service for buildings and structures condition monitoring both routinely and after singular events, such as impact, blast, or earthquake damage. Exploitation is likely to be through sales of sensing fibre, sensing equipment, inspection services and the inspection “system” comprising the fibre reinforced concrete and the optimized inspection equipment and monitoring protocols, both direct and licensed. Exploitation is therefore three-fold: materials, sensing equipment and inspection services.

Outcomes and next steps

The project demonstrated conclusively that the SenseCrete system can sense damage states in concrete and provide indication of the progression of damage which correlates with the unstable growth of microcracks. Further R&D is needed to improve technique sensitivity and develop the technique towards the point where measurement standards can be defined. Demonstration on both large infrastructure projects and precast concrete structures is required before market entry.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=102829>

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Capacitively coupled cables for transmission and distribution

103496, Energy Catalyst Round 4 - Mid Stage ISCF, 1/10/17 to 31/3/19, £1,545,759

Enertechnos Limited | Brunel University | TWI (The Welding Institute) | Eland Cables Limited

Globally, energy losses in the transmission and distribution system are 10.6%. In the UK the figure is 7.6%, and in 2016 losses were 27.5TWh, and account for 1.5% of the UK's CO₂ emissions. This project's aim is to complete development of a cable using a linear capacitor as the means of transmission, which will reduce voltage drop, increase the amount of energy delivered from a given generation source into the grid and reduce CO₂ emissions.

Market opportunity

The UK grid losses in 2017 could have powered 7 million average UK homes. Reducing system losses in the grid will save money, reduce CO₂ emissions and facilitate societal change such as the adoption of electric vehicles by enabling more power to be delivered to where it is needed without building new generation assets. Capacitive Transfer System (CTS) cable can reduce losses by more than 20% and enhance the productivity of renewable energy resources.

Innovation

The concept of CTS cable is that it utilises a linear capacitor to transfer electrical energy in the grid. This has the effect of introducing capacitance into the system to offset the inductance inherent in normal cable systems. This in turn reduces impedance in the system, thereby reducing voltage drop and the percentage of energy lost, and improving the quality of electricity by balancing out reactance.

Exploitation route

Following the completion of the project, the intellectual property enabling the CTS cable solution will be licensed to cable manufacturers and operators. This will ensure that the benefits of the CTS will be diffused over the widest possible geographical area in the shortest possible time. Furthermore, learning from the project can be incorporated into courses at Brunel University so that the knowledge can be shared widely.

Outcomes and next steps

The capacitively coupled cables project will produce a report on the design, testing and implementation of the CTS cable. This will be used to assist Enertechnos and Eland Cables in the commercialisation of the cable, will be incorporated into new teaching materials at Brunel University and will add to the knowledge-base at TWI. Following the project, a first implementation in the grid is planned to demonstrate characteristics of the CTS cable in a live environment.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=103496>

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Clamp-IT – disruptive bike security

103886, Infrastructure Systems - Round 2 - 6-12 Months, 1/9/17 to 30/4/18, £69,384

The Yellow Bike Company Ltd | Marchwood Technologies Ltd

Clamp-IT is a smart mobile phone operated secure bicycle parking network which attaches to existing street furniture. It offers greater security than hitherto available on the street. The unit is internet connected, monitored and managed and will be free to the user when sponsorship is in place. Our mission is to eradicate bike theft.

Market opportunity

There are an estimated 4,475 bicycles stolen every day in England and Wales and 80% of them have inadequate bike locks when stolen. This unit will negate the need for cyclists to carry their own locks and will provide assurance that, if Clamp-IT is compromised, they can claim from Yellowbike's Theft Protection Offer. Clamp-IT is ideal for city centres, railway stations, places of work, outside sports facilities and places of entertainment. Market opportunities are significant.

Innovation

Innovation in the Clamp-IT unit lies 1) in the novel assembly of existing components into a new application 2) in the locking system that prevents access to the chain locking device, 3) in the use of the AWS IoT framework, 4) in the business model, offering Clamp-IT free to the user, when sponsored and 5) in its future capacity to offer bike-share, support the dock-less bike solution and enable intermodal transport opportunities.

Exploitation route

Yellowbike's exploitation route is as follows:

- Renowned South East London Hospital trial will assess its suitability and performance
- South Coast NHS Trust pilot will enable Clamp-IT's accreditation to 'Secured by Design', a condition set by the local Multi National before they sponsor 100 units for the City Centre.
- Pilots at 1) the 24 Cycling Cities, 2) towns with the highest cycle theft and 3) Train Operating Companies will follow in anticipation of introducing it more widely.

Outcomes and next steps

The anticipated outcome from the South Coast sponsored installation is that it will prove the commercial viability of the business model. Small targeted pilots in cycling cities will encourage this model to be replicated and sponsors to be secured.

Yellowbike's next steps are to modify hardware, software and processes as required, identify a manufacturing process which will deliver an acceptable selling price, then either generate sufficient forward sales to pay for the mould or find an investor.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=103886>

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HySerVe - A Mini Hydrogen Dispenser for Breakdown Service Vehicles

103911, Infrastructure Systems - Round 2 - 6-12 Months, 1/9/17 to 31/8/18, £98,830

Fuel Cell Systems Ltd

The Office of Low Emission Vehicles has stated that fuel-cell technology will play a strategic role to deliver the ambition that all new cars be zero-emission by 2040. Breakdown vans will need to cover hydrogen vehicles with the option to top-up an empty fuel tank. The HySerVe project was to design and build a mini hydrogen dispenser to be fitted into a breakdown recovery van.

Market opportunity

There are 5000 breakdown recovery vans in the UK across three major providers. The car manufacturers (currently Hyundai, Toyota, Honda – with Kia, Nissan, BMW, Audi and Mercedes Benz promising to have fuel cell vehicles by 2021) will start to demand equivalent services for their hydrogen vehicles and the mini hydrogen dispenser can be fitted into a recovery van. There are more hydrogen vehicles deployed within mainland Europe, so there are good export opportunities.

Innovation

The FCSL plan is to create a spectrum of refuelling products that will decouple the fuelling of hydrogen from the limited static stations, including mobile and 'top-up' options. Essentially, these products are a delivery mechanism taking hydrogen and delivering it to the point of use. The mini hydrogen dispenser is the very first hydrogen 'jerry can'.

Exploitation route

The initial target market for the mini hydrogen dispenser will be UK breakdown recovery service providers using strong support from the car manufacturers. This will be followed by targetting EU breakdown service providers and then looking into Japan, Korea and California. Currently breakdown services can top-up a stranded vehicle with petrol, diesel, LPG and some offer 'fast charge' for stranded BEVs. Offering a hydrogen top-up will give the first mover a technological and sustainability edge.

Outcomes and next steps

The project finished in August '18, with the first product being delivered to the AA in early September. The AA are delighted to be at the forefront of breakdown innovation and have showcased the dispenser at a number of industry shows and in front of key car manufacturers. There are currently five other live enquiries for this product. There are also plans to expand the refuelling spectrum based upon the success within the HySerVe project.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=103911>

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Petit Pli - Clothes That Grow

104859, Design Foundations Round 1 2018, £21, 525

Petit Pli

Petit Pli embeds a patent-pending structure in garments to create clothes that grow with your child, fitting children from 9 months - 4 years. Petit Pli's technology extends the life of clothing. This extending clothing use is one of the most significant opportunities the fashion industry has to reach carbon, water, and waste targets (Ellen MacArthur Foundation, 2017). This feasibility project seeks to understand maternity apparel market needs.

Market opportunity

Clothing underutilisation & fast-fashion's linear model of production have detrimental societal & environmental effects. These effects are experienced at regional and national levels. The Ellen MacArthur Foundation recently reported that the overall benefit to the world economy would be \$160 bn if these issues were addressed by 2030. Petit Pli tackles the problems created by fast fashion by focussing on a specific market segment where the problem is acute - the childrenswear market & seeks to explore the maternity wear market.

Innovation

The patent-pending pleat system embedded in Petit Pli garments has been created using human-centric design methodologies. By employing these methodologies, Petit Pli's founder Ryan Mario Yasin used his Aeronautical Engineering training degree and knowledge of folding satellite panels to realise a commercially viable, sustainable and disruptive technological solution for the world's second largest polluter - the fashion industry.

Exploitation route

The outputs of this project - an understanding of the maternity apparel market, will be used to create products for Petit Pli's existing market, to include maternity apparel. Petit Pli aims to find solutions in which sustainability is the more desirable option - and not a trade-off.

Outcomes and next steps

The project is due to start in January 2019. This project aims to examine maternity apparel customers' behaviours and identify design challenges. As a result of the explorative nature of this project we forecast that the project's outputs will be used for product research & development of maternity apparel products which reflect real human needs.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=104859>

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Advanced Infrastructure Monitoring Solution (AIMS)

132702; Infrastructure Systems under 12 months and under £100k;
1/3/17 to 28/2/18, £124,316

Intrepid Minds | Manufacturing Technology Centre (MTC)

The proposal for AIMS was to develop a set of mobile and static sensors that could be coordinated through a single user interface initially in support of offshore wind turbine technology, but then for wider usage across the critical national infrastructure industry. As outputs to the project we'll be developing unmanned underwater, surface and aerial drones.

Market opportunity

We believe that the opportunity for this technology is large. We are able to integrate and coordinate any drones as part of a large, global, beyond visual line of sight technology. We are able to land, recover, recharge and communicate in the air, on the surface and subsurface with multiple different drones.

Innovation

We have developed sensors that can go inside turbine blades, underground, in gas and water pipes and in the sea for a fraction of the cost of current solutions. We have drones which stay in the air for days and link to swarming drones that can analyse and even repair turbine blades. We have a boat that is able to house multiple types of drones and coordinate them all. A new system supports a 20 drone to 1 pilot ratio and 8 pilots to 1 commander ratio.

Exploitation route

Our drone technology has already been picked up by one multinational provider in the renewables industry as part of further development with that company. UK and foreign defence organisations are currently trialling some of the technology and we are supporting disaster relief efforts globally. We are now looking to further our exploitation with oil & gas, environmental research, border controls, shipping/asset support etc.

Outcomes and next steps

The project was the catalyst for several conferences, shows and discussions with interested parties. Gaining traction has been slow as the team develops a very new technology with sceptical end users, but early adopters have seen the commercial impact that this has and are now understanding how the next few years of development will give them the competitive advantage they require.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=132702>

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Tenant Electricity Exchange

133163, Emerging and Enabling Technologies Round 2 - Up to 12 Months, 1/2/18 to 30/4/19, £173,130

Verv (apply as Green Running) | Powervault

Tenant Electricity Exchange is a 12-month feasibility study to discover how a combination of blockchain technology and artificial intelligence algorithms can be used to decrease the cost of energy for those who need it most, via the optimisation of distributed energy resources. Working at a social housing estate in Hackney, tenants will have the opportunity to purchase electricity directly from the owners of the solar panels on the building's roof.

Market opportunity

Increasingly, individuals are purchasing distributed energy resources, such as solar panels and battery storage units, however they are unable to fully capitalise on the amount of energy being generated. The technology being developed as part of the Tenant Electricity Exchange project will enable individuals to profit from the energy they generate but do not use.

Innovation

The innovation being unlocked is to demonstrate how the use of blockchain and AI in conjunction with distributed energy resources can create a new energy marketplace that will provide clean, locally generated energy at a lower cost to consumers.

Exploitation route

On conclusion of the project, the team will look to partner with existing energy retailers to collaborate on how to bring this innovation to market in a customer centric manner. These collaborations will be crucial to help provide the relevant evidence to regulators and legislators that the changes required to facilitate this marketplace are very much in the interest of the customer.

Outcomes and next steps

The project is still live, but proving to have a positive impact on the tenants at the test site! Simulations run on data gathered thus far show that there will be significant cost savings for those that join the Tenant Electricity Exchange as well as profit to be made for those selling their energy. In the new year, the project team will expand outside of the initial grant to begin actually updating customer's bills in collaboration with one of the largest UK energy retailers as part of the Ofgem's regulatory sandbox.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=133163>

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Establishing Mutually Beneficial Local Energy Markets (EMBLEM)

133216, Energy Catalyst - Early Stage - Round 5, 1/1/18 to 31/12/18, £298,810

Scene Connect Ltd | Swanbarton Limited

Establishing Mutually Beneficial Local Energy Markets (EMBLEM) tested the feasibility of a pioneering energy trading system for local energy economies, that aims to be a cost-effective demand-response solution which simultaneously reduces energy consumer bills and increases the affordability of renewable energy assets. Designed for the Global South, EMBLEM integrates Scene Connect's Cloud Solar, an off-grid energy metering and control hardware, and Swanbarton's Smart Trading platform to deliver an innovative product, tested on the island of Iona.

Market opportunity

Our target markets are remote off-grid and peri-urban communities in the Global South. The main commercial offering will establish a renewably powered energy trading market for DC nanogrids. International Energy Agency estimate that 60% of new electrification in the Global South will come from off-grid solutions, equally distributed between nanogrids and individual systems. They suggest that 36% of total investment in Energy Access (~\$50billion) by 2030 will go toward minigrids.

Innovation

There are two primary innovations. A fully liberalised P2P energy trading platform that utilises software 'agents' which negotiate prices between users in real-time, without any centralised control. The second is the development of novel, modular, DC nanogrid metering and control hardware that facilitates the incremental expansion of distributed energy resources on nanogrids. Combined, these technologies provide the commercial and technical infrastructure for evolving grids leading to end users climbing up the energy access ladder.

Exploitation route

The EMBLEM product will be a hardware-software technology component for new and existing DC nanogrid systems. Being a modular product, it will allow integration with different nanogrid developers in different regions of the Global South. The ability of the product to be retrofitted to existing systems facilitates an important additional route-to-market opportunity when older, existing systems need to be upgraded.

Outcomes and next steps

Outcomes from the UK, on-grid, trial with 30 participants (24 consumers, 6 prosumers) saw average annual savings of £260 (excluding network costs). Prosumers saw a 60% increase in revenue from the sale of renewable energy. The results demonstrate the product can deliver a mutually beneficial local energy market. The next step is to undertake a commercial trial in the Global South on a DC nanogrid in the context the system is designed for.

Further Information: <http://gtr.rcuk.ac.uk/projects?ref=133216>

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Power Services from Hot Water (PoSHWat)

133298, Open Round 3 Under 12 Months, 1/3/18 to 28/2/19, £133,530

Swanbarton Limited

Our project explores the technical and commercial possibilities for managing large fleets of small energy assets, to deliver network power balancing to the UK National Grid and its international equivalents. The work has focussed on low cost switching of assets and on cloud management of very large asset fleets.

Market opportunity

Our market opportunity is to offer grid-scale power balancing services by briefly switching off the supply to very large numbers of small non-critical energy assets, for example water heaters. Balancing services are an established market. Demand Aggregator businesses deliver them by adding switching devices to large commercial loads. They don't work with small energy assets, because their switching devices are too costly and because of the complexity of managing very large asset fleets.

Innovation

We've developed a prototype low-cost asset controller. More significantly, we've developed the cloud software and control heuristics to deliver reliable balancing services from very large asset fleets. We've proved the technology, built up our intellectual property and applied for patent protection.

Exploitation route

We have close ties with UK energy network operators and look forward to bringing our technology to market in the next wave of balancing services, to benefit not only the National Grid transmission network, but its peripheral distribution networks.

Outcomes and next steps

We've run trials and proved our technology for using energy assets to balance the network. We're working on the business case for developing a commercially deployable version.

Further Information: <https://gtr.ukri.org/projects?ref=133298>

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FrankenStack

133704, Energy Catalyst - Early Stage - Round 5, 1/7/18 to 31/3/19,
£168,469

ITM Power

The project seeks to assess the feasibility of re-using electrolyser stack components. This could have a significant cost reduction for electrolyser maintenance costs and open up new lease based business models for new business. The project will address the business case associated with buying and maintaining an electrolyser, the current business assumption is that the stacks will have an efficient lifetime after which stacks would be replaced. We will assess a plant that has been in the field in operation with a customer to test the feasibility of refurbishing and reusing stack components.

Market opportunity

ITM has been seeing requests for larger, commercial units but this is only from companies that have had successful pilot studies. A plant lifetime saving would enable ITM to investigate a lease or finance offer and potentially allow an offer of reduced cost on refurbished stacks. This outcome will enable significantly more businesses to enter the hydrogen market. Sales channels are established for the company, and the outcomes of this project will use existing company sales representatives in Germany, France, and the Nordic regions and in America as well as in the UK to deploy a new business offering.

Innovation

ITM has a world class research and development facility. At this facility ITM have a state of the art water testing laboratory that can assess water purification. This is currently used to chemically test electrolyser components in simulated conditions but there has never previously been an opportunity to test equipment that has been trialled in the field over a prolonged, continuous period. The unit that the company would acquire as part of this project is an ideal piece of equipment as it has been continually operational for over 35,000 hours, and also because it contains six electrolysis stacks which will provide a large amount of testing data. Once analysis has been completed, ITM will establish which components are suitable for reuse. This will be a completely innovative approach to system maintenance and research.

Exploitation route

ITM will develop a completely novel business model based upon the success of refurbishing a system. Because of the minimal capital costs associated with refurbishing rather than building a new system, a refurbished system could be sold at a fraction of the original sale value or even offered on a lease basis. This would allow new business to enter the market, to conduct preliminary pilot studies which would dramatically accelerate entries into the global green hydrogen market and therefore accelerating its growth.

Outcomes and next steps

The project will have several positive outcomes, one of which being a new business model discussed previously. Another project outcome is the learning that will be gained from analysing a plant that has been in the field and running continuously for a long period. ITM have never previously had an opportunity to assess this and the learning from the degradation analysis will inform research priorities into component durability improvements.

Further Information: <https://gtr.ukri.org/projects?ref=133704>

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Support Ageing Population - to live as independently as possible

971494, First Of A Kind Deployment of Innovation SBRI Phase 1, 1/11/16 to 31/1/17, £50,000

Levstone Limited

Levstone's mobile app "Trusted Elderly Care" (UK) and "Trusted Senior Care" (US market). The project was to develop a Business Plan to:

- Examine and validate the opportunity
- Identify keys to success, risks, ...
- Ensure that subsequent design and development was focused and premium quality
- Create an opportunity to work with a 'Lead Customer' in order to help refine the design and to provide credibility

Market opportunity

First-to-market opportunity: presently there is no mobile app used by families to support and look after their loved ones. The Department for Business, Energy and Industrial Strategy (BEIS) call this emerging market 'social care tech' that is ready to tip - waiting for the right innovation. BEIS commissioned research: 6.5million carers in the UK prepared to pay £100-150 per annum for a solution that lets them keep an eye on a loved one. Annual market of £1billion in just the UK! People are busy and families increasingly live apart. People want a way to look after and keep an eye on a loved one when they can't be with them. Gov UK paper "Future of an ageing population" corroborates the societal need to provide individuals with the tools to take more responsibility to support their elderly relatives.

Innovation

Innovation: design a mobile app that provides elderly people with a user experience that they find interesting, stimulating and they feel is useful and valuable. To date, no mobile app has delivered a valuable user experience for elderly people and hence there is no caring/wellbeing themed app that is used by significant numbers of elderly people. The Unique Selling Proposition is to create the 1st app joyfully used by older people and for multi-generational family care.

Exploitation route

Levstone have designed and developed the software in-house, own the IP, and use no 3rd party software (no dependencies). Exploitation is to use Google and Apple shops for the public to download the app. Levstone have an advanced prototype on Google Play available for public download. In October 2018 the Levstone 'Google shop' received 1500 visitors of which 250 people downloaded the app. The App has been downloaded in more than 30 countries.

Outcomes and next steps

Our innovative software is robust, responsive, resilient, functional, secure and multi-lingual. People can see it and try it – it's real. Next steps:

- Secure finance (presently self-funded with no loans or other people's money)
- User Experience – test, measure, refine (this is the innovation's USP)
- Discoverability – promote app via marketing, social media, ... to increase visitors/downloads
- Multi-Platform Rollout
- Financial Model – verify monetization (in-app payments, coupons, ...)
- Bring on board financial and business partners

Further Information: <https://gtr.ukri.org/projects?ref=971494>

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Enhanced Frequency Response from a Liquid Air Energy Storage (LAES) plant

971495, First Of A Kind Deployment of Innovation SBRI Phase 1, 1/11/16 to 31/1/17, £50,000

Highview Power

The rapid growth in renewable energy generation in the UK and energy markets around the world has created a recognised need for flexibility in the energy system. Energy storage is one of the main technologies that can provide this flexibility.

Highview Power is a UK-based developer of energy storage systems that use liquid air as the energy storage medium. Liquid Air Energy Storage (LAES) systems, demonstrated for many years at pilot scale and more recently at commercial scale, will offer a long duration, bulk energy storage option that will add resilience and flexibility to the power network of the UK and to export markets around the world.

The LAES technology is based around proven turbo-machinery and as a result its response time compares to typical mechanical systems. Consequently, it is not able to serve the fastest acting frequency response markets which electro-chemical storage systems are able to address.

This project hybridises the LAES technology (already present at Highview's Pilsworth project) with flywheels and ultra-capacitors to explore how the combined system can meet the fast-acting frequency response requirements of the UK system operator and hence broaden the range of services LAES can provide.

The target is a +/- 2MW 'instantly' acting system (with the fast response from the ultra-capacitors and flywheels), which is then sustained by the LAES system once it reaches the target output.

The two technologies are tied together by an intelligent control system which combines the output of the LAES plant and the Ultra-capacitors and flywheels, to form the desired overall profile required for the relevant frequency control service.

Further Information: <https://gtr.ukri.org/projects?ref=971495>

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Project title: iRoute: routing by public transport for commercial organisations

971528, First of a Kind Demonstration Phase 2, 1/4/17 to 31/3/18, £298,300

iGeolise Limited

Half the world lives in urban areas where public transport is often a better alternative than driving, however all field routing software uses road. iRoute takes multiple calls that need to be made (patients for example) and efficiently allocates those calls amongst multiple members of the field team (nurses), using public transport. It is the only public transport solution in the world, and reduces the congestion and pollution created by unnecessary road travel.

Market opportunity

The market opportunity lies between the Vehicle Routing software market and the Field Sales Management software market – combined, a c.\$8bn global market. It is for vehicles delivering people, not packages. Examples include community health workers providing in-home care for elderly or disabled, home and office cleaners, sales reps and business development managers, support teams, information collectors, field marketers, insurance assessors, property managers, even meter readers and installers.

Innovation

Field team routing software always uses road; never public transport. There are lots of A to B routing apps, but field team routing is much harder. If 1 sales person needs to be routed to 12 calls, there are 20m possible routes. iRoute can take 10 sales people and 100 calls, allocate calls efficiently to sales people, and route each with the shortest travel time, returning results within 1 minute 30 seconds.

Exploitation route

The initial exploitation route deploys iRoute's 'clustering' and 'routing to multiple locations using public transport' within the TravelTime API <http://docs.traveltimeplatform.com> This makes iRoute available to iGeolise's current clients. The next route is to add iRoute features to the Vehicle Routing software already on the market (as a plug in to existing software from providers like Oracle). The 3rd route will be a simple to use app for field team managers to use.

Outcomes and next steps

iGeolise has run trials with several clients (mainly in healthcare so far), and the results are very positive – healthcare professionals spending longer with patients / seeing more patients, because they spend less time travelling and parking. The societal benefits include less congestion and pollution. The next step is to embed this software with a large existing provider of vehicle routing, so that it can reach thousands of their clients.

Further Information: <https://gtr.ukri.org/projects?ref=971528>

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Kerb - Intelligent Kerbside Management

971531, First of a Kind Demonstration Phase 2, 1/4/17 to 30/6/18,
£1.102,146

Grid Smarter Cities Ltd

KERB Virtual Parking System (VPS) – Is a Real Time Dynamic, Intelligent Kerbside Management Solution for Cities:

The solution addresses the First of a Kind Challenge with an innovative, patent protected, ready for market solution with global potential that can deliver, rapidly, at least cost and effort:

- Additional capacity
- Adaptability
- Resilience
- Integration of / into other technologies.

Grid Smarter Cities Limited (Grid) has developed a novel web-based scalable application which allows commercial vehicle operators to opt to pay and park/ load/ unload on previously unavailable kerb space in high density, urban traffic areas. Operators will use the application to reserve a defined location on restricted kerbspace during an available time slot for a fixed fee. This pre-booked space becomes a 'Virtual Loading Bay' (VLB) or Virtual Parking Bay (VPB) allowing drivers to load and unload in close proximity to their delivery point without causing congestion and without the risk of receiving a Penalty Charge Notice (PCN) and saving time and fuel. Local Authorities (LAs) will determine the fee and the locations to be exempted. This can be time and vehicle specific to give preference to certain vehicles (e.g. zero / low carbon vehicles) and to 'nudge' behaviour into off-peak times. Using Kerb VPS helps councils to address air quality issues in general and also in specific areas by managing kerb space at a micro level and behavioural change through incentivisation and intelligent kerbside management managing traffic flows. Kerb VPS contributes to macro reductions when applied across the borough area by reducing congestion and driver stress on roads. Kerb VPS will reduce the cost associated with administering PCNs creating cost certainties (for fleet operators and councils alike) as well as efficiency savings from optimised deliveries.

Other benefits include:

- Efficient planning multiple drop-offs, reducing CO₂ emissions.
- Encourages take-up of electric vehicles (EVs) by the delivery industry, by providing bookable EV bays incentivised by 'at location' rapid chargers.
- Utilises kerb space on routes that traditionally prohibit loading and unloading – allowing deliveries at previously difficult to reach locations.
- Saves money by reducing the time and mileage spent searching for available kerb space.
- Reducing PM, NO and CO₂ emissions in keeping with "Corporate Social Responsibility" and international air quality standards.
- Sending 'real time' updates to Civil Enforcement Officers (CEOs) reducing the issuing of PCNs.

The solution is replicable and repeatable for London boroughs and provincial cities who will be able to opt-in with as many or as few VPBs / VLBs as they wish. Additionally the platform can be used for other vehicle types as well as freight vehicles such as EV's (including taxis), coaches, vehicles for disabled drivers and skips.

Further Information: <https://gtr.ukri.org/projects?ref=971531>

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Developing a real-time mobile network data platform for connected transport

971533, First Of A Kind (Phase 2) Infrastructure Systems, 1/4/17 to 31/3/18, £1,173,700

Citi Logik Ltd | QinetiQ | Vodafone UK | Worcester CC | Peel Ports (Liverpool)

Citi Logik developed a TRL 6, multi tenancy platform (Citi Analytics) which understands movement by vehicle, on foot and by public transport (multi model) utilising anonymised network data from the existing 3/4G network. The real time capability analyses traffic movement along key routes and predicts future traffic conditions in comparison to a baseline of prior movements. The capability was successfully built, tested independently by QinetiQ and deployed in Worcester and in Liverpool.

Market opportunity

Following the trials in Worcester with the City Council transport team and with the Port of Liverpool (Peel Ports) commercial team, Citi Analytics is now operational as a subscription service in the City of Hull. Citi Analytics is being enhanced with real time GPS data for the monitoring of journey times.

Innovation

The primary innovation was the use of real time and historic anonymised network data derived from the existing 3/4G network as a direct replacement for legacy data gathering techniques. The comparative analysis of real time data with a baseline of prior movements enabled the team to apply Artificial Intelligence to the new data sets and to create a predictive capability. The multi-tenancy cloud-based platform utilising commercial off-the-shelf technology has also created a highly scalable technology which is aligned with a subscription-based commercial offering. Collectively, this offers regionally and locally a mechanism to purchase a more cost effective alternative to existing surveys.

Exploitation route

Citi Logik was a recipient of a First of a Kind grant which enabled the deployment of a high technology readiness analytics capability using existing infrastructure. This was subsequently enhanced to encompass rail network analysis through a DfT grant (Rail Watch) and an SBRI grant to add pollution monitoring capability. These collective efforts have been underpinned with a long term Innovate UK loan to build out the full multi-modal capability.

Outcomes and next steps

The development of Citi Analytics has proven the viability and scalability of anonymised network data as a valid alternative to traditional surveys. With the addition of rail network analysis and pollution monitoring in real time, the new capabilities are demonstrating the potential of transport analytics utilising 3/4G infrastructures and their future application with 5G and IoT technologies.

Further Information: <https://gtr.ukri.org/projects?ref=971533>

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NetOS®: Dynamic & Intelligent Orchestration of Infrastructure Networks

971534, First Of A Kind Demonstration (Phase 2), 1/4/17 to 31/3/18, £1,834,694

Zeetta Networks Limited

Zeetta Networks has transformed Ashton Gate Stadium, Bristol, into a programmable sporting event and conference venue. The whole network infrastructure can now be seen and managed through a single PC screen, vastly reducing operational costs and providing unparalleled flexibility. Bandwidth and service levels can be adjusted to meet varying demands, in real time, and network traffic data now enables strategic decisions to be made by the stadium's owners concerning space utilisation and infrastructure investment.

Market opportunity

The deployment of Zeetta Networks' world-leading programmable network software, NetOS®, is a world first within a multi-purpose venue environment. The flexibility to create ring-fenced network 'slices' and alter service levels across different groups of users or different devices is a unique and highly valuable facility. This innovative technology is of considerable interest from telecoms service providers, as well as enterprises whose networks experience varying demands for network connectivity.

Innovation

Born as a spin-out from the University of Bristol, Zeetta Networks is a pioneer in Software-Defined Networking (SDN) technology. The company's NetOS® software enables the virtualisation of multiple-technology network infrastructures, and the creation of separate 'sub-networks' by slicing the virtual infrastructure into multiple discrete groups of devices. The software uses open protocols and can be programmed, providing the capability to create 'intelligent networks' that can adjust themselves automatically to meet varying demand for connectivity.

Exploitation route

SDN is a key component in enabling 5G telecoms technology to meet its potential. Service providers need to develop networks that provide ring-fenced, assured connectivity to key groups of users (such as those operating autonomous cars, for example) and network slicing is vital to this. In addition, large enterprises with multiple sites and/or multiple groups of users – such as stadia – are key target customers, and these will be accessed via a third party partner sales channel.

Outcomes and next steps

Following the company's initial deployment of NetOS® at Ashton Gate Stadium, Bristol Sport has become Zeetta's first commercial customer by signing up to a support contract. The business is also attracting significant interest from telecoms service providers, and a contract has recently been awarded to the business from a Tier 1 telecoms service provider to help in automating the management of their network infrastructure. Relationships are also being built with device manufacturers and other channel partners.

Further Information: <https://gtr.ukri.org/projects?ref=971534>

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Deployment of a Muon Tomography System for Nuclear Waste Characterisation

971536, First Of A Kind Demonstration (Phase 2), 1/4/17 to 31/3/18, £1,539,397

Lynkeos Technology Ltd

Lynkeos Technology is a multi-award-winning Scottish company that specialises in the innovative field of muography, which uses natural radiation to shed unique light on the contents of complex shielded structures. Lynkeos collaborated with the University of Glasgow and the UK National Nuclear Laboratory (NNL) to commercialise its Muon Imaging System (MIS) and to deploy it on a nuclear licensed site. This is now in operation at Sellafield where it is performing first-of-a-kind characterisation of nuclear waste containers.

Market opportunity

Processing and safely storing legacy and future wastes are major challenges for the UK nuclear industry. Globally, decommissioning is estimated to cost around £250 billion over the next century and up to £10 billion in the UK alone over the next five years. By improving waste classification, it is estimated that the MIS will reduce storage costs by several £100 million as well as reducing the risks associated with the long-term storage of nuclear waste.

Innovation

The Lynkeos Muon Imaging System (MIS) is the first of its kind within the global nuclear industry. It uses naturally-occurring background radiation, in the form of cosmic muons, to passively inspect the contents of shielded waste containers including Intermediate Level Waste drums and those arising from thermal processes such as GeoMelt® In-Container Vitrification™. The CE-Certified MIS produces high-resolution 3D density-based images within heavily-shielded structures and can identify the presence of small fragments of encapsulated fuel.

Exploitation route

Lynkeos has strong support from the NDA, Sellafield Ltd and NNL, which was crucial during this project. Upcoming imaging campaigns using the Sellafield deployed MIS will further validate this technology within Lynkeos' beachhead market. Lynkeos is engaged with other site-licensed companies and civil nuclear organisations within the UK and is in discussions regarding licensing within Europe. Other markets for this technology have been identified and feasibility measurements are being performed for a range of applications.

Outcomes and next steps

During this project, Lynkeos Technology designed, constructed and successfully obtained full EU CE Certification for its Muon Imaging System, which has subsequently been deployed on the Sellafield site within National Nuclear Laboratory's Central Laboratory. This commercial system has been commissioned and is now undertaking the first passive imaging analysis within the UK nuclear industry on active thermally-treated waste products from Veolia Nuclear Solutions' GeoMelt® process.

Further Information: <https://gtr.ukri.org/projects?ref=971536>

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Low temperature Anaerobic Digestion

971547, First Of A Kind Demonstration (Phase 2) - ISCF, 1/6/17 to 31/3/18, £771,128

NVP Energy

NVP Energy, a pioneering cleantech company, has developed a first-to-market wastewater treatment (WWT) solution for the Food & Drink and Municipal wastewater (WW) sectors which can turn WWT technology from an operational cost and energy burden into a revenue generating, energy-positive process with unmatched payback, a step-change for the energy-intensive WW industry. The high-rate Anaerobic Digestion WWT technology cleans low-strength wastewater efficiently at low temperatures and at a fraction of the cost of other WWT technologies. The renewable energy generated is of exceptionally high-quality biogas (>85% methane) and is 100% available for use on site.

Market opportunity

NVPE's innovation enables customers to treat their large volumes of low strength WW on site. The technology removes chemical oxygen demand (COD) total suspended solids and TSS concentrations in their WW, allowing customers to significantly reduce their current trade effluent charges. Unlike other WWT technologies, negligible sludge is produced, so sludge treatment disposal costs are minimal. A by-product of the Low temperature Anaerobic Digestion (Lt AD) process is biogas as the energy generated from the biogas is greater than the energy required to operate the system, it is carbon neutral and energy positive. The biogas that is generated has more than 80 percent CH₄ content with very low H₂S content, which is exceptional for AD and can be 100 percent utilised on site for heat and /or electricity production through Boiler or CHP systems, which will become an ongoing revenue stream for customers.

Innovation

NVP Energy has developed a unique technology that cleans WW to a very high standard whilst recovering valuable high quality biogas that is 100 percent available for reuse. NVPE's solution has global reach, where their innovative energy positive Lt AD technology works at temperatures less than 20 degrees C which is unique for AD and means no heat input is required for the microbes to work effectively and allows the Lt AD to work at Hydraulic retention times below 12 hours. The technology offers a triple effect of substantially reducing trade effluent charges by more than 60 percent, removing sludge creating biogas that is 100 percent available for reuse to generate heat and/ or electricity on site.

Exploitation route

NVPE's solution turns WWT from being an operational cost into a new revenue stream for prospective customers in Food & Drink Industries such as brewing, malting, distilling, bottling, dairy and meat processing, offering average paybacks of 3 years.

Outcomes and next steps

Following successful delivery, commissioning and operation of the innovative technology to date, NVP Energy has subsequently secured several contracts in the UK with companies such as Heineken, Welsh Water and a global malting company which will all be operational in 2019.

Further Information: <https://gtr.ukri.org/projects?ref=971547>

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Large-scale Solar Carports for Integrated Transport & Energy Systems

971548, First Of A Kind Demonstration (Phase 2) - ISCF, 1/6/17 to 31/3/18, £2.318,000

FlexiSolar Ltd

Solar carports allow dual use of large car parking areas for the purpose of producing electricity, generated from the sun, whilst benefiting car users. A surface car park is usually uncovered and open to the elements, so the construction of a solar carport allows the vehicles and users to be sheltered from adverse weather conditions. Installing a solar PV system not only saves money on customer's electricity bills but also protects against rising electricity rates in the future.

Market opportunity

With the 2017 announcement from the UK Government to end the production of new petrol and diesel vehicles by 2040, global motoring manufacturers are switching their focus to electric only production. A key number of vehicle manufacturers have pledged to commit to earlier dates for full electric roll out. It is estimated that there are over 100,000 electric and plug-in cars in the UK today – which equates to approximately 1 in every 200.

Innovation

Solar carport structures enable organisations to generate onsite energy at scale in a renewable form, providing reduced costs, revenue generation, energy supply and price security; with a premium, weatherproof parking experience. Plus, with the ability to incorporate EV charging points and future proof by adding more as demand grows, and the flexibility to integrate a sized battery storage system, solar carports can help to prepare sites for the low carbon transport of the future too.

Exploitation route

Following the completion of a solar carport test build, and subsequent prototypes, FlexiSolar has been successful in installing various solar carports, including the UK's largest, and aims to continue rolling out its solutions across the UK.

Outcomes and next steps

FlexiSolar has developed and refined the concept of integrated solar carports and has already proven itself as a leader in large-scale solar solutions, with its recent projects for clients such as Bentley Motors and Sutton Council demonstrating how the solar carport approach impacts both large organisations and local communities in delivering lower energy costs, higher energy efficiency, on site micro-generation, improved air quality, lower carbon footprint and integration with the EV transport revolution that is under way.

Further Information: <https://gtr.ukri.org/projects?ref=971548>

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SimplifAI

971549, First Of A Kind Demonstration (Phase 2) - ISCF, 1/6/17 to 31/3/18, £898,356

KAM Futures | BT | Future Everything | Infohub | Simplifai Systems Limited | Transport for Greater Manchester | University of Huddersfield

SIMPLIFAI - (pronounced simplify) - The project addressed the challenges surrounding the complex interaction between environmental, social and economic aspects of urban transport movements. It used advanced computing techniques to simplify the interaction between transport managers and users of transport networks. The project built a new form of transportation management to meet the urban transport challenges of the mid 21st Century.

Market opportunity

The world is experiencing a fourth industrial revolution. Never before has such an abundance of technology and data been available to us, nor has the pace of innovation and creativity been greater. Within smart infrastructure – the convergence of physical and digital infrastructure - transportation is leading the way. The global market is projected to be worth £900 billion by 2025; part of the larger smart cities market, itself projected to be worth \$2.5 trillion by 2025.

Innovation

Simplifai is software that uses artificial intelligence to rapidly calculate the optimum timings of traffic lights across an entire city to meet any traffic-related objective you might want to specify, in a way that's 20% more effective than existing solutions. Unlike current systems, it is designed to operate at city-scale, in real-time and autonomously, continuously adjusting its approach based upon real-time sensor data.

Exploitation route

Transport management and technology companies are our preferred route to market. We are developing partnerships in this sector at the same time as nurturing direct relationships with transport authorities. Simplifai enhances their products, allowing them to deliver greater customer value and, crucially, to manage traffic significantly better. Simplifai also shortens their product lifecycle at relatively low risk, by providing a product that they can use within 12 months.

Outcomes and next steps

Simplifai Systems is currently building the commercial version of our product. This is achieved in two stages. Firstly, an 'offline' product for the transport planning market then an 'online' version of the product for the traffic control market. Simplifai Systems is currently undertaking a fund raising round to finance the bootstrapping of the team and rapidly deliver our products to the first wave of customers in the North of England.

Further Information: <https://gtr.ukri.org/projects?ref=971549>

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ViridiScope®: field testing an innovative new sampling tool for the nuclear market

971552, First Of A Kind Demonstration (Phase 2) - ISCF, 1/6/17 to 31/5/18, £1,087,334

Viridian Consultants Ltd | LLW Repository Ltd | Magnox Ltd | Sellafield Ltd | EDF Energy Nuclear Generation Ltd

ViridiScope® is an innovative laser sampling tool that can be used in place of conventional drilling to remove material from a surface, to permit the safe, clean and fast sampling of materials such as concrete and brick for radionuclides and elemental characterisation. The key aim of the deployment project, working in collaboration with 5 sites undergoing decommissioning characterisation activities, was to overcome resistance to change, and thus gain acceptance of this new approach.

Market opportunity

Currently, highly radioactive samples are collected manually. Material is collected by suitably protected operatives with conventional drilling and subsequently characterised in off-site laboratories. Analysis times are long, thereby limiting the number of samples that can be taken, so detailed sampling to establish spatial distribution of contamination is not possible. This has significant implications for the segregation of waste streams and the resulting cost of inappropriate sentencing of large volumes of waste to ILW (Intermediate level Waste).

Innovation

ViridiScope® is a totally new approach to sampling for nuclear decommissioning. It is a laser sampling tool, designed to permit the safe, clean and fast sampling of surfaces such as concrete, plastic, wood, plaster and brick for a wide range of radionuclides and for elemental characterisation. ViridiScope® is robust and highly portable, and has been designed to be taken into high radioactivity areas. It can be operated manually or deployed on a remotely operated vehicle.

Exploitation route

By partnering with NDA-supported Site SLCs: LLW Repository Ltd, Magnox Ltd, Sellafield Ltd and EDF Energy Nuclear Generation, Viridian has accessed and tested ViridiScope® on five very different sites with a range of decommissioning projects: the waste repository site at Drigg; Socotec analytical laboratory; experimental reactor, Dragon at Winfrith; a decommissioning nuclear reactor at Trawsfynydd and an EDFE operational nuclear power plant at Hinkley Point.

Outcomes and next steps

The reliability of ViridiScope® has been demonstrated in the most adverse conditions. On one site, in less than four hours, we took 100 samples over 20 m² demonstrating the gamma activity for Am-241, Cs-137 & Co-60 over the area was below 0.2 Bq/g. ViridiScope® collected material at a height of 8 m on an ROV, work which would have required scaffolding. ViridiScope® is now at TRL8 and able to offer a range of packages to suit each application.

Further Information: <https://gtr.ukri.org/projects?ref=971552>

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