

Innovate UK

Results of Competition: SBRI Solar Pump Phase 2

Competition Code: 1610_SBRI_SP_PH2

Total available funding for this competition is up to £500k for Phase 2. This is 100% co-funded from DFID with Innovate UK administrating the funds.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
The Imagination Factory Ltd	Solar Steam Vacuum Pump	£250,000	£250,000

Project description - provided by applicants

A modern solar steam vacuum pump The Imagination Factory is bringing together modern solar technology with a simple legacy pump from the steam era, updated and refined using modern components and materials. Solar powered irrigation will be provided by a combination of a condensing steam pump and a solar steam generator. The Imagination Factory has successfully completed Phase 1 of the SBRI Solar Powered Irrigation Pump and has demonstrated technical feasibility in a functional proof of concept rig. Steam vacuum pumps are robust, piston-less and have very few moving parts. These pumps date from the earliest days of steam - steam vacuum pumps were widely used into the 20th century for pumping mines, ship bilges and for portable excavation work - they are well suited to pumping water with high levels of suspended solids. Steam applies direct pressure on the pumped water to provide positive displacement; condensing steam creates a vacuum to draw water into the pump. A vacuum is able to draw water to a height of ~30ft. Sub-Saharan Africa receives an abundance of solar energy. Solar thermal energy will be used to create low-pressure safe steam from a wet tube boiler. This project will combine these two well established technologies to make a modern solar steam vacuum pump; appropriate to localised low cost production, bringing practical affordable irrigation to these areas of the developing world. The Imagination Factory is working with Motivation - Freedom through Mobility – a charity skilled in setting up training, local manufacturing and production plant in the developing world. During Phase 1 of the competition a broader network of potential collaborators has been established covering a range of expertise to assist in development, covering; Sub-Saharan testing (initially Tanzania), manufacture, financial inclusion, distribution and product support. The Imagination Factory has a number of creative approaches to meet the aggressive cost target for this pump. Recycled and repurposed fire extinguishers and other used pressure vessels are intended as the core pump components. The design intent will be cost sensitive from the outset, the pump will be available in kit form appropriate for simple production, assembly, servicing and maintenance in the developing world. The Imagination Factory team includes members of the successful British Steam Car Challenge that broke and still holds the land speed record for a steam-powered car. Steam and engineering experience are embedded in this team.

Note: you can see all Innovate UK-funded projects here

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Azur Innovation Ltd	Solar Engine Irrigation System (SEIS) - Phase 2	£247,300	£247,300
Project description - provided by applicants			
<p>The Solar Engine Irrigation System (SEIS) is a solar powered irrigation system based around combining the mechanical output of a heat engine with a fluid pump. The heat engine is a free-piston variant of a Stirling/Ericsson cycle engine based on a thermomechanical generator developed at Harwell by Ted Cooke-Yarborough (see patent US 4,345,437) and further developed by others (see patent GB2298903). The thermomechanical generator has only one moving part and is designed so that it has no surfaces undergoing mechanical wear leading to an extremely reliable and long lasting mechanism. One version of the TMG recorded the longest service-free design life for any engine and lasted 90,000 hours before service intervention was required. The SEIS uses the upper diaphragm on the TMG to act as the moving component and is coupled to the pump. Two pump type options (both positive displacement) are proposed to offer additional site-specific opportunities - such as differing well depths and levels of water contamination. Their designs have been chosen to provide good lift, dry running and self-priming characteristics, tolerance to grit and sludge and high efficiency. The heat source for the engine is provided by a very low cost solar reflector designed to capture ambient light over a range of solar elevations. Optionally other heat sources could be used. The work is to be undertaken by the combined capabilities of Azur Innovation, Bowman Process Technology, Nottingham University and the water charity Practical Action.</p>			

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