sero January 2023 | Case Study

Penderi Retrofit Energy Project

Blaen-y-Maes, Swansea

+ UK’s largest renewable retrofit project of its kind
+ Innovative Community Solar Share scheme
+ Reduces bills and saves up to 350 tonnes of carbon emissions
+ Flagship scheme, leading the way to Net Zero

www.sero.life

Project Summary

Client:	Pobl Group
Industry:	Social Housing
Project Scale:	644 Homes
Project Type:	Retrofit
Location:	Swansea, Wales
Pre Construction:	2019 - 2022
Construction:	March 2022 - July 2023
Contractor:	Everwarm

Key Metrics

644 Homes Fitted with:

- Batteries
- Sero BEE's
- Smart meters
- Thermostats/smart heating controls

Powering the Community:

- **437** homes fitted with solar PV systems
- **1.4MWp** installed solar PV capacity
- **1.1MWh** electricity generated per year by the community
- **3.2MWh** of battery storage
- Targeting **60%** of electricity generated on site
- Targeting **50% reduction** in metered imported energy
- **30%** projected decrease in residents' energy bills
- **xx%** projected decrease in carbon emissions
- **£100,000 per year** income estimated to be generated for Pobl

Costs

£3.5M
funding from the European Regional Development Fund (ERDF) via the Welsh European Funding Office (WEFO).

£1.6M
matched funding from Pobl Group, Sero, Optimised Retrofit 2.1/2.2, Swansea Bay City Deal.

Return on Investment
The project will generate its own income from the on-site solar PV, allowing Pobl to fund the works already carried out and future steps on the properties' journey to Net Zero.

Community Solar Share
Equitable bill sharing scheme allows all properties to benefit from the solar PV, reducing residents' bills.

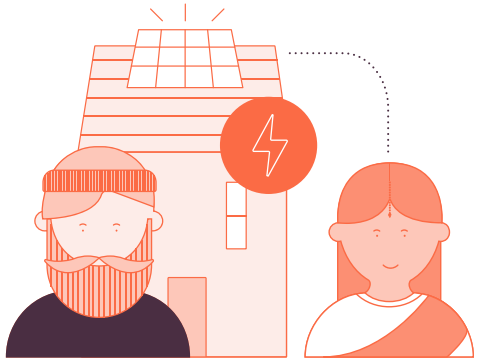
Project Summary

This ground-breaking project began life back in 2019. Affordable housing specialist Pobl Group approached Sero to develop and deliver technical solutions to help them retrofit 644 homes that they owned and managed in Blaen-y-Maes, Swansea, in a community known as Penderi.

This project is the first step for these properties on their pathway to Net Zero. It has already improved the efficiency of these homes, helping to reduce energy bills and creating a more comfortable environment for residents.

Sero specified 1.4MW of solar PV across the project and 3.2MWh of battery storage, which is expected to provide up to 60% of the communities' power needs. To distribute the benefits of this on-site generation equitably, Sero developed an innovative Community Solar Share Scheme, which, although not physically sharing power between homes, allows for the savings generated to be shared throughout the community.

Importantly, Sero designed this project to allow Pobl to actually generate an income from the solar PV installations,



whilst also lowering their residents' energy bills. This will not only help Pobl to fund the retrofit works that have already taken place, but also provide a continued revenue stream that can be used to fund the future steps needed for these properties on their journey towards Net Zero.

Whilst this particular project has benefited from £3.5M of funding from the (ERDF), via the (WEFO), and £1.6M in matched funding from Pobl Group, Sero, Optimised Retrofit 2.1/2.2 and the Swansea Bay City Deal, this type of external funding cannot be relied upon indefinitely. This project helps to prove that carefully planned and implemented affordable housing retrofit schemes can, in fact, significantly help to fund themselves, providing a model that can be repeated at scale.

The Sero Life service and the digital tools it provides will allow Pobl to accurately monitor how their properties are performing, and continue to plan and progress future pathways to help decarbonise their portfolio. It will also allow residents to monitor their own energy use and control the comfort of their homes. This allows Sero to continue to help Pobl both now and in the future.

2023
July project to be completed

Set to be completed in July 2023, the project has already significantly reduced the vulnerability of the community to the volatility of energy costs, helping to protect residents from fuel poverty, whilst accelerating Pobl on their journey towards Net Zero housing throughout their portfolio.

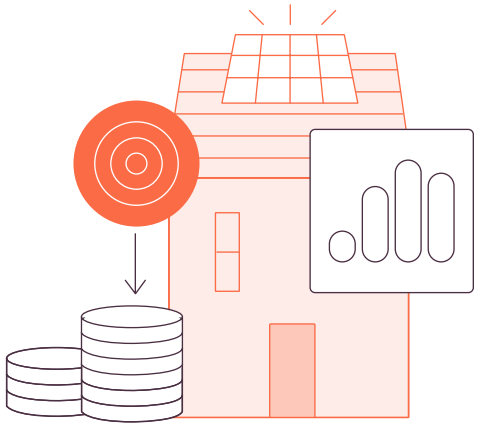
The Challenge

Partners' Objectives

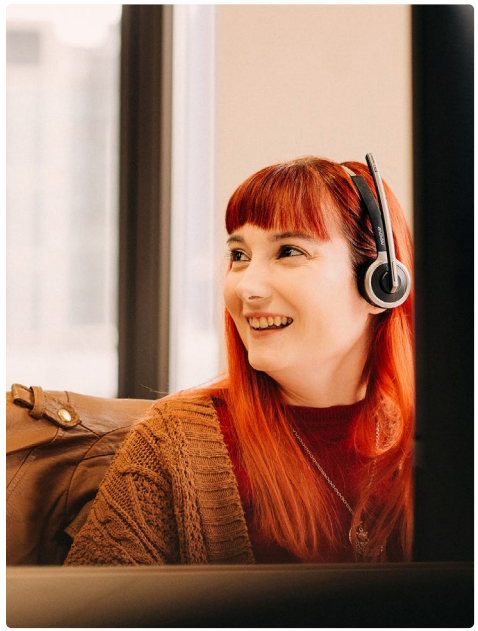
Pobl Group

Together, Pobl and Sero decided that the Penderi project would need to achieve the following objectives:

- Improve all the homes' sustainability and energy efficiency.
- Help address tenants' energy bills.
- Reduce the vulnerability of the community to the volatility of energy costs.
- Generate 1.1MWh of electricity from the community per year.
- Develop a billing model that distributed fairly the financial benefit of the installations between all homes.



- Demonstrate the viability of the model created, in order that larger scale projects can be undertaken elsewhere following the same principles.
- Demonstrate the financial viability of such a project and model.
- Capture lessons to improve and inform future projects.



Welsh European Funding Office (WEFO)

To support the viability of the scheme, £3.5M in funding was secured from WEFO. This was contingent upon meeting the following objectives:

- Contribute to the transition towards a low carbon and energy efficient economy.
- Establish the largest community based small-scale solar and battery storage scheme in Wales.
- Reduce fuel poverty in the community.
- Help to provide local employment and training.

The Challenge

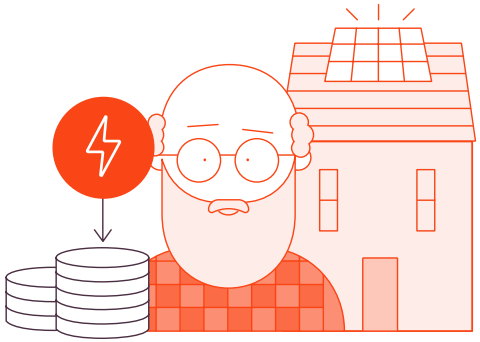
Identifying and Mitigating Risks

Local Infrastructure Upgrades
District Network Operator, Western Power Distribution (WPD), needed to upgrade and install new substations at a cost of £900,000. Sero worked closely with WPD to resolve programme coordination challenges, ensuring the project was not delayed. The works were undertaken at WPD's own cost as part of their commitment to facilitate renewables projects.

Resident Participation
This was essential to the project as the works were not obligatory. Sero therefore needed to obtain permission from the residents to allow access to their homes. Sero arranged extensive community engagement and helped develop resident communications literature with Pobl and the installer Everwarm, to facilitate this process and ensure a good uptake of the project.

Meeting the Solar PV Generation and Battery Storage Targets
There were inevitable variations in roof design, condition and orientation that limited the installation of solar PV, whilst some homes lacked the internal space to accommodate the batteries. Sero's energy services model, combined with the overall solar PV targets being for the whole scheme, mitigated much of the risk to the solar PV targets. An external battery option was incorporated into the scheme to allow for installation when interior space was limited.

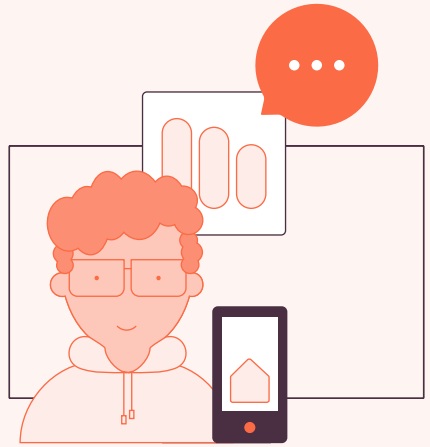
Pre-Payment Meters
These were present in around 40% of homes and were incompatible with the planned Community Solar Share Scheme. Sero's community engagement made it clear that one of the reasons for this was residents' budgeting concerns. The scheme would provide detailed monitoring and management of a property's energy usage and reduce energy bills. Sero therefore had to clearly convey this to the residents so that they would allow the installation of smart meters. Also, Sero Life partner Octopus Energy are currently working on developing a pre-payment tariff.



Measurement Criteria

To be able to properly assess the success of the project it was essential to provide and monitor the following metrics:

- Generation and storage capacity.
- Data around residents' bills and therefore savings on energy.
- Resident adoption of Sero Life and the energy services model.
- Resident satisfaction.



Sero's Solution

Technical Expertise

Sero's extensive industry-leading construction and digital expertise allows us to develop and deliver ground-breaking solutions to support our partners on their journey to zero carbon, from brief to handover and beyond.

Sero utilised our proprietary energy modelling system 'Hedgehog' to set on-site generation targets and specify the optimal use of Low or Zero Carbon Technologies (LZC) for installation. It helped establish an outline billing model to fulfil the shared power generation requirements.

In conjunction with surveying the properties involved in the scheme this determined that:

1. All 644 homes in the scheme would require:

Batteries
11KWh sonnen Batteries 10/11 providing 3.2MWh of total storage across the project

Sero BEE's
Building Energy Engine

Smart Meters

Thermostats / Smart Heating Controls

2. 437 homes could accommodate:

Solar PV
Photon supplied Trina black-framed mono 305Wp panels providing 1.4MW of on-site generation.

Sero's most exciting innovation was the development of the Community Solar Share Scheme. This provides Pobl with a revenue stream to help fund the costs of the LZC technologies that have been installed and future pathways needed on their journey to Net Zero. It ensures that all residents' bills are reduced across the whole scheme.

Although it does not distribute the actual energy generated by the solar PV, it allows for a fair distribution of the benefits. Homes with solar PV will be able to purchase the power generated by the panels from Pobl at a discounted rate. The rate is discounted against Ofgem's price cap rate, meaning residents' bills will always be reduced.

All homes will receive a community credit: the amount of credit is tied to the amount of energy used from the grid. Homes without solar installations will import more energy than if they had solar and will therefore receive a larger credit. The discounted rate of the solar energy and the rate at which the credit is applied are balanced so all homes in the community achieve a similar level of overall saving.

Sero's Definition of Net Zero
The amount of carbon emissions associated with a home's total operational energy on an annual basis is zero, while maintaining affordable energy costs and not compromising the indoor environment or comfort of the residents.

Sero's Solution

Technology

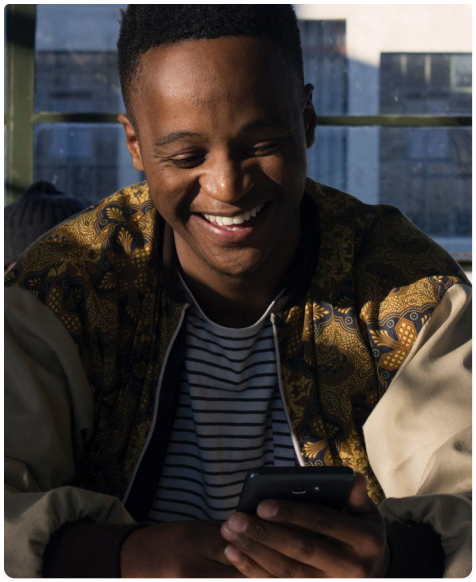
Sero BEE (Building Energy Engine)
This is a smart home energy management system which allows connection to the Sero Life app, monitors the energy use of the property and controls the internal environment. Data is fed back into the building passport of the property, to inform residents of their homes energy use and to help Pobl understand how their properties are performing. It forms an essential component in the Community Solar Share Scheme, as accurate metering of the energy produced by the solar PV and energy used from the grid is essential. It will also play an essential role in further energy and cost saving functions in the future.

Sero:Life App
This works in conjunction with the Sero BEE. Through the app, residents can input their lifestyle and behavioural preferences. With this information, data from the LZC technologies and weather data, the software can accurately forecast the energy requirements of the property.

Sero:Life

Read more here

In the near future this will allow for smart optimisation, for example, by ensuring that any energy that is needed from the grid is purchased at off-peak times where possible, further reducing residents' bills and the carbon load of the homes. It also provides a portal for residents to monitor and manage their homes' energy use, ensuring both comfort and efficiency.



Specified LZC technologies
Sero also specified the other related technologies needed to optimise the energy efficiency of properties in the scheme. These included the thermostats, hot water meters and heating/hot water controls. Sero also assisted in specifying the solar PV and battery technologies to ensure optimal performance of the power generation and that storage met the requirements of the project.

Sero's Solution

Services

The Sero Life team were heavily involved in resident engagement and community events, to help ensure the success of the scheme. They also ran workshops with Pobl's teams, briefing them on what solutions Sero was providing and the benefits they would provide to both Pobl and their residents.

Sero Life is also being offered to residents in the scheme. This service is provided in partnership with Octopus Energy.

Friends

Octopus Energy Supply

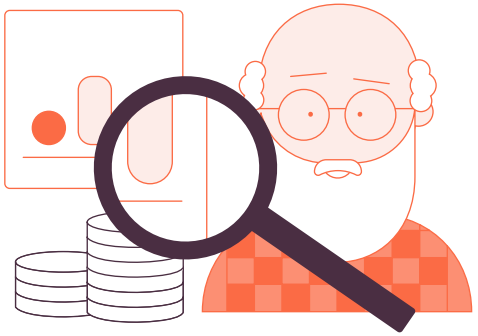
Sero Life customers will receive one bill, rather than a bill from their electricity supplier for energy purchased from the grid and another bill from Pobl for energy used from the solar PV. This will also incorporate the energy service elements, and credit applied. Importantly for residents, Sero Life also allows for extremely accurate billing, using the data provided through the Sero BEE. The energy savings that the scheme will provide may not be immediately factored in by other energy suppliers which can result in larger payments than necessary, based on pre-retrofit forecasting, to the detriment of residents.

Sero Life also provides Pobl with access to its Sero Passport platform to provide all the digital tools they need to continue to plan the pathways for these properties on their journey to Net Zero. In effect, the Sero Passport platform creates a digital representation of the properties. It captures the initial condition of the homes, the works carried out to date, monitors how effective these measures have been and allows for future improvement works to be planned and scheduled. Through Sero Life we will continue to play an active role in the future development of this project.

Sero Passport

Read more here

Sero also provided Project Management services for the scheme as part of our partnership with Pobl and to fulfil WEFO's funding requirements. We were available to provide on-site support for the first installations of the Sero BEE's, Measuring Instruments Directive (MID) meters and Current Transformer (CT) clamps, and are monitoring all installed batteries to ensure that they are functioning correctly.



Sero's Solution

The Process

Sero has been a key partner in this project from its inception in 2020, prior to securing funding or having a full project scope defined. After being approached by Pobl to help achieve their commitment to achieving Net Zero targets by 2030, the Penderi project was chosen to act as a flagship scheme, demonstrating the practical and financial viability of the resulting model.

2030
Net-Zero target date

Sero helped Pobl to secured £3.5M in funding from the European Regional Development Fund (ERDF), via the Welsh European Funding Office (WEFO). Planning could then move forward, with Sero developing and specifying the technical solutions to maximise the on-site power generation and energy efficiency of the homes involved.

An open tender process was then run by Pobl procurement, and Everwarm, one of the UK's leading energy services and regeneration companies, was appointed as the lead contractor. The tendering process did however raise a significant issue: the funding secured from WEFO would not be sufficient to fully cover the costs of the scheme. Rather than slow down the project's rollout, it was decided to separate the installation works into two phases, so that benefits could be delivered to residents as soon as possible while additional funding was secured. The first phase was the installation of the solar PV, battery storage and Sero BEE systems, and the second phase would install the heating controls and smart meters.

Throughout the project, Sero and Pobl's customer teams have worked together to develop materials for residents, explaining the project and technologies. This was distributed by post, social media and in person as part of the extensive resident outreach efforts that were needed to make the project a success.

Friends
Everwarm lead contractor

The installation work began in March 2022. As the lead contractor, Everwarm was responsible for contacting residents, to arrange property survey and installation appointments. Sero have been available on-site where required to assist with initial installations and troubleshooting. Work progressed quickly: by August 2022, installations had been completed in 100 homes and by January 2023, 330 installations had been completed.

An additional £1.6M matched funding from Pobl Group, Sero, Optimised Retrofit 2.1/2.2 and the Swansea Bay City Deal was secured to cover the costs of the second phase of installations, which began in January 2023.

The Results

As the project is still in progress, it is too early to assess the measurement criteria and judge the success of the scheme.

Over 300 initial installations of solar PV, battery storage and Sero BEE's have been completed so far, with installation work beginning on the smart heating controls and smart meters. Anecdotal evidence suggests that residents with completed installations are already noticing the saving to their bills. The project is on track for its expected completion in July 2023.

One result that is already known is that the project has created job and training opportunities in the local community, by Pobl working in partnership with Gower College.

Friends

Recruiting in the Penderi area

Everwarm has also utilised local skills wherever possible on this project, including recruiting employees directly from the Penderi area.

"Already we are seeing the positive impacts for both individual residents, and the wider community. In particular we are proud to be able to say that three members of the team on the ground installing this cutting-edge technology are from the Penderi community. This is helping increase awareness and understanding of the project, as well as the wide range of training and opportunities the growing green energy sector can offer."

Scott Paton
Operations Director at Everwarm

"This is just the start but the benefits are already being seen. Each installation helps decarbonise energy in Penderi and helps reduce home energy bills today and long into the future – that will make a huge practical difference to the community at a time when energy prices are soaring."

Solitaire Pritchard
Director of Regeneration at Pobl Group

In Numbers

300+
Initial installations of solar PV, battery storage and Sero BEE.

2023
On track for completion of July this year.

The Future

When the project is completed the Sero BEE's will be able to collect data on the performance and comfort of the residents' homes. This information will be available in the Sero Passport platform, provided through Sero Life. This will assist Pobl in asset management, resident engagement and help to inform and plan future pathways to further reduce carbon emissions on these properties' journey to Net Zero.

This information will also help to develop plans for other retrofit schemes across Pobl's portfolio - and beyond. In fact, data from this project, and the lessons learned through its delivery, are expected to play a large role in informing the wider rollout of LZC technologies in thousands of homes as part of the 'Homes as Power Stations' project, funded by the Swansea Bay City Deal.

Through Sero Life, Pobl will be able to provide residents with a single, managed and significantly lower energy bill. This will reduce fuel poverty in the community and improve the comfort of Pobl's residents.

The Community Energy Sharing Scheme will be used in other Pobl retrofit projects to bring the same shared benefits to other communities.

Community Solar Share

Read more here

Sero will monitor and evaluate the project against its objectives and measurement criteria. This will continue for 12 months after the final completion of the project. Sero will be helping Pobl in collecting performance and billing data from the participating properties to assist in this assessment.

Have a similar project? Get in touch.

Hello@sero.life

www.sero.life