

Annex 1 Remit Zero cylo – Innovate UK application

The potential and Innovation

Cylo could be the future of emission-free heat for our homes. Cylo is said to be capable of directly replacing a gas or oil-fired boiler without compromising on functional performance, comfort, or convenience. The cylo vessel is a novel thermal store, which harnesses electricity from the grid during off-peak hours when it is in abundance, cleanest and cheapest. cylo is also capable of using Demand Side Response (DSR) technology in line with PAS 1878:21 to utilise electricity when it is in oversupply. Cylo stores this thermal energy, using pressured water as its storage material, until it is required by the household to provide hot water on demand for radiators, taps and showers.

At full charge, the cylo vessel will store 68kWh of heat, which in most cases will be sufficient to maintain the heating systems for a full day on the coldest of winter days. cylo's storage capability, if aggregated, will play a meaningful role in grid balancing services by providing high volume long-duration storage with an extremely low environmental impact, harnessing energy at times when electricity is in over-supply. cylo is not only able to provide zero emission heat to all, but allows those significantly impacted by high energy costs to take advantage of off-peak tariffs and Demand Side Response technology.

The cylo vessel can heat a domestic wet-central heating system to a temperature at or above that of a gas boiler. Typically, the cylo vessel can heat a home quickly, transmitting heat to a home at 55C and, through control, capable of holding this temperature at +/- 1C. Contrastingly, heat pumps typically transmit heat at around 40C to 45C meaning that building fabric upgrades are needed, supported by larger radiators, rendering installing expensive and disruptive. Whilst a heat pump can offer a high coefficient performance, it is entirely reliant on electricity when heat is needed. A heat pump cannot store energy. In contrast, whilst a cylo vessel offers a COP of ~1, its ability to store energy offers the user the opportunity to harness electricity when it is at its cheapest or from surplus renewables, if available.

Cylo is easy to install, requiring no building fabric upgrades or radiator replacements, unlike the expense associated with heat pumps, and can be fitted in a single day, smoothly replacing a fossil fuel boiler. Where space within the home is restricted, the cylo vessel can be installed in an outbuilding or garage.

Comparing each cylo vessel to a natural gas fired alternative boiler, each cylo vessel will generate average annual savings of 2.2 tonnes CO₂e. The cylo vessel achieves a roundtrip efficiency of over 95%. This operating efficiency will not degrade with time. cylo has a longer plant life than fossil fuel boilers or heat pumps of over 40 years.

The above unique selling points have been demonstrated in the Remit Zero lab at Exeter Science Park, however, to develop a strong business case to propel our product to mass and rapid commercialisation consumer trials are essential. During these trials, the aim is to establish a more precise understanding of the benefits cylo can bring. The data gathered will allow for the development of a robust business case for the installation of cylo. This will allow cylo to effectively compete with other energy efficient heating systems within the market. The project will also highlight cylo's ability to reduce energy during a time of increasing prices within the UK. For the UK more

holistically, cylo's storage capability facilitates grid-balancing and can play a meaningful part in supporting the UK's journey to net zero.

Justification for funding

Smart grant funding and associated consumer trials will rapidly accelerate the commercialisation of cylo. This investment provides the opportunity to significantly open the market for the installation of cylo within local authority and Housing Association housing stock; of which there over 4 million homes fall into these categories. Smart Funding offers the opportunity to partner and collaborate with a local council, which enables us to work directly with our target market. Until cylo's practical application and benefits are illustrated, local councils are not able to independently invest in installing cylo. Similarly, Salix funding is targeted at more developed technologies, particularly heat pumps. cylo is a novel technology and consumer trials are necessary before full commercialisation. Smart funding would accelerate product commercialisation through allowing cylo to effectively compete with similar products and to demonstrate in practice its unique selling points and business case. This collaborative project with a local council will leverage further opportunities for investment, as we believe this project will inform future initiatives within other Housing Associations and Local Authorities.

Smart grant funding to support consumer trials is the next step in our business development plan. Remit Zero's progress to date includes having secured a supply chain for the production and manufacture of cylo, as well as being in the process of achieving UKCA regulatory conformity to ensure our product is ready for market. Remit Zero has ameliorated cylo(r)'s design and developed comprehensive installation and maintenance instructions. Remit Zero has obtained ISO 9001 to demonstrate our internal quality assurance. In addition, within the past year, Remit Zero has employed an applications engineer, supply chain manager, legal graduate and further administrative staff to provide specialist expertise and support the growing business. Remit Zero has demonstrated that the cylo vessel functions effectively through having undertaken extensive testing of the vessel within our lab at Exeter Science Park. Remit Zero has also secured an order of 4 cylo's from the Ministry of Defence to trial the vessel within its domestic properties. Remit Zero are securing a robust supply chain and working with a consultant to improve production capacity and economies of scale, demonstrates that cylo is now ready for mass commercialisation. The next step is to undertake consumer trials to assess cylo's interaction with the user and household, and to demonstrate how cylo can benefit Local Councils and Housing Authorities.

The potential Market

Remit Zero has identified two initial target markets (1) The Ministry of Defence and (2) Public Housing Stock (local authorities and housing association). To implement cylo within both markets, consumer trials are required to demonstrate robust commercial viability and a strong business case. MOD are facilitating this within their own portfolio. These consumer trials will support penetration into the public housing market. The accompanying consumer feedback and the data gathered will help inform further projects across the UK and internationally. There are currently approximately 4 million local authority and Housing Association homes within the UK.

Around 2 million gas boilers are installed within the UK each year. The Government targets 600,000 of these to be replaced by heat pumps leaving a net addressable market of 1.4 million units per annum within the UK alone. However, to access this

market, Remit Zero must clearly demonstrate the benefits of cylo in application. Once this is demonstrated, the potential market is significant and rapid commercialisation within the public sector can commence.

Cylo can assist in the decarbonisation of the public sector and can help achieve the government's net zero targets whilst also assisting those in fuel poverty and struggling with rising energy bills- there is, therefore, significant commercialisation potential. The specific market subsector of this project is that of older housing, including social housing, with poor EPC ratings. The cylo vessel seeks to provide affordable zero emission heating and hot water to any home regardless of the home's energy efficiency. Unlike other forms of zero emission heating, the cylo vessel is simple to install and is not reliant on building fabric upgrades or changes to radiators for it to work effectively.

Once cylo's capability is demonstrated within the public sector, Remit Zero intends, to expand into the private sector both within both domestic and commercial markets.

The focus of these trials is (1) to demonstrate that cylo can utilise Demand Side Response technology, (2) to illustrate that those on low incomes can make a tangible difference when it comes to tackling climate change; (3) to show this innovative technology is able to simultaneously tackle climate change and socio-economic challenges, such as fuel poverty through reducing energy bills.

Impact and Benefits

The impact and benefits of conducting these trials are as follows: (1) to demonstrate the benefits of cylo(r) technology in reducing energy costs, particularly for those in fuel poverty, (2) to enable those on low incomes to play a meaningful role in combatting climate change (3) to illustrate the ability for cylo to make a tangible difference to grid balancing efforts within the UK through utilising off-peak electricity tariffs including emerging dynamic Demand Side Response (DSR) based tariffs.

During these trials and following their completion, Remit Zero will ascertain (1) precisely how much each household is able to save on their energy bill in comparison with a gas or oil fired boiler, (2) ease of operation including utilising the user interface, (3) a more precise understanding of carbon savings (4) user perception of cylo more generally including aesthetics and ease of installation and (5) how cylo is able to use Demand Side Response technology (DSR) most effectively in practice

Remit Zero hopes that following its completion, this project will be ready for commercialisation across the UK and internationally within both the public and private sector within domestic, as well as commercial premises. These consumer trials intend to strengthen cylo(r)'s position within the market by allowing cylo to more effectively compete with similar products such as heat pumps. Following the completion of these trials Remit Zero believes that the consumer feedback and data gathered will enable (where relevant and necessary) further design amelioration, user interface modifications, an improved marketing and communications strategy, and a greater understanding of how Demand Side Response can be used to cylo's full advantage.

In the short term, the outputs from the trials will help create a more refined product, ready for mass and rapid commercialisation. In the medium term, within the 18 months- 2 years following completion of the trials, the project will inform further projects within the UK public sector, resulting in increased revenues and greater market share. Within long-term, the next 5- 7 years, it is hoped that the trial and resulting data will result in cylo installation within the private sector both within the UK

and internationally. In addition, the successful commercialisation of cylo will allow Remit Zero to continue to innovate and develop similar net-zero products in the future.

Remit Zero designs and manufactures cylo within the UK, therefore the success of these trials and rapid commercialisation that ensues, will not only support, secure and foster current and future jobs within Remit Zero directly, but will support the wider subcontractor, suppliers of cylo including our vessel and component manufacturers and subcontractors. cylo is designed in Exeter with our subcontractors currently based in the southwest of England and South Wales. cylo manufacture supports levelling up efforts within the UK.

As Remit Zero grows and appoints further members of staff, Remit Zero believe that expanding our diversity and inclusivity can contribute immensely to our firm's expertise and talent pool. As we intend to scale rapidly, we have implemented new recruitment practices to remove any potential opportunities for unintentional bias. Remit Zero are working with local schools, colleges and Universities to provide opportunities for those wishing to pursue a career in the Greentech economy. Remit Zero have also signed the Armed Forces Covenant in recognition of their desire to support those leaving these armed forces (either through choice or circumstance) by offering them a career within their business. Our inclusive employment and training opportunities will ensure that our project is delivered by both world class engineers and trainees with a variety of experience and a diverse range of skills.