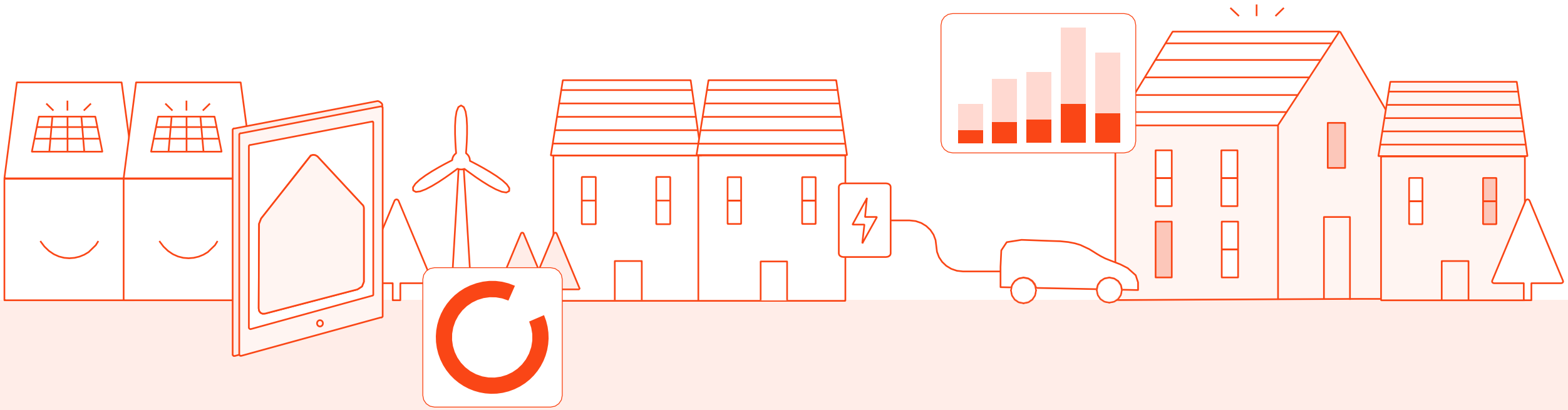
sero

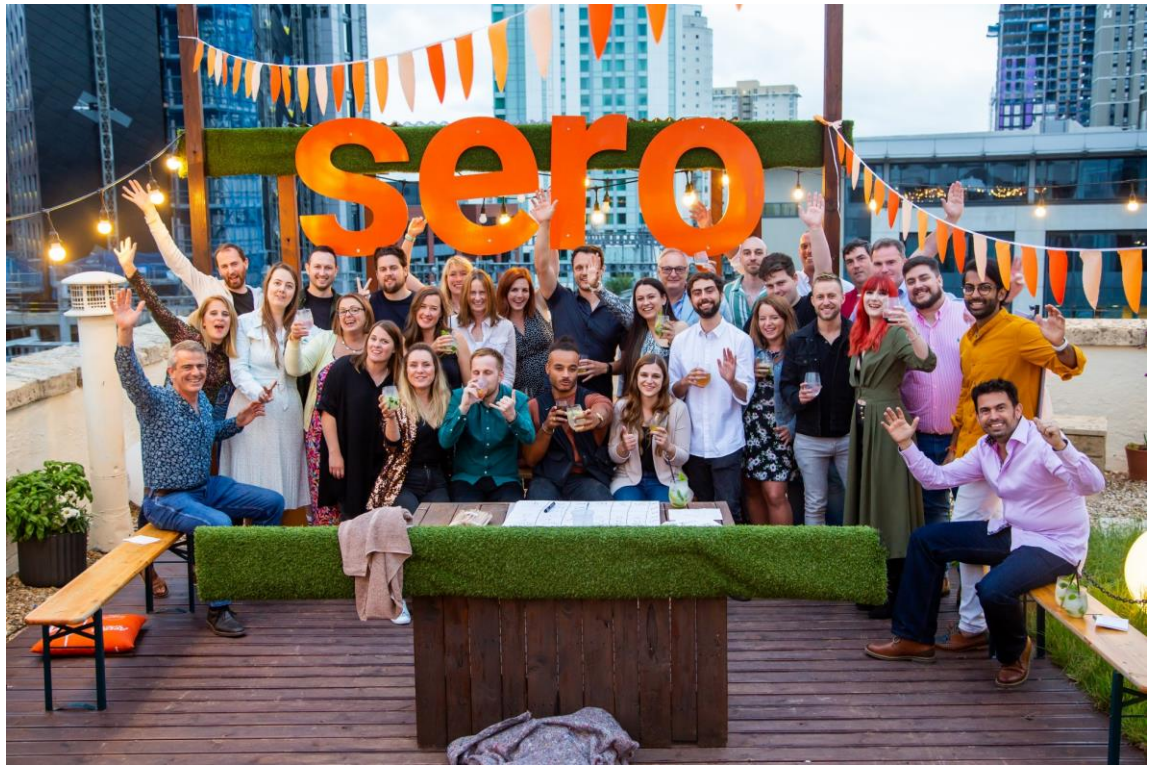
Net Zero –Homes

November 2022

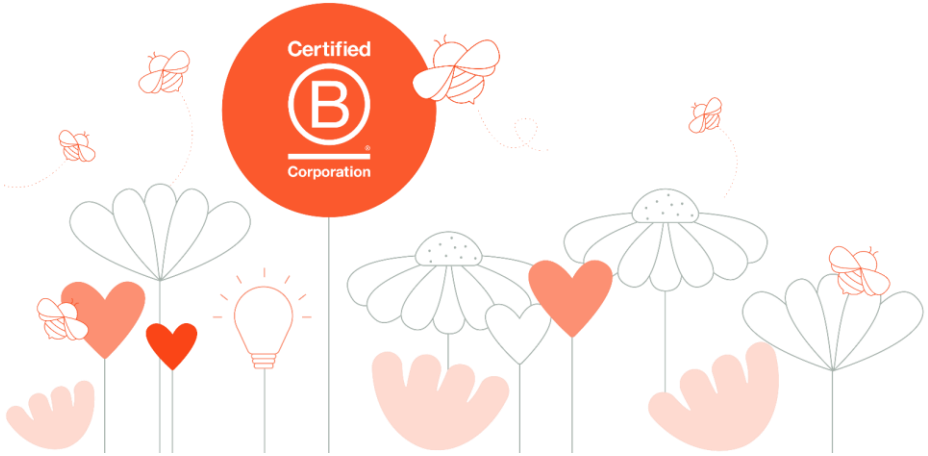


sero

Who are we?



We were founded in 2017 with the mission of accelerating the net zero transition for new and existing homes.



Certified B Corporation

TECH NATION NET ZERO

ENERGY LAUNCHPAD ACCELERATOR

Wales StartUp Awards WINNER 2020

Green Finance Institute Coalition Member

CARDIFF BUSINESS AWARDS WINNER 2020

Llywodraeth Cymru Welsh Government

FinTechWales Foundry

sero

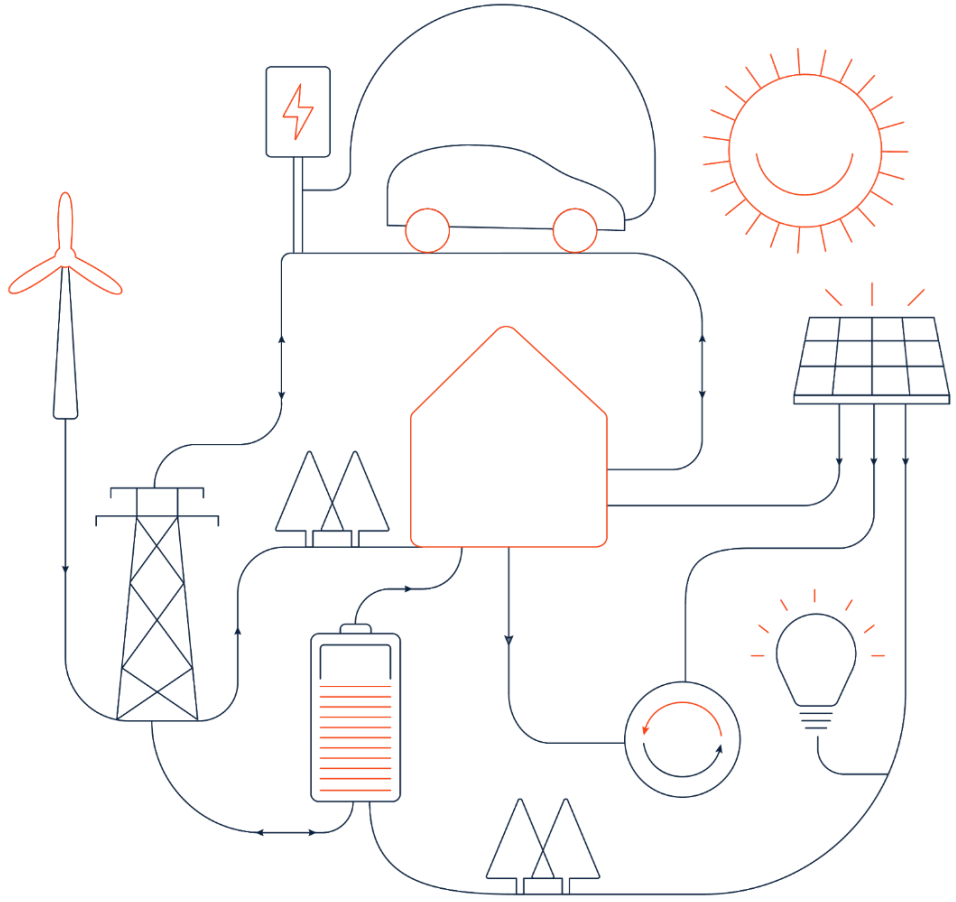
What do we do?

We're a Technology and Services company.

To achieve our mission, we provide **digital products** to support housing providers and the construction industry to delivery net zero carbon in reality.

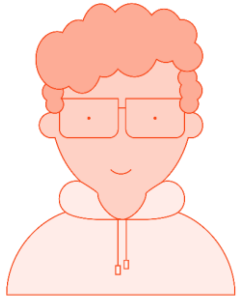
We underpin these digital products with leading technical expertise, focused on delivering the right outcome for each unique home and the resident.

We also work to innovate and disrupt collaboratively, to help break down barriers to Net Zero Carbon with practical research and evidence.



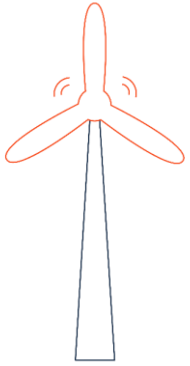
sero

What's our objective?



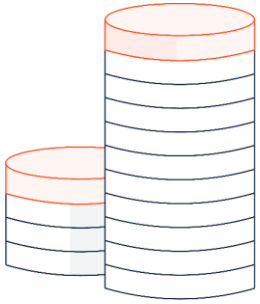
Improve resident experience

Improve quality, reduce the performance gap



Maximise the consumption renewable energy

Build efficiency through better data and digital tools



Reduce capital costs and introduce new funding mechanisms

Build specifications based on target outcomes

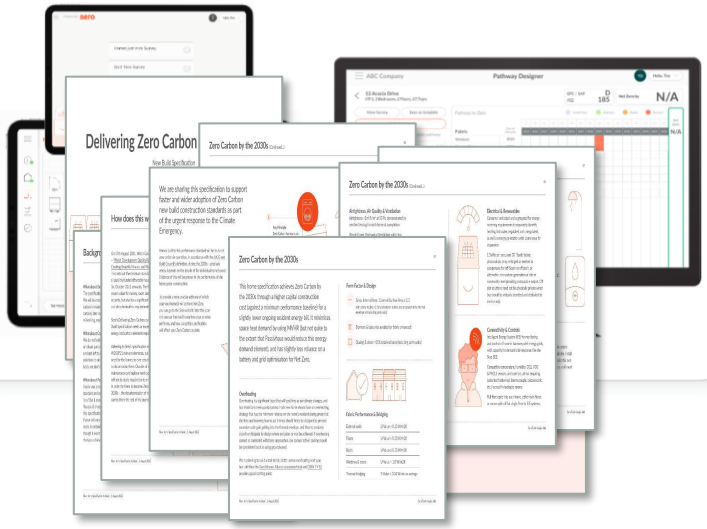
sero

A quick view of technology

Plan

C — Capture

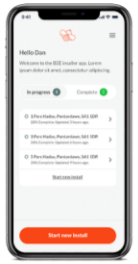
P — Pathways



Implement

B — BEE

V — Verify



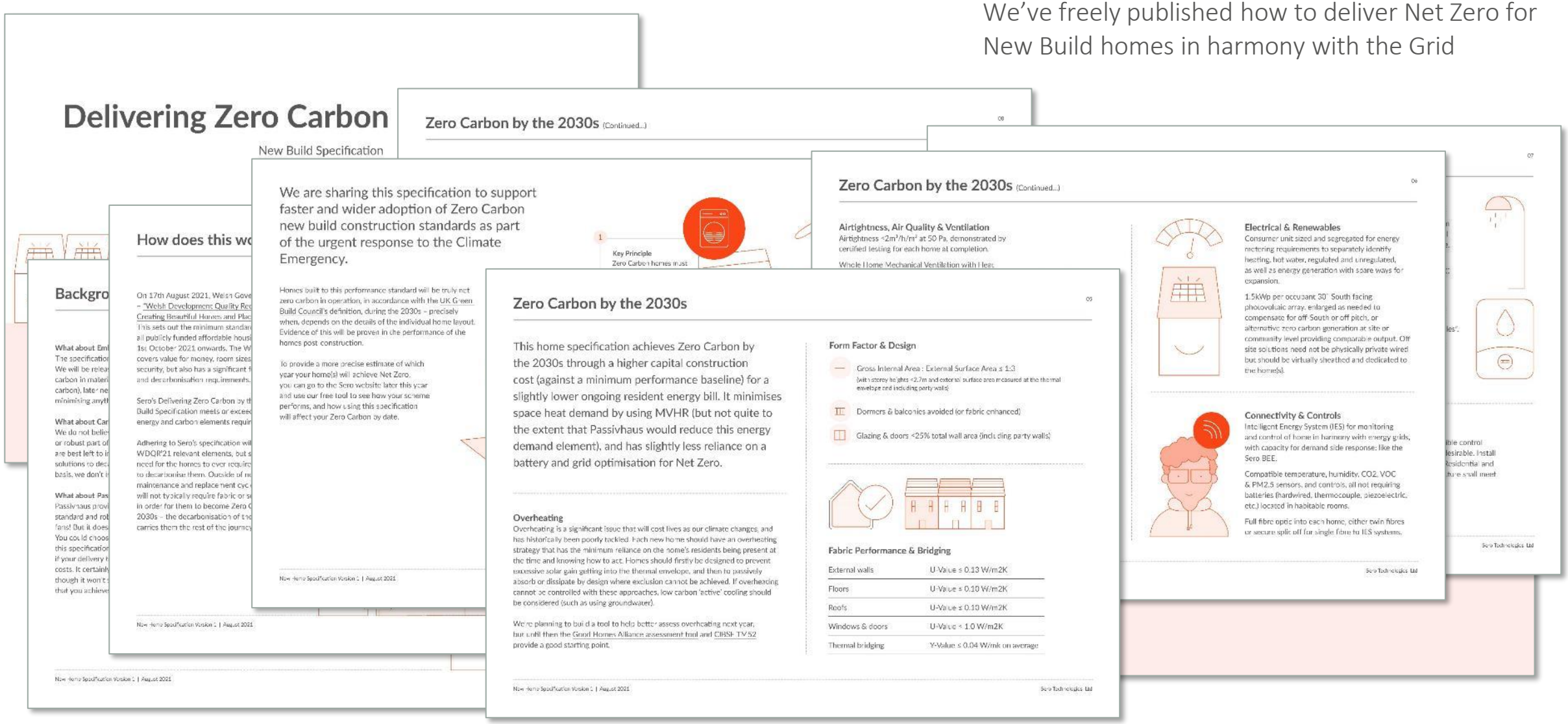
Live

L — Sero Life

sero

What have we done in New Build?

We've freely published how to deliver Net Zero for New Build homes in harmony with the Grid



sero

Plan: Pathways

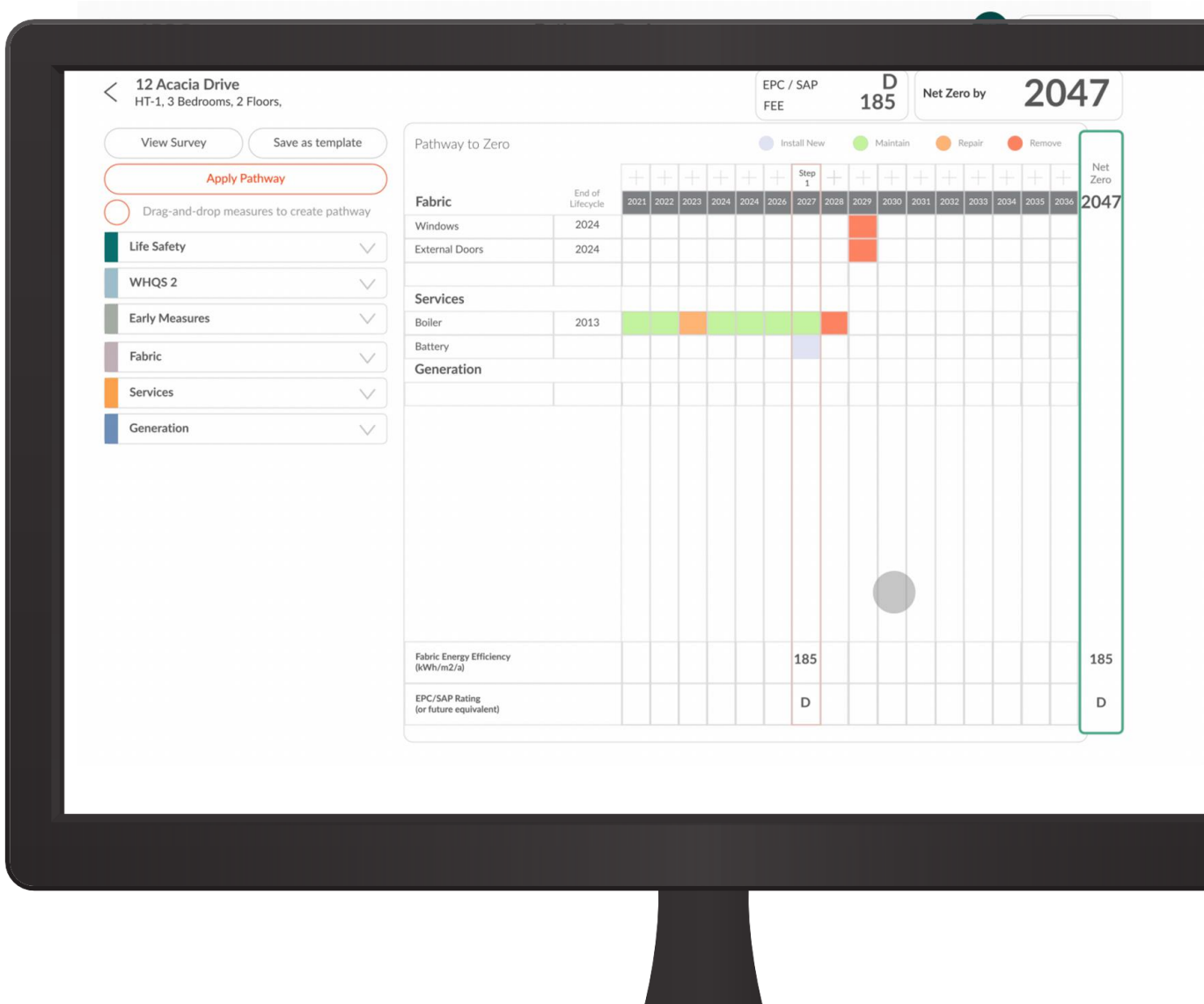
Pathways to Zero is about coordinated improvement measures over time in line with property owner goals

The Pathways approach allows multiple routes to Net Zero Carbon, and by aligning with planned maintenance spend, is significantly cheaper than ‘deep retrofit’

We’re developing assumed Pathways, which quickly indicates likely steps based on typologies. This gives a rough guide to begin the journey to Net Zero Carbon.

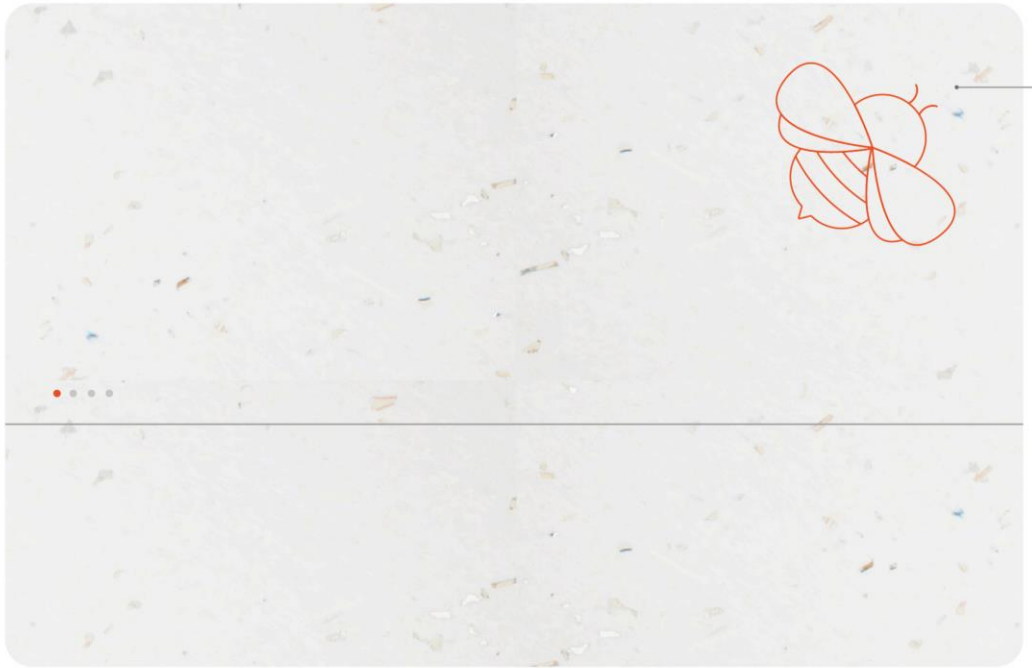
Full Pathways to Zero automatically checks technical compatibility of every measure, forecasting carbon, energy, cost and much more, for every step of the way

HEDGEHOG models the individual home in granular detail, including factors such as storage and demand shifting, meaning these forecasts are much more specific and reliable for residents, owners and financiers



sero

Implement: Building Energy Engine (BEE)



Manufactured in the UK solely for Sero, with a core computer (hub) with firmware securely connected to the Sero cloud

Has a dedicated router to run communications separately when needed, and contains power supplies for the connected devices

Collects environmental & energy data from the building, including temperature, humidity and CO2, and local metering for space heating, hot water & plug in usage, plus extras such as renewables

Enables control of high energy appliances, such as heat pumps, hot water storage, batteries and other energy systems, to work in harmony with the Grid (if residents' wish)

Provides data and control to residents and property owners to better optimise their homes and reduce their energy costs (and carbon footprint)

sero

Implement: Verify

This will enable installers to evidence that they have correctly installed energy efficiency measures in homes

It will provide independent checks to support, or challenge, the installation quality. In doing so, it will work to reduce the performance gap

We are using data form the BEE and connected devices to validate installs and identify defects or performance issues in new build and retrofit projects.

sero

Live: Sero Life

Comfort, not Kilowatts

sero

Live: Sero Life

An app and Service for customers with a Sero BEE.

Moves from selling kWh to providing a comfort-based outcome, requirements set by the resident.

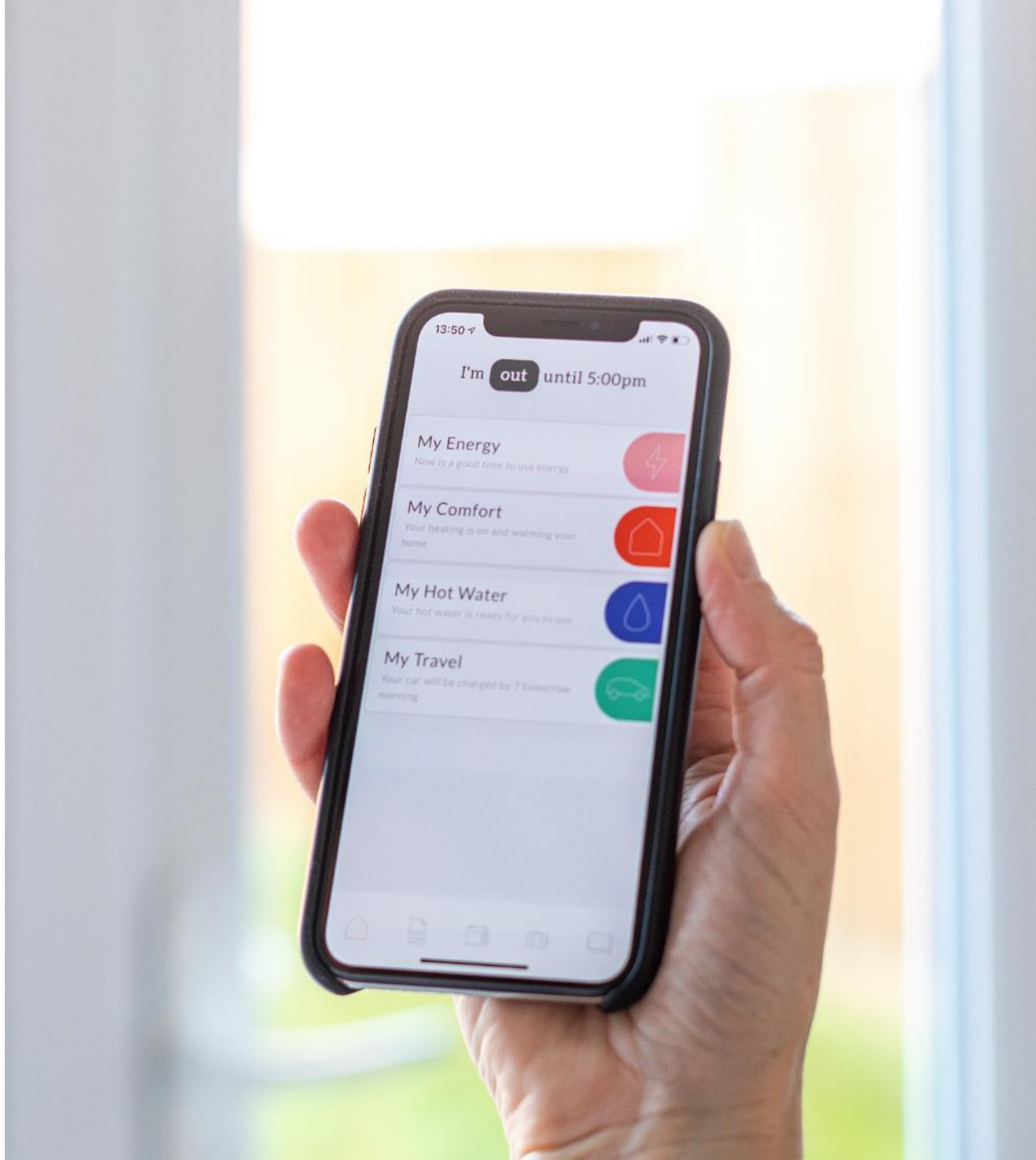
Utilising the homes metering and controls, Sero controls the energy used by the home and when.

To provide electricity, we’re partnered with Octopus Energy as the Regulated Supplier.

Our team supports the residents comfort and operation of the home.

We’ll offer live Carbon footprints using grid intensity data and consumption data (which can be expanded to customers without hardware)

Sero Life is a key resident engagement tool in delivering Net Zero.



sero

Educate the easy way - view energy usage broken down by into at least:

- Space heating,
- hot water,
- plug-in appliances

With extras where presence such as electric vehicles and renewable generation. See for yourself where your fuel costs are going

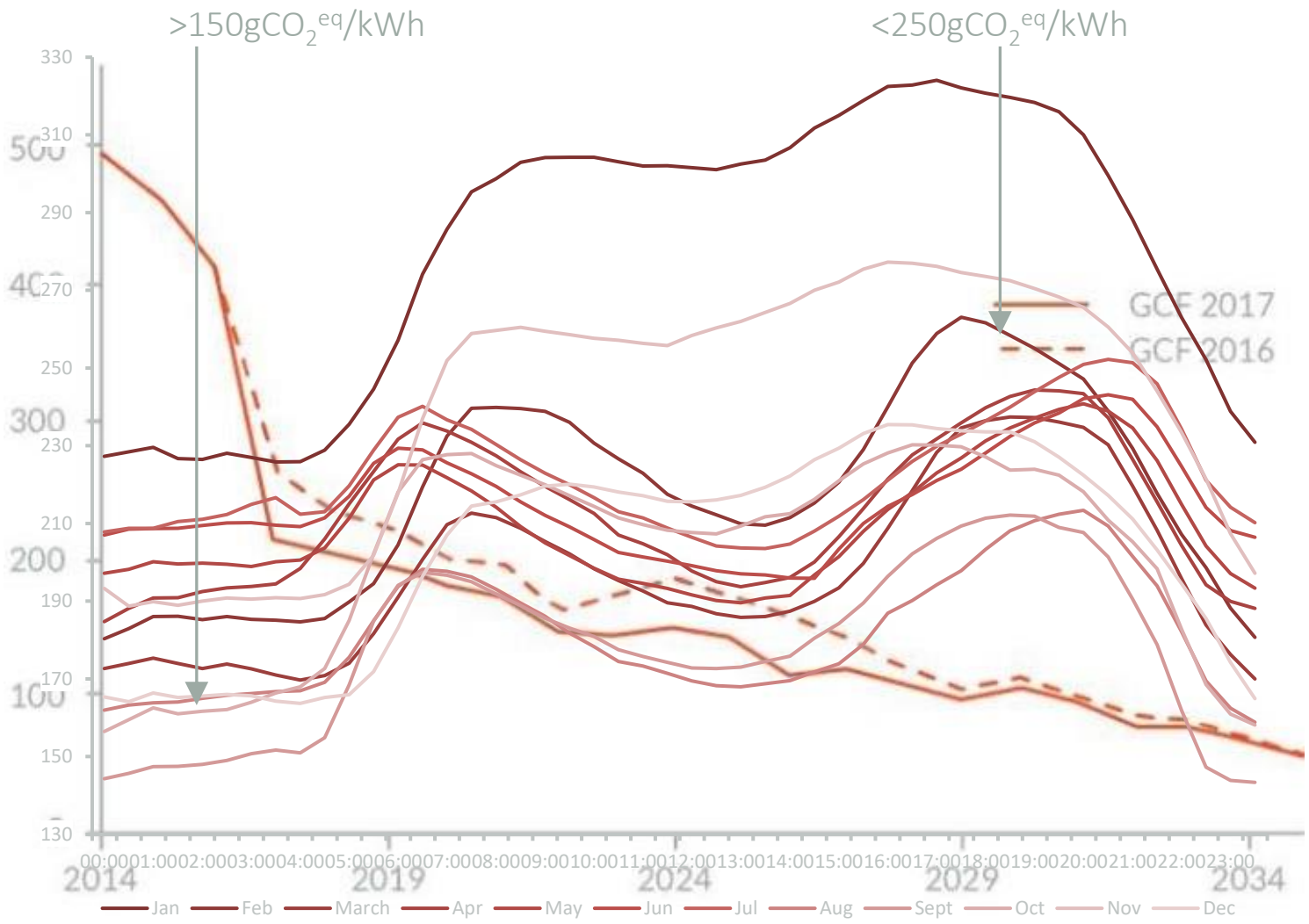
Energy features / account management includes:

- Change temperature and schedules
- Access your account details
- Compare energy views

The App will also provide the customer with detailed home Carbon footprint output

sero

What is Net Zero Carbon?



Net Zero Carbon does not equal Net Zero energy.

We include the people living in the home.

Carbon intensity of electricity changes with demand and generation mix every day.

This approach is different from the Standard Assessment Procedure (SAP) and Energy Performance Certificates (EPC), and more accurate for individual homes, families and finances

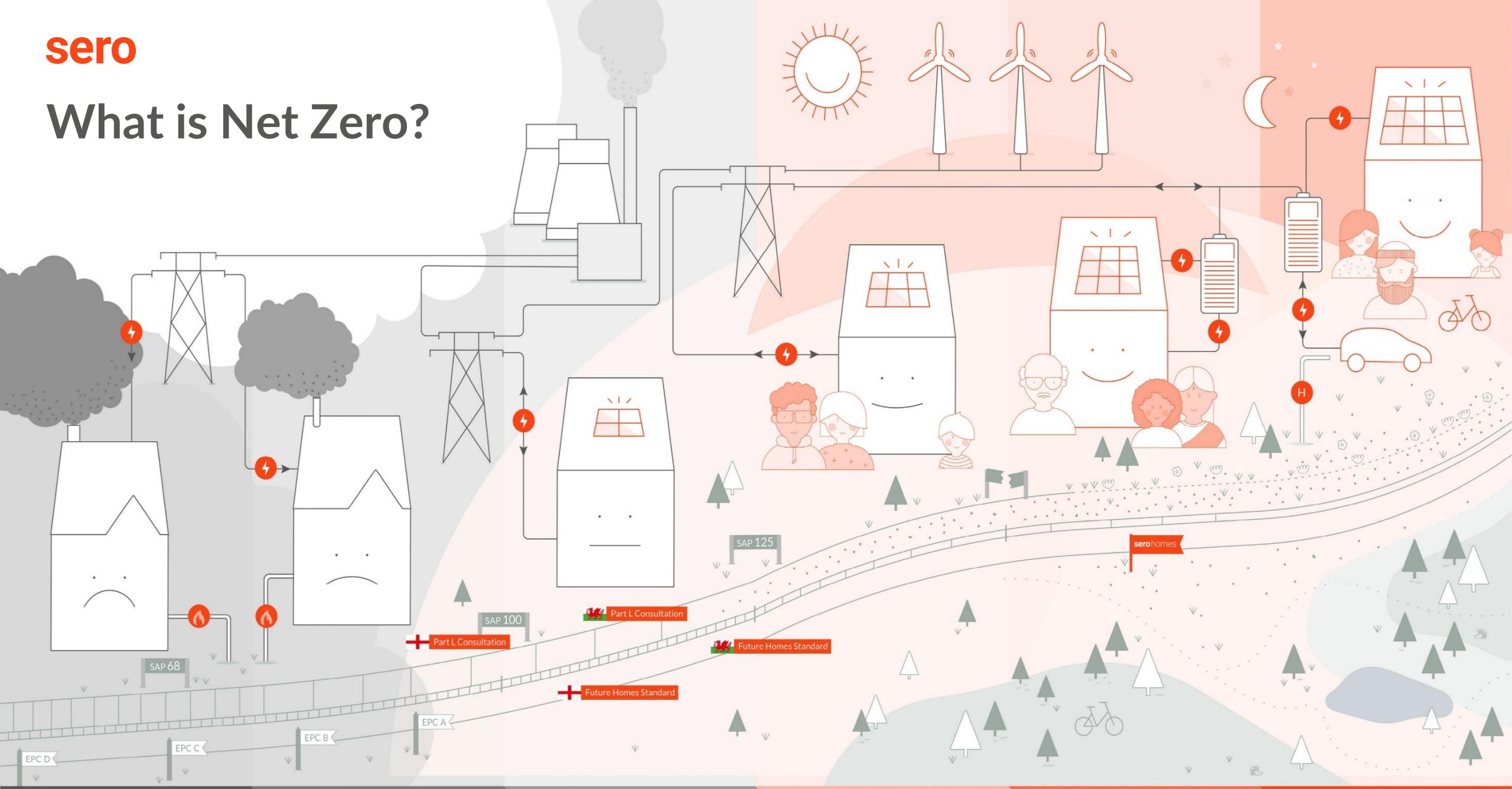
Easy to measure and evidence.

We account for future grid decarbonisation

It's about **when** you achieve Net Zero not if.

sero

What is Net Zero?



8,159 $kgCO_{2e}$ | 2,704 $kgCO_{2e}$ | 1,165 $kgCO_{2e}$ | 143 $kgCO_{2e}$ | 0 $kgCO_{2e}$ | ... $kgCO_{2e}$

sero

Case Study: New Build

Parc Eirin

sero

Parc Eirin Project

225 homes

- 112 private sale (Pobl Living)
- 113 sold to institutional owner (Tirion Homes)

Net Zero – 2030's

Technology

- Sero BEE
- Ground source heat pump (Kensa)
- In-roof mounted solar (Viridian)
- Battery storage (Sonnen)
- Intelligent hot water storage (Mixergy)
- EV charging (NewMotion)
- 3 phase power supply
- Separate fibre network

sero

Case Study: New Build

Aspen Grove

sero

Aspen Grove

214 homes

- 169 private sale (Wates Living)
- 45 affordable inc flats (Cardiff Council)
- Part of the 1,000 home Cardiff Living programme

Net Zero – 2030's

Technology

- Sero BEE
- Ground source heat pump (Mastertherm)
- In-roof mounted solar (Viridian)
- Battery storage (Sonnen)
- EV charging
- Separate fibre network - Hyperoptic

Low carbon heating options

1. Ground source heat pump

2. Air source heat pumps

- air-to-water heat pumps
- air-to-air heat pumps

3. Direct electric:

- Electric boilers
- Infra-red panels
- electric storage heaters
- in-room electric heaters

sero

Low carbon heating options

	GSHP water-to-water	ASHP air-to-water	ASHP air-to-air	Direct electric (Infra-red etc.)
Capital costs	$$$$	$$$	$$	$
Efficiency	COP ≈ 4	COP ≈ 3.5	COP ≈ 3.5	COP = 1 *Possibly some demand efficiency in intermittently heated spaces*
Outdoor space	No outdoor unit	Outdoor unit *(aesthetics are improving)*	Outdoor unit *(apart from low-capacity all-in-one units)*	No outdoor unit
Cooling	Yes, with modification (passive cooling with fan coils)	Yes, with modification (active cooling with fan coils)	Yes	No
Ideal use case	Very large homes/units or locations where having outdoor units would be prohibitive	Larger homes	Smaller, more open plan homes, or homes with significant overheating risk	Very low heat demand homes with little risk of overheating
Other considerations	Bore hole issues can be hard to investigate		Need separate hot water solution, probably a stand-alone heat pump water heater or storage electric boiler Need F gas engineers to install	Need separate hot water solution, probably a stand-alone heat pump water heater or storage electric boiler

sero

Building Regulations

English and Welsh Governments have introduced further improvements to Building Regulations in June 2022 and November 2022, respectively.

These updated regulations mean for new-builds uprated insulation & air tightness levels along with Heat Pumps will effectively become standard.

In effect, the minimum permitted standard ‘bar’ has been raised substantially, meaning the uplift from a minimum Building Regulation compliant home to a Net Zero Carbon specification has been reduced.

sero

Case Study: Area-Based Retrofit

Penderi, Swansea

sero

Penderi Project

The retrofit of 644 homes in one locality, with one common landlord (Pobl Group)

- Solar panels
- Battery storage
- Sero BEE

£5m project with Distribution Network Operator investing £1.5m in network upgrades.

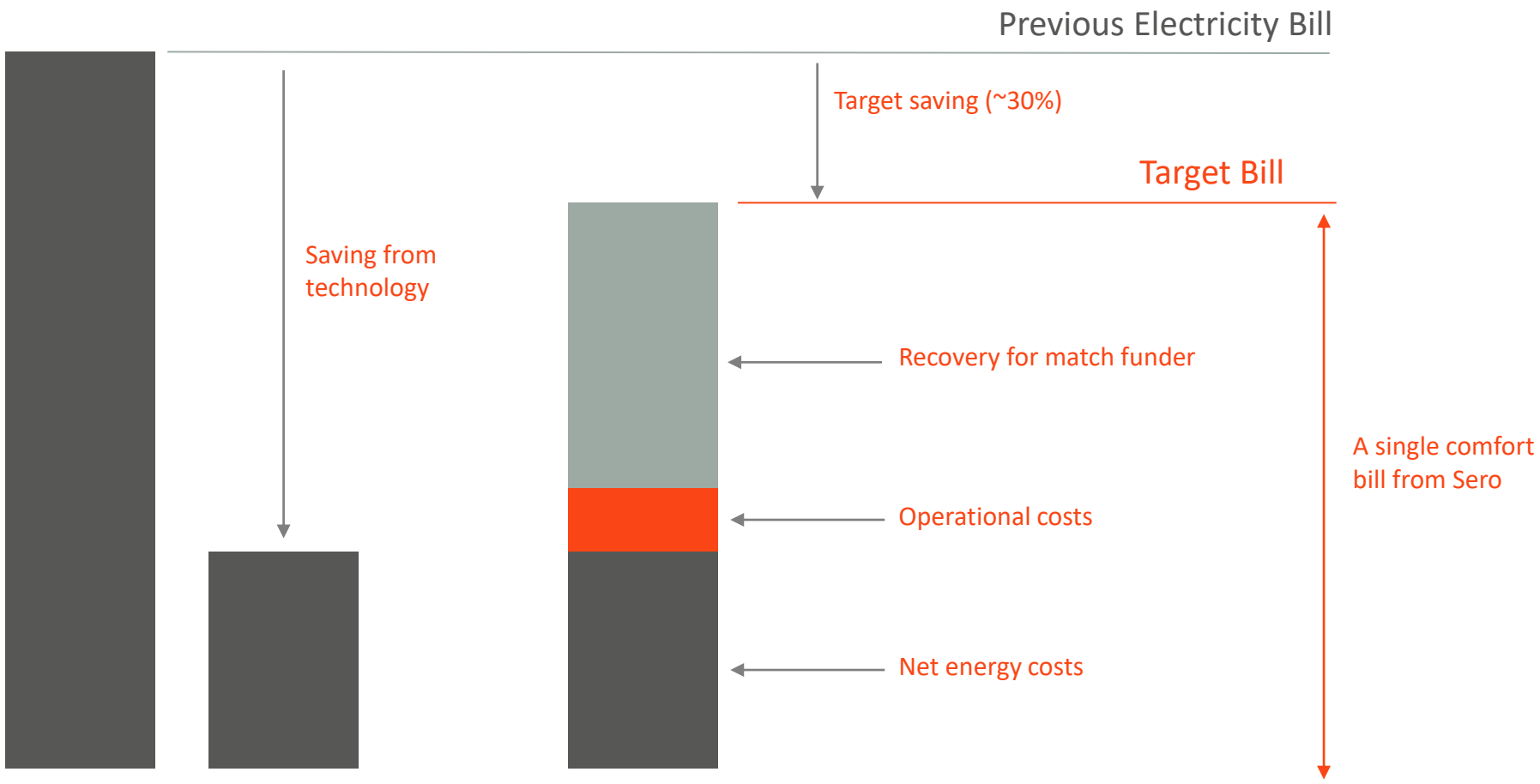
The project will sell solar to residents at a below market rate, generating an income for the landlord. The benefit will also be socialised to homes without PV through the comfort bill.

The community will target incomes from balancing markets.

Now a pathfinder for a 5,000 home project soon to be announced.

sero

Energy Costs



sero

Research Projects

We collaborate with significant partners and sectors to undertake ‘close to market’ research, looking to tackle the barriers impeding delivery of Net Zero Carbon. These include…

FLATLINE – UK Gov. funded research into Domestic Demand Side Response (dDSR), delivering trials with residents via Sero to explore sensitivities and opportunities

EQUINOX – Ofgem NIC funded with Western Power Distribution, exploring dDSR with Grid benefits, and pricing structures to support widespread adoption

VALUER – UK Gov. funded with Rightmove, RICS and Monmouthshire Building Society, evidencing the value difference of Net Zero and supporting ways to recognise this in sales and mortgages

FLATLINE

OptimisedRetrofit

VALUER PROJECT

sero

The VALUER project

Mortgages for Greener Homes

Energy Efficient Home Purchase

Product Term	Initial interest rate %	Overall cost for comparison	Maximum loan to value	Product fee	Additional Features	
2 Year Fixed	2.39%	4.6% APRC	95%	£999	-	More details
5 Year Fixed	2.69%	4.2% APRC	95%	£999	-	More details

VALUER builds on the work of LENDERS

Monmouthshire Building Society are now offering a green mortgage product based on EPC A homes

The product is available across Wales & England

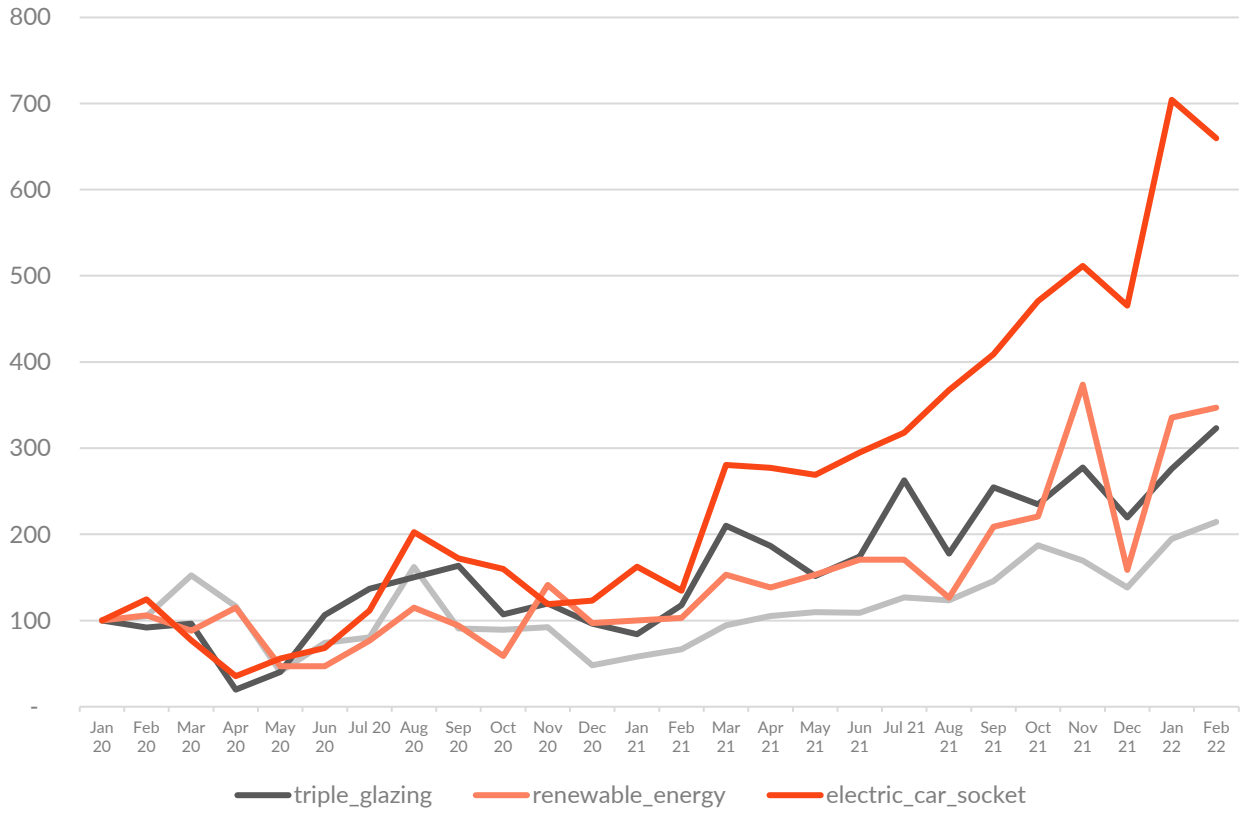
Both products are in the top 10 rates available (at launch) with an LTV of 95%

The product is complimented by a recalibrated affordability calculator which allows consumers who purchase energy efficient homes to potentially borrow more

sero

The VALUER project

Growth in ‘green terms’ in listings:



Steady increase in the number of listings where estate agents mention green terms

The rankings of some of the more common green features/terms are increasing through Rightmove keyword sort

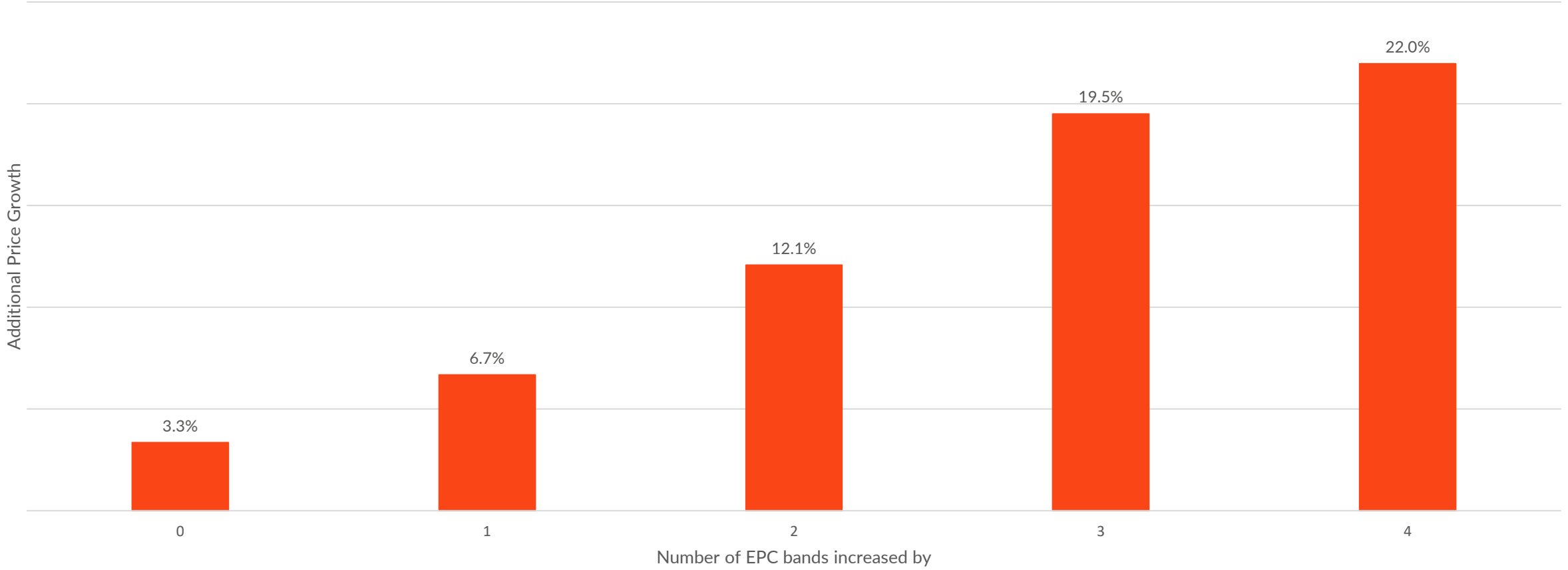
Energy efficiency is becoming more common in the consumer’s list of property requirements

sero

The VALUER project

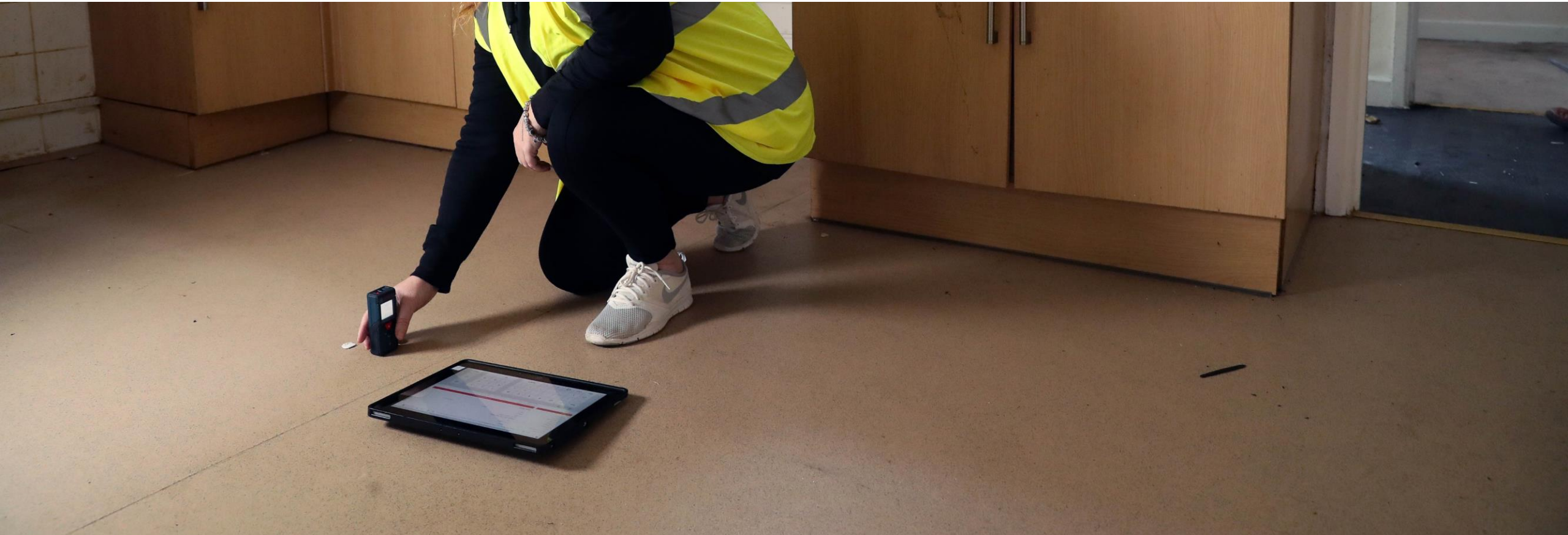
Increased Resale Value

Rightmove data shows that improving the EPC rating leads to additional growth of property value in excess of market trends



Case Study: National Retrofit Programme

Optimised Retrofit



sero

Optimised Retrofit

Welsh Government plans to retrofit 250,000 social homes, initially to EPC A, and then on to Net Zero Carbon over around a decade

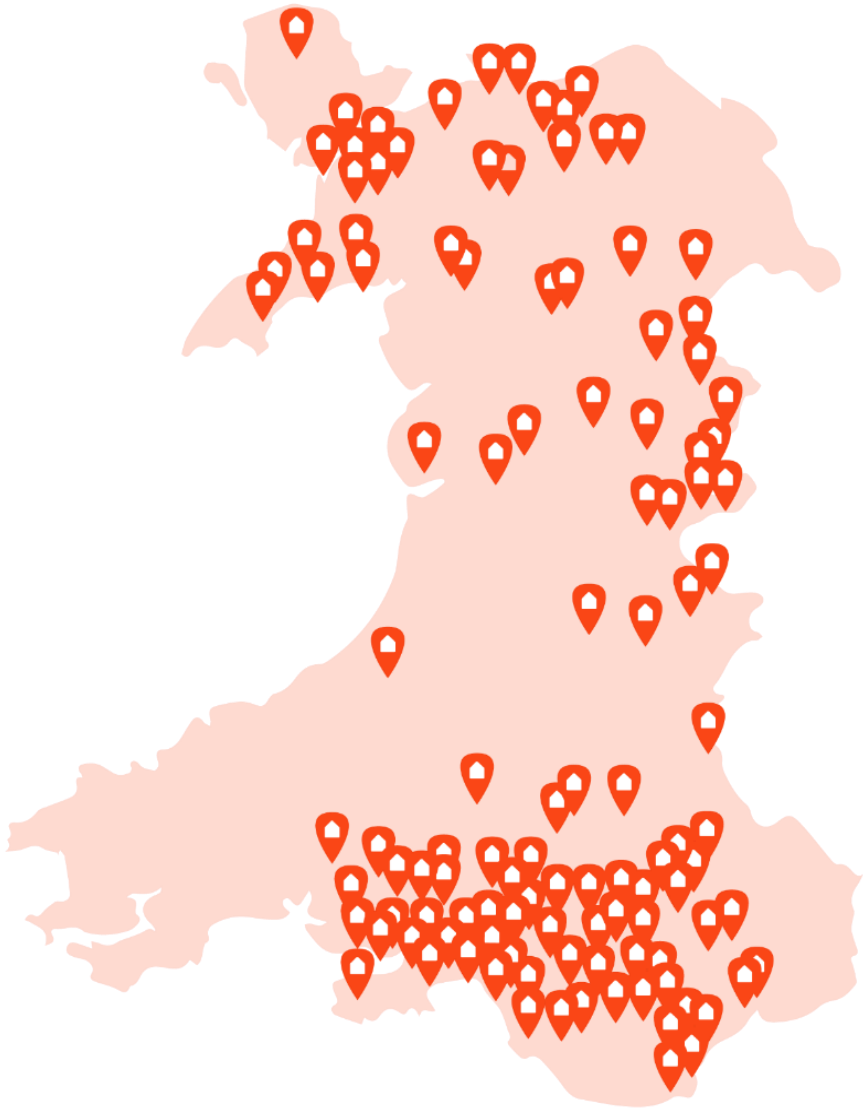
Sero created the Optimised Retrofit Collaboration to deliver this, so far with c.30 Registered Social Landlords and Local Authorities across Wales

The Collaboration has already got c.6,000 homes on their Pathway to Zero, with each home working through the step-by-step Sero methodology

Each home will provide granular survey, cost, implementation and operational data to Sero and the Collaboration, forming the largest dataset of residential retrofit and operation of its kind, driving even better outcomes

The Collaboration also tackles challenges such as resident engagement, skills, training, procurement, finance, communications, and much more…

Welsh Government have already committed to a further £100m into their retrofit programme in the next two financial years, driving even more scale-up and delivering more detailed data



Thank you

Jim McArdell &
Steph Willis
jim@sero.life
steph.willis@sero.life