



RISE

Retrofit information,
support & expertise

Heat Batteries - Supplier Perspective

Case study

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tepeo

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Introduction

Heat batteries have recently been incorporated into the UK Government's Warm Homes initiatives, with the specific aim of making social housing more affordable and sustainable. These batteries work by storing electricity during off-peak hours, when energy is cheaper and more likely to be drawn from a renewable source, and release heat as needed. This helps households reduce their energy bills and their reliance on fossil fuels. We spoke to Iain Duncan of Tepeo to find out more about their heat battery, the ZEB.

This publication aims to share insights, good practices, and lessons learned from relevant retrofit, sustainability and warm homes projects. It is intended for informational purposes only and does not constitute recommendations or endorsements of specific suppliers, products, or services within the sector. For any solution for your retrofit project, you should always undertake your own due diligence on the best option available.

Introduction: Who are Tepeo and what is the ZEB?

Tepeo was founded in 2018 with the mission of decarbonising residential heating. Recognising the significant carbon emissions from traditional heating systems and the growing shift towards electrification of the UK's power system, Tepeo sought an alternative to heat pumps; one that provides energy system flexibility by integrating energy storage.



Figure 1 The ZEB-40R. A smart 'heat battery'; a replacement for a fossil fuel boiler. Source: Tepeo.

This led to the development of the Zero Emission Boiler (ZEB), an innovative solution designed for homes where heat pumps may not be suitable.

What makes the ZEB different?

Unlike traditional electric heating solutions, the ZEB is a type of heat battery. It stores energy when electricity is cheapest and releases it when needed. This ensures cost-effective and efficient heating while reducing power drawn from the grid during peak hours. It also eliminates the need for external space, making it ideal for properties with limited outdoor space. By storing energy as heat, the ZEB can also deliver high flow temperatures to the heating system (like a traditional boiler). This avoids disruptive and expensive renovation work to the existing heating system during installation.

How can the ZEB contribute to the decarbonisation of heat in the UK?

Heating accounts for a significant portion of domestic carbon emissions. By enabling electrification of more homes and integrating energy storage, the ZEB reduces reliance on fossil fuel-based heating systems, supporting the UK's transition to net zero. It charges using electricity, ideally during periods of low grid carbon intensity or when surplus renewable energy is available. Its compatibility with flexible energy tariffs further ensures sustainable energy consumption, which allows more renewable generation onto the UK electricity system.

What role does the ZEB play in the broader energy transition?

The ZEB aligns with the UK's electrification strategy by providing an efficient, adaptable heating alternative. While heat pumps remain the backbone of the transition to low carbon heating, they are not suitable for all properties, particularly in flats or high-density historic areas where there is limited space for installation. The ZEB fills this gap, ensuring the UK's diverse housing stock has a range of low-carbon heating solutions available to meet different retrofit challenges.

Technology and operation

How does the ZEB work in terms of energy storage and time-of-use electricity pricing?

The ZEB integrates with smart tariffs, charging when electricity is cheapest and using stored energy to provide high-temperature heating when required. The system is equipped with software that models household heat demand, automating charging cycles to draw power at the cheapest times of day. The ZEB will also only charge as much as will be needed given the weather conditions.

Can it integrate with other technologies like solar PV?

Yes, the ZEB works well with solar PV systems, optimising self-generated energy for heating. It can also complement existing hot water cylinders or heat battery technologies, such as SUNAMP's '[Thermino' products](#)', to deliver a fully integrated solution for heating and hot water.

Applications and suitability

What types of homes or buildings are best suited for the ZEB?

The ZEB is particularly effective in homes with low-to-medium heat demand, including:

- New-build detached and semi-detached houses
- Older semi-detached homes with minor insulation improvements
- Terraced houses with space constraints that make a heat pump impractical
- Flats, mid-rise, and low-rise buildings

It requires minimal installation space and can be positioned under stairs or in a utility room. There is no flue to install, so unlike fossil fuel boilers it is possible to locate the ZEB inside the home, wherever might be most suitable

Does it work for hard-to-treat properties?

Yes. Unlike heat pumps, which require adequate internal infrastructure for low flow temperature heating and outdoor space for the heat exchange unit, the ZEB delivers high flow temperatures, making it viable for homes where the existing heating system requires higher flow temperatures (e.g. single panel radiators, microbore pipework, cast iron radiators etc).

Barriers and support

What are the biggest barriers to adopting electric heating or thermal storage?

Public awareness remains a challenge, particularly with the dominance of local authority-led retrofit schemes favouring heat pumps. Heat batteries are a new



technology category and while storage heaters have been around for decades, it is difficult to build awareness, curiosity and trust in a new solution.

Cost has been another key barrier. While the ZEB costs approximately £8,000 (including VAT and installation) until recently funding schemes did not apply to heat batteries.

Thankfully, the Warm Homes Fund now provides match funding of up to £15,000 to assist with the installation of Heat Batteries and the UK Government are currently consulting on extending the Boiler Upgrade Scheme to heat batteries too.

Can homeowners access support for installing a ZEB?

Currently, the ZEB is not included in mainstream subsidy schemes like the Boiler Upgrade Scheme, but the Government are reviewing this now (at time of writing June 2025). Advocacy for inclusion in government-backed incentives could accelerate adoption. The DESNZ Clean Heat team are the best point of contact if you want to hear more or register your support!

Looking ahead

What are the biggest challenges in scaling up ZEB deployment?

Local authority hesitancy in adopting new technologies, alongside competition with heat pump subsidies, presents barriers to growth. Expanding awareness and improving financial accessibility are key priorities.

What innovations are in development for the next generation of ZEBs?

Tepeo is working on multiple advancements, including:

- Solar integration for direct consumer onsite generation / generation-matching
- Improved offline control
- Expanded app capabilities
- Entry into flexibility markets to help reduce running costs for customers
- A compact ZEB version for smaller homes
- *Potentially*, a model capable of providing both heating and hot water akin to a combi boiler

Where do you see the future of low-carbon heating heading in the next 5-10 years?

The heating industry is moving towards greater electrification, with diversified solutions beyond heat pumps. Hybrid models incorporating high efficiency and highly flexible, smart systems, such as Tepeo's ZEB, will play a crucial role in ensuring all homes can transition to low-carbon alternatives.

Engagement and resources

Why should homeowners, installers, and policymakers be interested in ZEB technology?

The ZEB offers a versatile approach to electrified heating, solving key challenges faced by heat pumps, the electricity system and customer uptake of low carbon heat. As we continue to approach national net zero targets, stakeholders must explore diverse solutions to accelerate decarbonisation.

How can people learn more or get involved?

- **Homeowners:** Can explore available funding options and consider how ZEB technology fits their home
- **Installers:** Can leverage training opportunities to expand service offering
- **Policymakers:** Can support market expansion through improved funding mechanisms of heat batteries in incentive programs

