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# Case Study

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**Kevan Ryan Court**

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Merthyr Housing  
Association, Wales

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ambion



# Case Study: Kevan Ryan Court



**Customer:** Merthyr Tydfil Housing Association (MTHA)

**This case study examines the lifetime costs of Ambion Low Carbon Heat Panel space heating in a real-life situation, and compares this with the lifetime costs of other electric heating systems had they been installed in the property. Real operational data for an Ambion Low Carbon Heat Panel system in one of the flats is used to compare its energy performance with conventional heating technology.**

## LOCATION

Heol S.O. Davies, Georgetown, Merthyr Tydfil, Mid Glamorgan, CF48 1EE. The Georgetown area of Merthyr Tydfil is within close proximity to the town centre.

## BUILDING DESCRIPTION

Kevan Ryan Court consists of 42 self-contained flats and is a retirement home. It offers a communal lounge, kitchen, laundry facility, hairdressing salon and IT suite, as well as enclosed gardens and car parking. It also includes wheelchair access.

Many of the daily activities take place within the communal lounge. The home is supported by resident management staff and Careline alarm service.

Flats range in size from studio, 1-bedroom, and 2-bedroom. The tenure is rental and MTHA is the landlord.

# System Installed

Each flat has been fitted with the Ambion Low Carbon Heat Panel system except a final 9 flats where tenants held out for the pre-existing storage heaters. These flats are being converted to the Ambion Low Carbon Heat Panel system as they become void.

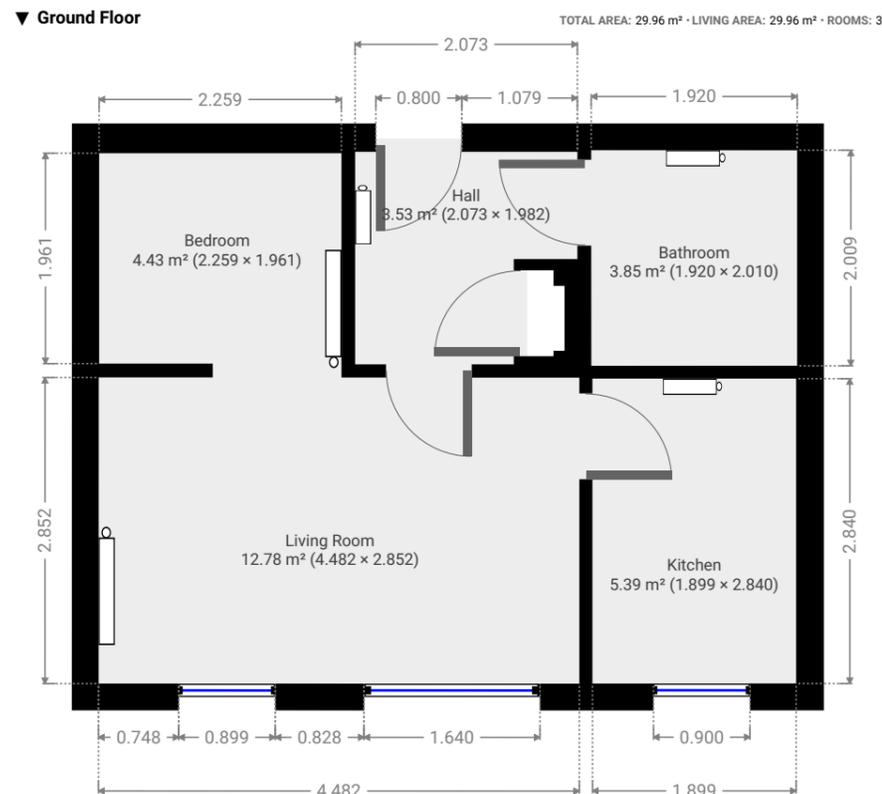
In reality, a conventional water system was retained in this property. However, the lifetime costings below assume a KERS-200 water heating system was installed.



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# Example Flat

The lifetime costs calculation relates to a typical flat within the property.



## Key Facts

- One-bedroom top-floor flat.
- Total area: 31.9m<sup>2</sup>
- Annual space heat demand – 6,112 kWh (SAP/EPC calculated)
- Annual water heating demand – 2,351 kWh (SAP/EPC calculated)
- EPC rating – C75

The model assumes a KERS-200 water heater has been specified as well as the Ambion Low Carbon Heat Panel system space heating. This is not included in the SAP rating. KERS has a 310% efficiency in SAP and would therefore likely increase the EPC rating.



# Lifetime Costs and Emissions Analysis

The lifetime costs calculation relates to the above flat, which is typical of the property. The model calculates the lifetime costs to landlord, tenant and combined, and compares them with alternative electric systems.

Panel heaters and storage heaters assume a standard water cylinder and immersion is specified. An air source heat pump (ASHP) is also included as a combined space and water heating system.

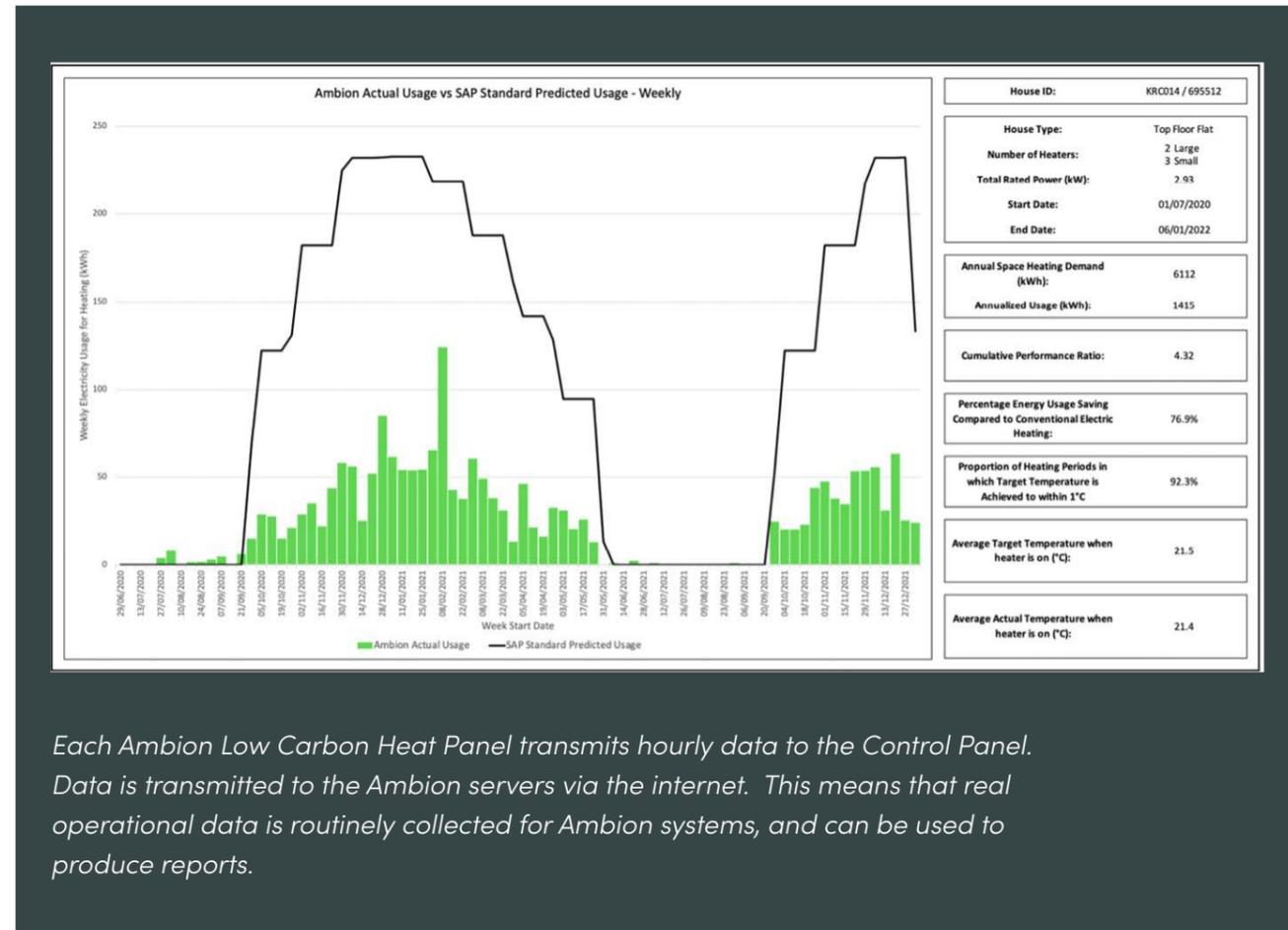
## KEY FINDINGS

A table of data is set out at appendix A, and key points may be summarised as follows:

- For the landlord: at £3,465, the upfront cost of the Ambion system is 15% cheaper than storage heaters (£4,069), but more than conventional panel heaters (£2,180).
- At £6,555, the upfront cost of the Ambion system including the KERS water heater is 46% cheaper than an ASHP (£12,250). Both panel and storage heater examples are cheaper, but are based on cheaper conventional water heaters: cylinder and immersion.
- The Ambion system has no maintenance costs (as with the other electric systems – other than the ASHP) as there are no moving parts, and no water-based delivery system.
- For the tenant: at £709 in year-1, the Ambion system (including the KERS water heater) has energy costs 23% lower than an ASHP (£921) and significantly lower than either a panel or storage heater (£2,395 and £1,855 respectively).
- Lifetime costs: as a combined system, the Ambion system (including the KERS water heater) has the lowest lifetime costs – £17,416 – of all the systems, including an ASHP (£25,621). Conventional panel heaters have the highest lifetime costs at £31,808, nearly double that of the Ambion system.
- Lifetime carbon emissions: the Ambion system (including the KERS water heater) has the lowest emissions at 8.7 tonnes, and conventional heat panels and storage heaters the worst at 29.3 tonnes. The ASHP emissions are 11.3 tonnes.

# Real Performance Data

Set out below is the 'dashboard' for the flat in this property, showing the actual energy use since installation.



Each Ambion Low Carbon Heat Panel transmits hourly data to the Control Panel. Data is transmitted to the Ambion servers via the internet. This means that real operational data is routinely collected for Ambion systems, and can be used to produce reports.

In the graph, the black line represents the predicted annual energy use for heating, using the standard SAP calculation, for this particular flat. This equates to expected energy usage with conventional electric heating technology at 100% efficiency. The green bars represent the actual

energy used by the Ambion system in this flat – a saving of 76.9% in this example. This equates to a Performance Ratio of 4.32 (which is above the average Performance Ratio of 3.5 used in the lifetime costs analysis described above).

# About Ambion Low Carbon Heat Panel system

The Ambion Low Carbon Heat Panel system has a unique control system which uses constant dynamic pulsing – rather than a ‘zoning’ on/off approach used by other direct heating systems – to dramatically reduce energy usage and maintain the property’s temperature within 0.1 °C of its target, 24 hours a day.

The system uses infrared heat panels because building materials absorb and store infrared, releasing it between pulses, making it the perfect partner for the pulsing approach.

Control of the system is achieved by a single Control Panel which contains all customer settings (temperatures per heater etc.), orchestrates the pulsing of the heat panels and provides full operational data across the system.

The results of using dynamic pulsing plus the infrared panels are significant. In accommodation blocks, the Ambion system has an expected Performance Ratio of 3.5 meaning occupants can expect to use 70% less electricity when compared to conventional systems, which also equates to a 70% reduction in carbon emissions.

## SPECIFICATION

Ambion advised on the exact specification of the Low Carbon Heat Panel system, as summarised in the table and as set out on the floor plan (on page 4).

Ambion	No.	Power kW
Large panel	2	0.82
Small panel	2	0.43
Large panel IP	1	0.82
Small panel IP	0	0.43
Total panels	5	
Control panel	1	
<b>Total space heating</b>		<b>3.32</b>
Total per m2		0.10

# About KERS water heater

This all-in-one design can replace mechanical ventilation and heat recovery with only one external penetration. SAP registered, it helps achieve building regulations part L and F and has a COP value of 3.1 meaning occupants can expect to use 68% less electricity when compared to conventional systems, which also equates to a 68% reduction in carbon emissions.

The KERS MVHR range is a combined hot water, heat recovery and MEV system with a storage cylinder. It converts waste heat energy from bathrooms and kitchens into low-cost renewable hot water.

# Appendix A - Lifetime Costs and Emissions Table

## LIFETIME COSTS

	LOW CARBON		CONVENTIONAL	
	Ambion	ASHP	Panel Heaters	Storage Heaters
<b>Up-front cost</b>				
<b>Space heater (installed)</b>	<b>£3,465</b>		<b>£2,180</b>	<b>£4,069</b>
Ambion saving			-59%	15%
<b>Water heater (installed)</b>	<b>£3,090</b>		<b>£1,300</b>	<b>£1,300</b>
			-138%	-138%
<b>Total (installed)</b>	<b>£6,555</b>	<b>£12,250</b>	<b>£3,480</b>	<b>£5,369</b>
Ambion saving		46%	-88%	-22% Source: BEIS
<b>Utility Bills - Year 1</b>				
<b>Space heater</b>	<b>£494</b>		<b>£1,730</b>	<b>£1,340</b>
Ambion saving			71%	63%
<b>Water heater</b>	<b>£215</b>		<b>£665</b>	<b>£515</b>
Ambion saving			68%	58%
<b>Total</b>	<b>£709</b>	<b>£921</b>	<b>£2,395</b>	<b>£1,855</b>
Ambion saving		23%	70%	62%
<b>Lifetime Costs - 15 Years</b>				
<b>Space heater</b>	<b>£9,311</b>		<b>£22,639</b>	<b>£19,916</b>
Ambion saving			59%	53%
<b>Water heater</b>	<b>£8,105</b>		<b>£9,169</b>	<b>£7,395</b>
Ambion saving			12%	-10%
<b>Total</b>	<b>£17,416</b>	<b>£25,621</b>	<b>£31,808</b>	<b>£27,311</b>
Ambion saving		32%	45%	36%

# Appendix A - Lifetime Costs and Emissions Table

## LIFETIME EMISSIONS

	LOW CARBON		CONVENTIONAL	
	Ambion	ASHP	Panel Heaters	Storage Heaters
<b>Energy Consumption</b>				
<b>Space heater MWh pa</b>	1.7		6.1	6.1
Ambion saving			71%	71%
<b>Water heater MWh pa</b>	0.8		2.4	2.4
Ambion saving			68%	68%
<b>Total MWh pa - total</b>	2.5	3.3	8.5	8.5
Ambion saving		23%	70%	70%
<b>Lifetime Emissions</b>				
<b>Space heating - Tonnes CO<sup>2</sup></b>	6.1		21.2	21.2
Ambion saving			71%	71%
<b>Water heating - Tonnes CO<sup>2</sup></b>	2.6		8.1	8.1
Ambion saving			68%	68%
<b>Total - Tonnes CO<sup>2</sup></b>	8.7	11.3	29.3	29.3
Ambion saving		23%	70%	70%

## KEY ASSUMPTIONS

The model from which the above table is extracted uses the following key assumptions:

- Lifetime costs are over 15 years (in line with industry norms). Please note the lifetime of the Ambion Low Carbon Heat Panel is over 20 years, and Ambion offers a 10-year warranty, which can be extended to a 20-year warranty.
- Lifetime energy costs are discounted by 3% pa for all systems, in line with BEIS calculations.
- The Ambion Low Carbon Heat Panel system has an average Performance Ratio of 2.69 across all house types; and varies across house-types (see appendix B). The Performance Ratio for accommodation blocks is set at 3.5.
- The Performance Ratio for KERS is set at 3.1, based on its SAP energy efficiency of 310%.
- The Performance Ratio of all other technologies is set at 1.0 (100% efficiency); other than ASHPs which is set at 2.6 (UCL Energy Institute / BEIS March 2017).
- Source of tariffs and carbon factors is Energy Saving Trust, April 2022.
- Ambion product costings are at RRP. Whilst volume discounts are available, RRP has been used to compare fairly with third-party prices.
- Sources of all third-party electric products costings is BEIS.
- Sources of all third-party electric install costings is BEIS.

Please refer to our detailed model for further information.

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# Appendix B - Ambion Low Carbon Heat Panels System Performance Ratios

The Performance Ratio of the Ambion Low Carbon Heat Panel system, which uses the Ambion proprietary 'computer-controlled infrared' (CCIR) technology varies by house type as set out in the table below. This table is based on Ambion's data-set of 100-house years of real operational data for a range of house-types.

Performance Ratios (PR) of CCIR by house type		
House Type	Mean Performance Ratio	Energy Saving Represented by Mean PR
Electric Convection	1.00	0%
Detached	1.84	46%
Semi	2.41	58%
Terrace	2.89	65%
Accomodation block	3.50	71%
Flat	5.05	80%
Weighted average	2.69	63%