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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041204	Mid	AEON ENERGY LTD	£812084	£621360

Project Title
AEON - Development of an innovative, floating, dual-energy platform (60kW) for Small Island Developing States

Public Summary – Provided by applicants
AEON - Development of the next-generation floating hybrid energy platform for island communities

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040896	Early	KINETIC HYDRO LTD	£298753	£237235

Project Title

Improving Affordability and Reliability of Energy Access in Uganda with River Turbines

Public Summary – Provided by applicants

Improving Affordability and Reliability of Energy Access in Uganda with River Turbines
This study will show how novel hydro-kinetic river turbines can be a valuable addition to the portfolio of solutions that can be used to accelerate energy access and improve the quality of life for poor, rural communities in Uganda.
The emergence of small, efficient, free-stream, hydro-kinetic turbines capable of economically generating electricity from the speed of fast-flowing water is a new development. It uses technology transferred from the offshore tidal energy sector, in which the UK has been a world-leader since it began, about twenty years ago. Hydro-kinetic technology is fundamentally different to conventional hydropower that extracts energy from rivers as they drop through a height, or 'head'. Conventional hydropower is cost effective and reliable at a large scale supplying power to national grids. But these enormous projects often fail to connect poor communities who are either 'beyond', or 'beneath' the grid. Hydro-kinetic turbines that are easily deployed without civil engineering works can offer affordable, reliable power to those who might otherwise be left behind.
The consortium who will deliver this feasibility study brings together Kinetic Hydro, a UK SME developing the turbine technology, Practical Action, a charity with over thirty years' experience working in Sub Saharan Africa, the Challenges Group, a business development agency supporting social enterprises, and the University of Leicester, who have an established capability in assessing hydropower potential using satellite data.
Uganda will be used as a case study to assess the feasibility of hydro-kinetic river turbines contributing to the acceleration of energy access provision. The country has opportunities and barriers to success that will be representative of (but not the same as) others in sub-Saharan Africa. It has low, but accelerating access to electricity, a poor and widely dispersed rural population, and a network of rivers

suited to hydro-kinetic turbines. Women and marginalised groups in rural areas have disproportionately poorer energy access, as well as limited control over productive resources. Basic tasks such as collecting water, fuel and fodder consume many hours a day. Energy access can be transformative if it can used to free up time spent on chores so that it can be used for income generating activities. This project will therefore research how to deliver sustainable and impactful development projects based on hydro-kinetic turbines for the children, women and men living in Ugandan communities near to suitable rivers.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047783	Mid	CARNOT LTD	£1499909	£1120431

Project Title

Rice-straw powered biowaste to energy

Public Summary – Provided by applicants

This consortium, let by Carnot Ltd, seeks to develop the world's first profitable rice-straw bioenergy demonstrator for a rural community in Lombok Island, Indonesia. Rice straw is separated from the grains during harvesting and either combusted (producing CO2) or left to decompose (producing methane with 25* Global Warming Potential) due to challenges with harvesting it, particularly in flooded paddy fields (a common occurrence). Straw Innovations has created innovative technology that overcomes the barriers to harvesting it in all weathers, unlocking a potential 300Mt of rice straw generated in Asia every year.
Rice straw has high ash content (around 20%), comprising about 75% silica. This, combined with other components in the straw (chlorine, potassium) causes melting and slagging / fouling in boilers when combusted. Hence, it is not an easy fuel to chop or combust. PyroGenesys have developed a lower-temperature pyrolysis process which can convert rice straw into Biochar, a carbon-sequestering fertiliser that can be used by the rice farmers, and biofuel. The carbon sequestered can be traded on carbon removal markets. Surplus biofuel not used to generate electricity can be sold. Electricity is a low-value commodity and renewable electricity projects will typically require very large scale to be profitable and attract funding required from investors. PyroGenesys' process solves this problem by opening up two very high-value revenue streams.
Carnot is developing ceramic engine gensets with double the efficiency of state-of-the-art diesel gensets, capable of operating on all fuels. These will provide electricity to the rice mills as their base load as well as electricity to a rural community. Integrating Carnot's gensets enables revenues generated by biofuel sales to be maximised.
Indonesia:
* Is the world's 5th largest GHG emitter.

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* Is the largest producer of biofuels worldwide.
* Has mandated to convert a significant portion of its palm oil into FAME biodiesel.

There is a reluctance to move to renewable energy due to fossil fuel sunk costs/subsidies and no proven profitable off-grid low-carbon energy business model. This demonstrator project aims to be the catalyst to breaking the deadlock and unleashing investment into Indonesia's enormous renewable energy potential.

Key project outputs:

* Pilot-scale demonstration of business model feasibility
* 200,000kg rice-straw feedstock;
* 76,000kg value-added-biochar/53,200kg carbon sequestration/80,000kg biofuel;
* 2.28MWh electricity provided to rice mill.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046053	Mid	POWERHIVE INC UK LIMITED	£1180071	£826050

Project Title
"Bee-Smart" - Powerhive's Smart-Grid Software

Public Summary – Provided by applicants
In Sub-Saharan Africa, over 600million people lack access to electricity and millions are connected to an unreliable grid. Lack of energy security, especially in poorer parts of Africa, leads to reliance on biomass-fuels and expensive diesel-generators and diesel plants. Energy optimisation and redirection are a potential game-changer for widespread adoption of renewable energy. Modern green mini-grid (GMG) technologies manage renewable power intermittency, demand-response services, and dispatch stable, clean, and sustainable power into the local/national grid system. However, cost, flexibility and reliability are significant barriers preventing widespread adoption. The most cost-effective approach for powering mini-grids is to use renewable energy sources, which are widely available across Africa. Barriers to the growth of private sector mini-grids in Africa include gaps in the policy and regulatory framework and the lack of proven business models \[ADBG,2016\]. **Powerhive's Solution** Using advancements in data-analytics and Big Data principles, Powerhive will develop an innovative machine-learning solution (Bee-Smart) that analyses energy production, usage, meterage, community needs, to address challenges through smart insight engine providing social and financial dividends at low-cost to rural communities, maximising data to ensure low-cost, accessible energy for end-users. **Optimising Production/Storage/Usage through Data** The project will aid GMG providers to optimise renewable energy grids to make excess power generation work for local communities using AI-based insights and decision-making from GMG meterage, site locations, communities, agricultural and business needs in the

specific region of the GMG as well as other data such as weather impacts on GMG energy production. These AI-based insights will give GMG energy suppliers the ability to redirect energy at off-peak, low-cost rates to provide additional services to communities based on their own needs. This innovation will aid energy companies in providing lower-cost energy, optimising their own grids to reduce operational expenditures, and enable increased energy access for communities, while using the intermittent nature of green energy production to their advantage. Powerhive will provide a SaaS solution, which will be bundled with productive energy use hardware.
Beneficiaries/Stakeholders
The main beneficiaries of the project will be rural communities that rely on GMGs for energy, which aren't connected to the national grid. Bee-Smart will be aimed at GMG production and energy companies, using their own meterage data to better serve energy consumers and reduce operating costs. Powerhive supports the global advance on SDG7, enabling access to clean energy. Bee-Smart will subsequently be rolled out across Sub-Saharan Africa post-project.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10039913	Mid	NEW RESOURCE PARTNERS LIMITED	£985516	£747536

Project Title

Catalysing Bankability of East African Mini-grids by Integrating Transport Energy Demand

Public Summary – Provided by applicants

This project offers the potential to accelerate clean energy access in Kenya and sub-Saharan Africa, including for disadvantaged and marginalised groups, and supporting gender equality, by creating new business models for "**Integrated Mini-grids**". In Kenya, energy off-take from mini-grid projects averages 40% (Knights Energy). Such projects often remain non-commercial, and require government funding, resulting in persistently low energy-access-rates (71.4%, World Bank). Mini-grid projects in Kenya average around 60kW, an investment of only £50-80k, and too small to be attractive to many private investors.

The project directly targets **energy access** for presently unserved energy users, including marginalised, disadvantaged and groups such as women, the elderly and persons with disabilities. It does this through rendering rural mini-grids investable, and providing the means (software) for developers and investors to identify portfolios of many such projects, which will positively impact many more villages than presently reached by Kenya's rural electrification programmes.

The primary energy input to the energy systems envisaged is solar, with some potential for small wind farms also. Clean energy technology is envisaged also on the demand-side of the energy systems, including electric vehicles. In addition to providing energy access, deployment of the business models envisaged will displace reliance on fossil-fired transport energy, leading to reduced local pollution of air, soil and water, and reduced CO2 emissions from the burning of fossil fuels both in the production of electricity, and in the distribution of fuel. In addition static battery energy storage systems will be investigated to help balance the demand for energy in mini-grids with the timing of solar/wind supply. Finally, Demand Side Response (DSR) and other efficient demand management practices will be investigated for their balancing potential.

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The Project Partners include two Kenyan-headquartered and two European partners. **New Resource Partners** (NRP) is a local clean energy innovation business, advising national and local governments, and investors in clean energy, working in the UK, Europe and India. **Sustainable Transport Africa** (STA) is the in-country lead, an NGO whose core mandate is to promote energy access for the underprivileged through sustainable transport solutions. **VAI Capital** is an investment and fund manager specialised in sustainable transport, with focus on financing integrated energy and e-mobility projects for financial return and climate, economic and social impact. **Knights Energy** (Trading Name of Knights and Apps Ltd.) is a clean energy project developer, with a total installed capacity of over 12MW installed across East Africa.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040419	Mid	SUN HARVESTER LIMITED	£521714	£368560

Project Title
Solar-Hydrogen Powered 100% Renewable Modular Mini-Grid (Solar-H2)

Public Summary – Provided by applicants
In developed countries across the globe, we take reliable energy access for granted. Although progress on energy access is being made in developing regions, 770m people worldwide are still living without access to modern energy services \[World Bank 2020\], including 600m in Sub-Saharan Africa. Grid connection and solar PV systems have improved energy access for Sub-Saharan African urban populations, with 74% now benefiting from electricity access. However, in rural Sub-Saharan Africa, only 26% of the population have access to electricity \[WEO2019 database, IEA 2020\]. These rural areas are deprived of clean, reliable, and cost-effective energy to supply domestic, commercial and community buildings. This leads to a reliance on biomass fuels (creating life-threatening health hazards and decimating ecosystems) or expensive, polluting diesel plants \[Oxfam, 2020\]. Stand-alone systems and clean mini grids have been identified as a solution, with IEA predicting they will make up 70% of rural connections by 2030 \[ADGB, 2020\]. In this project, Sun Harvester will work with Kenyan partners, Hope Bright Future Centre (local agent, NGO Hope for the Nations) to design, develop and field test an affordable community mini-grid solution, powered by solar panels. Working directly with local communities, the partners will address all the gender and social inclusion aspects related to design and end-user needs. We will further develop our stand-alone Instant Grid (IG) modular energy storage technology for use in a mini-grid. Our mini-grid solution will be scalable, so we can achieve enough power supply capacity to supply entire communities. We will replace diesel generator back-up with hydrogen fuel cell technology to deliver a 100% renewable mini-grid solution. Elimination of diesel brings extensive, environmental,

fuel saving, security of supply and health benefits. For example, carbon dioxide currently emitted by generators in Sub-Saharan Africa is equivalent to 22m passenger vehicles on the road. \[The Dirty Footprint of the Broken Grid, World Bank 2019\].
Sun Harvester's solution will reduce mini-grid Levelised Cost of Electricity (LCOE) from $0.39/kWh \[Irena, 2020\] to $0.24/kWh. Cost savings are achievable through: easy installation, replacement of individual battery cells and battery monitoring/management for increased lifetime. Furthermore, our modular design allows correct sizing of mini-grid installations, reducing entry level CAPEX costs from c.$100k to $10k.
Our solution will be economically viable and specifically designed for deployment in remote, rural areas of Kenya, and sub-Saharan Africa. This will unlock affordable, secure, energy access for all, bringing benefits to sub-Saharan Africa's most at-risk and impoverished communities.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040903	Mid	NATURAL SYNERGIES LIMITED	£1484228	£1038960

Project Title
Technical and Societal Innovation for Delivering Access to Community Wide Affordable Cylindered CBG for Cooking and Sustainable Fertiliser

Public Summary – Provided by applicants
Natural Synergies Ltd (NS) Industrial Research project "Technical/Societal Innovation for Delivering Community Wide Affordable Cylindered CBG for Cooking and Sustainable Fertiliser" is to establish new data and knowledge, which would eventually lead to establishing an demonstration waste to energy process based around an advanced anaerobic digestion treatment process that has been developed by NS. This seminal development work will utilise a sectoral system of innovation which will eventually lead to nationwide joint partnerships, between NS the (technology provider) and poorer sectors of the local community. NS together with project partners, are involved in a project that concerns advanced pre-treatment and processing of faecal sludge and organic waste, providing enhanced, efficient energy security/generation, utilising locally available resource and GHG emission savings. NS aims in this Industrial Research project, to develop a stand-alone enhanced energy pre-processing technology, for rural and peri-urban locations in developing countries, increasing the efficiency of energy generation for the supply of affordable clean energy, for cooking and transport to the poor and marginalised local community and also with the production and supply of a sustainable source of fertiliser to local farmers. The decentralised and localised waste to energy plant, will also serve as a low cost faecal sludge management system and organic waste treatment facility, preventing the dumping of waste into waterways and land, providing benefits to both the environment and health to the local community. During the course of the project, the team will work in close co-operation with existing co-operatives and where necessary, expand and create further entrepreneurial partnerships, encouraging women's empowerment, social inclusion and security in the overall waste supply chain and product sales and marketing. This will lead to establishing a circular economy for waste treatment with close co-operation between the energy plant operator and the local community. Although specialised

components will be sourced in the UK, NS will establish non-specialised component manufacture/build using local industries leading to job creation in DC, economies in plant build, short inbound/outbound feedstock and product supply logistics, marketing, sales and service supply chain.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10038248	Early	COMPACT SYNGAS SOLUTIONS LIMITED	£299970	£254966

Project Title

"Green" Tea: creating clean heat and power with biomass residues and gasification technology to future-proof your cuppa.

Public Summary – Provided by applicants

Our vision for this project is to strengthen the financial, environmental and societal viability of Kenya's tea sector through decentralised electricity and heat generation from crop residues, enabling lower costs, emissions and fuelwood use, and higher reliability.
The consortium brings together Compact Syngas Solutions (CSS) gasification technology provider and the expertise, knowledge and skills in Kenyan tea agriculture, energy sector from the Consultative Group of International Agricultural Research-International Institute of Tropical Agriculture (CGIAR-IITA) and The Grass Company (TGC).
The key objectives of this feasibility project is to prove to the Kenyan tea supply-chain through operational and financial data and stakeholder engagement that gasification technology is key to an affordable, efficient and reliable energy source for the production of tea that also is better for the environment.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046726	Mid	SOLARISKIT LTD	£414815	£327450

Project Title
Developing new solutions and building capacity to unlock the potential of solar thermal in East Africa

Public Summary – Provided by applicants
Solar thermal technology has the potential to drastically reduce dependence on fossil and biomass fuels to meet heating demand in sub-Sahara Africa. Harnessing Africa's abundant solar radiation with solar thermal will reduce end user energy costs, lower the demand on grid, decrease deforestation, while improving energy security and lowering carbon emissions. The current low penetration of solar thermal technology in Africa, however, is due to: * High system cost * Difficult transportation of components * Complex installation * Shortage of skilled installers This project aims to address key barriers which have prevented the adoption of solar thermal technology in sub-Sahara Africa, focusing on the following objectives: * Design and testing of a complete low-cost solar thermal system. Our goal is to reduce system cost by approximately 40% compared to current systems available. The system will comprise of SolarisKit's flat-packable solar collectors, a new low-cost solar thermal controller compatible with high efficiency pumps, and plastic piping kit. * Conduct extensive in-country testing of the new low-cost solar thermal system for domestic and commercial applications. * Create a solar thermal centre of excellence at Strathmore University to train installers of solar thermal systems. In previous work funded by Energy Catalyst 7, SolarisKit successfully developed its low-cost flat-packable solar collector, improving its performance while reducing its cost. While the collector is a core component of a solar hot water system, other components are also

required contributing to its overall cost. This project focuses on developing a new low-cost solar pump controller with fuzzy logic, and plastic hydraulic piping kit to further reduce total system cost. The lower cost system is targeted at both domestic and commercial applications with in-country testing to be completed in Kenya and Rwanda.
Installation skill level is a key barrier preventing solar thermal technology reaching its potential in Africa. To address this issue, SolarisKit will partner with Strathmore Energy Research Centre to establish a centre of excellence to train technicians on the installation and maintenance of solar hot water systems. This centre will be an ideal platform to transfer knowledge from the UK to Kenya, building upon Kenya's current solar thermal capacity.
By the end of our 24 month project, we will develop a new low-cost solar thermal system suitable for the African market, create a Centre of Excellence for the Installation of Solar Thermal Systems, complete the training of 10-15 technicians, and carry out the installation of approximately 150 collectors for training and commercial pilots.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048467	Early	AFRICA NEW ENERGIES LIMITED	£299532	£209673

Project Title

Exploring the feasibility of pumped hydroelectric energy storage (PHES) using seawater in South Africa

Public Summary – Provided by applicants

South Africa is currently facing its biggest ever power crisis with many parts of the country facing rolling blackouts of up to 6-hours/day due to an inability to consistently meet demand which results in daily load shedding. This is severely impacting businesses and households, limiting economic growth and further deepening an unemployment crisis, currently at a staggering 34.5%.
In response, South Africa's government has committed to transforming the Energy Sector. A key part of this goal is centered around Renewable Energy investment and a move away from coal which currently accounts for 70% of energy supply, with a target of 17800 MW of electricity to be derived from renewables by 2030\. However, for this to be achieved it needs to be accompanied by an effective means of energy storage.
This project aims to address this current barrier through the initial development of a 11 GWh pumped hydroelectric energy storage (PHES) using seawater as the storage medium, with the potential to be scaled further. Although seawater PHES is not new, it has not been attempted at large-scale with key challenges (e.g., saltwater corrosion, biofouling, impact on marine life) to be addressed. However, with the acceleration of renewable-investment programmes and increasing demand on freshwater reserves, a number of seawater projects are currently being considered in other locations including Australia and Chile.
Replicating the same set-up of freshwater PHES (energy storage achieved by pumping water to an upper reservoir when energy is abundant and then generate electricity during peak times by releasing the water to the lower reservoir in this case the sea, therefore reducing capital cost) but with planned innovations in filtration techniques, dam lining and through the use of floating solar panels to reduce evaporation, the UK-based Africa New Energies (ANE) Limited, seek to overcome legacy challenges to offer a solution that can increase and further demonstrate the viability of seawater-PHES globally.

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Successful outcomes from this 9-month feasibility study will give confidence to move into detailed design and financing. Once operational from 2025, the proposed solution will deliver significant socio-economic and environmental impacts across South Africa including:

* Support the case for Renewable-Energy investment as the country seeks to move from its coal dependency.
* New employment opportunities.
* Provide greater grid stability.
* Improve security of supply and affordability.
* Reduce the need for freshwater use in a country recognised for its aridity.
* Annual CO2 savings of 1.96 million tonnes.
* Replicable knowledge and model.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041195	Mid	FUTURE EARTH LTD	£394860	£276402

Project Title
Managing, monitoring, evidencing solar system productivity - REMOT

Public Summary – Provided by applicants
Solar energy for productive uses like grinding corn or refrigerating produce in small businesses or homes can significantly improve agricultural productivity and socio-economic living standards for poor African off-grid communities. The required power output compared to typical home systems is generally greater and quite expensive, so most customers prefer credit-based payment models and require reliable system performance. Solar distribution companies have tapped into this fast-growing market but market penetration is hindered by manual solar system performance monitoring across wide geographies, and rudimentary systems for managing payments. Digital systems for automatic payment management, real-time performance monitoring, and pre-emptive troubleshooting, can ensure quick and effective system maintenance and system reliability and provide the data evidence base for solar distributors and development finance institutions to really accelerate the uptake of productive use solar systems. Our Remote Energy Management and Monitoring Technology (REMOT) at TRL7 is currently deployed in \>1500 solar PV installations across 8 SSAf countries with field trials underway of our 3rd generation hardware in \>1,100 of these. The hardware is the only unit on the market which is entirely fabricated in Africa in our new factory in Uganda. Matching our hardware innovation, our vision under this IUK competition is to develop: 1. New innovative software capability for primary (solar distribution companies) and secondary (international development finance institutions and insurance company) clients 2. Transformational software-as-a service subscription model to make REMOT even more affordable and accessible 3. Trial the software with existing and new clients to provide the evidence base for a Series A investment raise of $1 million

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Importantly, through the total project we will impact an estimated 74,769 persons and enable 452,600 kWh solar energy generated per year.
Our short term vision after this project is to reach a client base of 200 B2B clients across 15 African countries and \>1,000,000 beneficiaries in health clinics, schools, small businesses and households by 2025\.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047646	Early	University of Oxford	£274894	£225453

Project Title

Affordable Solar Photovoltaic-Powered Cold Storage in Vietnam

Public Summary – Provided by applicants

Vietnam's cold storage market is expected to grow fast with booming demand that is expected to reach USD 295 million in 2025, yet the growth is obstructed by a critical shortage of suppliers. The country is in urgent need of more cold storage facilities as the current capacity only meets 30-35% of the nation's demand. Cold storage can have transformative impacts on small and marginal farmers and rural communities through enhanced market connectivity.

To address the major challenge in the costs and capacity of current cold storage equipment in relation to the volume of frozen food production, our project will build on the solar energy and thermal energy storage technologies to develop and test inexpensive and off-grid cold storage, to meet the specific and urgent needs at the farm of small-scale fishing and aquaculture, to reduce food loss and maintain quality of product to market. Alongside the technology, we will also develop the novel purpose-driven business and finance models that are socially and economically appropriate. Working with in-country partners, the technologies and business models will be tested through farm-side pilots, focusing on the needs of women and low-income communities. Finally, our work will be undertaken to assist the partnership to understand the production and distribution capabilities required in Vietnam to scale accessibility and maintain low costs.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10045465	Early	University of Oxford	£276809	£232281

Project Title

OxReGen Wind Turbine Mini-grid Pilot

Public Summary – Provided by applicants

In Somalia, only 15% of the population has access to electricity (Somalia National Development Plan). 90% of this electricity is supplied through isolated, diesel-based mini-grids (World Bank), which are costly and unsustainable. Furthermore, reliance on diesel generators does not support the United Nations' Sustainable Development Goal of ensuring universal access to affordable, reliable and modern energy services by 2030\.

Of all the countries in Africa, Somalia has the highest potential for onshore wind power (African Development Bank). Therefore, implementing an affordable and reliable wind energy solution is the obvious choice for increasing energy access in Somalia. This is the aim of the project.

The project team is comprised of members from the University of Oxford, ÉireComposites and Save the Children International. They will develop an innovative wind turbine mini-grid system, that will be both affordable and reliable. The mini-grid system will store energy to power electrical appliances, even in the absence of wind. This system will be constructed using locally sourced, off-the-shelf components, making it simple and easy to install. In addition, there will be minimal maintenance that anyone can be trained to carry out.

The team will identify a test site in Somalia to install a wind turbine mini-grid system. Implementing the technology in a community that does not have access to electricity will be revolutionary. The power generated could be used to: refrigerate vaccines; power internet access; pump groundwater; provide lighting; and/or charge mobile phones. Furthermore, having a reliable source of renewable electricity will increase income-generating activities and remove the need to purchase fuel.

From a broader perspective, in sub-Saharan Africa, only 40% of health centres, half of schools, and 28% of the rural population have access to electricity (World Bank). To continue serving these needs in the future, a social enterprise will be formed to manufacture more

wind turbine mini-grid systems. The aim of the social enterprise will be to increase access to renewable, affordable, and reliable energy in sub-Saharan Africa. This project, and the energy produced from these systems, will have the potential to change lives.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10043805	Mid	CONSORTIO LIMITED	£703161	£554657

Project Title
Ghana GOALs - Generation, Operation, and Access to Energy, at Lowest carbon and cost solutions

Public Summary – Provided by applicants
The Ghana GOALs project will create self-sustaining smart energy communities with access to clean renewable energy and innovative cooking technology, resulting in improved air quality and better working conditions, especially for women and girls. Ghana GOALs will test a new concept for modern cooking, reducing the reliance on foraged firewood and kerosene. This will be combined with the creation of electrical microgrids, using solar photovoltaic panels (PV) and storing energy overnight in batteries. These will be trialled at selected secondary high schools and in an off-grid community to evaluate different business models for replication. For the cooking trials, two schools will be selected from a potential pool already identified: an all-girls school and a mixed school. Gender equality and diversity will be a key factor, and educational materials created will help change preconceptions related to cooking. Whilst some practical testing of the innovative cooking pots is currently in progress by one of the partners, KNUST, this has not been deployed at scale or the business models investigated. Using modern cooking techniques will also free up time spent in collecting firewood and managing the stove. Since 70-80% of cooking is wood or kerosene fired in Ghana, reductions in carbon and smoke emissions will also be significant with environmental and health benefits. To help ensure financial viability, the project will test automated fraud detection and pre-payment for electricity, as part of the transition to 'smart grids' needs to monitor and meter energy consumption. Ghana GOALs' key objectives are to develop: 1. Fraud-resistant net metering solutions with the Electricity Company Ghana for microgrids.

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2. The business concept of communal cooking in both a schools' programme and a local community. Two large cooking facilities can feed up to 550 pupils/people.
3. Smart microgrids to optimise use of renewable energy and enable a decision tree analysis to evaluate how the grid is used.
The Ghanaian partners KNUST and EEK have already deployed a PV and battery microgrid at one site (Yeboahkrom). However, this does not yet include modern cooking or net metering, and related business models have not been designed or evaluated. The solution also has the potential for roll-out across sub-Saharan Africa.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046033	Mid	CAMBRIDGE ENERGY PARTNERS LTD.	£1447934	£1013554

Project Title
Mobile Industrial Solar Platform (MISP) - Scalable and portable solar generation (60kW - 10MW) bringing industrial-scale levelised cost of electricity for last mile electrification

Public Summary – Provided by applicants
In sub-Sahara Africa (SSA) the combination of vast solar potential, estimated at 60,000,000 TWh/year (40% of the global total), and the latest photovoltaic technology should mean that solar energy can address the energy trilemma in the region. However rural access to electricity remains low and expensive. In Mali for example, only 16.5% of the 11.5m people living rurally have access to electricity, coinciding with high incidence of poverty, 93% of rural Malians live on <$3.10/day. The regional mass-deployment and investment in solar minigrid (60kWp--1 MW) is being restricted by: 1. High-upfront capital cost. 2. Inefficient energy generation (fixed-tilt; high down-time). 3. Lack-of-portability and transportability, meaning deployment and redeployment expensive/difficult. 4. Inability to remotely monitor/manage generator assets (e.g predictive maintenance, real-time ROI data). Together, these results deliver an unattractive levelised-cost-of-electricity (LCOE), and prevent serious financial investment in systems. Solution = Mobile Industrial Solar Platform (MISP) - Scalable and portable solar generation (60kW - 10MW) bringing industrial-scale levelised cost of electricity for last mile electrification An 18-month industrial research program delivered by Cambridge Energy Partners who will develop a scalable and portable solar generator solution (60kWp - 10MW) that delivers industrial-scale levelised cost of electricity for last-mile electrification in sub-Sahara Africa. Fully fabricated in our state-of-the-art semi-autonomous production facility, the affordable and simple to deploy solution, which can be remotely managed, takes a holistic approach, optimising efficiency at every stage of the lifecycle.

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Through our partners on the ground, Kowry and Ben-Yeleen, we will provide real world evidence of the product's capabilities and its industry-leading levelised cost of electricity through a demonstration in rural Mali.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10044397	Mid	CAGE TECHNOLOGIES LIMITED	£922920	£646044

Project Title
BioGas MicroGrid in a box (BGMG)

Public Summary – Provided by applicants
BGMG (Bio Gas Micro Grid in a box) will develop a hybrid renewable energy hub for deployment in off grid communities. It combines solar, wind and biogas energy resources in one drop-in containerised unit with electrical energy stored and deployed from batteries and waste heat recovered for local utilisation. The project expands the work of the partners in the recent highly successful Energy Catalyst WEGEN project that resulted in development and subsequent commercial sales of a novel 6kW plug-and-play biogas generator technology. The partners include WEGEN collaborators CAGE Technologies Ltd (CTL)/OakTec (power system technology developer), Sistema Bio (biogas system OEM and system trial and demonstration) and Sutton Power Engineering (generator OEM and supplier of solar hardware). The partners will develop an intelligent energy management platform to integrate, manage and distribute the bio/solar/wind energy inputs based on a development of the existing CTL/OakTec intelligent control platform. Additional outputs will be an application of the WEGEN biogas engine technology to a new modular liquid cooled engine family that will allow a range of power outputs to suit application requirements delivering world leading fuel efficiency and low emissions. The liquid cooled engines will employ CHP technology to capture waste heat for distribution. CTL and Sutton have considerable experience of hybrid power systems having deployed LPG-solar-battery systems for site welfare with the HS2 rail project at Euston, London and more recently hydrogen-solar-battery hybrid to power the cruise ship terminal in Orkney. BGMG will support the development of carbon neutral microgrids in sub-saharan Africa and India and a trial system will be deployed to Kenya and be tested in a high profile location. Applications include stand-alone power for large food and agricultural businesses, villages, schools, hospitals and health-centres and public buildings. Bio-waste from the immediate location including food can be used in the feedstock.

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As global energy prices rise the business case for BGMG becomes stronger. Whilst the system will be more costly than a simpler generator or solar array it can be funded to the customer on a 'machinery as a service' basis by Sistema's established easy payment business model and will enjoy minimal fuel and running costs over its lifetime giving it a much lower lifetime cost than conventional fossil based power systems. Immediate commercial opportunities include powering larger farms, food production businesses including rice mills where rice straw is used as part of the AD feedstock, agricultural processing and charging EV's.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040641	Early	LENKÉ SPACE AND WATER SOLUTIONS LTD	£279132	£221005

Project Title
Optimising Energy Demand in Rural Communities via Precision Agriculture Technology (SWIFT)

Public Summary – Provided by applicants
Due to the high irrigation and related energy load requirements of farmers growing horticulture crops, ability to analyse historical and future irrigation/energy demand is crucial to assess feasibility/develop mini-grids and monitor energy-demand fluctuations during implementation. This project will upscale SWIFT (Soil Water Index Forecasting Technology) to provide historical and future irrigation demand at 10m HR and 2meter depth via AI powered system and EO aided crop detection method to project energy demand, assess the applicable energy sources mix (hydro/solar/wind) and provided detailed mini-grid design. By producing a technology that will de-risk mini-grid developments via the reliable, affordable and efficient information it supplies, SWIFT will incentivise investors to enter the rural electrification energy market in sub-Sharan countries.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041412	Mid	THERMOELECTRIC CONVERSION SYSTEMS LIMITED	£672339	£528187

Project Title
Hybrid energy system for clean cooking and electricity generation

Public Summary – Provided by applicants
This aim of this UK-Nigeria-Ghana mid-stage collaborative project is to optimise the concentrated-solar-power (CSP) and thermoelectric generator (TEG) hybrid energy system we developed in previous project, testing and demonstrating them in relevant user environment. The system has clear benefits of providing both clean energy for cooking and off-grid electricity, addressing the energy access issue in the targeted countries. The project will allow the UK consortium (Thermoelectric Conversion Systems, Cranfield University and University of Derby) to collaborate with a Nigerian company (IBEDA) and a Ghanian company (Conlons Kitchen) to optimise the design of the energy system, build demonstrators locally in Nigeria, field test its performance in rural communities of Nigeria and Ghana, conduct market research, and develop relevant GEIS and business models. The system will have an additional international market in other sub-Saharan and South Asian countries. This project will enable the consortium to progress into further TRL development and commercialisation post-project. Successful outcomes will bring competitive energy products to a significant and growing market.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047733	Mid	OX GLOBAL LTD	£1241672	£869170

Project Title
OX Global Limited - Enabling new energy infrastructure in underserved regions of Rwanda through the integration of zero-emission vehicle groundwork

Public Summary – Provided by applicants
Despite the goal to achieve 100% energy access in Rwanda by 2024, the current access-rate is at 76% in urban communities and only 44% in rural regions (USAID,2022). The wiring of the energy distribution network in Rwanda is 16,000km long, of which 35% is covered by MV (medium voltage) lines and 65% by LV (low voltage) lines. Electricity connections for non-residential and industrial users (public, commercial centres, factories, hotels and offices) are prioritised because the marginal costs are relatively low in comparison to households in scattered, remote areas. Moreover, residential users consume a low amount of electricity, which reduces the incentive to target this group. Currently, 80% of the Rwandan population lives in remote, rural areas. Therefore, it is difficult and expensive to connect them to the national grid. Furthermore, off-grid renewable containerised systems require an economy for the electricity to justify the investment. To overcome this clear unmet need of providing basic electricity services in rural communities, the consortium is developing a business-case that is profitable and scalable to the Rwandan population. OX-Global Limited (OX) is an award-winning UK start-up automotive company founded by not-for-profit company, Global Vehicle Trust (GVT). In partnership with OX Rwanda Limited (OX-Rwanda) the consortium's mission is to deliver affordable transport in emerging markets, driving a self-reinforcing cycle of economic growth and social impact. OX and OX-Rwanda fuse together experts in engineering, energy, and advanced manufacturing to build an infrastructure for Productive Use of Energy from Ox-Rwanda's depots and truck-bases, and will study how to make energy available to the general public in rural communities. In this Industrial Research project, development of the OX-truck, a unique zero-emissions-vehicle (ZEV) will not only

disrupt the existing transport and logistics infrastructure for Rwandans requiring affordable transport for trading agricultural goods, but will also catalyse the start of energy distribution networks installed in rural areas previously deemed uneconomical.
This project is anticipated to deliver transformative effects for the consortium by opening new markets, generating revenues and team growth through partnerships with Farmer-Entrepreneurs, Small Trader SMEs, and Corporates by providing innovative solutions that will benefit emerging markets.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048018	Late	SEAWATER SOLUTIONS LTD	£2412346	£1085556

Project Title
Halophyte-based Energy & Agro-ecological Transitioning (HEAT)

Public Summary – Provided by applicants
The Halophyte-based Energy & Agro-ecological Transitioning (HEAT) Project seeks to commercialise halophytic agro-ecological approaches and bio-energy technologies in Sub-Saharan Africa by introducing saltwater-irrigated biomass production in degraded soils for localised transitions to clean energy and land regeneration. Targeting both bio-energy production and carbon sequestration, the project will test a combined integrated production and processing model in tandem with a service-based business model with existing partners and investors with the aims of operationalising/commercialising the results by the end of the project timeline. The project will be undertaken in Ghana and Namibia with a range of partners from the UK, EU, and African registered entities with a track record of working together in various global geographies. With a strong focus on socio-economic development for rural communities, gender inclusivity, and safe access to clean energy, HEAT expects to exploit the results of the 24-month project for the long-term benefit of communities and existing consortia in the three focus regions of West Africa, South-West Africa, and South Asia.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10038372	Mid	SMART VILLAGES RESEARCH GROUP LTD	£333178	£233225

Project Title
Pay-N-Pump 2 - storage integration for home and institutional energy access, and improved irrigation impact

Public Summary – Provided by applicants
PAY-N-PUMP is an innovative smart digital pay-as-you-go water-pumping and irrigation solution for small scale farmers in Uganda, built in a push-cart format, developed by Aptech Africa Ltd in an Energy Catalyst 7 project, in partnership with SVRG. Despite COVID-delays, more than 65 systems have been piloted, and farmers have observed crop-yields and household-income increase by as much as 200%. The 3 pieces of consistent feedback from customers are: 1. hours of irrigation do not match farm demand (optimum timing is dawn and dusk, when solar power is weak) 2. inability to use the system for household or institutional (eg schools, clinic, church) energy access, eg for lighting, phone charging or other new micro-entrepreneurial businesses 3. system is out of the price range of many farmers In this project, partners Aptech Africa and SVRG, will seek to modify the Pay-N-Pump technology to include modern, reliable Li-Ion battery storage to both enhance irrigation performance to better match market-demand, and simultaneously to make the system dual-use, so that it can both provide farm irrigation and also household or institutional energy access. This is a considerable technical challenge, but also a consumer challenge to find a design that can optimise system performance and impact in both use-case scenarios. But success in this project would see the creation of a unique, transformative technology. At the moment, users need two separate systems for household and irrigation services. This is not only expensive, but household systems are typically small and unreliable, and hard to scale as household energy-usage increases. There is no product currently on the market that combines the two use-cases as we propose, in a PAYG business model, and which is mobile for ultimate flexibility and ability to serve different needs, and therefore that is able to create such a wide range of impacts.

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Our modelling suggests that the storage-enhanced dual-use PAY-N-PUMP could increase farm yields by 250%, and provide irrigation and household energy at 70% of the cost of using two separate systems. We estimate that the two-in-one nature of this solution will at least double our market size, and consequently not only significantly increase agricultural productivity in Uganda, but also provide a novel and attractive solution for energy access in rural communities, since it transforms energy-access from a cost to a profit-making opportunity. This project simultaneously addresses SDG-7(Clean and affordable energy), SDG-1 (No Poverty), SDG-2 (Zero Hunger), SDG-6 (Clean Water and Sanitation), and SDG-13 (Climate Action).

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048160	Mid	SMART VILLAGES RESEARCH GROUP LTD	£393559	£310892

Project Title

Payment-Enforcement Technology and Business Models for High-Impact Borehole Solarisation in Tanzania

Public Summary – Provided by applicants

From 2019-2022 in NorthernTanzania, SVRG and OMASI collaborated on an EnergyCatalyst6 grant to bring innovative integrated-energy-services and productive-use technologies to marginalised Maasai communities.
The project has been a great success, with innovative solar-energy and productive-use technology installed at 5 boreholes (displacing diesel-generators), two community-minigrids and business-hubs, two schools and a community radio-station, directly impacting more than 12,000 people.
The technology with highest impact and best commercial potential is the solarisation of existing diesel-powered boreholes. We are able to install innovative solar-technology instead of the diesel-system, and powers additional high-value productive-uses like flour milling. And because the boreholes have been operating for years, we are able to access their records and set repayment-plans for the operators or the community borehole-committees that are cheaper than the amount they were paying for diesel monthly.
Not a single one of our installations has not at some time in the last three years defaulted on their repayments. There are several reasons for this: maasai culture, remoteness of the sites and distance from us, the reluctance to make payments to foreigners a higher priority than helping kin. But the main reason is that it is easy to default, and there is less moral obligation to pay, since the systems continue to operate whether or not they make repayments.
In this project, we intend to research and test technology-solutions to integrate into our systems that could remotely disable them in the event of repayment defaults. This is more difficult than it sounds. It is easy to block a phone, a solar-home-system, or even a Tanesco metered grid-connection, since they are sealed units. A 50kW solar-power system with inverters mounted in a building is hard to control. Remote-controlled switches in fuse boxes can easily be bypassed. This is why there is no readily-available current solution for controlling

large component-based systems in this fashion. We will look at alternatives for performing the control function, and how to make them non-bypassable, and then test their performance to revise our business and technology model. If successful, this will remove the single greatest barrier to our ability to scale-up this very affordable and simple borehole-solarisation technology, which has immediate economic and carbon community-impact

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10045436	Mid	ACELERON LIMITED	£838290	£586803

Project Title

Scaling Affordable Minigrids through Expandable 2nd life Batteries (SAMTE)

Public Summary – Provided by applicants

According to the World Bank, clean power minigrids are the least-cost electrification solution for 300 million people in sub-Saharan Africa. However, the high upfront CAPEX cost of minigrid systems, uncertain customer demand, and restrictive financial ecosystem significantly impede sector growth and sustainability. Within this framework, batteries are a major obstacle and intervention pathway, as they account for up to 30% of a minigrid's cost (the single most expensive component) and need regular replacement. Challenging this "battery barrier" our project will field pilot Vittoria Technology's innovative, digital battery leasing platform (Storage-as-a-Service) and Aceleron's scalable 2nd life Li-ion batteries at three MeshPower minigrids in Rwanda / Uganda. This pilot will demonstrate the technical, financial, and social impact benefits of the scalable battery leasing model -- and sustainable commercial potential across the continent. Field studies confirm that reliable, affordable energy storage is critical to the long-term viability of off-grid renewable systems. Without affordability, customers cannot purchase electricity \> minigrid operators cannot fund battery maintenance \> power is not reliable \> customers defect from the minigrid and projects fail. In contrast, Vittoria Technology's scalable battery leasing with expandable storage products (like Aceleron 2nd life) enable a Virtuous Cycle supporting "right-sized" affordable battery banks, lower cost-reflective tariffs, higher energy use, greater community impact (e.g. via PUE, e-cooking), demand and revenue growth, and affordable "as needed" capacity expansion.
Alongside MeshPower, this pilot will field test Vittoria Technology's low-overhead battery leasing tools (including prototype digital platform automating Battery sizing & lease terms, Credit risk assessment, Local vendor matching, Contract onboarding), legal and financial frameworks, and remote monitoring/control processes to deploy our first semi-commercial trial battery leases. Likewise, this pilot will test the field performance of Aceleron's scalable 2nd life batteries as capacity expansion "modules," adding them into the

energy storage architecture of 3 minigrids through unique integration strategies we have assessed to allow combination of dissimilar battery products and age -- including 1st life Li-ion and legacy lead acid.
Through expandable, modular battery technology and finance, our companies can enable affordable, sustainable minigrids that lower LCOE and increase adaptability to grow capacity alongside customer demand. Our innovative approach will 1) provide affordable advanced battery replacement / expansion for aging minigrids in sub-Saharan Africa (where 70% of minigrid batteries are short-lived lead acid, SEforALL/Bloomberg); and 2) support deployment of new minigrids that are lower-cost and scalable. Combined, these two avenues can catalyze growth and sustainability in the sector.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046610	Early	INGINE WAVE ENERGY SYSTEMS LTD	£211525	£155087

Project Title

Feasibility Study for a Wave Energy Pilot Project in Indonesia

Public Summary – Provided by applicants

INWAVE, the onshore-type Wave Energy Converter, is suitable for shoreline and remote islands. IWES's business goal is to offer the **world's first affordable Wave Energy Converter**, with a **simple, scalable & sustainable** technology. The technology has been claimed feasible at prototype demonstration level since 2015 with Seal of Excellence award by European Commission's Horizon 2020 programme, and Marine Energy Alliance (MEA) award in 2019, scoring high-quality innovative marine energy systems to deploy across all over the coasts. It provides the unique approach of: (i) deploying power-generated device **onshore**, (ii) harvesting wave energy from **the shallow nearshore water**, and (iii) using the **whole range of wave movements**. It ensures **durability, safety and affordability**. This **reduces costs and time, enabling sustainable supply for the smaller scale local market needs**.
INWave innovation brings access to clean and affordable energy to the coastal community. It is competitive with expensive diesel generators, which are commonplace in fishery villages and remote coastal areas in Indonesia. In particular in the bordering region, remote area and eastern part of Indonesia, meeting energy demand is very expensive relying on fossil-based energy, due to the logistic conditions. Diesel generators, kerosene lamps and wood-burning are common occurrences.
There is a huge potential of ocean energy in Indonesia that could be utilised to generate electricity. The main beneficiaries of planned wave power plants are coastal communities from relatively traditional fishery villages and farms in the coastlines to replace the unstably priced, pollutive diesel generator with the clean, affordable and constant wave energy power.
The object of the proposed **Feasibility Study** is to prepare for the feasible construction and commissioning of a Wave Energy Pilot Plant in **Nusa Tenggara province, Eastern Indonesia, where the renewable energy demand is high**. Through appropriate surveys and assessments, the Feasibility Study is expected to yield guidelines concerning significant technical, social, economic, and environmental

aspects of the project. The proposed innovation to be installed in a coastline is an onshore-type WEC technology. Onshore, because as opposed to many other offshore capital-intensive WECs under slow development, its power generation unit is located on the shoreline and not at sea, **bringing the market entry much faster**. This design enables system stability, significant costs reduction and makes clean energy infrastructure investment more affordable. We shall maintain the collaborative partnerships with all relevant government stakeholders, which ensure project adequation with the country's sustainable development targets and regulatory framework.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041051	Mid	EUROPEAN THERMODYNAMICS LIMITED	£1082848	£757994

Project Title
SPITFIRE: Self-Powered Biomass Stove For Remote Communities

Public Summary – Provided by applicants
Globally, 3 billion people have no access to clean cooking, relying instead on dirty-burning charcoal as primary cooking and water heating fuel. The release of CO and PM (linked to \>4M deaths/year) led the WHO to declare pollution caused by unclean cooking as "the world's largest single environmental health risk". As its alternative, the use of firewood substantially influences deforestation, due to unregulated foraging for firewood, while negatively impacting wildlife. Quality of life in Sub-Saharan Africa is also severely impacted by lack of (domestic and institutional) access to electricity. According to the WDI, 72% of Zambia's population has no access to electricity. The SPITFIRE-stove will address both the major unmet need for clean cooking solutions and the lack of access to electricity. This will be achieved by developing an affordable, low-emission, biomass-pellet-burning clean-cookstove that generates a no-added-fuel electricity surplus. The institutional SPITFIRE-stove will use temperature-controlled airflow regulation to ensure complete combustion to eliminate \>80% of CO and particulate-matter emissions compared to traditional combustion. Airflow regulation will be via an electric fan, powered by a thermoelectric generator (TEG), which will both power the electric fan and provide an electricity surplus for storage in a low-voltage battery with charge-out ports for charging/powering small electronic devices. Furthermore, cooling of the TEG by an integrated water-cooling system will deliver a free supply of heated water. SPITFIRE will develop: -Novel high-temperature thermoelectric materials and production processes for the TEGs, -15kW burner technology that allows intelligent, temperature-controlled airflow regulation;

-Institutional-scale, sustainable biomass-pellet-burning stove.
Integration of the scaled-up stove and burner design with the novel high-temperature TEG module via hot- and cold-side heat receptors/exchangers will require close collaboration between the partners and multiple iterations of system level modelling and simulation. The SPITFIRE project ultimately aims to deliver a final stove design, assemble 30 demonstrator products, and validate stove performance in field trials within institutional kitchens in public services and local enterprises such as restaurants, schools, and orphanages, in our primary target market, Zambia.
The SPITFIRE-stove will therefore address the clean cooking and energy dilemma by;
-Delivering clean, sustainable biomass-burning cooking stoves with low emissions,
-Delivering cooking stoves that will utilise reduced-cost biomass pellet fuels that are approximately one-third of the price of LPG and half of the price of charcoal, Ensuring reliability of energy supply for Zambia and beyond by utilising locally-sourced sustainable forestry for the biomass pellets.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040308	Mid	4RDIGITAL LIMITED	£698859	£386156

Project Title

On-shoring Li-Ion battery manufacturing for PAYG productive use in Kenya

Public Summary – Provided by applicants

This project will bring local assembly and manufacture of Lithium-Ion (Li-Ion) batteries to sub-Saharan Africa (SSA) for the first time, overcoming the supply-chain constraints that were exacerbated during Covid. The batteries will be equipped with technology to enable a wide range of productive use products to be developed for sale on a Pay-As-You-Go (PAYG) basis. PAYG enables low-income customers to purchase capital items to productive purposes and make re-payments over time.

Many productive uses can be made of clean-energy products in SSA that increase incomes while reducing carbon emissions and pollution. To be useful and affordable to low-income communities and micro-small businesses, these products require high-quality Lithium-Ion (Li-Ion) batteries and the vision for this project is for a thriving and high-quality Lithium-Ion (Li-Ion) battery assembly and manufacturing capability in East Africa. This will: reduce the costs and risks of the current long-tail battery supply chain; enable rapid scaling of off-grid and grid-connected products; and build local manufacturing and assembly capacity, creating employment and increasing local technical skills in the clean-energy sector.

The primary innovation relates to the next-generation business model that will leverage the capabilities of one of Africa's largest energy and water solution companies to: deliver locally assembled/manufactured batteries into the market; and catalyse the growth of clean energy off-grid productive use equipment through the assembly/manufacture and sale of PAYG enabled batteries.

This project is innovative in three key ways:

*A long-established African business, Davis & Shirtliff (D&S) will assemble/manufacture and sell Li-Ion batteries with a focus on PAYG solutions (this market has been addressed only by start ups).

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*The batteries will be enabled with the necessary technology to support PAYG sales, unlocking access in the local markets served by D&S.
*The products using these batteries will be digitally connected to climate financing through the sale of carbon credits through the Carbon Value Exchange (CaVEx platform).The project targets all aspects of the energy trilemma: increased affordability through cheaper locally assembled battery packs, enhanced security of supply through smarter in-field monitoring and reduced carbon emission through increased battery life and fossil fuel displacement.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047643	Early	University of Surrey	£299969	£254729

Project Title

REACT (Renewable Energy Access for the Conversion of Tuk-tuks)

Public Summary – Provided by applicants

This project aims to develop innovative technologies and business models that together will improve energy access to hundreds of thousands of Sri Lankan three-wheel tuk-tuk drivers. Tuk-tuk-drivers -- male and female - rely on their vehicles as an important source of income but currently lack access to energy which is affordable, reliable and carbon free. The project will convert internal combustion engine tuk-tuks to electricity and power them with solar energy.

Tuk-tuks are the main light transport method in Sri Lanka - there are over 1.2 million tuk-tuks in the country which generate considerable air pollution. The vast majority of these vehicles are powered by out-of-date two or four stroke petrol engines. In addition, the recent fuel price rises and severe supply instability has affected the tuktuk drivers' community who are subsisting on low-incomes.

We estimate that the cost of conversion can be recovered within 1-2 years by the saving from fossil fuel costs. To maximise the environmental impact, the e-tuk-tuks will be charged by electricity generated from solar power, which is renewable, zero emissions, cheap and reliable. A battery subscription scheme will be introduced and evaluated which means the drivers will not pay for the battery pack which is the most expensive component of the conversion. An affordable subscription fee will be charged to the driver for using the battery who will be able to swap their discharged battery packs for fully charged batteries at our charge stations. The battery subscription scheme has several advantages: it will make the entire e-tuk-tuk conversion scheme more affordable, and it will also maximise the renewable energy utilisation as the batteries will all be charged at the solar power station. The business model of the battery subscription scheme will also be carefully evaluate using the data collected from the trial operation during the project.

The Technology lead for the project is an industrial firm, Alta Vison (Pvt) Ltd (AVL) who have a rich experience in renewable energy system installation and operation, and energy storage system development. They are supported by two academic partners with sound

track records and knowledge in mechanical and electric system design, electric and hybrid vehicle research and development. The team has both a strong technological and business background, as well as good understanding of the local market and the policy landscape in Sri Lanka. A future exploitation plan will also be developed during the project.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047987	Early	FARMER CHARLIE LTD	£299914	£209940

Project Title
Cool Mangoes

Public Summary – Provided by applicants
The Cool Mangoes project addresses the critical issue of cool storage of horticultural produces in Côte d'Ivoire. Mangoes make an important product which could be more efficiently used in the food chain, lowering wastes due to fruit flight attacks and the perishable nature of the production. Farmer Charlie (UK) and Cool Lions (Côte d'Ivoire) are partnering to develop an optimised digitally informed cooling solution for cooperatives. Containers will be available to cooperatives under a rent-to-own economically efficient model. In turn, cooperatives will then sell cooling capacity to farmers through a cost-effective, pay-as-you-store model. Our solution relies on solar panel energy, which is stable, and supports Côte d'Ivoire's goal of getting 42% electricity from renewable sources. On the digital front, containers are equipped with a remote door-lock system and sensors (e.g., temperature) to ensure the efficient use of the cooling facility and the best preservation of the produces. Sensors will also be used to measure external temperature and provide a way for "just-in-time" cool storage, which will provide further opportunities for farmers to sell their produces at the best price, later, while lowering the 20-40% post-harvest wastes. This translates in a CO2 emission reduction too. The "Cool Mangoes" project will demonstrate the benefits of cool storage through an on-site test in a Northern rural town of Côte d'Ivoire, central to mango production, involving a community of 400 farmers.

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Smallholder mango farmers will be able to preserve their produce, extending the shelf life of mangoes and other horticultural products (e.g., pineapples, fruits, and vegetables) by several weeks. The project will validate our innovative cooling-as-a-service solution and serve as a visitor centre for other cooperative leaders to secure additional deployments and scale our presence.
An effort will be made to monitor and ensure equality, diversity, and inclusion, especially of women farmers and youth. We will also devise plan for net zero, sustainability and monitoring and evaluation of the success of the project. The communities will benefit not only through income increase, but also through the availability of vitamin-rich fruits and vegetables over a longer period of time, contributing to bettering of the local population health.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048856	Late	MODULARITY GRID LTD	£3500262	£1525092

Project Title
Demonstrating a combination of innovative technologies and business models that enable rapid, large-scale deployment of renewable energy infrastructure in low income countries

Public Summary – Provided by applicants
Modularity Grid is partnering with two of the largest telecom industry players in Africa, with the end goal of extending access to affordable, reliable and renewable energy to poor communities, while also helping address the urgent need to for telecom towers to reduce their energy emissions and costs.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047400	Early	PANITEK POWER LIMITED	£278233	£194763

Project Title
Gravitricity Energy Storage - South Asia Feasibility

Public Summary – Provided by applicants
Gravitricity is a novel technology to store energy by raising and lowering the weights inside a shaft. The design is based on an innovative combination of tensioned wires and a winch structure. This provides stability, performance and cost advantages. Gravitricity systems can generate up to 20MW of power, with durations of several hours. An evaluation by Imperial College London, accounting for Gravitricity's longevity (10-50x higher cycle life than batteries), shows that Gravitricity is more cost effective than other forms of electrical energy storage. This lifetime direct cost saving will enable local and regional grids in South Asia to accept higher proportions of renewable electricity. The target markets for this project are India and Pakistan. Electricity demand is expected to treble between now and 2040\. Currently 73% of electricity is coal sourced in India, and 56% of electricity in Pakistan is fossil fuel sourced, from coal, gas and oil fuels. Cost effective energy storage enables higher penetration of wind and solar power on the grid. The Indian government has the target to have installed over 500GW of solar and wind power by 2030, up from 100GW in 2021\. The uptake of solar is driven in part by its very low cost, reaching 2 pence/kWh. As the share of renewables rises, this can cause frequency and voltage disturbances due to mismatch of load demand and generation. Gravitricity is well suited to grid balancing and rapid frequency response services. This feasibility project will combine Gravitricity's technology with Panitek Power's expertise in bringing sustainable energy solutions to the South Asian market. It will develop a South Asia specific solution of the technology to address this market. This is through identifying technical, regulatory and market requirements, and then engineering an optimized solution. In parallel, there will be an evaluation of local supply chains to adapt to local requirements and improve cost effectiveness. Future project partners and potential sites will also be identified to form a proposal for a follow-on demonstrator project.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041594	Mid	PYROGENESYS LTD	£1499271	£1177123

Project Title
Harvest Cool

Public Summary – Provided by applicants
Agriculture plays a significant role in the Nigerian economy, contributing 22.35% GDP (2021) and employing \>70% of its population at subsistence level(1). Onions are a lucrative, dry season irrigated crop and ~2 Mt/annum are produced, largely in Northern Nigeria. Opportunities for onion farmers are not fully realised, due to low investment in agronomic practices, and post-harvest losses (up to 50%). Traditional drying of onions could be replaced by a cool supply chain from field to market, however, access to energy for chilling hampers this initiative. The Harvest Cool project represents stakeholders from farming business, agricultural services, and technology providers who will deliver an integrated energy system to develop a low carbon cold storage system for onions grown in Nigeria. The partnership comprises PyroGenesys (biomass pyrolysis technology); Lavender Fields (agricultural produce aggregator and marketer); the Nigeria Agribusiness Group and Agrolog (agricultural extension services, Nigeria) and University College London (Life Cycle Assessment input). The project builds on a feasibility study carried out by Lavender Fields, identifying farming communities which sell to a major onion market (Karfi) in Kano, Nigeria, with a demonstrable need to develop cool supply chains for perishable crops. The project is innovative in bringing together unique engineering designs which address cold storage for transport from the field to a central storage point. The project is also innovative in the conception of a business model which considers energy provision; the benefits of food waste reduction; adding value to low income farming communities; and a circular carbon farming system with potential to improve agronomic conditions and carbon sequestration in soils.

The project will be assessed quantitatively through Life Cycle Assessment of global warming potential (GWP) of the overall system and qualitatively through a programme of community interactions, demonstrating the project's contribution to addressing SDG7 Affordable and Clean Energy and SDG13 Climate Change.

REFERENCES

(1) https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041126	Late	RHEENERGISE LIMITED	£4982694	£2242212

Project Title
Creating a stable grid for local farmers with High-Density Hydro energy storage

Public Summary – Provided by applicants
The project vision is to provide efficient, reliable power supply for a collective of apple farmers in the Western Cape \[AFWC\] in South Africa, by creating a minigrid capable of providing 24/7 renewable power, substantially independent of grid supply. Currently, South Africa is experiencing a severe energy crisis and suffers from 2 load-shedding periods of 2-4 hours each day. The AFWC have a high electricity demand for crop irrigation and are currently not able to obtain energy during load shedding periods, limiting production, employment and future economic growth. The proposed minigrid is comprised of solar generation, energy-storage (RheEnergise's HD-Hydro technology); a Rolls-Royce power-management-system; and a local grid connection. The project will provide clean energy to the farmers throughout the day, allowing them to continue operations throughout the day, uninterrupted by blackouts. The truly innovative part of this project is RheEnergise's High-Density Hydro energy storage solution. HD-Hydro is conceptually like traditional pumped-hydro. When energy is abundant and low-cost, water is pumped uphill, through pipes (penstock), into an elevated reservoir. When electricity is needed, the water is released, passing through turbines and flowing into the lower reservoir, regenerating electricity in the process. However, HD-Hydro replaces water with a high-density fluid (2.5x denser than water). The higher density means that projects can store 2.5x more energy for the same size, OR that they can be installed on hills 2.5x lower and produce the same power. Other advantages include smaller project area; low volumes of water required, and prevention of evaporation. RheEnergise's solution is also lower cost than other commercially available solutions, such as lithium-ion batteries.

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RheEnergise's HD-Hydro solution is unique among energy storage solutions due to the large percentage (up to 75%) of the total project value is spent within local communities, providing enormous benefits to the local economy in South Africa.
The benefits of this project are multiple and long-lasting:
* improved energy access for apple farmers, increasing production
* creates local jobs in farming, construction of projects and project supply-chain
* increased high-quality food production for exports

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10043736	Early	CENTRE FOR ENERGY EQUALITY LTD	£295052	£206536

Project Title
Solar Battery Hub

Public Summary – Provided by applicants
There is a major challenge in making electricity accessible in off-grid communities in Nigeria as well as other parts of the world with limited energy access. While connected microgrid solutions have great potential, there is a real need for flexible and rapidly deployable solutions that can enable productive and transient electricity users to access affordable electricity. The Solar Battery Hub brings a brand-new dimension to microgrid technologies for off-grid communities. By offering an entirely flexible solution to energy use with a new commercial model, the solution improves on and adds to more traditional, connected microgrid solutions. By focusing on productive users of energy, markets will be stimulated, accelerating the growth of clean energy and associated opportunities in rural parts of Nigeria. The Solar Battery Hub will consist of a small solar array, connected to batteries of various sizes and capacities. This will enable productive energy users such as schools, medical centres, and markets stall operators to rent the batteries and take only the energy they need when they need it. This will reduce the overall cost burden of investing in fully connected micro-grid systems, which are often unaffordable or take a long time to get up and running. During the project, we shall develop and refine a design for the solution based on extensive market research, including direct engagement with rural communities in Nigeria. We shall then test and demonstrate the solution on a small scale to seek feedback and inform future developments. As well as helping to contribute to improved energy access and the prosperity that this brings, the Solar Battery Hub will address a range of wider challenges, including:

* Food Waste; enabling cooling for market stalls will help reduce the 45% of food currently wasted due to perishing in high temperatures.
* Health: the solution will enable primary healthcare centres to be powered, enabling drugs and vaccines to be stored for longer (by refrigerating) and lighting for night-time operations.
* Skills: by powering schools and education centres, the solution will help develop skills for young people in rural communities.
* Income: having temporary power solutions will enable small businesses and stalls to prosper, increasing economic activities.
* Equity: bringing power to rural areas will help narrow the gap between rural and city communities. Also 80% of market stall operators are women, enabling greater opportunity for gender equality.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048085	Late	INDUSTRY CAPITAL AFRICA PARTNERS UK LLP	£4327984	£1947593

Project Title
Pambegua Project: Rural grid rehabilitation for renewable energy access and C&I

Public Summary – Provided by applicants
Sustainable Development Goal 7 (SDG7) is to achieve universal access to energy by 2030\. Given high expected population growth over that period, the target requires connecting a cumulative total of more than 1 billion people. In SSA, reaching universal access by 2030 would require tripling the current rate of annual connections to over 60 million people on average each year (IEA). Achieving universal access will require an average investment of US$40bn per year, with two thirds of the additional investment in SSA alone. The nearly 600 million people without access to electricity in SSA, represent over two thirds of the global total. About half of the SSA population without access to electricity live in five countries: Nigeria, DR Congo, Ethiopia, Tanzania, and Uganda. Konexa was created to address the need to develop and invest in electrical distribution networks in SSA. Konexa will operate across the energy sector value chain including power generation (solar PV and hydro), medium voltage and low voltage distribution networks, last mile reticulation, and off-grid distributed solutions (solar home systems, mesh grids and mini-grids). Konexa aims to achieve operational efficiencies across its on-grid and off-grid initiatives by implementing and utilizing utility system technologies, common systems and processes and leveraging synergies across infrastructure assets such as call centres, customer service centres and operations and maintenance resources. In addition, by re-integrating large anchor commercial and industrial customers to the grid that currently rely on diesel, Konexa can cross-subsidize the provision of reliable energy to lower-income grid-connected residential customers and off-grid customers with the significant revenue base of these anchor customers. Konexa has received regulatory approval from the Nigerian Electricity Regulatory Commission (NERC) to develop the first distribution sub-franchise in the country. We have partnered with the Kaduna Electricity Distribution Company (KAEDCO), a utility serving four states

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in Northern Nigeria. We have deployed off-grid technologies including mini-grids, mesh grids, and solar home systems, and signed PPAs with C&I customers in both urban and rural areas.
This project aims to extend our business model into rural areas by leveraging PPAs with rural C&I customers and rehabilitating existing utility assets to serve surrounding communities from our centralised generation site, while serving smaller communities with mesh grids and solar home systems.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048752	Early	SMARTKLUB LIMITED	£299388	£253968

Project Title

African SCENe: Sustainable Community Energy Networks

Public Summary – Provided by applicants

African SCENe (Sustainable Community Energy Networks) is a 12-month feasibility study that will enable the characterisation and identification of schools within low-income suburban communities in Nairobi that have the potential to become clean energy hubs through innovative business models.
These energy hubs will be capable of generating, storing and distributing clean energy for the community they serve, accelerating access to adequate, affordable, and reliable renewable energy in Kenya, whilst enhancing energy awareness and education, The proposed business models will remove the financial and technical burden from the schools, in line with learnings from past projects developed by the partners. Given challenges around grid reliability and supply, African SCENe will investigate how the business model could be defined to co-exist within the existing and future energy structures. Key to the proposition is the social benefits that can arise from increasing access to studying and cooking facilities that are powered by clean, safe and reliable electricity.
SmartKlub's role is to develop the business model to enable the realisation of the energy hubs, with funded facilities being managed under a lease contract with the school. Edu-Cater Global will take the lead on utilising facilities to inform and enhance pupils and families' learning experience and awareness of clean energy subjects. They will use subcontractor Map Kibera to identify and access appropriate schools to work with and that can be proposed as future demonstrators. University of Nottingham's role is to develop the social, economic, policy and technical researches needed to support the project. FWD.London will ensure deliverability, replicability and scalability across sub-Saharan Africa, by utilising and growing existing supply chains where feasible or developing them from UK businesses. It aims to facilitate the adoption of sustainable business practices across Africa, helping to mitigate the adverse effect human development has on both the environment, and climate. They also seek to ensure that local communities benefit from the vast natural

resources available to them. These benefits are unlocked through a combination of; skills training programmes, knowledge transfer initiatives and capital investment.
The project team will be supported by an advisory board that includes Kenyan Power, the Institute of Energy Studies Research Kenya, the International Finance Corporation of the World Bank Group and the Kenya Renewable Energy Association.
We are actively seeking to form partnerships across the region to achieve these aims and goals.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10042544	Mid	INCLUSIVE ENERGY LTD	£763066	£534146

Project Title

Cool Efficiency in West Africa

Public Summary – Provided by applicants

Cooling infrastructure - fridges and freezers - are vital for commerce, home use and for preserving medication, vaccinations and food. Unlike many off-grid solar energy systems, cooling solutions must operate as close to 24/7 as possible to ensure there is little/no wastage and are therefore subject to 'over-specification', leading to high energy system costs. In addition, when using a solar system to power a fridge, there are multiple issues that can interrupt the power supply including faults on the solar, battery or load sides, tampering, incorrectly sized systems or low energy yield due to poor weather.

This project brings together a consortium of companies that seek to solve these issues so that project partners Focus Energy and Koolboks can offer a higher quality and easier to manage cooling services for customers in West Africa. To do this, the project builds on Inclusive Energy's remote monitoring system, Cloud Solar, and will seek to develop data modelling and machine learning techniques with both the live data and meta-data to deliver insights to cooling service providers and their customers. As well as reacting to faults and issues that have already occurred, the project will investigate and develop a solution to provide predictive maintenance for a range of issues including predicting the end of life of the batteries and predicting probable system issues such as lack of energy availability.

These issues can then be mitigated with sophisticated load shedding and controls via the Cloud Solar charge controller, along with alerts for the solar system owners and providers to advise on energy saving techniques. Therefore, the project proposes development of 3 parallel and integrated capabilities: (1) analyse, (2) forecast, (3) mitigate.

Inclusive Energy will work with Koolboks and, Focus Energy, and their West African customers, to ensure that the insights are relevant and that the user interface is fit for purpose.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10042059	Early	B.P.P. TECHNICAL SERVICES LIMITED	£299076	£209353

Project Title

Solar-hydrogen microgrid with dedicated fresh-water production for Bandjoun, Cameroon

Public Summary – Provided by applicants

Increasing concerns about climate change, including desertification, requires the development of accessible clean energy solutions for the world's least developed regions. The conversion of the large resource of solar energy in such regions into clean Hydrogen (H2) fuel and fresh water, offers an effective solution. This has a significant impact on gender equality and social inclusion since the collection of wood for cooking fuel and water collection is a burden on women in these societies.
Technological improvements are reducing the cost of H2 production, making it increasingly attractive (40% cheaper by 2030 \[IRENA, 2020\]). The public in the UK and abroad are demanding policy changes, and in response, 33 countries have declared a climate emergency \[CEDAMIA, 2021\]. Cost reduction of renewable energy sources will drive the future implementation of decentralised Green H2 production systems in places with abundant renewable energy.
The objective of this project is to develop an innovative energy solution for urban areas in Africa characterised by abundant solar energy. The system will integrate modular technologies and a 'Plug & Play' approach to Green H2 and clean water production using intermittent solar power sources.
The benefits for the local community are: a) use hydrogen as an energy storage medium to provide continuous power supply throughout the day and night b) additional clean water available to the community c) carbon-free fuel replacing oil-derivatives for heating and electrical appliances d) reducing congestion on the grid with a decentralised power system e) generate hydrogen as cooking fuel and fresh water to alleviate burdens on the female gender.
This project is conducted in collaboration with the solar energy company Universo, based in Bandjoun, Cameroon and the local authorities of Bandjoun to demonstrate a clear example application.

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There are four key innovations: 1) develop a novel power flow and energy storage technique for the electrolysis of water using intermittent solar power; 2) use of representative mathematical models of major equipment components at high TRLs (≥ 7) that will enable the system to be rapidly moved to demonstration and exploitation 3) design a modular system with Plug & Play features to minimise complexity and the need for external expertise to manage it over the long-term 4) implement an effective way of storing and transporting hydrogen for applications in urban areas.
Successful project implementation will unlock and de-risk future investments in Bandjoun and similar regions. It will generate new income for BPP and Universo.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10038564	Mid	S&AO LTD	£1499765	£1183834

Project Title
Hydrogen-empowered Hydro-Electric Grids (HyHEG)

Public Summary – Provided by applicants
Nepal has a tremendous potential for hydroelectricity production. Across the county, micro hydroelectric power (MHP) projects are constructed to provide basic electricity supply to local people. These island microgrid systems are limited in their performance due to their power restrictions. While a typical run-of-the-river electric generator has a constant nominal (equals peak) power output, load demand fluctuates well below this peak power output and cannot surpass it. This grossly limits electricity harvest and causes much potential energy to go to waste. Power intensive activities such as cooking cannot be covered by electric supply due to generator power constraints, Country-wide biomass is resorted to for cooking, covering 69% of the total Nepali energy consumption. Exposure to smoke from biomass-based cooking is an acute health risk, giving rise to yearly 4 million premature deaths globally. This is a typical power and energy matching problem with fatal consequences for the population. This situation is combated in this project by introducing Hydrogen production, storage, distribution, and Hydrogen-based cooking. Connected to a micro hydroelectric power station, the Hydrogen generator is able to substantially increase the energy harvest by converting surplus electricity into Hydrogen. The Hydrogen subsequently is supplied to local homes as fuel gas for cooking, thus circumventing electric power limitations. In this way, performance and efficiency of the micro hydroelectric power station are substantially increased, and clean renewable cooking is made possible.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046865	Early	HYBRID GASIFICATION LTD	£289316	£228918

Project Title

Gasification of agricultural waste streams for the secure cooking gas supply of rural and isolated communities in Pakistan (GAS-SCRIPt)

Public Summary – Provided by applicants

In response to this unmet need of low-cost, secure and sustainable supply of cooking-gas to the rural and deprived regions of Pakistan, Hybrid Gasification Ltd UK (HGL) in collaboration with Durham University UK (DU) and Global Engineering and Marketing Pakistan (GEM) are developing a gasification technology 'GAS-SCRIPt' which utilises agricultural and household waste as feedstock to produce high calorific value (20MJ per m3) clean cooking syngas (Mixture of H2, CH4, CO and CO2).
Through this 12 months project, the consortium will prove the feasibility of designing, building and testing a 10kg per hr throughput electrically heated pyrolysis system for the gasification of agriculture residues and household waste into syngas and biochar. The plant will be installed and tested at a testing site (Rangeenpur, Lahore, Pakistan) and electricity needs of the GAS-SCRIPt operations will be fully met by solar powered generator.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040475	Early	The Robert Gordon University	£192511	£157551

Project Title

AR-Mini: AI-powered renewable mini-grids for rural regions in Sri Lanka

Public Summary – Provided by applicants

The rapid depletion of conventional energy resources and environmental costs associated with the use of fossil fuels for electricity generation have put increasing pressure on electrical utilities to include distributed renewable energy resources into their networks, In addition, energy efficiency, demand-side management and load control are becoming integral parts of modern electricity distribution operations. Regulatory bodies and customers also demand improved power quality, reliability and operational flexibility. In these conditions, increasing the supply capacity by investing in traditional infrastructure alone would not be sufficient. Smart grids, mini-grids and demand response schemes are some of the initiatives that distribution utilities can take to meet these future challenges.
Renewable energy sources have the capacity to ensure sustainable energy supply and fuel diversification. They increase energy security, reduce the risk of fuel pollution and reduce the dependency on fossil fuels. Renewable energy sources conserve the country's natural resources. This is especially beneficial for countries like Sri Lanka, which have no fossil fuel reserves but are rich in renewable energy sources. Despite the benefits, the use of renewable sources increases the complexity of management and control of the electricity grid. Mini-grids are used to alleviate such complexities but there are challenges when balancing demand and supply from multiple renewable energy sources. An intelligent mini-grid controller can deal with uncertainties in both demand and supply. It can help maximise the use of renewable resources and while minimising the use of fossil fuel (e.g. hybrid system using diesel).
This collaborative project between Sri Lanka (AVS) and the UK (RGU), aims to demonstrate the feasibility of an AI-powered Renewable Mini-grid (AR-Mini) for rural regions in Sri Lanka. The project objectives are as follows:
* Design and development of a prototypical AR-Mini, managed by an AI-powered mini-grid management system, that optimises core operations.

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* Assess the feasibility of AR-Mini in terms of improving access to low-carbon, reliable and affordable energy in Sri Lanka.
Due to its geographical location, solar, hydro and wind power are considered to be cheaper sources of electricity generation in Sri Lanka compared to fossil fuels. Hence the proposed innovation (AR-Mini) will reduce costs, emissions and increase the reliability of supply to the end-users like rural households, SMEs and social institutions, ultimately addressing all three areas of the energy trilemma. Although the primary focus is Sri Lanka, findings of the proposed innovation can be adopted in similar countries in South Asia, sub-Saharan Africa and South East Asia.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10043541	Early	Cranfield University	£296222	£250235

Project Title
Sustainable cooling hub for small-scale fisheries in Indonesia

Public Summary – Provided by applicants
Indonesia is the largest archipelagic country and the second largest producer of seafood in the world. Yet Indonesia's coastal communities, which mostly consist of small-scale fishers, are home to nearly a third of the country's poorest. Small-scale fishers have lacked access to the technology and resources required to preserve their catch from their rural locations to the markets. This results in up to 35% of seafood pre-consumption lost. Thus, access to cold chain technology is vital to mitigate this problem. The project aims to design a sustainable cooling hub that can cover cooling services in small-scale fisheries. The hub will maximise the renewable energy potential through solar energy utilisation and energy storage. The project has the potential to deliver outcomes and impact energy access through the optimised design of a sustainable cooling hub. The optimal design will consider the technical, financial, and environmental performance, ensuring an efficient, affordable, and clean cooling solution. This will significantly improve energy access to households in most small-scale fishing villages.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10039601	Late	ACHELOUS ENERGY LIMITED	£1161603	£714202

Project Title

Floating Instream Tidal and Solar (FITS) Power Plant - Nepal Pilot Project

Public Summary – Provided by applicants

Harvesting hydrokinetic energy from running river water presents a highly attractive addition to the existing renewable energy sectors. Critically, and unlike most other renewables, this technology guarantees a predictable and consistent energy output which can contribute to the baseload power requirements of its energy off-takers.

AEL has developed an innovative hybrid technology which couples run-of-river hydrokinetic generation with solar - the Floating Instream Tidal and Solar (FITS) power plant. FITS technology has been specifically optimized for river deployments, and is scalable to enable both energy access and utility scale power generation.

This project will deliver the first fully developed FITS pilot, supplying constant renewable power to an off-grid community in rural Nepal. The electricity supplied will be used to provide lighting and cooking facilities to households in the community, and will additionally power water filtration and pumping equipment, providing access to clean water for drinking and water for agricultural industry.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046103	Late	INCLUSIVE ENERGY LTD	£1356909	£787182

Project Title

Smart Biogas 3: Digesting Data

Public Summary – Provided by applicants

Smart Biogas (tm) is a patent pending, remote monitoring platform designed to monitor increasing numbers of geographically dispersed household/institutional biogas digesters at minimal cost across the world. Smart Biogas collects data on individual biogas digesters' performance and usage, allowing detection of potential faults or substandard installation/operation. This data is transmitted to a cloud platform where the data is, through this project, automatically processed and made intelligible to the user for, example through notifications, to facilitate prompt repairs or further user training. Hardware and software was designed and successfully piloted with Energy Catalyst Round 7 funding (No.105909) (EC7) .
Over the course of EC7, we released a MVP (Minimum Viable Product/first release) of the metering hardware and web-application, and recorded over 55 million hourly reports on biogas performance from around the world and published two academic papers. This MVP product allowed the metering to happen and display the information in a web-application but, valuable and unique as that product already is, at this stage it does not add any additional intelligence to the data. This grant would allow us to develop a number of other features for commercial release including:
* Enhanced analytics for preventive maintenance and diagnostics for biogas plants
* Finalise Carbon Credit reporting
* Enhanced sensing hardware to provide further data points
* Robustness development of the existing product and for wider use cases including larger commercial digesters
* Further academic papers and knowledge dissemination

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Ultimately we seek to address financial barriers and operational inefficiencies enabling viable biogas-as-a-service commercial models, enhancing company operations and providing additional income streams. Smart Biogas provides a powerful tool that facilitates increased access to biogas technology for more people, especially the rural poor.
The project is led by Inclusive Energy Ltd, with support from prominent actors in the biogas sector in East Africa, Kenya Biogas Program and Biogas Solutions Uganda, academic input from the University of Nottingham, and larger scale commercial pilots with Green Impact Technologies (Malawi) and Grassroots Energy (India).

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048793	Early	NEWAFRICA IMPACT LIMITED	£194355	£116613

Project Title

10MWe Bioenergy CHP, Weza, Eastern Cape, South Africa - Feasibility Study

Public Summary – Provided by applicants

This project, a collaboration between NewAfrica Bioenergy (NAB), NewAfrica Clean Energy (NACE), and Merensky Timber (Merensky), a part of Hans Merensky Group (HMG), will produce a bankable feasibility study for the Weza 10MWe CHP, producing electricity and steam for industrial and rural use and the Ugu District municipality. The project will produce energy for productive use and facilitate energy efficiency improvements in rural communities where economic activity is predominantly linked to agriculture and forestry. Moreover, the project will demonstrate the viability of a new business model to provide sustainable, low-cost bioenergy.
Based on the latest IEA report, biomass holds the potential to fulfil 57% of Africa's energy demand by 2035\. However, despite the enormous biomass energy potential, only 0.58% of power in Africa is generated using biomass. There is an absence of competent institutions with strong mandates and long-term oriented action plans. Institutes, agencies and stakeholders who work on the development of biomass energy show poor inter-institutional coordination. Progress in the production of biomass energy is limited by this lack of collaboration, coordination, and delays. Owing to weak coordination, the delay in implementing policies has limited investors' interest in investing in this field.
The successful implementation of this Project will catalyse NAB as Africa's leading bioenergy project developer and financier. This project will be a key step in NAB's effort to establish low-cost, medium-sized, and standardised projects with other agribusinesses across Africa. The combination of technical know-how and finance within the group will establish a new business model to promote renewable energy across the continent.
We will provide a bankable feasibility assessment for a 10MWe CHP bioenergy plant at Merensky's Weza sawmill and FSC-certified forests. 1/4th of the electricity will go to Merensky and 3/4th to Ugu district municipality and C&I off-takers, enhancing energy

availability and affordability. The Project will fulfil the Energy Trilemma by employing renewable energy to enhance energy availability and affordability in Ugu.
The consortium will ensure at least 40% female representation in project implementation. NewAfrica Bioenergy is an integrated developer of bioenergy plants in Africa. Its partners founded Africa's largest forestry enterprise outside SA, built wood processing units, and raised $200m for investments in Africa. Our collaborator NACE is a SA developer and investment company. And HMG is the world's 2nd largest avocado grower and distributor, SA's largest sawmiller, and 4th-largest forest owner.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040806	Early	DE COURCY ALEXANDER LTD	£206577	£151212

Project Title
Angaza Africa - Harnessing solar and wind power to provide sustainable energy access in rural Kenya

Public Summary – Provided by applicants
Creating sustainable economic growth and education in rural Africa requires zero carbon energy in local areas. However, the majority of current propositions are either expensive, complex, fragile or hard to deploy. Angaza Africa will show a different way. Utilising a portable hybrid system, combining solar, wind and battery developed at Glasgow Caledonian University and a citizen-based business model led by E-Safiri Charging in Kenya, Angaza Africa will demonstrate a new way of creating power. Innovate UK funding will enable a partnership between UK academia and small-scale rural industry in Kenya that will transform the lives of people in a sustainable way.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10043594	Early	MOBILE POWER LTD	£293801	£214892

Project Title

Electrifying Rural Development in Africa: displacing low-productivity manual labour activities and fossil-fuel generators in off-grid communities via a novel modular inverter design.

Public Summary – Provided by applicants

Approximately 1 billion people in Africa do not have reliable access to the electricity grid. The only option to access electricity is through fossil-fuel generators. However, the majority of women farmers are not able to afford generators and so are trapped in being reliant on manual labour, which limits productivity and therefore income.
Mobile Power supplies affordable, clean power to poor households and enterprises in off-grid communities across Africa using a pay-as-you-go smart battery rental system.
This feasibility project builds on previous Energy Catalyst Projects by focusing on a new product - a modular inverter - that complements the MOPO Batteries and enables off-grid communities to use AC appliances that are powered by affordable, clean energy, without any upfront costs.
This project will create a new collaboration between Mobile Power and Dr Krijn Peters from Swansea University who has been researching in Sierra Leone and Liberia for 25 years. He studied the impact of the spread of motorcycle taxis(okadas) that enabled women farmers to begin to sell crops at local markets, facilitating the transition from semi-subsistence farming to cash crop production. Mobile Power's EC7 project was aimed at electrifying this okada revolution using the MOPOMax Battery and solar swapping stations to power electric-motorcycles and expand their reach, into areas where fuel is expensive or not available.
ADDITIONALITY: This EC9 project will test the feasibility of a low-cost inverter that would enable the MOPOMax Battery to replace fossil-fuel generators in the Battery's 'Second Life' once it no longer can be used for e-mobility. Our hypothesis is that not only could the MOPOMax Batteries + Inverter undercut generators in cost, but they could also help the women farmers to increase their income by

replacing some of the low-productivity/manual agricultural processing activities with mechanised ones. This is due to Mobile Power's pay-per-use model where the MOPO Battery and Inverter will be rented out whenever the women need the electricity. This fits with the irregular and infrequent patterns of energy use that rural farmers need for pumping, milling and refrigeration, depending on seasonal harvests. This irregular demand creates a barrier for women to purchase a generator and inverter, which are both too expensive if only needed for certain weeks of the year. In comparison, a women farmer can come to a MOPO Hub and rent a MOPO Battery and Inverter whenever she needs it, with no deposit, no credit check or fixed payment structure.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10040674	Early	Aston University	£279851	£234938

Project Title
Off-grid modular cold rooms and pre-coolers for remote and dry areas in Ethiopia

Public Summary – Provided by applicants
The lack of sustainable cooling in Ethiopia is an unresolved challenge, leading to 30-50% of food waste, which amounts to a $4.3 billion loss annually. It precludes most farmers from achieving the desired profits through sales volume for their temperature-sensitive foodstuff. Such a challenge primarily impacts smallholder and women farmers, who produce 90% of fruits and vegetables in Ethiopia. Evaporative cooling is widespread in dry climates and uncomplicated technology. However, it does not sufficiently prolong temperature-sensitive crops' shelf-life to reach central markets. Neither does it control the cold room's humidity and temperature to the desired conditions. Additionally, cooling practices are often rendered ineffective by the lack of secure electricity in Ethiopia, a problem common to most of sub-Saharan Africa. Currently, the grid electricity coverage in Ethiopia is 36%, mostly in central cities, while 78% of the population lives in rural locations. The sustainable cooling challenge is made more pressing as recently a market has emerged for secondhand refrigerators, utilising environmentally harmful substances decommissioned from Europe. Such units are driven via grid electricity or PV panels of sizeable electric batteries and are typically based in central food markets. These inefficient refrigeration units are environmentally harmful and compromise the route towards SDG-7 "Climate action. In this project, we seek to resolve the sustainable cooling challenge by applying innovative technology to evaporative cooling, operating it at a low cost via renewable energies. The project will: 1. Utilise a green refrigeration technology driven by solar heat to achieve the desired cooling conditions. 2. Utilise an eco-friendly hybrid PV/vertical axis wind turbine by the investor (Kinder Energy) to maintain the system's operation via small electric batteries. We will install a demonstrator prototype in Ethiopia.

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3. Store the heat in the soil to affordably maintain the operation of the solar-thermal-driven refrigeration technology.
4. Develop sustainable business models to enable the uptake of the technology.
5. Develop a techno-economic model for the technology for community use via, for example, a pay-as-you-go scheme.

The developed system will secure the cooling and enable smallholder and women farmers to increase sales volume at desired prices, minimising food wastage. It will promote sustainable economic growth and encourage the technology developer (Kinder Energy) to create jobs and empower women farmers. The project will provide economically viable, scalable alternatives to the harmful secondhand refrigeration system market.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048584	Early	CHALLENGES CATALYST LTD	£264292	£206047

Project Title
HydroWheel Product and Business Case Development

Public Summary – Provided by applicants
Floating across rivers and streams to generate affordable, accessible renewable energy with less damage to the local ecosystem, HydroWheel is the world's first inflatable waterwheel. It emphasises lower costs, durability, easy installation and continuous power production. The innovation's commercial and impact potential in sub-Saharan Africa is further enhanced by the region's abundant hydro resources, where the installed capacity is estimated at 30.4 GW; 300 GW potential remains untapped. The deployment of off-grid renewable energy systems is a cost-effective solution expected to contribute significantly to satisfying power needs, driving economic growth and industrialisation and reducing poverty throughout sub-Saharan Africa. This project will determine how HydroWheel can commercialise and optimise the design of its innovation to provide an alternative (or complementary) technology to incumbent renewable energy technologies (including conventional pico-hydro, solar PV, diesel generators) and ultimately satisfy the electricity needs of under-served communities throughout SSA (starting with Uganda). This project is particularly determined to understand, test and ultimately sell to market segments that promote the productive use of electricity, further catalysing economic development, employment creation and productivity enhancements in rural areas. Hydrowheel Ltd will: hone the design of the waterwheel, optimising the waterwheel pockets (paddles) and examining their suitability for manufacture in small textile workshops in sub-Saharan Africa; optimising specification and sourcing suitable generators and gearboxes in conjunction with an experienced waterwheel manufacturer; and running a small-scale trial and then larger trial in Knoydart, Scotland. CREEC will be responsible for the Pilot Project Development phase in Uganda that involves literature review, community engagement (initial consultation and surveys of local communities), future project scoping, initial location screening, designing a pilot project and conducting technical field studies and finally conducting environmental and social impact assessments.

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MicroGen will use its "ISMO" GIS tool to survey river valleys in the target areas, identifying sites which conform to the project's definition of 'potential' and provide market and industry knowledge to support business plan development, and to facilitate research.
Challenges Catalyst and Challenges Uganda will support HydroWheel to create a viable commercialisation strategy to exploit the innovation. This will include key activities such as market sizing of beachhead market; micro-segmentation and development of relationships with key customers; identifying in-country value chain integration and creation opportunities; business and financial modelling and route to market strategising.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10039354	Early	INTERNATIONAL LEAD ASSOCIATION	£274021	£229014

Project Title
AfTrak - Micro Electric Agriculture for Africa

Public Summary – Provided by applicants
AfTrak -- A micro electric tractor designed for Africa to mechanise land preparation. According to the International Energy Agency (IEA), over 800 million people have no reliable access to electricity, primarily in sub-Saharan Africa and rural regions of developing Asia. However, despite many existing initiatives energy poverty eradication is a demanding challenge and requires novel strategies to meet the ambitious targets. Obstacles include high capital costs, difficulties with energy demand forecasts, environmental factors, theft & damage. The roll-out of grid or micro-grid connections to rural communities is often limited by the expendable income of a community being too low to purchase sufficient energy to be attractive to an infrastructure investor; AfTrak focuses on providing a significant agricultural revenue boost to pave the way for future energy rollout whilst simultaneously providing community power for key applications such as cooking, phone charging and lighting. The AfTrak system is a micro electric tractor capable of mechanising land preparation. This low-cost, walk-behind tractor system is powered entirely by solar, has built-in battery storage, can prepare the soil to a depth of 400mm and provides power for agricultural applications such as water irrigation and domestic applications such as phone charging, electric cooking and lighting. Across large areas of Malawi, under the few inches of topsoil, there is a heavily compacted layer of rock-hard earth. This is largely the result of long-term use of manual hoes, human and animal footfall, and occasionally heavy machinery. Plant roots cannot generally penetrate through this hard layer. Nor can air or water, which is necessary for the healthy living soils that support good agriculture. The AfTrak system has been coupled with an innovative agricultural methodology developed by Tiyeni called Deep Bed Farming (DBF). DBF reimagines the traditional Malawian farming cycle, the methodology has won approval from the Malawian Ministry of Agriculture

and demonstrates a significant increase in yield. However, DBF requires a substantial increase in the amount of land preparation in the first year before an increase in yield is produced. This creates a barrier to entry, especially for those households with a deficiency in family labour (child, female, and elder lead households). Coupling the capabilities of AfTrak to significantly lower the labour required for the initial land preparation, Tiyeni will be able to educate and engage communities at a heightened rate, whilst also allowing the communities to generate additional income and gain access to energy.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10042192	Early	University of Birmingham	£270959	£225700

Project Title

Feasibility study for sustainable, affordable solar PV/T-biomethane energy solution for rural Pakistan

Public Summary – Provided by applicants

Pakistan is the sixth most populous country in the world with a population of 216.5M and annual growth rate of 2%. It is an agrarian country with two thirds of its population living in rural areas. Despite its abundant renewable energy sources, Pakistan is facing severe energy crises where it imports a third of its energy requirements and is still using conventional methods of energy generation that produce significant CO2 emissions.

Majority of the rural population in Pakistan meet their cooking and heating needs by burning biomass like animal dung, wood fuel and charcoal in traditional cook stoves which are inefficient and causes household indoor air pollution (HAP). About 28,000 people die each year due to HAP, and it accounts for 40 million cases of acute respiratory illnesses per annum causing significant economic burden which costs about 1% of GDP per annum. Also, Pakistan is facing severe deforestation problem and currently forests cover only 2.5% of the land area as every year 27000 hectare is lost due to deforestation leading to increased CO2 accumulation in the atmosphere.

There are huge amounts of waste in Pakistan including 20MT/yr solid waste of which almost half is biomass like (food waste, paper leaves, grass and fodders), 70MT/year of agriwaste like wheat and rice husks, cotton sticks and sugar-cane residues, and 365MT/Yr of animal waste coming from more than 170M heads of cows, buffalos, cattle, sheep, camels and goats. Exploiting this agricultural and animal waste, this project aims to investigate the feasibility of a novel Waste to Energy system to produce biogas which will be further upgraded and separated into biomethane and carbon dioxide. The biomethane will be used for cooking and heating while CO2 will be used for wide range of industrial applications. Also, the proposed system will produce nitrogen enriched bio-fertilisers that can be used for soil enhancement, increased land fertility and food production.

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The widespread of the proposed technology will have major impacts on Pakistan population where clean, affordable and secure source of energy can be generated using locally available waste. Based on the waste produced from the 70M heads of cows and Buffalos only, over 57488Mm^3/yr of biogas and 30MT/yr of nitrogen enriched bio-fertilisers can be produced. This will significantly reduce Pakistan fuel imports, enhance the living standards of the rural communities particularly women, girls and disadvantaged groups, reduce CO2 emissions and improve the environment.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10044025	Early	Coventry University	£298240	£238293

Project Title
A high-power solar e-cooker: accelerating the transition to inclusive e-cooking in sub-Saharan Africa

Public Summary – Provided by applicants
Globally, 2.4 billion people still use firewood, charcoal or some other form of biomass for cooking, resulting in 3.2 million premature deaths in 2020---mostly women and young children---due to the serious health issues caused by indoor air pollution. Access to clean cooking, such as electric cooking to replace the uncontrolled burning of biomass, is critical to reduce deforestation, mitigate climate change and reduce health risks for users. In Rwanda, 1.9 million households still rely on wood and charcoal for cooking. To address the massive health problems caused by indoor air pollution---and met the global Sustainable Development Goal (SDG) of modern, affordable, and safe energy for all---Rwanda has prioritised a clean cooking program aiming to provide new or improved access to clean cooking solutions to 500,000 households by 2026\. The uptake of solar electric cooking is seen as critical for Rwanda to meet its clean cooking target. Solar electric energy costs have fallen so much that, for many households, electric cooking using solar panels is expected to be cheaper than using charcoal. Our vision is that solar e-cooking will eventually accompany or become part of solar home systems, which have already become popular in many African countries for powering lights and small appliances. However, currently, there are no solar e-cooking systems available as part of Rwanda's clean cooking programme. The challenge now is to develop an affordable and marketable solar e-cooking system, available with a service and payment model that will appeal to a broad spectrum of potential end-users, without reinforcing existing economic disadvantage. To address this need, this project will bring together energy poor households with academic researchers, consultants in cook stove monitoring, a solar energy company and Rwanda's regional energy provider. Together, they will co-design a new highly marketable low-carbon, clean and affordable solar e-cooking system by integrating existing solar products to arrive at a new whole system design.

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This project will be a starting point in helping households transition away from traditional forms of cooking that are dependent on fossil fuels, giving communities the confidence to use e-cooking appliances and make purchasing decisions around off-grid solar e-cooking. By working towards establishing a solar e-cooking eco-system, SMEs and financiers will be encouraged to increase investment in producing a range of solar e-cooking products for the market, and governments will be able to provide more targeted support for solar e-cooking to achieve their clean cooking targets.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048103	Late	GAMOS LIMITED	£4984908	£1767160

Project Title
Development and Commercialisation of Innovative PAYG Induction Stoves in Africa

Public Summary – Provided by applicants
BURN is the largest vertically integrated modern cookstove company in the world, providing world class R&D, manufacturing, and carbon offset projects from its HQ in Kenya. BURN produces the world's most fuel-efficient biomass cookstoves, has sold over 1.4 million units to date and has operations or distribution in over 15 African countries. Gamos and BURN were the recipients of Energy Catalyst Round 7 funding for development and pilot distribution of innovative, affordable electric pressure cookers (EPCs) in Kenya. The project validated the need and availability of a market for EPCs with a financing program. Low-income households in urban and peri-urban communities in Kenya were part of the project, and reported positive outcomes such as a reduction in cooking costs, reduced indoor pollution, and time savings from using the EPC. The success of this pilot necessitated Gamos and BURN to develop a more versatile electric stove, to complete BURN's suite of electric stoves. Gamos is partnering with BURN Manufacturing to develop, test, and commercially roll-out BURN's innovative electric cookstoves in four target markets in Africa, with the goal of building a commercially viable distribution model. Once prototypes are manufactured and tested in-house, a distribution pilot will be launched for the roll-out of the electric cooking line to low-income households in urban and peri-urban communities. Through the distribution pilot, we will establish a proof of concept for a financing program. BURN's electric stoves are designed for grid-connected low- and middle-income urban and peri-urban households in sub-Saharan Africa. The stoves leverage high urban electricity penetration, ongoing charcoal usage, and low lifeline electricity tariffs in the four target markets. The average urban electricity access rate in the target markets is 84%, and this is expected to increase to 97% by 2030\. Electricity in these markets is available at affordable rates with an average lifeline tariff of $0.06 per kWh. Despite a high rate of on-grid

connectivity and low tariffs, 51% of urban households in our target markets continue to cook with charcoal, presenting a significant market opportunity.

The use of electric stoves in cooking presents advantages over other fuels. It is 3-10x cheaper to cook using electricity than other fuels, saving consumers up to USD 1,700 over 7 years of use. Electric stoves also reduce cooking time by over 50% and eliminate indoor air pollution in comparison to other cooking stoves/fuels.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048505	Early	University of Huddersfield	£297334	£252734

Project Title
VIETNAMESE-FARM-CLEAN-MICROGRID

Public Summary – Provided by applicants
The project named as CLEANGRID (VIETNAMESE-FARM-CLEAN-MICROGRID) studies feasibility of a microgrid system with clean/renewable energy sources including PV, treated biogas generator, and secondary life battery as energy storage for Vietnamese agriculture (pig) farm. The project target is to provide an affordable, reliable, and clean energy solution to Vietnamese agriculture farm whilst mitigate the environmental pollution from farm waste and unreliable/off-grid power supply with good return of investment. The beneficiaries of the project are both the farm workforces/owner and the neighbor community where often locates in poor rural/remote/distant area with unreliable/off-grid power supply. With low-cost and mobile energy for basic appliances such as lighting, cooking, water-pump, communication, internet access, the project will address both gender and social inclusion as well as encourage equality. Livestock sector plays an important role in Vietnamese agriculture with 73% meat production is pork (26.7milion pig-head for 2014) and 70% pig-head (60% pork product) are from smallholder/householder farms (WB report). To mitigate this environmental issue from animal waste, waste process via anaerobic digestion for biogas generation and then using on cooking and power generation is often considered. Therefore, an affordable purification biogas process to improve the in-site cooking and power generation efficiency as well as reducing erosion issue on appliances is one major part of the project. The treatment is based on waste material (bentonite) from Vietnamese local mining and therefore, a cost-effective approach. The cooking via biogas could change the wood cooking behavior in the distant area leading to reduction of pollution/deforestation.

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As a tropical country, Vietnam has high-potential on solar power. However, for any microgrid system, energy storage is highly expensive. For cost-effective, energy storage system using secondary life battery from electric bike/vehicle in Vietnamese market is another topic of interests of the project. Also, a microgrid control system for maximizing energy conversion efficiency and minimizing energy consumption is essential.
The battery and DC/AC inverter modules are designed and developed in such a way that it is detachable as a mobile module for distant/remote area where electricity system is unavailable for community service such as water-pump.
To facilitate the scale-up of the microgrid system concept with different power levels and more renewable energy power integration such as biomass power generation, wind-turbine..., an energy conversion loss model for microgrid system is developed and validated via in-lab test. Also, a business model including investment cost, performance cost, return on investment, and potential CO2 capture/reduction is developed.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048381	Early	OPEN ENERGY LABS LTD	£292938	£205057

Project Title

Developing a smart solar energy platform for families and fleet operators

Public Summary – Provided by applicants

The number of people without access to electricity in Africa dropped from almost 860 million in 2018 to 770 million in 2019 (IEA et al., 2021). However, without more sustained efforts, it is predicted that 650 million people will still live without access to electricity in 2030, despite universal access to affordable, reliable, and sustainable electricity by 2030 being a key Sustainable Development Goal (United Nations, 2015). Grid expansion is necessary, but unconnected individuals remain difficult to reach as they're mainly rural, poor and marginalised. Not only this, but those connected via off-grid solar technology are facing issues with the lifespan of their systems. A study carried out in Kenya found that Nearly one-fifth of solar products stopped working within 18 months despite a 25-year predicted lifespan, with the majority of these products, being kept unfixed in the home (Cross and Murray,2018). Therefore, presenting issues with the maintenance and lifespan of current solar home systems.

Solar Home Systems are stand-alone units that include a photovoltaic panel (electricity generator), a battery and charge controller (energy storage and distribution), and electrical appliances (the energy load), providing at a minimum "Tier 1" electricity access for task lighting and phone charging (ESMAP, 2015). Solar panels with 1 -- 10 W output can be used to power lights to replace kerosene lamps in households. However, deployed solar panel systems have high failure rates (Feron, 2016); for example, reported failure rates of 65% in Laos (IRENA, 2014). These high failure rates result from a lack of maintenance or after-sales service, and harsh operating conditions (Van Diessen, 2008).

With funding from Innovate UK, Open Energy Labs (UK SME), Fam Studios (UK Innovation agency), will develop a MVP smartphone application/hardware to support remote/rural users to control, monitor, maintain and expand the functionality of a Solar Home System (SHS). Whilst also developing a strategy to support HE/FE students to become fleet entrepreneurs that can maintain/repair any

type/brand of SHS. Thereby directly lowering the barrier to the uptake of renewable energy technology in Rwanda and sub-Saharan Africa; namely, lowering the skill level required for people to design, install, operate, manage, and maintain household systems. We will assess the feasibility of this innovation during this project with the aim of developing an alpha prototype to use for further testing.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10044048	Early	CHARM IMPACT LTD	£296014	£207210

Project Title
Predictive Analytics for Due Diligence - PADD

Public Summary – Provided by applicants
Today 770 million people live without access to electricity and 2.5 billion people lack access to clean cooking facilities. Achieving full electricity access by 2030 requires annual investment of just over USD 35 billion, or only 2% of current global energy investment. However, current investments in power access are well below this. Without additional sources of funding, clean energy start-ups and companies working in emerging economies will not have the capital to scale their businesses for improved energy access, reduced carbon emissions and improved gender equality and social inclusion. Charm Impact, an early stage debt provider for locally owned, clean energy companies in emerging economies, is executing a feasibility study to research the ability to develop an intuitive credit scoring process using predictive analytics.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10047685	Early	CEPOWER LTD	£299792	£243339

Project Title
Feasibility study of a disruptive low-cost and low-maintenance electrical machine technology for industrial drives and grid-connected energy storage systems

Public Summary – Provided by applicants
This project will assess the feasibility of a newly configured induction motor technology with brushless rotor design for use in industrial variable speed drive (VSD) applications including grid-connected flywheel energy storage drives. It offers substantial reductions, projected to be over 25%, in the system capital cost as compared to conventional VSD technologies by utilising a fractional-size frequency converter. It hence enables a far greater proportion of motor applications to benefit from the energy efficiency and improved environmental impact of VSDs. The core technology has been progressively developed in computer simulation and small-scale laboratory prototypes and the aim of this project is to prove the technology feasibility on a credible-sized experimental prototype VSD system and to assess its economics and benefits for industrial VSD applications

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10039002	Early	J & K BARNARD (FARMS) LIMITED	£95489	£66842

Project Title
Solar powered heat engine to power tools including electricity generator for rural villages.

Public Summary – Provided by applicants
Problem: Rural smallholders in developing countries need an energy source or motor which has a low-cost purchase price and is simple to maintain with village resources. This is vital in villages that have no mains electricity -- SDG7\. Photovoltaic electricity is an option for such provision, but cannot be maintained in a village and is liable to catastrophic failure if damaged. PV is only 15% efficient Only 58% \[https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=UG\] of people in Uganda are not connected to the network. **Vision:** The full project will have a multi-disciplinary team to design innovative solar energy capture to n run a small electrical generator, 1Kw, or other equipment. This will have a very low carbon footprint from manufacture to daily use and be sustainable. **Principal Output of** this feasibility study will be a framework for a project to produce a minimum viable product that can provide torque to generate electricity. This will involve next generation solar power. Attention will be given to designs that are low cost, easy to manufacture, require simple production equipment and can be adapted for production in countries with limited engineering manufacturing capability. The use of a modular design will be investigated to enable the use simple standardised components. This will reduce the manufacturing costs and allow flexibility for the production of different Technical production, business profitability, supply chain management for both inputs and outputs, marketing and sales will be examined.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10046809	Early	AKREON TECHNOLOGY LTD	£285074	£199552

Project Title

EcoCool

Public Summary – Provided by applicants

The potency of vaccines is as good as the required temperature for their storage. The movement of vaccines from the point of production to the point of vaccination is known as the cold chain. The quality of this chain determines the preservation of the viability and strength of vaccines. Therefore, the temperature of the chiller must be optimal. Unfortunately, this is not obtainable in developing nations because the conventional coolers are powered by electricity and the electric power generation in Sub-Saharan Africa is inadequate.

While cities and urban areas in Sub-Saharan Africa have access to power supply, even though inadequate, those living in rural areas suffer infrequent supply. In some cases, they lack power altogether. This makes it difficult for the conventional coolers that depend on this kind of power generation to sustain the potency of vaccines and deliver them accordingly. Some have resorted to the use of petroleum to power these coolers. However, fuel has become a premium commodity, with an ever-increasing cost globally. Asides from this, the release of carbon into the atmosphere does more harm to humans.

Another wonder of the **EcoCool** is that it is portable, thus making mobility seamless. The implication of this is that everyone in the most primitive environment can get vaccinated without any worry about the storage temperature of the vaccines. And in cases where there is no sunlight, the **EcoCool** has been built in such a way that there is a standby battery that can sustain the potency of the vaccines until sunlight is restored. However, such scenarios will unlikely occur since Sub-Saharan Africa is known for its hot weather. Besides the medical logistics of vaccination, **EcoCool** plays a significant role in bringing solutions to the adverse effects of gas emissions on the environment as it relies on renewable energy for power supply.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041374	Early	SMART GRID CONTROLS LTD	£298415	£253649

Project Title
Sharing Renewable Energy Generation through, Mobile Energy Storage (MES)

Public Summary – Provided by applicants
Climate change is the defining issue of our time. from shifting weather patterns that threaten food production, to rising sea levels that increase the risk of catastrophic flooding, the impact of climate change is global in scope and unprecedented in scale. We must move rapidly to ensure that a greater proportion of our energy is generated from renewable sources. In Sub-Saharan Africa, the required Energy Transition will predominantly be achieved through Independent Power Producers (IPPs) who secure their funding from Global Capital markets. Whilst the mitigation of climate change is urgent and essential, it is also vital that we see a fair transition to a new energy infrastructure, a transition is therefore needed which does not leave behind poor and disadvantaged communities. In South Africa, the generation of renewable energy has been encouraged through the Renewable Energy Independent Power Producers Programme (REIPPP). This programme requires IPPs to allocate 2.5% of their total funding to socio-economic projects. This project seeks to test the feasibility of charging a bank of small batteries from solar farms installed by IPPs, then utilising those batteries to provide power to low income/rural households and micro businesses. It is envisaged that the power would be provided free of charge as part of the IPPs social commitment. The feasibility project will specifically address the viability of delivering this project in Kwa Zulu-Natal, focusing on a cluster of five off grid villages around the town of Cato Ridge. We will also test the model through discussions with a number of IPPs, working in South Africa. The operational model we wish to test is for a social enterprise to manage the distribution of the batteries to households within a prescribed programme. It is envisaged that the batteries would be replaced on a weekly basis. We wish to test the ideal size of battery for this purpose and the most practical arrangements for this, within a dispersed rural community.

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The project will be structured to ensure that at least 50% of the beneficiaries of the project are women living in rural areas.
There are a number of specific innovations within the project
Technical Innovations
(i) AI supported Business Model which supports IPPs in their planning of effective socio-economic programmes.
(ii) Affordable mini energy router;
Business Innovations
Social enterprise "energy for rent" shops;
Sustainable community Innovations
Mitigate energy poverty in rural areas.
Create jobs for local community
Support women entrepreneurs

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10042313	Early	EVONET ENERGY LTD	£284082	£241170

Project Title
Sunsafe II

Public Summary – Provided by applicants
The 2019 Kenyan census by the [Kenya National Bureau of Statistics reported that][0] 12.04 million households (50.4%) use grid electricity for lighting and 19.3% use solar hence approximately 30.3% of households are still unconnected. The census placed the grid electricity connection rate at 26% connection for rural areas and 88.4% for urban areas. Additionally, at least 6.6 per cent of the population uses a tin lamp and 2.8 percent rely on firewood for lighting. Electricity reliability on the grid [remains low at 30%][1], with the census reporting that 8.4 million of the 12.04 million households do not have reliable electricity. Urban areas, which have a higher connection rate, also experience blackouts at least one day a month for [scheduled maintenance by the grid provider][2]. Therefore, even areas considered as having reliable electricity might need backup systems. Solar photovoltaic (PV) systems can electrify unconnected households and provide backup systems if electricity reliability is an issue. Given unmet electricity needs above, there is a large market for solar PV systems in Kenya, even as the grid expands. These systems fall into two categories: component-based solar systems (CBSS) or plug-and-play systems (PPS). Plug-and-play systems are pre-assembled solar home systems (SHS), while CBS are sold as separate components, which are assembled on-site by technicians into SHS. CBSS are often preferred by consumers due to their load flexibility (i.e. a system is designed for loads the consumer has and/or wants to power) which allows for [higher tiers of electricity access][3] (increased capacity, reliability), more easily than PPS. Unfortunately, [limited technical knowledge][4] about the design and installation of solar PV, can render CBSS unreliable or unsafe. This lack of knowledge can result in sub-optimally sized systems or systems sold without key components of system safety and functionality, like charge controllers.

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This project addresses the identified knowledge gap by developing a system running on a smartphone that digitizes selection of CBSS components thus simplifies system sizing in component-based solar photovoltaic systems. It targets electrical retailers and technicians to ensure that the systems they put together for customers are correctly sized and configured, without requiring sizing knowledge.

[0]: https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-iv-distribution-of-population-by-socio-economic-characteristics
[1]: https://openknowledge.worldbank.org/bitstream/handle/10986/31333/9781464813610.pdf?sequence=6&isAllowed=y
[2]: https://www.kplc.co.ke/category/view/50/planned-power-interruptions
[3]: https://openknowledge.worldbank.org/bitstream/handle/10986/24368/Beyond0connect0d000technical0report.pdf?sequence=1&isAllowed=y
[4]: https://www.sciencedirect.com/science/article/abs/pii/S2214629621001948

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10039507	Early	Aston University	£299483	£252836

Project Title

Hybrid Energy Powered Smart Irrigation System for Smallholder Farmers

Public Summary – Provided by applicants

Water scarcity already affects every continent, and the problem is more prominent in Sub-Saharan Africa and South Asia. Water shortages have drawn the attention of the development community to the necessity of achieving more efficient use of limited water resources, especially in agriculture to increase crop production and to achieve global food security in a sustainable way. This target, however, demands an increase in the irrigated area regardless of the water resources available.

Access to sustainable and cost-effective irrigation system is key to many small-scale farmers in order to sustain their livelihoods and food security. Running an irrigation system is still extremely challenging. There are still no electricity grid-extension in many rural areas in many developing countries. In the absence of a reliable electricity supply, farmers have to resort to diesel-based pumping systems. These systems create high operating costs, often experience service gaps, contribute to GHG emissions, and contribute to the energy bill in countries that do not produce such fuels. Therefore, renewable energy options, and in particular solar and wind energy, seem a very promising solution for sustainable agriculture in regions with high-solar-insulation and wind energy density, given its environmental advantages, low maintenance and increasingly low investment costs.

This project aims to design, develop and demonstrate a novel "smart irrigation system" powered by "solar and wind energy" simultaneously. This technology is cost effective, efficient, with no running cost, and zero emission. This will provide energy access to small-scale farmers for irrigation of food and cash crops, and results in an increase in their earnings.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10041599	Early	ELECTRO MECHANICAL DEVELOPMENTS LIMITED	£172265	£124719

Project Title
Passive Air Cooling (cool-earth)

Public Summary – Provided by applicants
Cool-Earth is an innovative application of an ancient practice for cooling water rural sub-saharan Africa, based on evaporative cooling. This project demonstrates the technical feasibility report validated with an aesthetic model and a technical design of an optimised evaporative cooling system validated by instrumented demonstrator that will facilitate a refined concept with commercially relevant ancillaries.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10043288	Early	DPSUN LIMITED	£209966	£125500

Project Title
SAMGRIST - Samoa Grid Stabilisation

Public Summary – Provided by applicants
This Grid Stabilisation project was identified as the third highest priority project in Samoa's NDC Implementation Roadmap and Investment Plan (2022). Close to 60 percent of the Samoa's electricity supply is now being produced by renewable sources. However, the amount of energy from solar panels is currently being restricted on the main grid on Upolu due to grid stabilization issues. There is an opportunity for an **innovative business model** where the utility engages a private entity to install and operate the batteries. This model would be the first of a kind in the Pacific and would harness private sector expertise, decrease investment for the Government owned utility, promote competition in the market for DER, and be the first step in moving towards a dynamic electricity system that is capable of supporting two-way power flow. A private entity would be competitively procured by the national utility in Samoa, to finance, install, operate and maintain the distributed batteries across the network. The private entity will charge and discharge the batteries based on the provisions set out in the contract which will be designed to stabilise and optimise the grid. The utility company will pay the private entity overtime with revenue collected from customers.

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Project Number	Stage	Admin lead	Proposed project costs	Proposed project grant
10048187	Early	ACHELOUS ENERGY LIMITED	£296814	£251613

Project Title

Solar2Wave: Design of Floating Solar Farms to Overcome Tough Ocean Waves

Public Summary – Provided by applicants

Indonesia has a population of approximately 273m, of which 1.5m still lack access to the energy grid. These people live on remote islands, relying on diesel power generation that is expensive and unreliable.
The Solar2Wave project will carry out a floating photovoltaic (FPV)-based innovation to solve the energy-access issue of Indonesia's remote islands. An FPV farm is fully scalable, as it consists of small individual solar panels. Different sizes of FPV farms can be placed along the coastal line of an island and connected to residents. In particular, the Solar2Wave innovation can ensure that FPV panels remain intact from incident ocean waves, and thus provide a sustainable solution.
By providing energy access to Indonesia's remote islands, Solar2Wave will bring improvements to the economy, working conditions, education, health services, and hazard resilience. This will be demonstrated through a case study based on a representative island.
Following the present feasibility study, Solar2Wave will show the potential to be placed for ~6000 islands of Indonesia with residents.
The innovation will make FPV an appealing solution to replace the country's current 88% electricity using fossil fuels. We can foresee a long-term development of FPV in Indonesia. The UK and Indonesia will benefit each other from the associated businesses. The enormous FPV market in Indonesia can be a golden opportunity for these two countries to establish joint corporations, and conduct extended trade as well as cultural and educational engagements.
Eventually, Solar2Wave will be boosting the world's trend of extrapolating FPV from lakes to seas. The project will help us achieve the Net-Zero goal and mitigate climate change.

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ENERGY CATALYST

UKaid from the British people

Results of Competition: Energy Catalyst Round 9

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			£	£
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