

# ECO Innovation Showcase

6<sup>th</sup> February 2019



# Room 1

- Chimella
- CorkSol
- Schneider Electric
- ArtBrick
- Energiesprong
- InstaClad
- Stormdry
- AirEx
- Radbot
- Q-bot
- Build Test Solutions
- PassivSystems
- VRM Tech

# Room 2

- Chimney Sheep
- Ecological Building Systems
- Oxypod
- Energy Store
- Sempatap Thermal
- Resourcematics
- Switchee
- Gapotape
- Daikin
- Pavatex Insulation
- CB Energy Products Ltd
- Leeds Beckett University

# Innovative Measure Pitches

Room 2




# Chimney Sheep



Department for  
Business, Energy  
& Industrial Strategy





  
**Chimney**  
**Sheep**®

**Chimney** Draught Excluder



# Ecological Building Systems







Penny Randell - Director



**ecological**  
BUILDING SYSTEMS

*Naturally  
Better*

## **Mission Statement**

“To Support the construction sector in the creation of a better built environment through the Supply of innovative, sustainable, ecological building materials and solutions and Deliver quality, affordable products and training”



**ecological**  
BUILDING SYSTEMS

*Naturally  
Better*

## Products & Systems with Sole Agency in the UK



pro clima air & windtight membranes, tapes & seals



Gutex wood fibreboards



Diasen cork lime thermal plaster



Calsitherm climate board



Thermo-Jute insulation



Wellhofer insulated airtight attic hatches



Optime airtight downlighter Boxes



ELKA Strong Board – diffusion open racking board

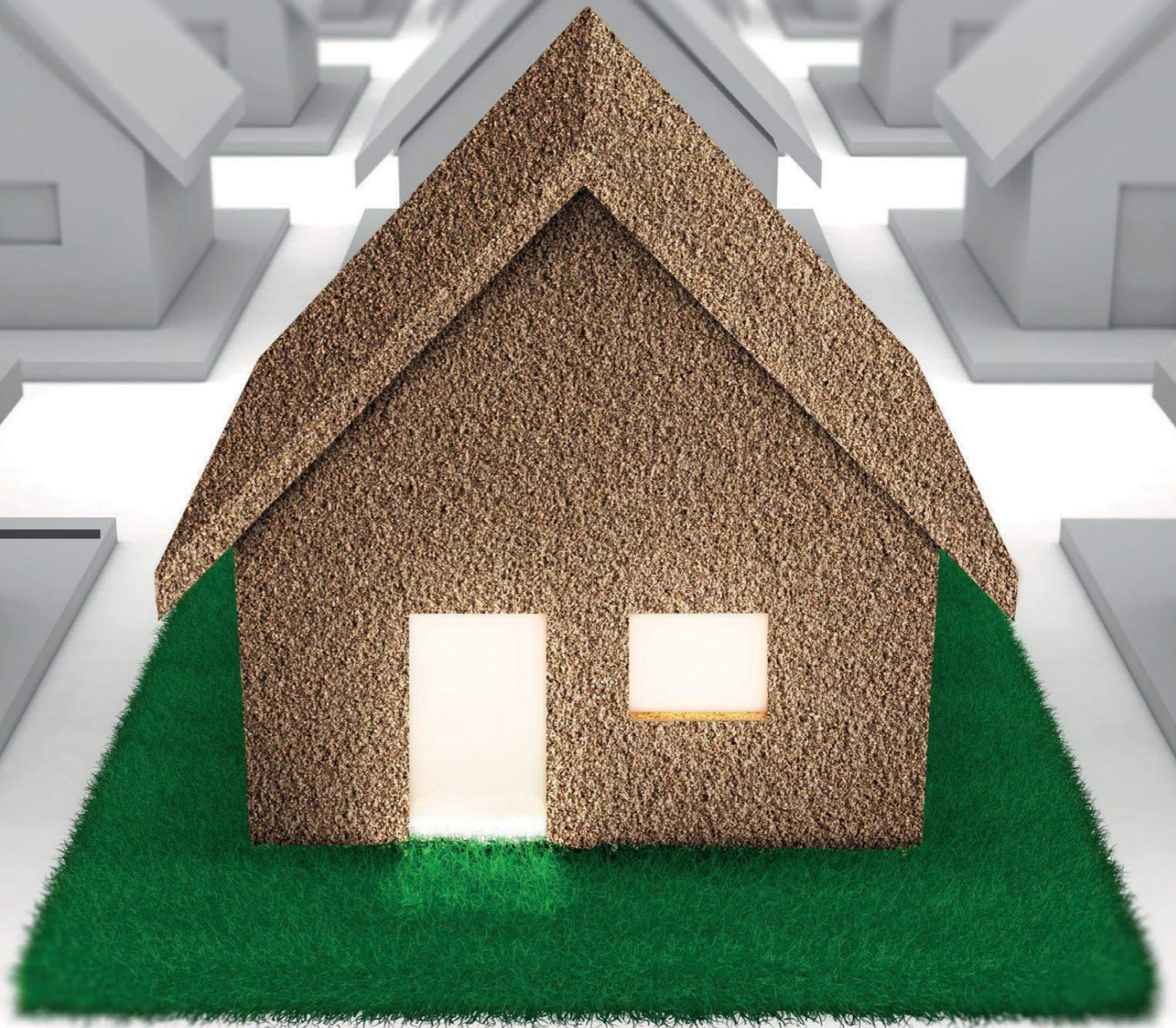


Bosig Phonotherm 200 thermal bridge insulation

# DIATHONITE® THERMACTIVE.037

CORK BASED  
INSULATING  
PLASTER

THINK UNIQUE,  
BE DIFFERENT.



ecological  
BUILDING SYSTEMS



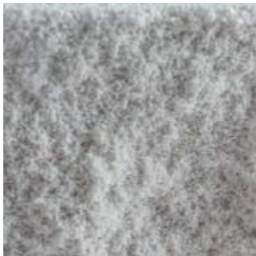
**A UNIQUE FORMULA THAT  
IMPROVES THE  
INSULATION OF A  
DOMESTIC HOUSEHOLD**

**Natural, renewable,  
versatile and sustainable.**

## RAW MATERIALS



**CORK**



**AMORPHOUS SILICA**



**PUMICE**



**PERLITE**



**NATURAL HYDRAULIC LIME NHL5**



**NATURAL FIBRES**



**DIATOMACEOUS EARTH**

## BENEFITS

**Low thermal conductivity ( $\lambda=0.037$  W/mK)**

**Highly breathable and capillary**

**Reduces the risk of mould occurrence**

**Does not burn (Class A1)**

**High compression resistance**

**Lightweight and quicker drying than traditional plasters**

**Its use contributes to LEED credits.**

**Its elasticity reduces the risk of cracking**



## THERMAL COMFORT



THERMAL CONDUCTIVITY  
 $\lambda = 0,037 \text{ W/mK}$



VAPOUR PERMEABILITY  
 $\mu = 3$



THERMAL DIFFUSIVITY  
 $\alpha = 0,1 \text{ m}^2/\text{Ms}$



DEHUMIDIFICATION CAPACITY  
 $1,00 \text{ Kg/m}^2\text{h}^{0,5}$



POROSITY  
**71%**



DENSITY  
 $\rho = 250 \pm 15\% \text{ kg/m}^3$



ELASTICITY  
**742 N/mm<sup>2</sup>**



COMPRESSION RESISTANCE  
**2,8 N/mm<sup>2</sup>**



FIRE REACTION  
**CLASS A1**



# CERTIFICATIONS AND SUSTAINABILITY

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**EPD** ENVIRONMENTAL  
PRODUCT  
DECLARATION

**LEED**®  
Leadership in Energy and Environmental Design

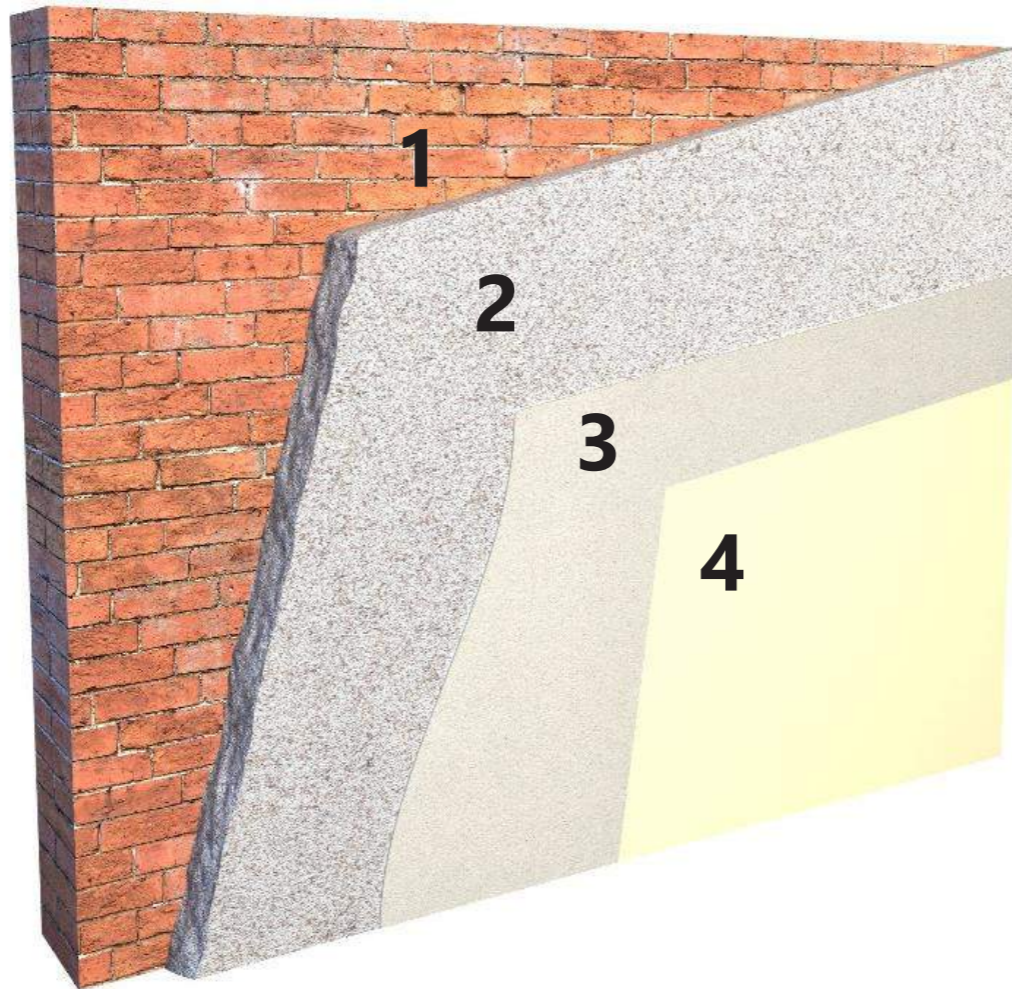
## PERFORMANCE CERTIFICATIONS

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**CE**

**AVIS**  
TECHNIQUE

## THE SYSTEM



- 1** Existing wall: masonry / brick / stone
- 2** DIATHONITE THERMACTIVE.037  
Thermal spray coat
- 3** ARGATHERM  
Thermal insulating finishing  
smoother
- 4** NATURAL PAINT or  
Cork-based finishing

## Spray application



DIATHONITE<sup>™</sup>  
THERMACTIVE.037

# Floating



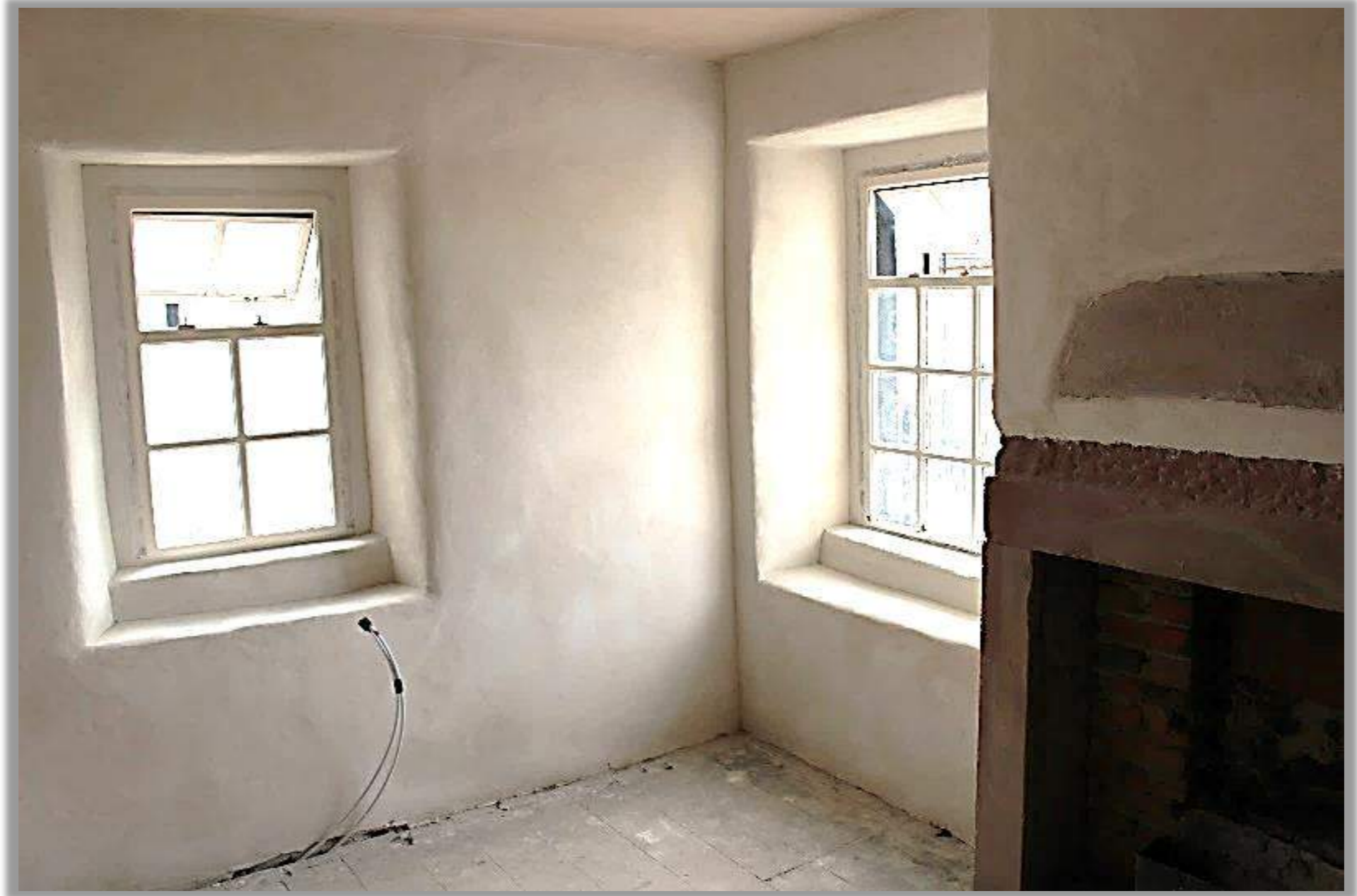
DIATHONITE<sup>™</sup>  
THERMACTIVE.037

Ready for finishing coat



DIATHONITE<sup>™</sup>  
THERMACTIVE.037

## Finishing coat - ARGATHERM



DIATHONITE<sup>™</sup>  
THERMACTIVE.037

# External & Internal

DIATHONITE™  
THERMACTIVE.037





ecological  
BUILDING SYSTEMS

*Naturally Better*

[www.ecologicalbuildingsystems.com](http://www.ecologicalbuildingsystems.com)

[info@ecologicalbuildingsystems.com](mailto:info@ecologicalbuildingsystems.com)

01228 711511



# Oxypod



# Bob Harris MCIQB / Master Builder of the Year Energy Efficiency 2005 / 2008 - Co-Inventor of the Oxypod



# Earthdome: Green Apple Fuel Power and Energy Award Oxypod – Winner of

CIBSE Manufactures Award - UCL EngEx Seed Funding

CIOB International Research Award – Rushlight Energy Reduction Award



Oxypod - Scalable: Homes to Hospitals  
New and Refurb  
Automatically Removes Air from Water Heating and  
Cooling Systems



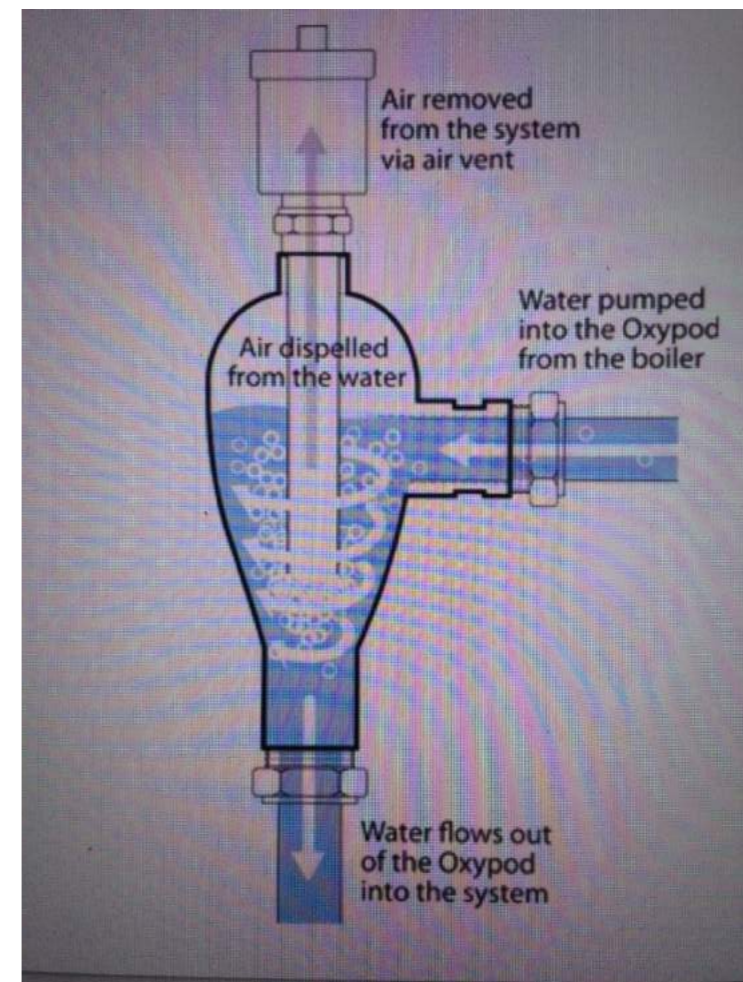
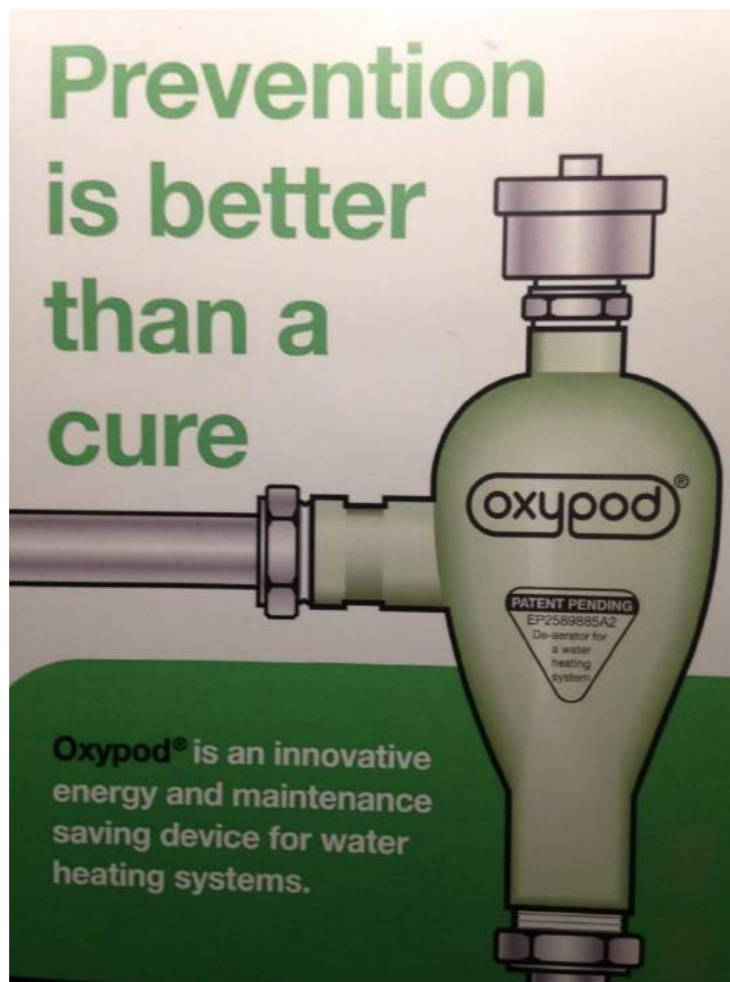
National Physical Laboratory (NPL)-BEIS Funded  
The Goodwin Trust-Hull  
National Energy Action (NEA) & UCL Tested



# Patented Innovative Technology

## How it Works

Fit and Forget – Energy Efficiency – Reduces CO2



# Oxypod Technology Suitable for ECO3 “Demonstration Actions” Practical Help For Those in Fuel Poverty



**oxypod**<sup>®</sup>

Beat fuel poverty,  
warm your tenants  
homes & cut your  
maintenance costs

Award  
Winning  
Technology

Independently Quality Tested

Radiator before Oxypod<sup>®</sup> installation

Radiator after Oxypod<sup>®</sup> installation

Boiler  
Manufacturer  
**APPROVED**

Enjoy the benefits of Oxypod<sup>®</sup>

- Compact energy saving device (up to 30% reduction in energy usage)
- Maintenance saver – no need to use magnets, filters or inhibitors
- Increased boiler life
- No more bleeding of radiators and better heat retention
- Warmer rooms enabling thermostats and valves to be turned down
- Quick and easy to install
- 20 year guarantee – fit and forget
- Reduces CO<sub>2</sub> emissions – Approx. 1.25 tonnes per standard 3 bed house per year
- Value for money - 2 years ROI

**MADE IN  
BRITAIN**

# Contact Me!

ECO3  
Oxypod

**Looking for a “Utility Buddy”**

**Bob Harris**

**07956 341578**

[bobharris@bobharris.plus.com](mailto:bobharris@bobharris.plus.com)

**LinkedIn**

**Bob Harris MCIOB**



# Energy store





## Innovate

We are always innovating whether that's new products or challenging current industry processes



## Thermal Image

We use the latest thermal imaging software to identify effective and defective insulation



## Manufacture

We are the largest EPS bead manufacturer in the UK with 5 factories located in the UK and Ireland



## Install

We are Northern Ireland's largest cavity wall installer in both the retro and new build market



## Funding

We distribute government funding in Northern Ireland for insulation measures

# Who are energystore?

**energystore** are more than just a manufacturer

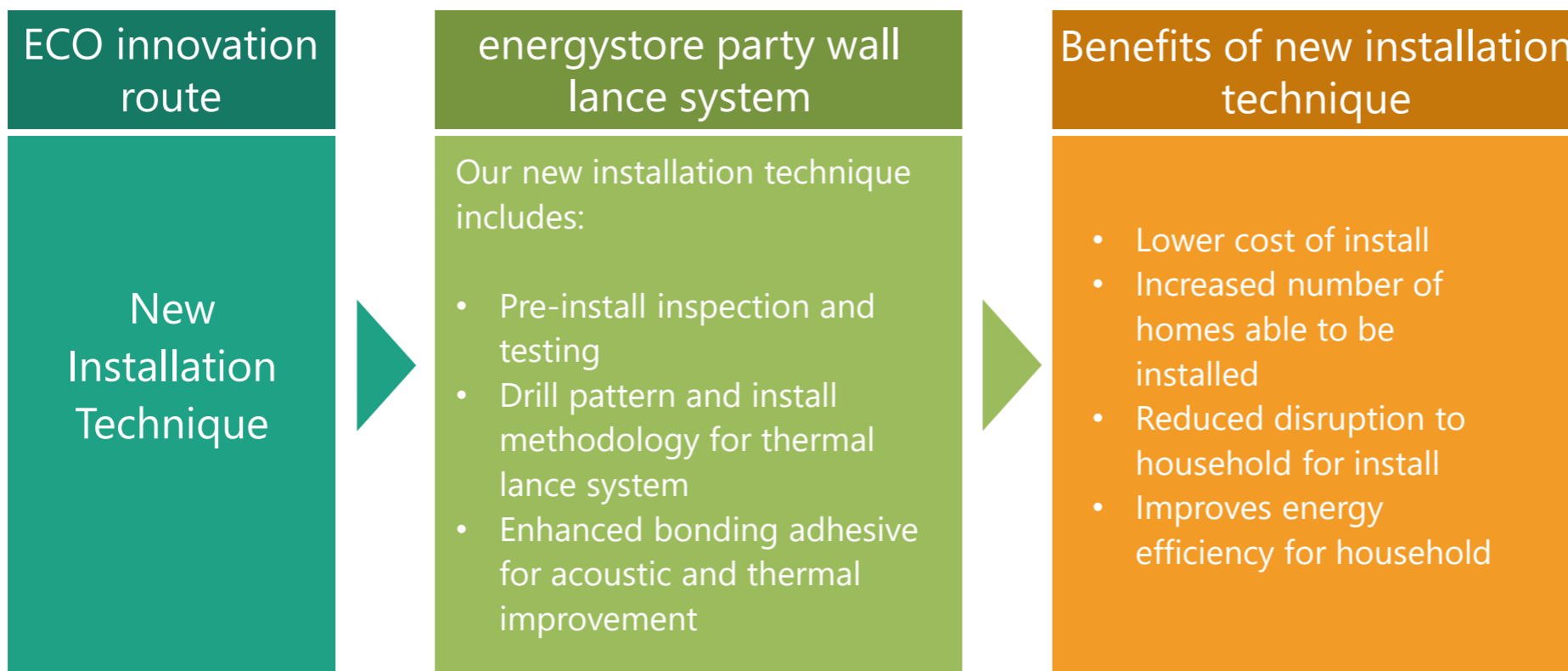
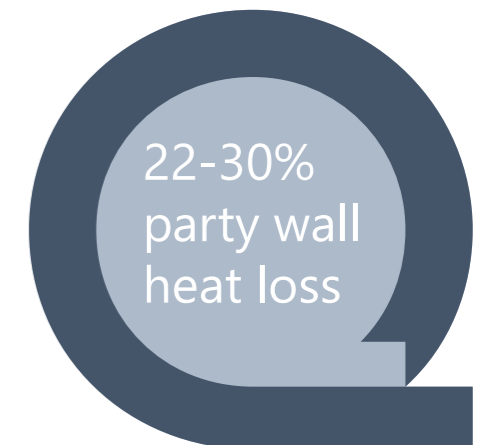
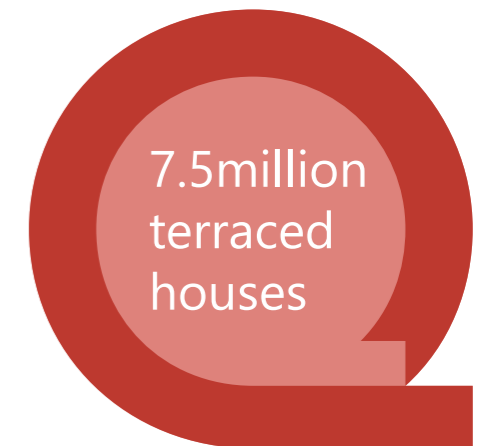
**energystore** has been insulating homes for over 40 years, using the highest quality insulation materials throughout that time. In recent years, we have grown considerably, expanding from two manufacturing facilities to five in only a couple of years, enabling us to provide industry leading support to the insulation industry nationwide. Our focus on quality, and real life performance, has helped us to become the largest EPS bead manufacturer in the UK and our pace of innovation makes us believe we are only at the start of the journey.

# ECO innovation route

energystore have developed a new installation technique to close the gap on delivery

In previous ECO schemes mid-terrace properties have been largely ignored due to difficulty/cost of install and the level of funding available for these types of properties.

energystore have developed a new installation technique for party walls which makes party wall insulation viable to be installed in some of the most fuel poor homes in the country.



# energystore party wall lance system

A new installation technique for party wall insulation

The **energystore** party wall lance system removes the high installation and make good costs of previous install options whilst also reducing the disruption for the homeowner.



Pre-install inspection process and testing

Party wall drill pattern and install methodology

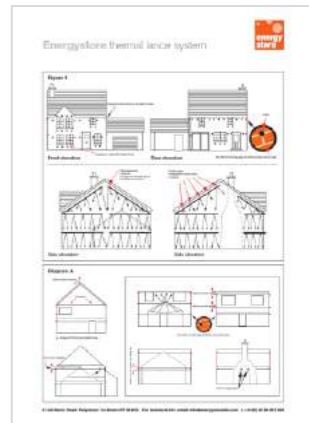
Lance system used for quick install with minimal disruption

**energystore**  
cwi masonry system manual



The **energystore** party wall lance system has 3<sup>rd</sup> party certification with KIWA.

We train and inspect all of our installers to assure the highest quality of installs.



# Additional benefits of superbead

In addition to the thermal properties of our product it also has other benefits



## Acoustic properties

We have developed an enhanced adhesive for our insulation system which improves the bonding quality and gives our product acoustic benefits in party wall.

Our **Robust Details** testing has been completed and we are awaiting board approval. We will be the only bead insulation recognised for both acoustic and thermal performance.

**robust**details®



## Low embodied carbon

We completed a lifecycle assessment with **Sustainable Homes** which showed energystore superbead has the lowest embodied carbon per functional unit in comparison to other insulation products on the market.

This leads to a greater carbon saving in comparison to other products with an average of a 5 months carbon payback.

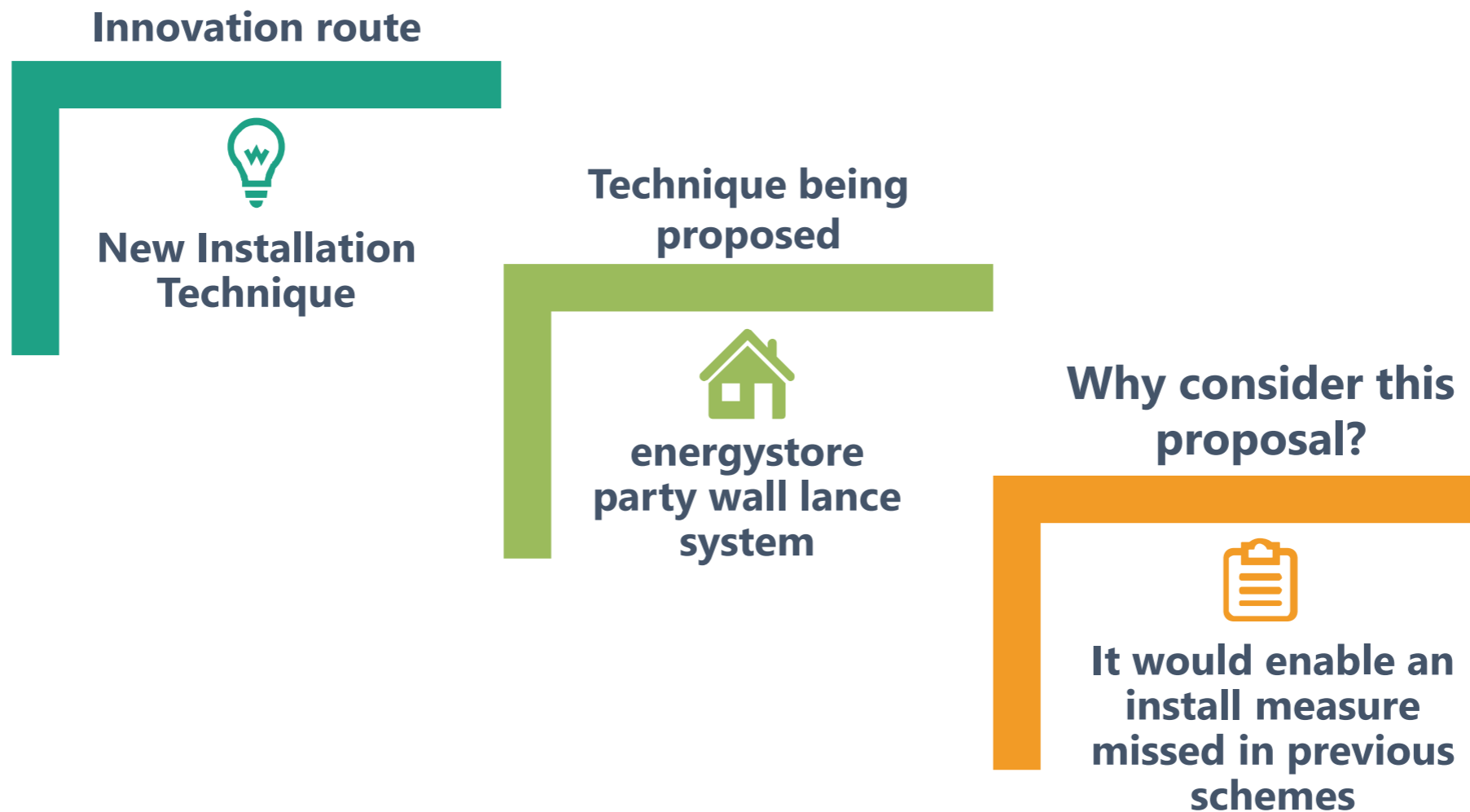


LIFE CYCLE ASSESSMENT  
REPORT | SUPERBEAD



# Innovation route: Summary

Our new installation technique enables previously missed properties to be installed





Thank you for  
your time

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# Sempatap Thermal



Department for  
Business, Energy  
& Industrial Strategy



# **MOULD GROWTH CONSULTANTS LIMITED**

**SEMPATAP THERMAL**

# COLD AND DAMP HOMES



# SOLID WALL HOMES



**HARD TO HEAT**

**EXPENSIVE TO INSULATE**



# SEMPATAP THERMAL



# SEMPATAP THERMAL





# SEMPATAP THERMAL





# SEMPATAP THERMAL



# SEMPATAP THERMAL







## Test Report



THERMAL RESISTANCE OF  
SEMPATAP (NOFLAM)  
INSULATION MATERIAL



FOR Building Research Establishment Ltd.  
Scottish Laboratory  
Kelvin Road  
East Kilbride  
Glasgow  
G75 0RZ

For the attention of Brian Anderson.

IDENTIFICATION Order number 000141450, dated 9 April 2001. NPL specimen number QM279 was assigned to the specimen pair. The Sempatap (noflam) wall/ceiling insulation material was supplied on a roll by Mould Growth Consultants Limited.

BASIS OF TEST NPL Guarded hot-plate apparatus conforming to BS874:1986.

UNCERTAINTY The overall measurement uncertainty is estimated to be within  $\pm 6.0\%$ , based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%.

Reference: PP21/E01030232

Date of issue: 02 May 2001

Checked by: 

Page 1 of 3

Signed:  (Authorised Signatory)

Name: John Redgrove for Managing Director

**Results – CERT savings for 10mm Sempatap.**

CO <sub>2</sub> savings for 10mm Sempatap (kgCO <sub>2</sub> )							
Dwelling type	no. of beds	Gas	LPG	Electric	Oil	Coal	Wtd Ave
Flat	1	223	251	476	283	591	247
Flat	2	269	302	574	341	713	297
Flat	3	324	365	694	412	861	359
Mid-Terrace	2	276	311	591	352	731	306
Mid-Terrace	3	309	348	662	394	819	342
End-Terrace	2	526	592	1,079	657	1,379	579
End-Terrace	3	589	663	1,208	736	1,545	648
Semi-bungalow	2	394	444	815	493	1,037	434
Semi-bungalow	3	426	480	880	532	1,120	469
Det-bungalow	2	469	528	994	586	1,257	518
Det-bungalow	3	506	570	1,072	632	1,356	559
Det-bungalow	4	544	612	1,152	679	1,456	601
Semi-house	2	574	647	1,176	717	1,507	632
Semi-house	3	617	695	1,264	771	1,620	679
Semi-house	4	661	744	1,353	826	1,734	727
Det-house	2	865	974	1,856	1,085	2,340	958
Det-house	3	930	1,047	1,995	1,166	2,515	1,030
Det-house	4	999	1,125	2,143	1,252	2,702	1,106



CO <sub>2</sub> savings for 10mm Sempatap (kgCO <sub>2</sub> )							
Dwelling type	no. of beds	Gas	LPG	Electric	Oil	Coal	Wtd Ave
45% Flat (3 ext)	1	292	329	620	372	783	324
45% Flat (3 ext)	2	352	397	747	449	944	390
45% Flat (3 ext)	3	425	479	903	542	1,140	471
55% Flat	1	166	187	359	210	434	184
55% Flat	2	200	225	432	253	524	222
55% Flat	3	242	272	522	305	632	268
Mid-Terrace	2	276	311	591	352	731	306
Mid-Terrace	3	309	348	662	394	819	342
End-Terrace	2	526	592	1,079	657	1,379	579
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Det-house	3	930	1,047	1,995	1,166	2,515	1,030
Det-house	4	999	1,125	2,143	1,252	2,702	1,106

Savings assume solid wall of U value 2.1 W/m<sup>2</sup>K is insulated to U value of 1.58 W/m<sup>2</sup>K using 10mm Sempatap.  
 15% Comfort Factor is included.  
 All other assumptions identical to CERT calculations done by BRE for OFGEM in 2007.

Fuel	Emissions / kWh	
	kgC	CO <sub>2</sub>
Gas	0.0518	0.1899
Elect	0.1175	0.4308
Oil	0.0680	0.2493
Coal	0.0817	0.2996
LPG	0.0584	0.2140
Wtd Av	0.0755	0.2767

Evaluated by BRE using BREDEM  
 Jan 2008



**SEMPATAP THERMAL - 10 mm - Solid brick wall - Gas central heating****Annual Savings**

	floor area m <sup>2</sup>	GAS CENTRAL HEATING House with solid walls U-value 2.1		External wall area excl. openings m <sup>2</sup>
		kWh/yr	£/yr	
<b>FLAT WITH 2 EXTERNAL WALLS</b>				
1 bed	42	880		24
<b>2 bed</b>	<b>61</b>	<b>1,278</b>		<b>29</b>
3 bed	89	1,864		35
<b>FLAT WITH 3 EXTERNAL WALLS</b>				
1 bed	42	1,454		42
<b>2 bed</b>	<b>61</b>	<b>2,111</b>		<b>51</b>
3 bed	89	3,080		61
<b>MID-TERRACED</b>				
2 bed	63	1,506		39
<b>3 bed</b>	<b>79</b>	<b>1,889</b>		<b>43</b>
<b>END-TERRACED</b>				
2 bed	63	2,525		69
<b>3 bed</b>	<b>79</b>	<b>3,167</b>		<b>77</b>
<b>SEMI-DETACHED BUNGALOW</b>				
<b>2 bed</b>	<b>63.5</b>	<b>2,139</b>		<b>53</b>
3 bed	74	2,493		57
<b>DETACHED BUNGALOW</b>				
<b>2 bed</b>	<b>67</b>	<b>2,528</b>		<b>66</b>
3 bed	78	2,943		71
4 bed	90	3,396		76
<b>SEMI-DETACHED HOUSE</b>				
2 bed	77	2,884		76
<b>3 bed</b>	<b>89</b>	<b>3,333</b>		<b>82</b>
4 bed	102	3,820		88
<b>DETACHED HOUSE</b>				
2 bed	90	4,279		119
<b>3 bed</b>	<b>104</b>	<b>4,944</b>		<b>128</b>
4 bed	120	5,705		138

Flats - savings for a top-floor flat are intermediate between a mid-floor and ground-floor flat. Savings in this table are calculated for a top-floor flat.

Costs are based on the SAP2001 cost for gas, that is, 3.74 £/GJ

BRE 15th April 2002



**SEMPATAP THERMAL - 10 mm - Solid brick wall - Electric storage heating**  
**Annual Savings**



	floor area m <sup>2</sup>	ELECTRIC STORAGE HEATING		External wall area excl. openings m <sup>2</sup>
		House with solid walls U-value 2.1 kWh/yr	£/yr	
<b>FLAT WITH 2 EXTERNAL WALLS</b>				
1 bed	42	746		24
<b>2 bed</b>	<b>61</b>	<b>1,083</b>		<b>29</b>
3 bed	89	1,581		35
<b>FLAT WITH 3 EXTERNAL WALLS</b>				
1 bed	42	1,262		42
<b>2 bed</b>	<b>61</b>	<b>1,833</b>		<b>51</b>
3 bed	89	2,675		61
<b>MID-TERRACED</b>				
2 bed	63	1,285		39
<b>3 bed</b>	<b>79</b>	<b>1,611</b>		<b>43</b>
<b>END-TERRACED</b>				
2 bed	63	2,193		69
<b>3 bed</b>	<b>79</b>	<b>2,750</b>		<b>77</b>
<b>SEMI-DETACHED BUNGALOW</b>				
<b>2 bed</b>	<b>63.5</b>	<b>1,889</b>		<b>53</b>
3 bed	74	2,201		57
<b>DETACHED BUNGALOW</b>				
<b>2 bed</b>	<b>67</b>	<b>2,250</b>		<b>66</b>
3 bed	78	2,619		71
4 bed	90	3,022		76
<b>SEMI-DETACHED HOUSE</b>				
2 bed	77	2,499		76
<b>3 bed</b>	<b>89</b>	<b>2,889</b>		<b>82</b>
4 bed	102	3,311		88
<b>DETACHED HOUSE</b>				
2 bed	90	3,846		119
<b>3 bed</b>	<b>104</b>	<b>4,444</b>		<b>128</b>
4 bed	120	5,128		138

Flats - savings for a top-floor flat are intermediate between a mid-floor and ground-floor flat. Savings in this table are calculated for a top-floor flat.

Costs are based on the SAP2001 prices, that is, 20.80 £/GJ for on-peak and 7.93 for off-peak. Assume 90% off-peak and 10% on peak giving a weighted average cost of 9.217 £/GJ

Licensed Copy: Steven Leach, BSI/PAS 2030 steering group account, Version correct as of 27/01/2014 17:19, © The British Standards Institution 2014

# PAS 2030:2014 Edition 1

## Improving the energy efficiency of existing buildings

Specification for installation process, process management and service provision



Department  
of Energy &  
Climate Change

**bsi.**







Promoting choice and value  
for all gas and electricity customers

## Carbon Emissions Reduction Target (CERT) 2008-2011 Technical Guidance Manual

Document type: Guidance

Ref: 85/08

Date of publication: 13 June 2008

### INSULATION - MEASURE SAVINGS

#### SOLID WALL INSULATION

Property Details	Number of beds	Annual reduction in carbon emissions (kgCO <sub>2</sub> /a)	Lifetime (years)
<b>SEMPATAR 10mm</b>			
Flat	1	247	30
Flat	2	297	30
Flat	3	359	30
Mid-Terrace	2	306	30
Mid-Terrace	3	342	30
End-Terrace	2	579	30
End-Terrace	3	648	30
Semi-bungalow	2	434	30
Semi-bungalow	3	469	30
Det-bungalow	2	518	30
Det-bungalow	3	555	30
Det-bungalow	4	601	30
Semi-house	2	632	30
Semi-house	3	679	30
Semi-house	4	727	30
Det-house	2	956	30
Det-house	3	1,030	30
Det-house	4	1,106	30
Mansard	2	785	30

#### CAVITY WALL INSULATION

Property Details	Number of beds	Annual reduction in carbon emissions (kgCO <sub>2</sub> /a)	Lifetime (years)
<b>GREY BRICKS WITH CONDUCTIVITY 0.033 W/Km</b>			
Flat	1	259	40
Flat	2	312	40
Flat	3	377	40
Mid terrace	2	331	40
Mid terrace	3	370	40
End terrace	2	579	40
End terrace	3	548	40
Semi-det bungalow	2	441	40
Semi-det bungalow	3	477	40
Detached bungalow	2	545	40
Detached bungalow	3	588	40
Detached bungalow	4	632	40
Semi-detached	2	631	40
Semi-detached	3	679	40
Semi-detached	4	726	40
Detached	2	1,026	40
Detached	3	1,103	40
Detached	4	1,185	40

Office of Gas and Electricity Markets, 9 Millbank, London SW1P 3GE

[www.ofgem.gov.uk](http://www.ofgem.gov.uk)





# Thermographic Survey

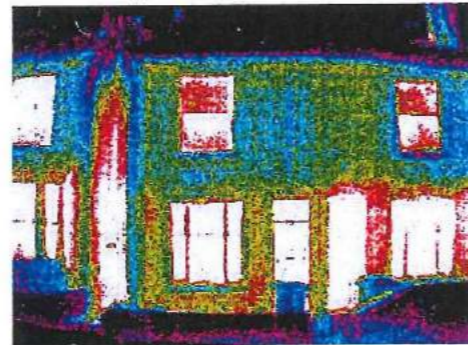
## Sempatap Thermal on 8 Domestic Properties for Wolverhampton City Council



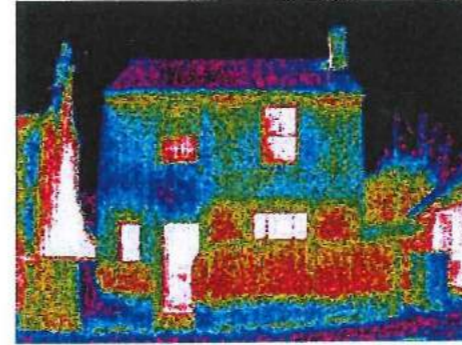
Visual image



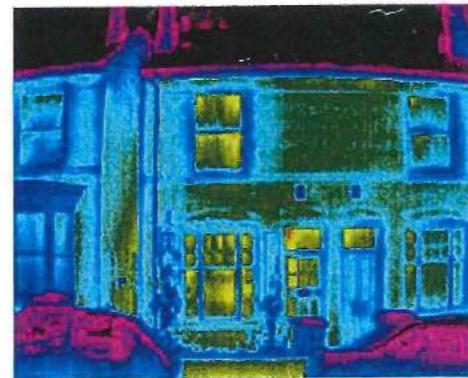
Visual image



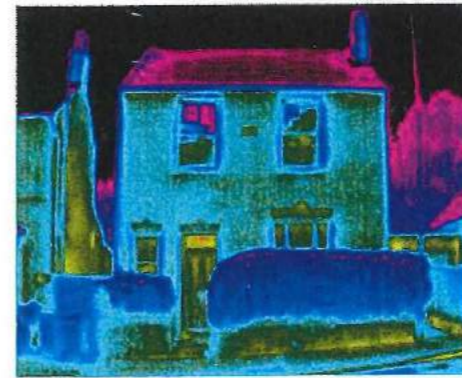
Before thermal



Before thermal



After thermal



After thermal

### Analysis

In the before image, inconsistent temperatures can be seen in red and yellow colours indicating heat loss due to poor detailing or missing/ damaged insulation. Warmer temperatures are seen on the bottom level of this property suggesting heating is on compared to the above level; however it could simply be there is no insulation at all. Analysis of the property after insulation reveals significantly reduced heat loss across the elevation suggesting a much more energy efficient property.

With acknowledgement to **IRT Surveys Ltd. 01382 228700**

# SEMPATAP THERMAL



## Future of home insulation to be transformed following research project

The way in which homes are insulated could be transformed following research by Leeds Beckett academics.

The Leeds Sustainability Institute (LSI) at Leeds Beckett were successful in an open tender competition for a £200,000 research project by the UK Government.

The Department for Business Energy and Industrial Strategy has asked the LSI to examine the effectiveness of new types of wall insulation for buildings. The project, which is being led by Dr David Glew, Reader in the Leeds Sustainability Institute, will inform future domestic energy efficiency policy in the UK.

Dr Glew explained: "Hopefully, the result of this project will help those most affected by fuel poverty.

"Current methods of insulating Solid Walls can be expensive and complicated to install, so few homes actually have this insulation.

"Thin Internal Wall Insulation provides a slightly lower energy savings than conventionally used Solid Wall Insulation, but may be simpler and cheaper meaning more homes could be insulated and have a greater benefit to society overall.

"Our research will evaluate the performance of Thin Internal Wall Insulation against thicker insulation projects through various building performance evaluation tests in homes in Leeds this winter."

The insulation will also be tested in a hygrothermal laboratory, a specialist facility where accurate measurements can be taken on any changes to how moisture flows through walls when the products are installed.

Dr Glew added: "This project builds on the LSI's reputation for undertaking excellent building performance fieldwork research.

"We were up against leading research institutions and universities in the UK; and it's a real vote of confidence that we were successful in securing this project.

"This project is especially rewarding as it should lead to a direct impact on domestic energy efficiency policy and potentially the health and wellbeing of millions of people in the UK."

The project is due to be completed in October 2018 and will allow the LSI to further develop their building performance testing protocols, including the co heating test which was first developed by Leeds Beckett

# SEMPATAP THERMAL



# Resourceomatics



# Retrofitting a smart heating solution on existing electric storage heaters

Demonstration action proposal from d-Risk and Invisible Response

**invisible**response



# Technical Status

---

- Product at TRL8:
  - Product developed from 2014 originally by Energy Assets Ltd
  - In service since 2014-15 heating season with some London landlords
  - Used on community energy projects in Scotland and Wales
  - Never launched at volume market but now refined and ready
- Tested at independent GB laboratory
- Safely installed by Landlord Works Depts and contractors since 2015

# Retrofitting a smart heating solution on existing electric storage heaters

---

1. There are 1.5m households in GB with electric storage heating, typically tower blocks and rural off-gas properties

2. Residents suffer a poor heating experience due to tariffs that only permit night-time charging of the heaters

3. Proven demand for improved heating services, but to date no organisation has found the right technology, price point and route to market, until now

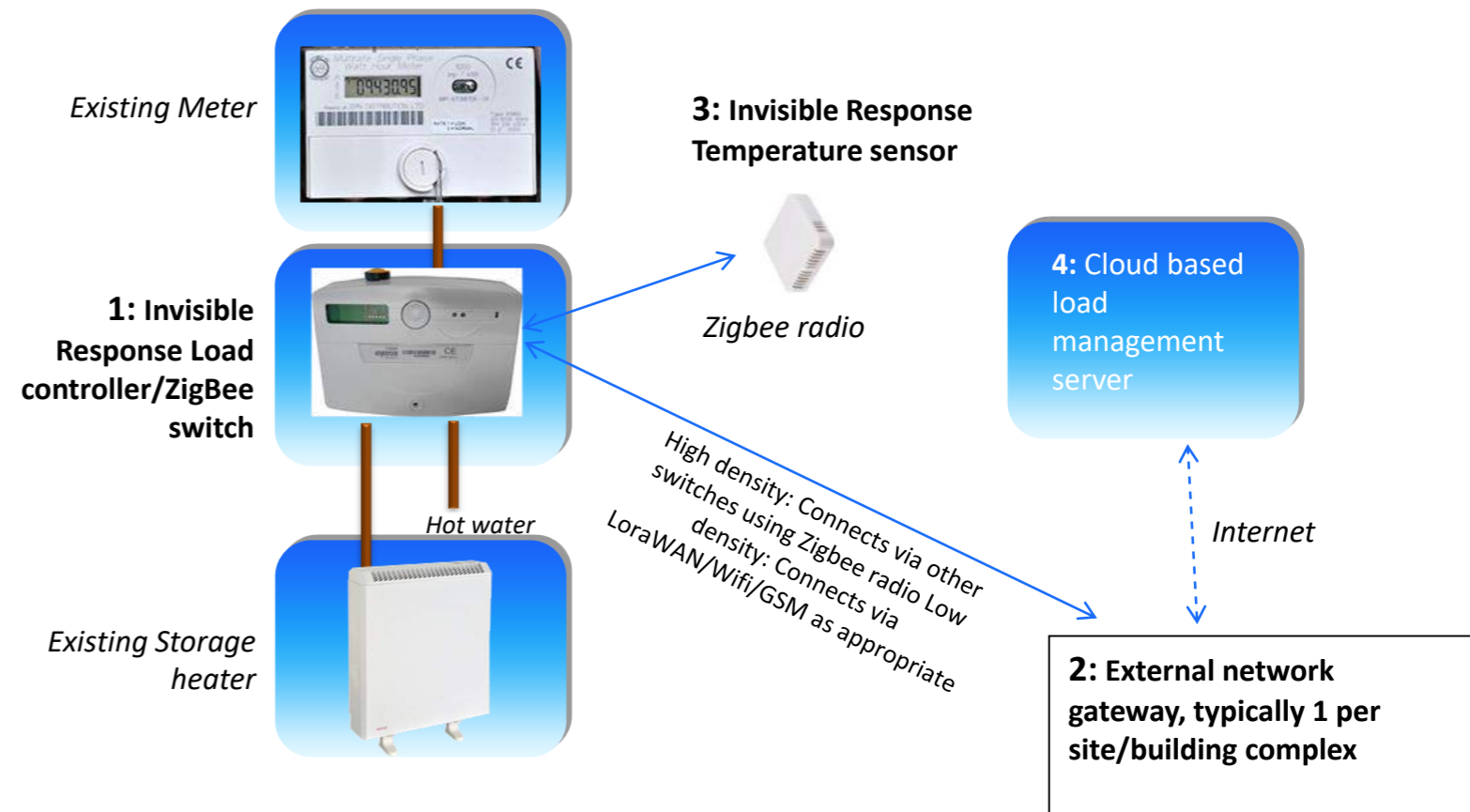
4. Communications technology – solutions available for urban and rural areas and range of building types

5. Storage heaters are a flexible load that can be aligned with inherently volatile renewable generation – further reducing reliance on fossil fuels



# The retrofit service – How it works

1. Load switch installed downstream of the meter
2. Network Gateway installed in a nearby public area to collate data from multiple switches
3. Temperature sensor installed in resident's flat
4. Cloud-based server optimises charging to reflect resident target needs, flat temperature, local weather forecast, supplier tariff and/or availability of local generation
5. Some sites will have a 4.8kWh battery storage allowing storage heater charging at low rates during pick hours.



# Solving the communications challenge in all geographies and buildings

---

Traditional industry switching depended on RadioTeleSwitch and fixed time charging regimes via timeswitches and non HH meters with integral switching

New Communications options include:

## **ZigBee Mesh**

Proven and installed since 2014 by Energy Assets  
High Density Housing (e.g. tower blocks/estates)

## **LoRaWAN**

Core Competence of Invisible Systems over last 10 years  
Low Density Housing

## **Wi-Fi / GSM**

Proven and installed since 2016 by Energy Assets Low Density/dispersed Housing

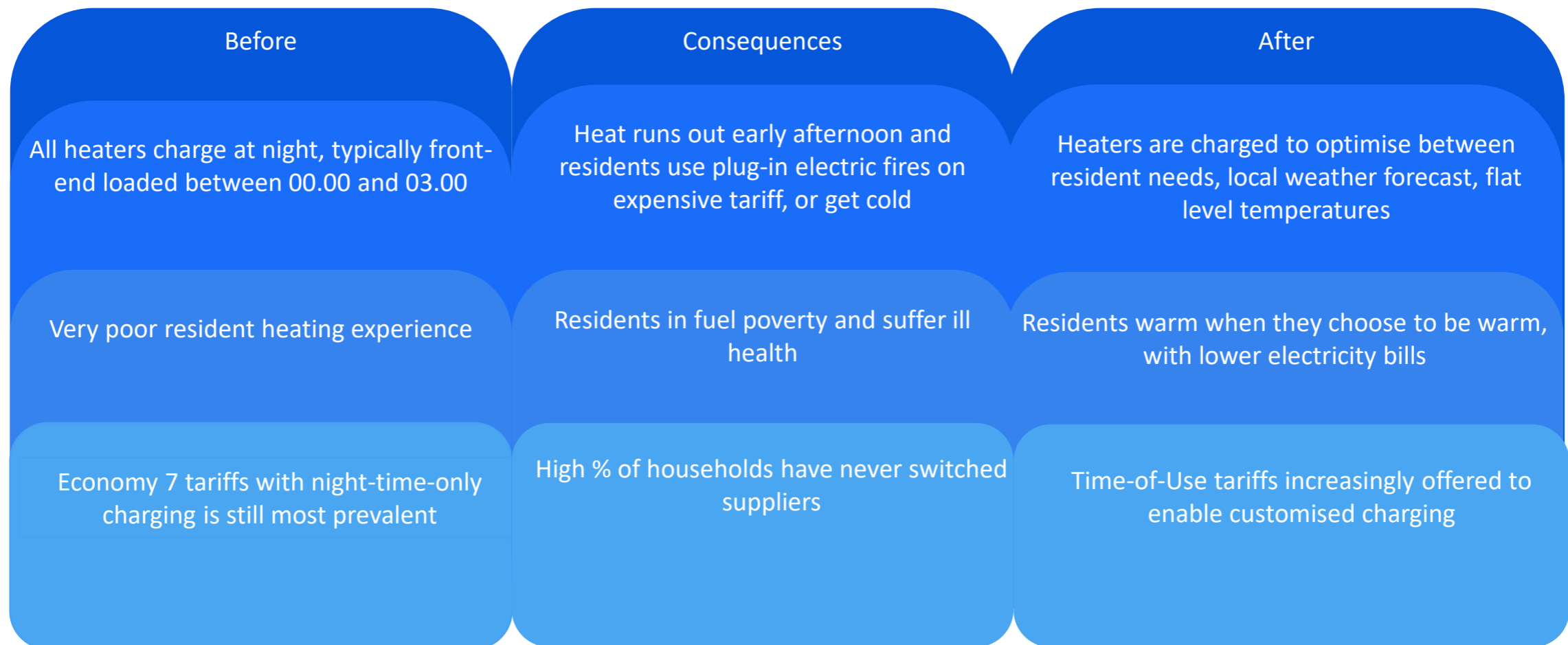
## **Evergreen Smart Power's VPP**

The VPP will dispatch batteries and access frequency response.



# How will this service benefit low income, vulnerable and fuel poor households?

---



# Thank You

**invisible**response



**d-Risk**



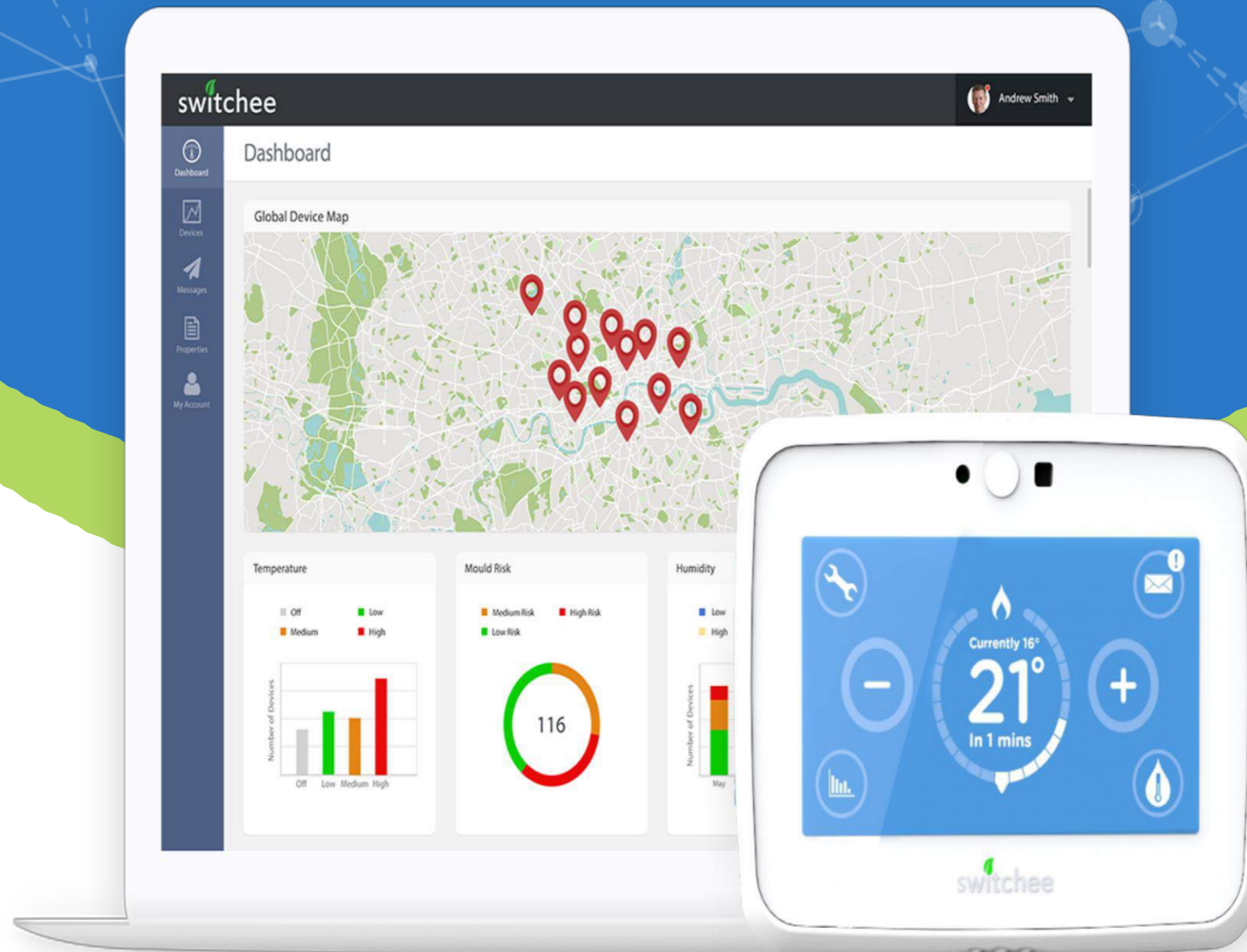
**evergreen**  
smart power



# Switchee



# switchee



---

# The Smart Thermostat For Affordable Housing

---

Switchee empowers landlords to create exceptional homes for their residents.

We focus on solving the urgent problems in housing like affordability, comfort, security and safety.



# Saving Residents Money

The B2B configuration automatically saves residents money



## GSM CONNECTIVITY

...through the mobile phone network - Switchee doesn't rely on residents' WiFi



## LEARNS OCCUPANCY

...utilising it's variety of sensors Switchee is capable of learning patterns and optimising heating accordingly



## "FIT AND FORGET" FULLY AUTOMATIC

Switchee can function with no manual intervention from residents



## OPTIMISES HEATING SETTINGS

Switchee uses the information it gathers to optimise individual properties heating settings.

## The In-built Thermostat Sensors Measure



Air Pressure



Motion



Humidity



Temperature



Light



# Insights Dashboard

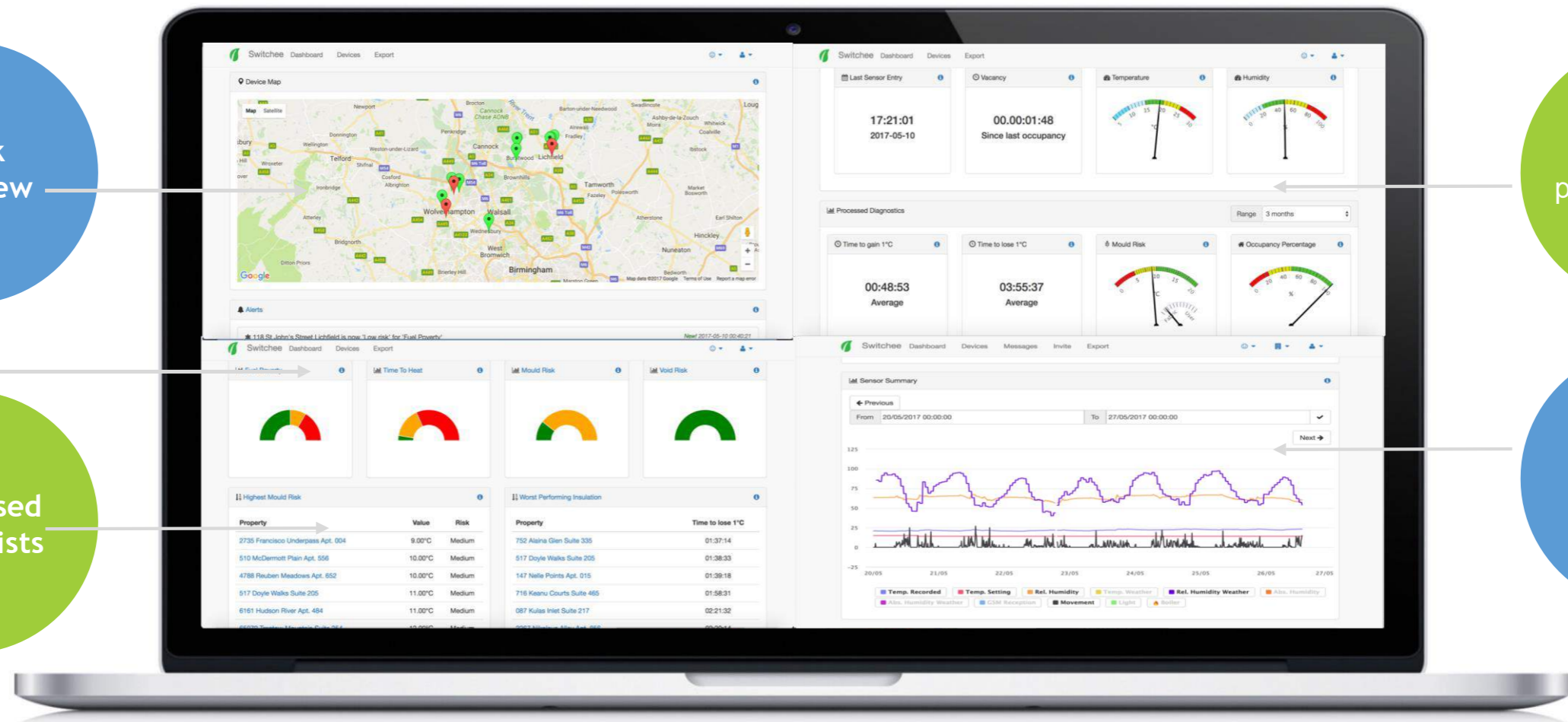
Our online dashboard delivers bespoke, actionable insights to landlords

Stock Overview

Prioritised action lists

Individual property data

Historical Data Tracking



# End To End Solution

Switchee is an end to end solution which saves residents and landlords money



## 5 Built-in Sensors

Algorithms learn occupancy and thermal profiles



## Heating Automatically Optimised

The property is heated according to it's sensor data



## Raw Data and Profiles Analysed

Alerts and KPIs sent to landlord dashboard



## Landlords Act On Insights

Utilising data - landlords can act on alerts about CD&M



## Landlord Saves Money

With preventative maintenance landlords spend less.

15% Household energy consumption reduction

£200 per property annual maintenance saving 2.5 year ROI

# ELIGIBLE UNDER ECO3 INNOVATION

Switchee is eligible under ECO3 Innovation Routes

- ✓ Never installed under ECO
- ✓ TRL 8, EMC/EST certified
- ✓ Up to £150/year off energy bills
- ✓ Can save asset managers £200/year per property
- ✓ Rapid and low-cost installation
- ✓ Compatible with all heating systems and households
- ✓ Deployed individually or with other interventions

Demonstration  
Action

Innovation Uplifts

In-Situ  
Performance

# Designed for Scale

**Evidence base from successful 2015, 2016 and 2017 pilots has resulted in nationwide rollouts and first contract specifications in 2018**



More than 46 Housing Associations and Local Authorities own > 1,000,000 homes

# Conclusions

How can Switchee help you?



Eligible for ECO 3 Innovation Demonstration Action & Innovation Score Uplift



In-built monitoring technology to evidence savings...potential for in-situ eligibility



Tangible landlord benefits have already created a real incentive for scaled roll out



Social housing distribution channels established



Low cost, easy installation, compatible with other measures and on all heating systems



---

# Thank You For Listening

---

Ian Napier

Chief Commercial Officer

[ian@switchee.co](mailto:ian@switchee.co)

[www.switchee.co](http://www.switchee.co)

@SwitcheeUK



# Break and Networking



# Gapotape



Department for  
Business, Energy  
& Industrial Strategy



**gapotape**<sup>®</sup>



**ofgem**

Making a positive difference  
for energy consumers

Eliminate the Performance Gap

Award Winning



Eliminate the Performance Gap



# Testing & Validation

Eliminate the Performance Gap

NATIONAL PHYSICAL LABORATORY  
Continuation Sheet

Figure 1 Cross section drawing of the basic roof structure

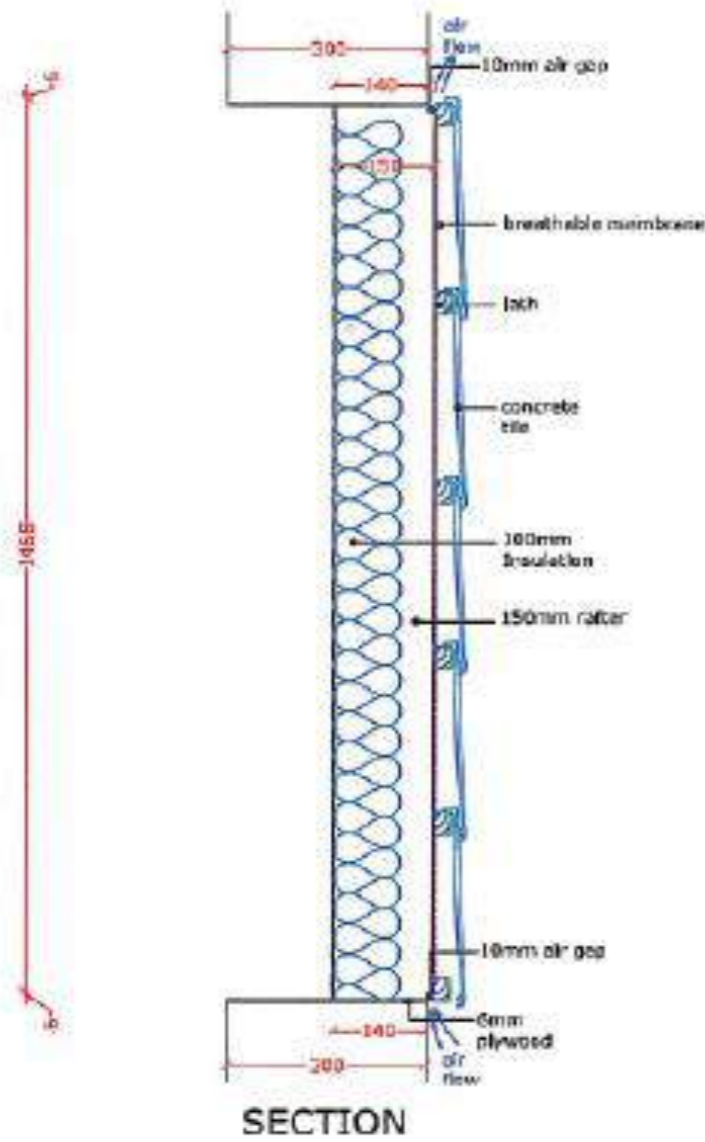


Photo 9 installed board



Photo 10 all boards installed



Eliminate the Performance Gap

## Testing & Vaidation



Eliminate the Performance Gap

# What we now know

**NATIONAL PHYSICAL LABORATORY**  
Teddington, Middlesex, UK, TW11 0LW Telephone: +44 (0)1753 2022

**Test Report**  
Series of U-value measurements of a FRG insulated roof section to evaluate the thermal performance of Gapsape.

The test report is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides confidence of measurement to the 2% level of uncertainty in order of measurements related to the relevant Physical Laboratory or other recognised national standards. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

**FOR:** Gapegroup Ltd  
19 Main Street  
Castledown  
Northern Ireland  
BT31 5DQ  
For the attention of Edward Ward

**IDENTIFICATION:** NPL quotation number 201402006 dated 19th March 2014. NPL operation number R162 was assigned to the roof section incorporating the Gapegroup Ltd, Gapsape OT10108 product.

**BASIS OF TEST:** The NPL Rotable Wall Opened Hot Box, whose calibration is traceable to National Standards and using the measurement procedures defined in the standard BS EN ISO 8990.

**UNCERTAINTY:** The overall measurement uncertainty is estimated to be within  $\pm 2.5\%$  based on a standard uncertainty multiplied by a coverage factor  $k=2$  providing a level of confidence of approximately 95%.

Reference: PP11001402006/1 Page 1 of 11  
Date of issue: 18 November 2014 Signed: *R. Williams* (Authorized Signatory)  
Checked by: *[Signature]* Name: Ray Williams for Managing Director

**BBA** APPROVAL SCHEME FOR CONSTRUCTION  
BRITISH BOARD OF AGREEMENT ASSESSMENT REPORT  
Ref: 5253542

Southall, Uxbridge, Westford  
Herts. WD25 5SW  
Telephone: 01895 525000  
Facsimile: 01895 525001  
Website: www.bba.org.uk

**Contents**

- 1 Introduction
- 2 First day witnessing at National Physical Laboratory (NPL)
- 3 Second day witnessing at NPL
- 4 Reasons for vertical orientation of the hot box
- 5 Pictures
- 6 Observations
- 7 Conclusion
- 8 NPL Report Ref: PP11001402006/1

**Executive summary**

The measured results from NPL tests indicate, when Gapsape is installed with no air gaps and a tight fit on all four sides, the correction level 0 for air voids can be used when calculating U-values to BS EN ISO 8990.

Prepared by: *[Signature]*  
(Stephane Barakovic - Team Manager)  
Date: 9 April 2015

Authorised by: *[Signature]*  
(John Abon - Head of Approval)  
Date: 9 April 2015

On behalf of the British Board of Agreement

British Board of Agreement 2015 Assessment Report Ref: 5253542  
Page 1 of 7 pages

Eliminate the Performance Gap

On Site

Construction Detail	Test Number	Environmental Temperature °C	U-value W/(m <sup>2</sup> K)
Pitch Roof without <i>gapotape</i>	R162(B)	12°C	1.51
Pitch Roof with <i>gapotape</i>	R162(D)	12°C	0.31

Note: Prior to testing the structure modeled at U-value of 0.31 W/(m<sup>2</sup>K) using the calculation methodology that is specified in BS EN ISO 6946.



20%

Eliminate the Performance Gap



On Site

Construction Detail	Test Number	Environmental Temperature °C	U-value W/(m <sup>2</sup> K)
Pitch Roof without <i>gapotape</i>	R162(B)	12°C	1.51
Pitch Roof with <i>gapotape</i>	R162(D)	12°C	0.31

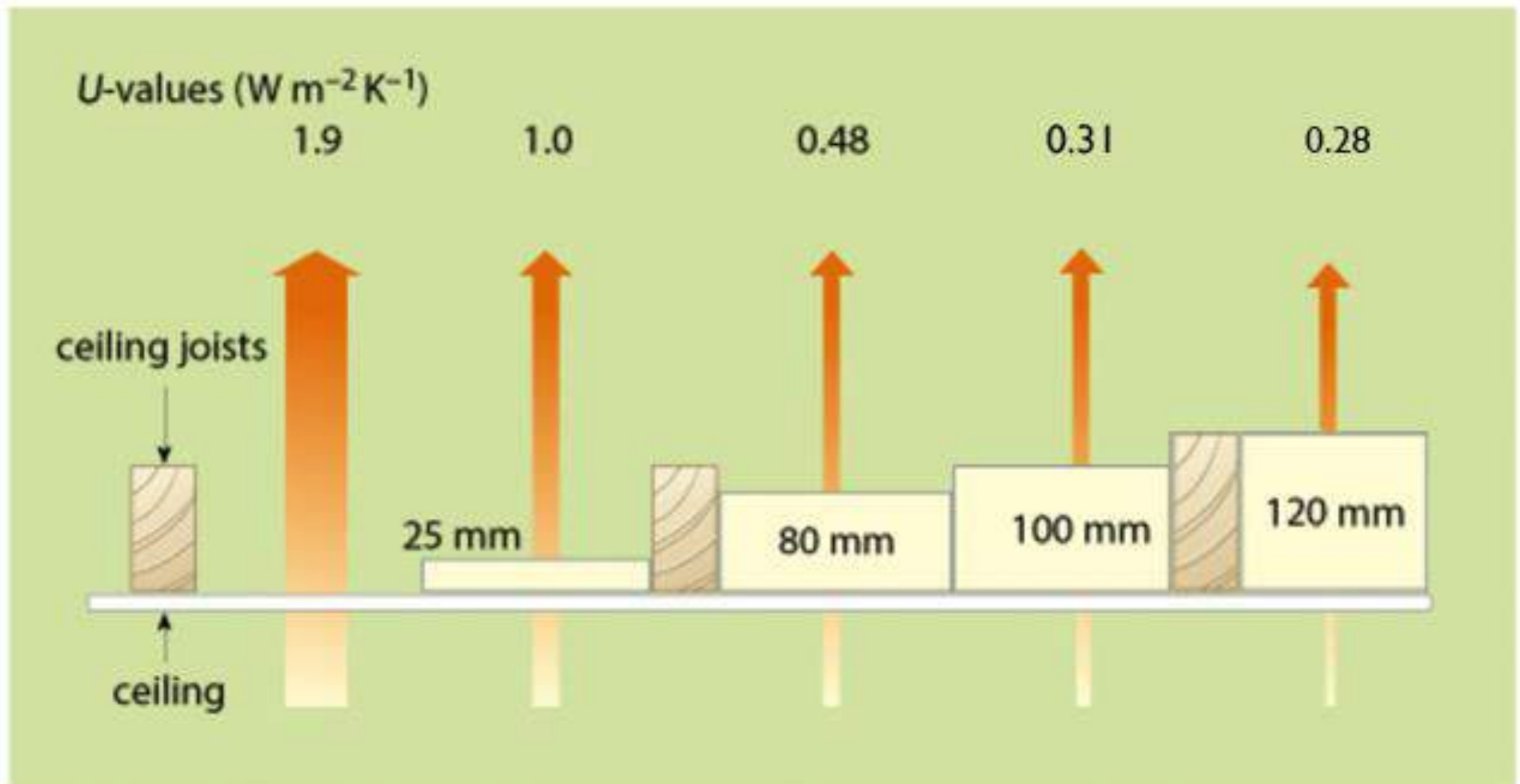
Note: Prior to testing the structure modeled at U-value of 0.30 W/(m<sup>2</sup>K) using the calculation methodology that is specified in BS EN ISO 6946.



100%

Eliminate the Performance Gap

## *U*-values resulting from different thicknesses.

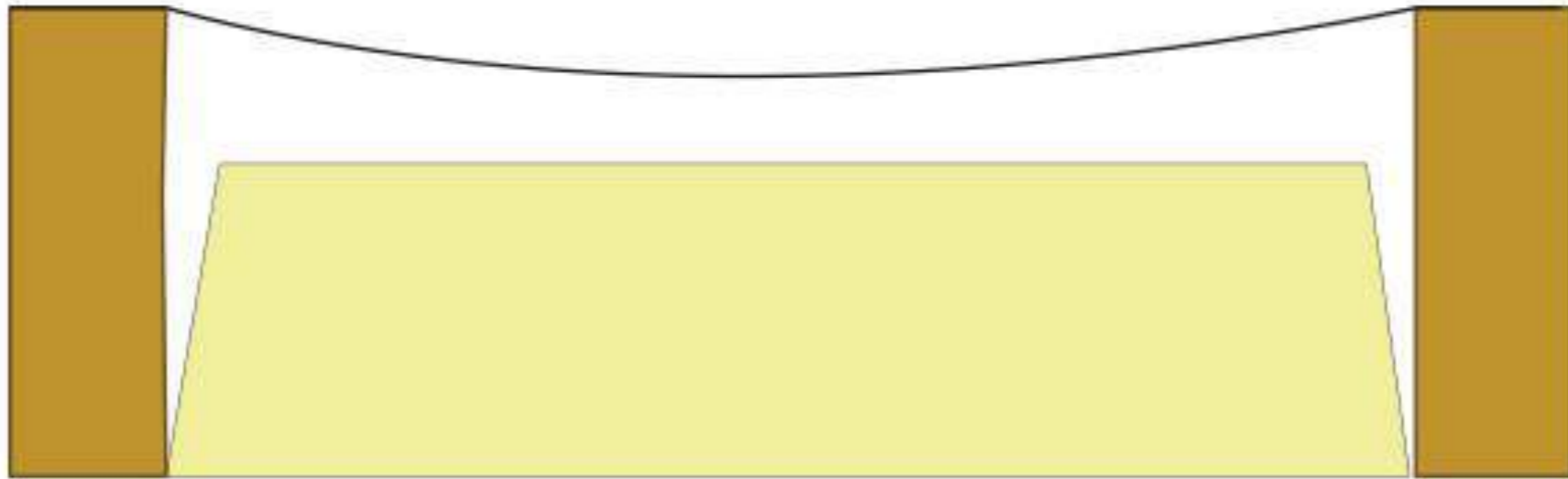


Eliminate the Performance Gap

# The Problem

Eliminate the Performance Gap

## Bevellers



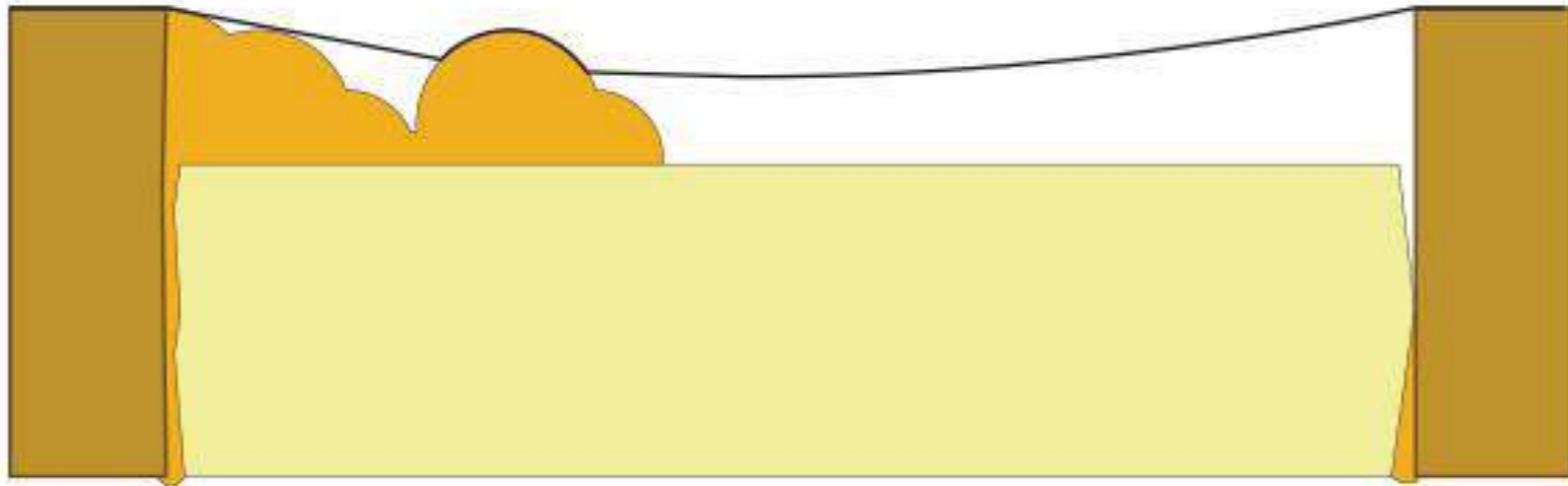
Eliminate the Performance Gap



Waste

Eliminate the Performance Gap

Sprayers

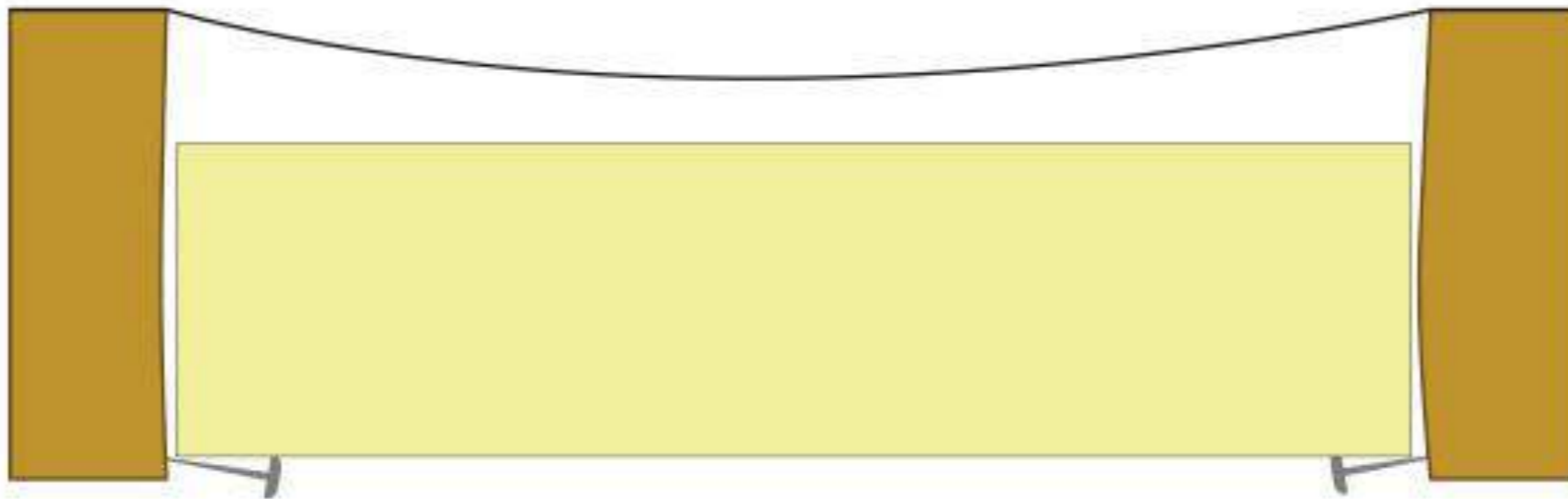


Eliminate the Performance Gap



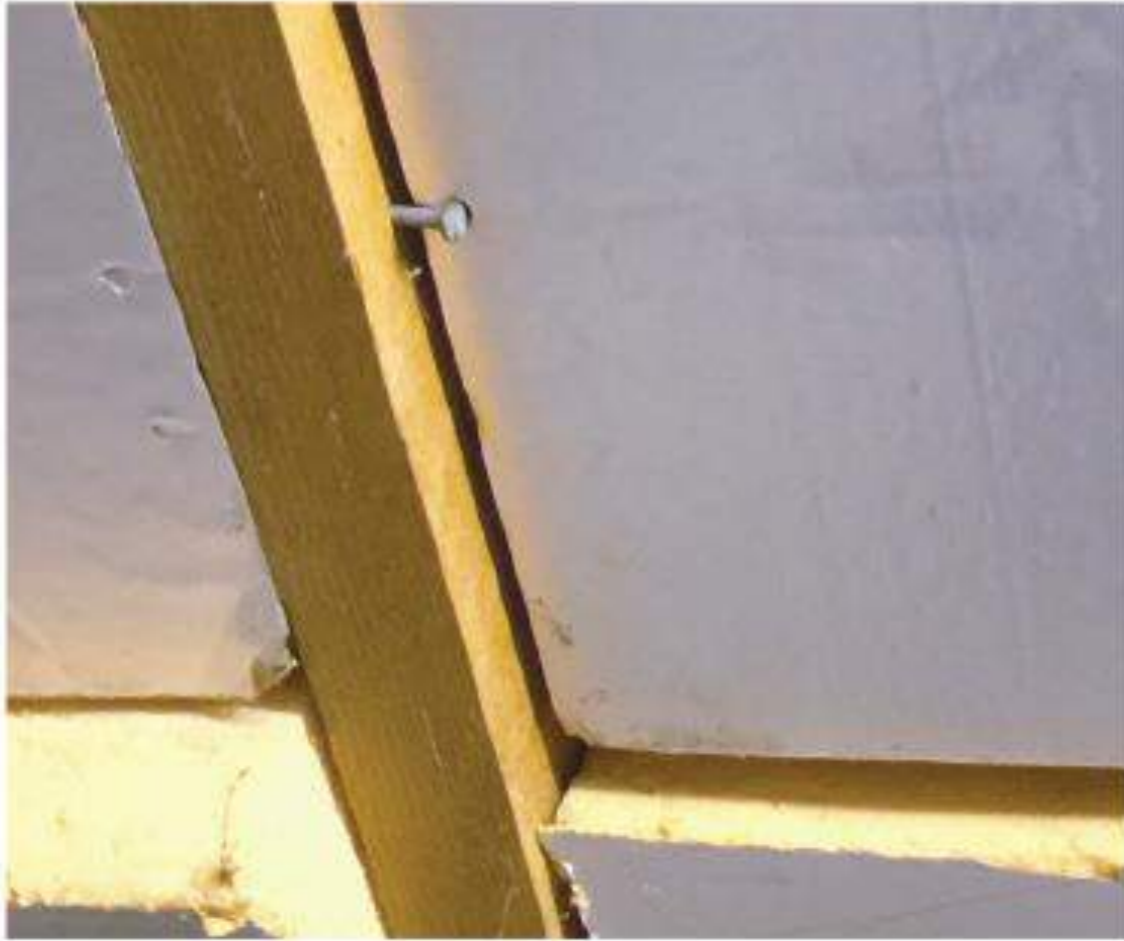
Eliminate the Performance Gap

# Nailers



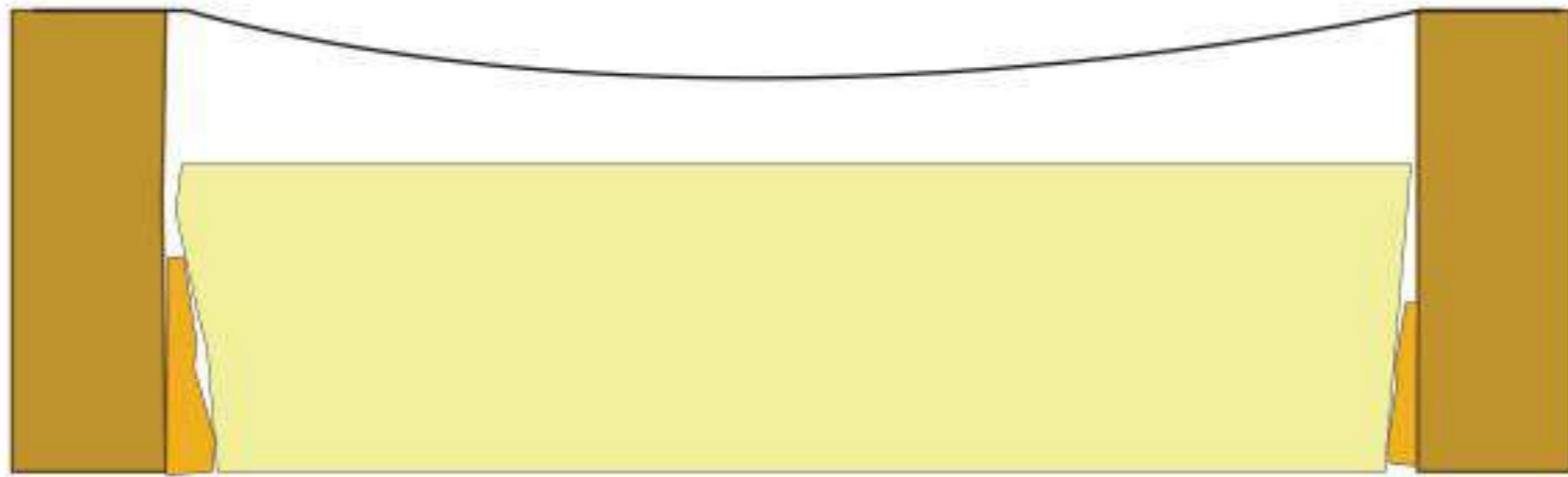
Eliminate the Performance Gap





Eliminate the Performance Gap

# Packers

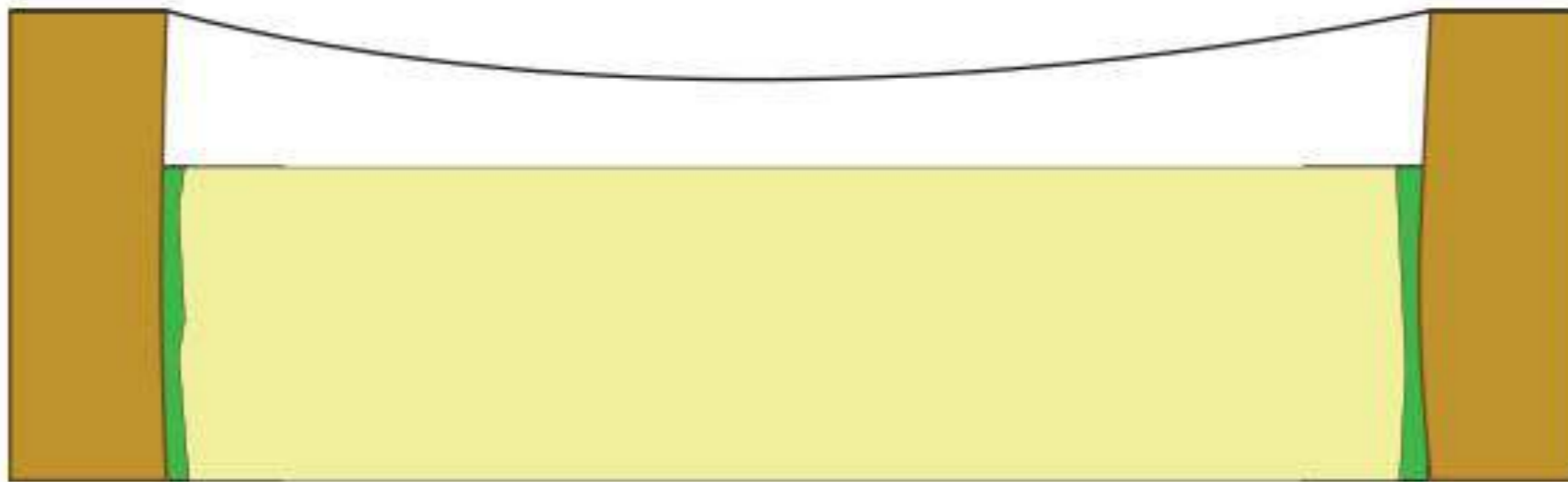


Eliminate the Performance Gap



Eliminate the Performance Gap

## Gapotapers



Eliminate the Performance Gap



Eliminate the Performance Gap

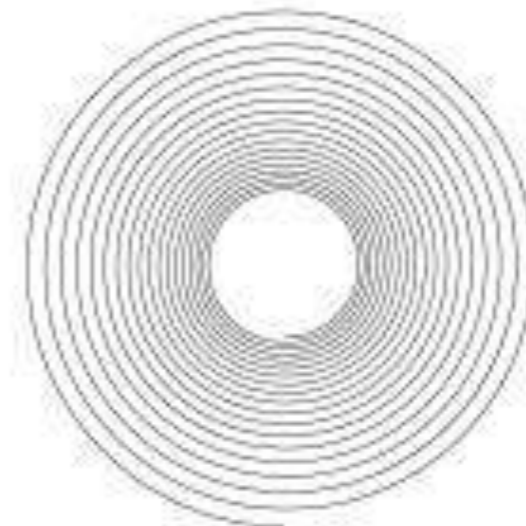


Eliminate the Performance Gap

5 x 10m Roll



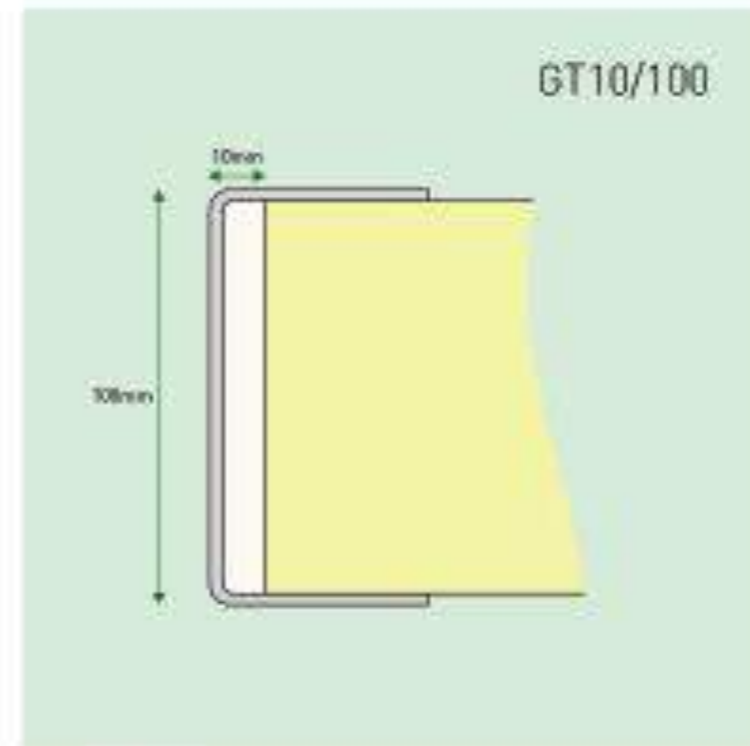
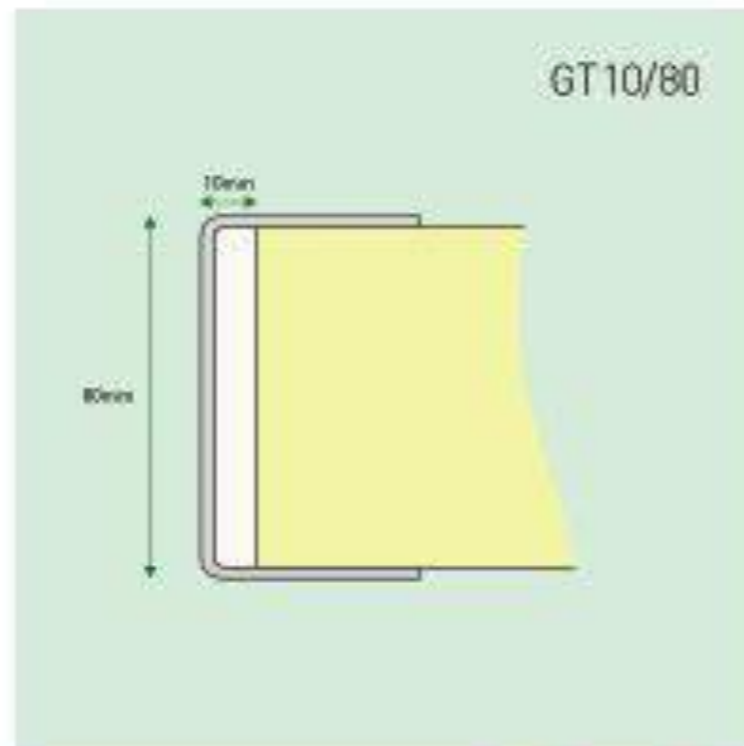
1 x 10m Roll



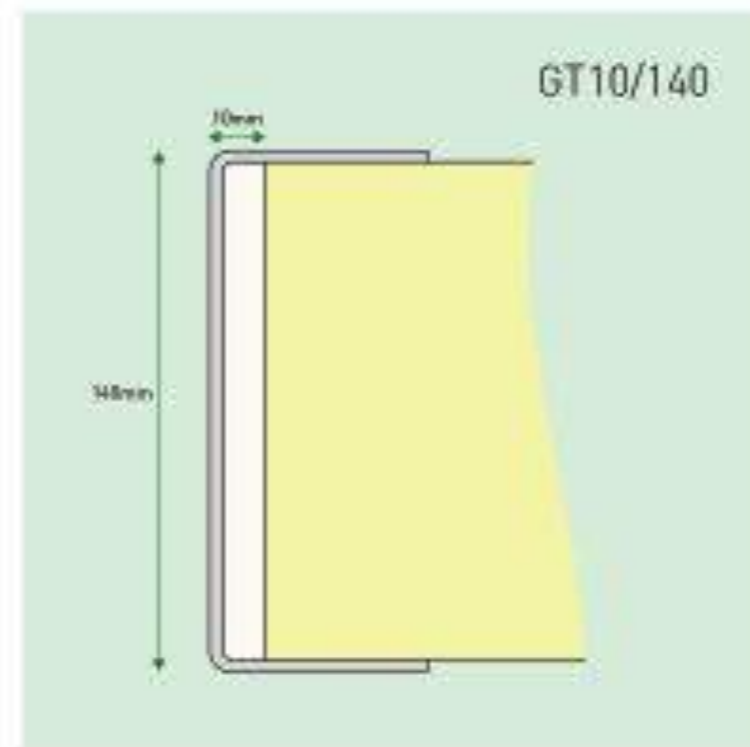
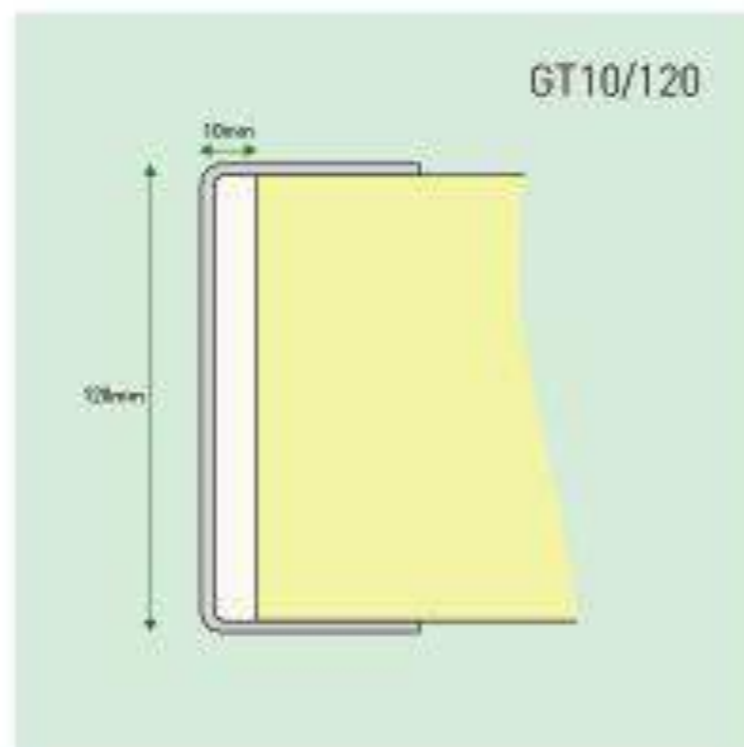
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Eliminate the Performance Gap



## Product widths



Eliminate the Performance Gap



## Why *gapotape*

- Upto 80% increase in performance
- New & improved installation technique
- Tested and verified
- Marketable product that is being sold in the market
- Innovation Score Uplifts:
  - material
  - energy efficiency performance

TRL 8



TRL 9



(HHCRO)



(CERO)



Eliminate the Performance Gap

**gapotape**<sup>®</sup>

info@gapogroup.com

www.gapogroup.com

028 4377 0505

 @gapotape

**100%**  
PIRFORMANCE

**100%**  
OF THE TIME

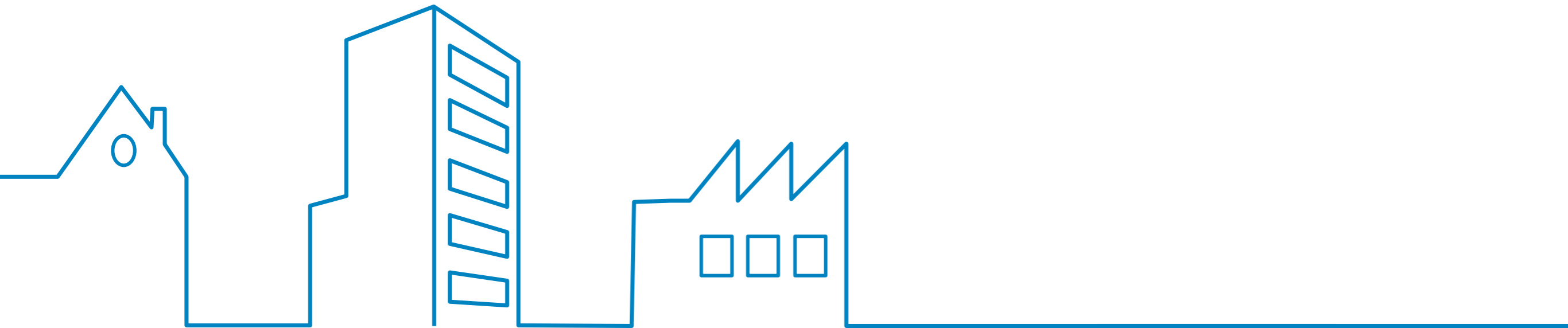
# Daikin





# Daikin Altherma Hybrid heat pump

ECO3 Innovation Component





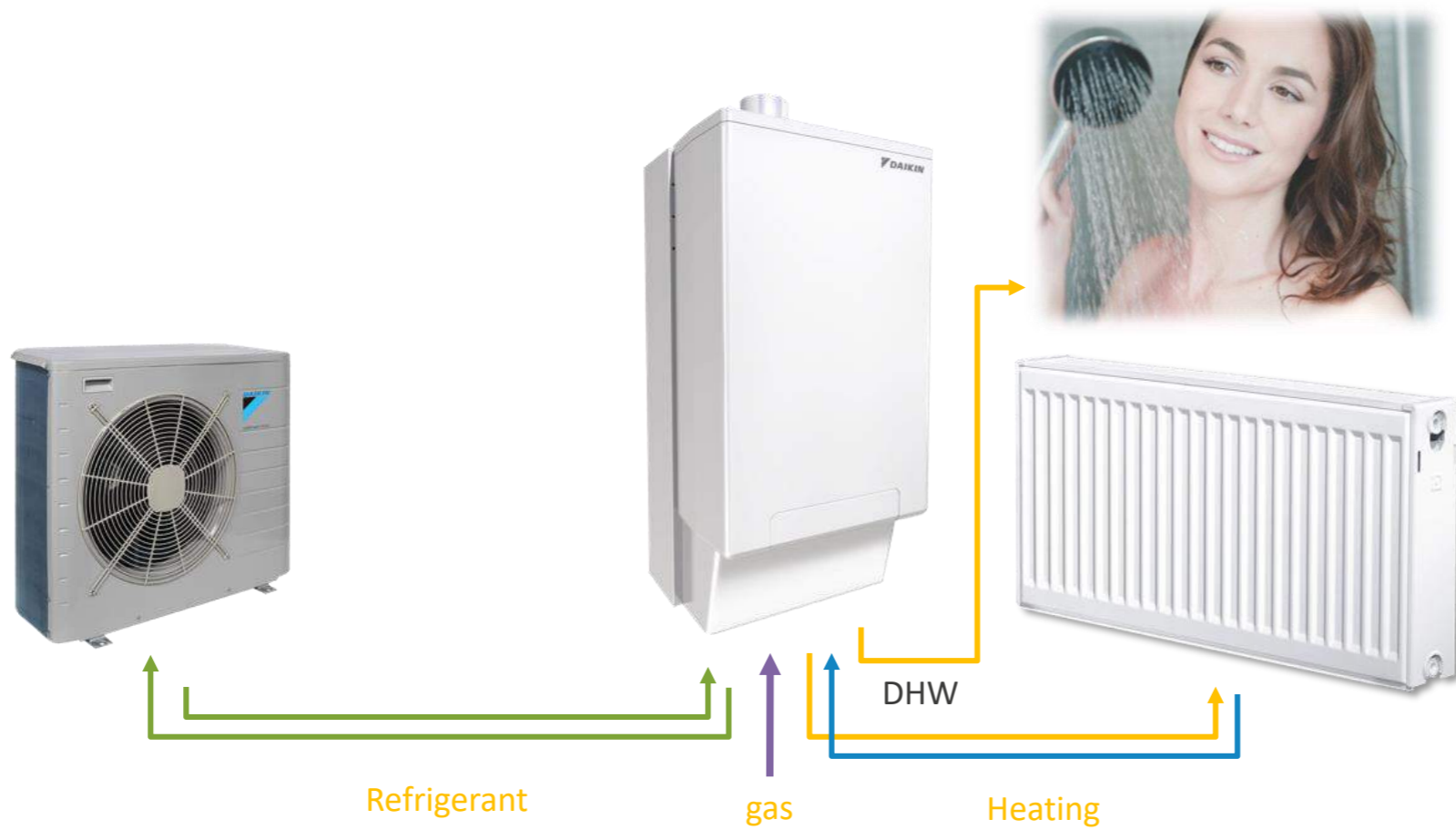
## Section 1

### AGENDA

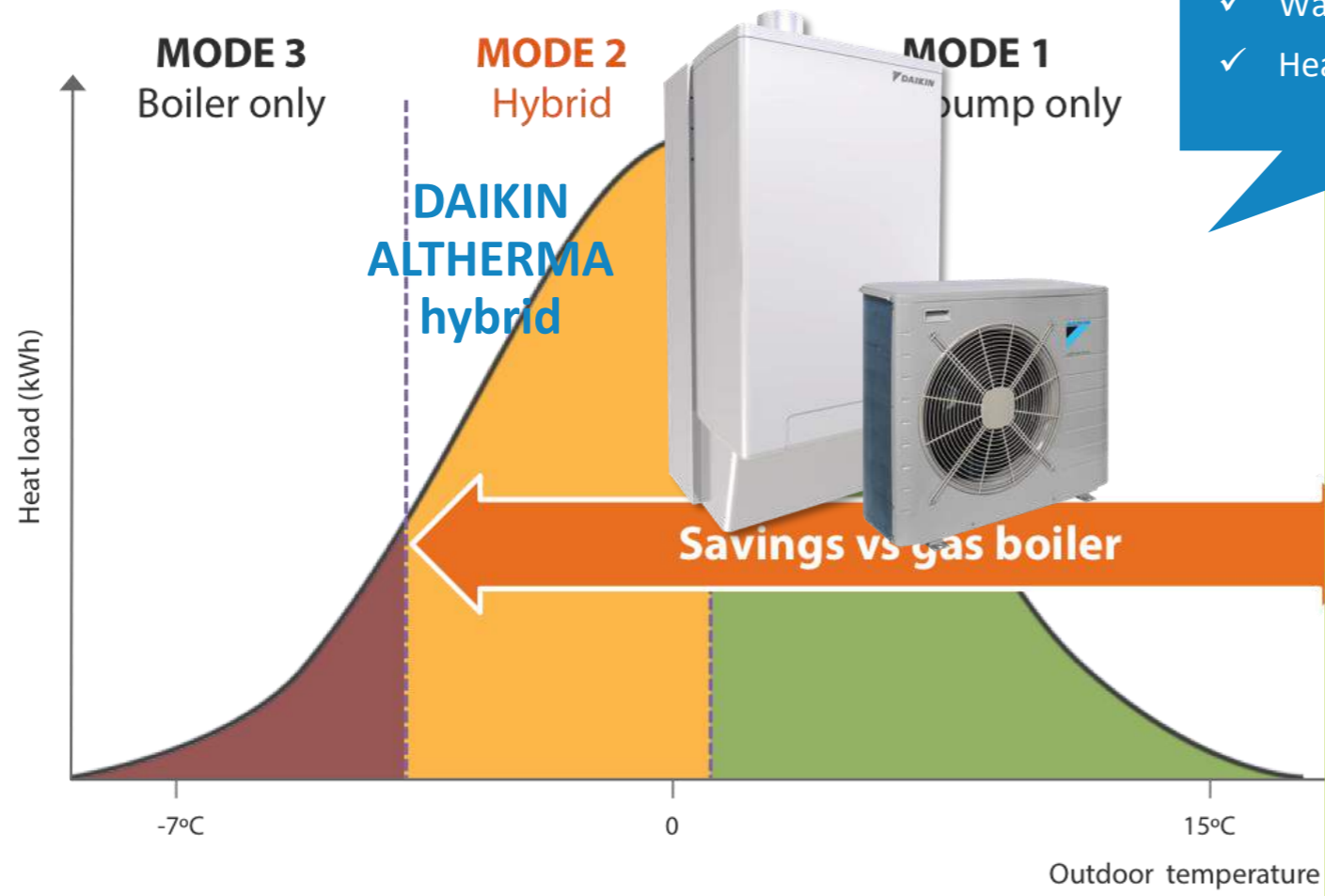
- (1) What is Hybrid system
  - Boiler and Heat Pump
- (2) What does Hybrid system do
  - Smart Logic
- (3) How can it fit under ECO3 Innovation component
  - Innovative approach to the delivery of energy efficiency measures to fuel poor houses

The solution:

# Daikin Altherma hybrid heat pump



# Two heat sources running seamlessly together



Automatically managed by Daikin's intelligent control logic based on:

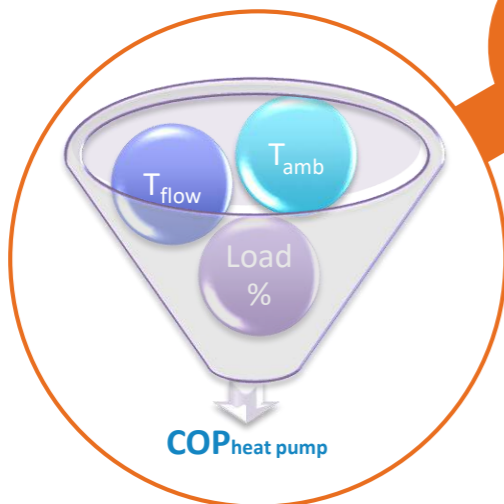
- ✓ Electricity price
- ✓ Gas price
- ✓ Ambient temperature
- ✓ Water temperature
- ✓ Heat load

- ✓ For homes connected to the gas mains or LPG
- ✓ Always runs the cheapest source
- ✓ Compact
- ✓ No need to change radiators
- ✓ Eligible for Renewable Heat Incentive (RHI)





Energy prices  
Ecological mode

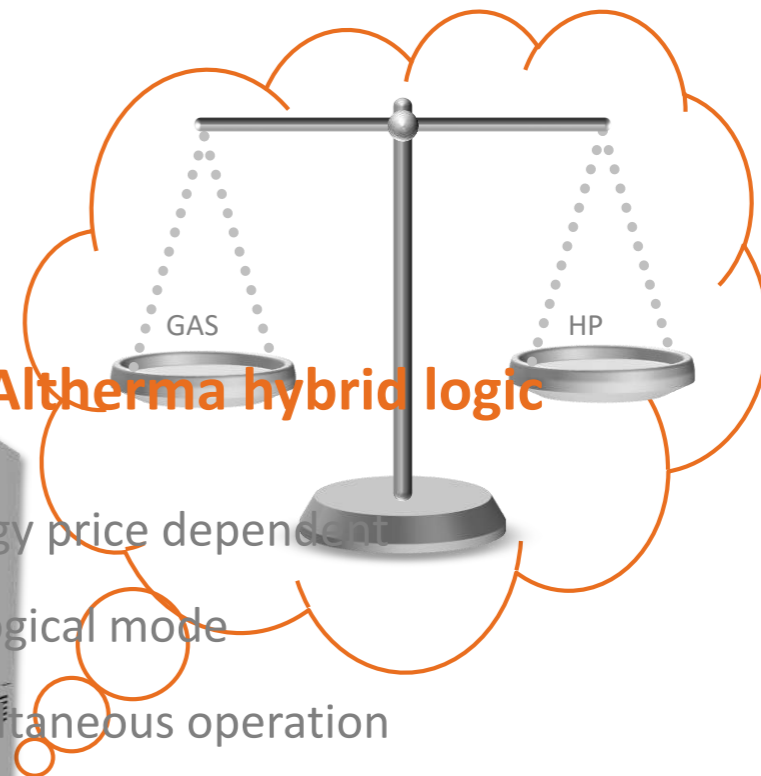


Operating condition



### Daikin Altherma hybrid logic

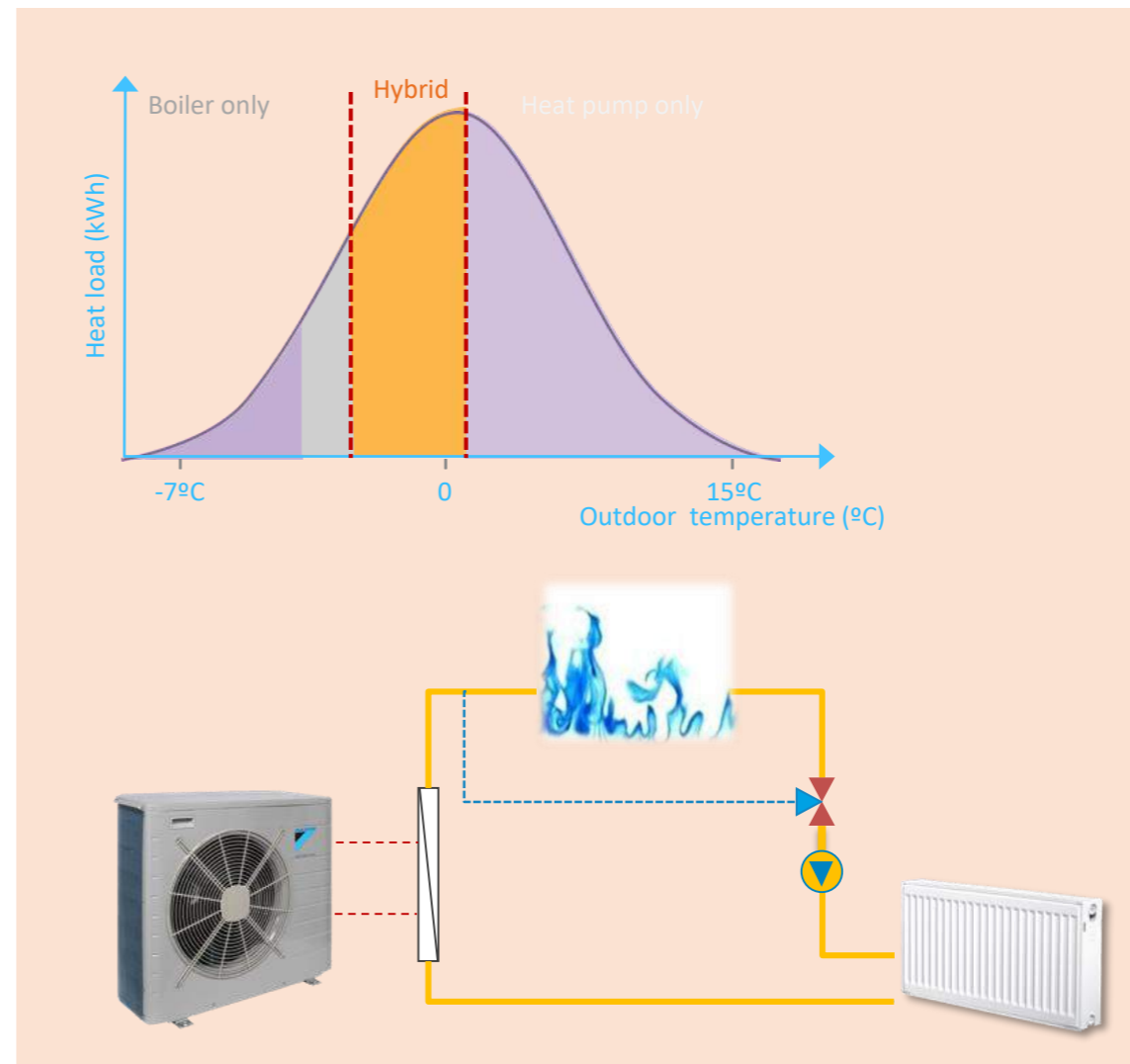
- Energy price dependent
- Ecological mode
- Simultaneous operation
- COP increase by flow reduction



### The Daikin Way

## The Daikin way

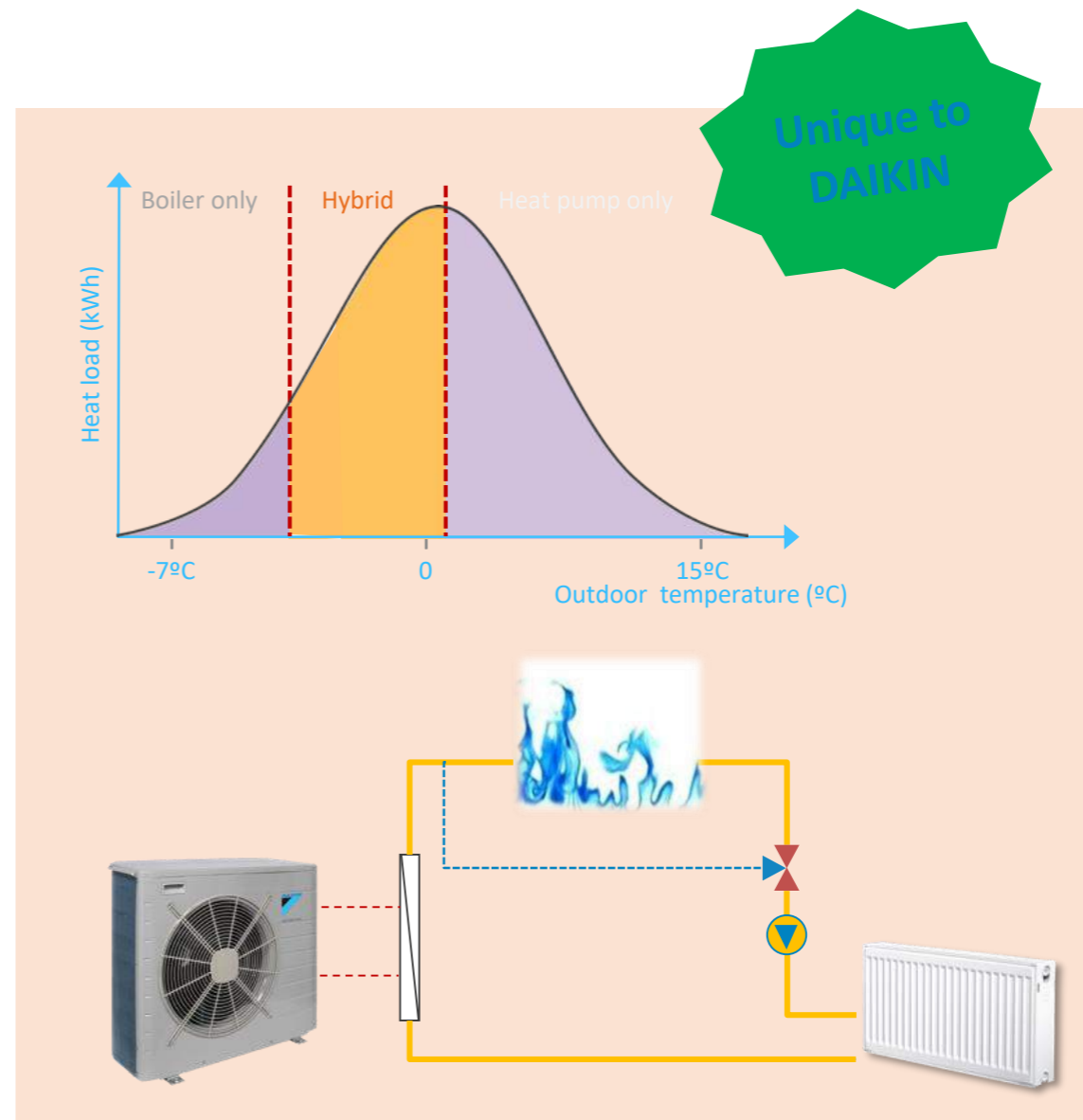
- Heat pump cannot cover the complete heat load
- Heat pump COP is higher than balancing point
- Simultaneous operation of heat pump and gas boiler



### The Daikin Way

## The Daikin way

- Heat pump COP slightly lower than the balancing point
- Heat pump COP can be improved by reducing water flow rate
- Simultaneous operation of heat pump and gas boiler

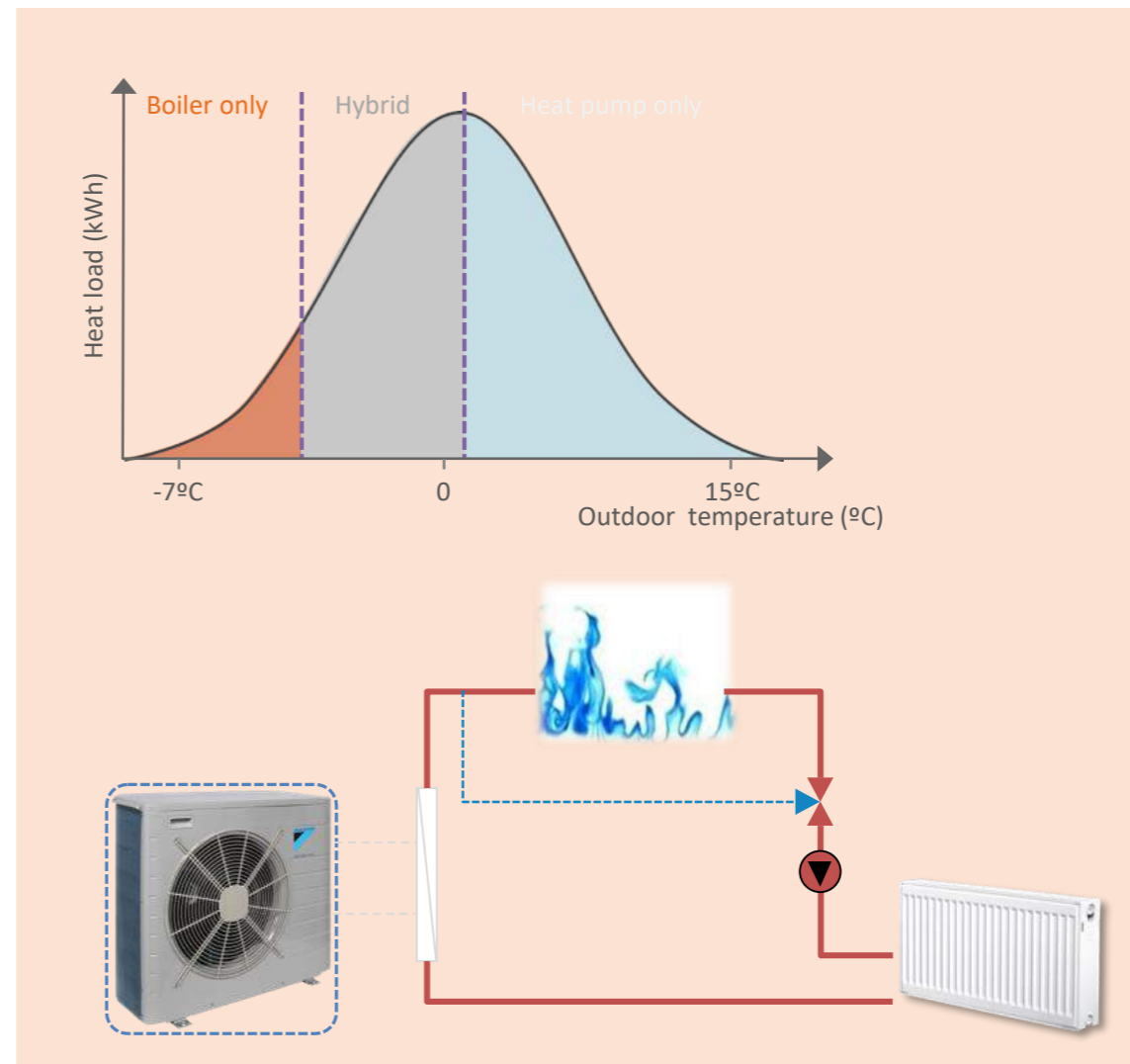


## - Boiler only

The Daikin Way

### The Daikin way

- Heat pump COP is lower than balancing point
- Boiler covers complete heat load



Lets use **Technology Innovatively** to address one of the biggest challenge of the country and change the headlines of 9000 people died due to cold homes to **Many fuel poor homes enjoyed the warmth this winter!!**

Hybrid solution can be considered under ECO3 Innovation component middle part] –

- Tried and tested technology
- Manufactured accredited and not used under eco

**NEDO Smart Community Manchester Project and FREEDOM project Bridgend used Hybrids: (National Grid FES 2018 includes Hybrids as one of the pathways to decarbonise heat)**

- Taking advantage of Time of use tariffs and **avoiding peak electricity prices. Saves Householders money**
- Are more **flexible** and can switch between electricity and gas, so that in moments of high energy need, the grid will not be overloaded;
- Using electricity when low carbon emitting generation sources, such as renewables, are generating, **thereby reducing overall carbon emissions**
- **Avoiding more costly and disruptive changes** to homes.
- PEACE OF MIND WITH END USER WARRANTY



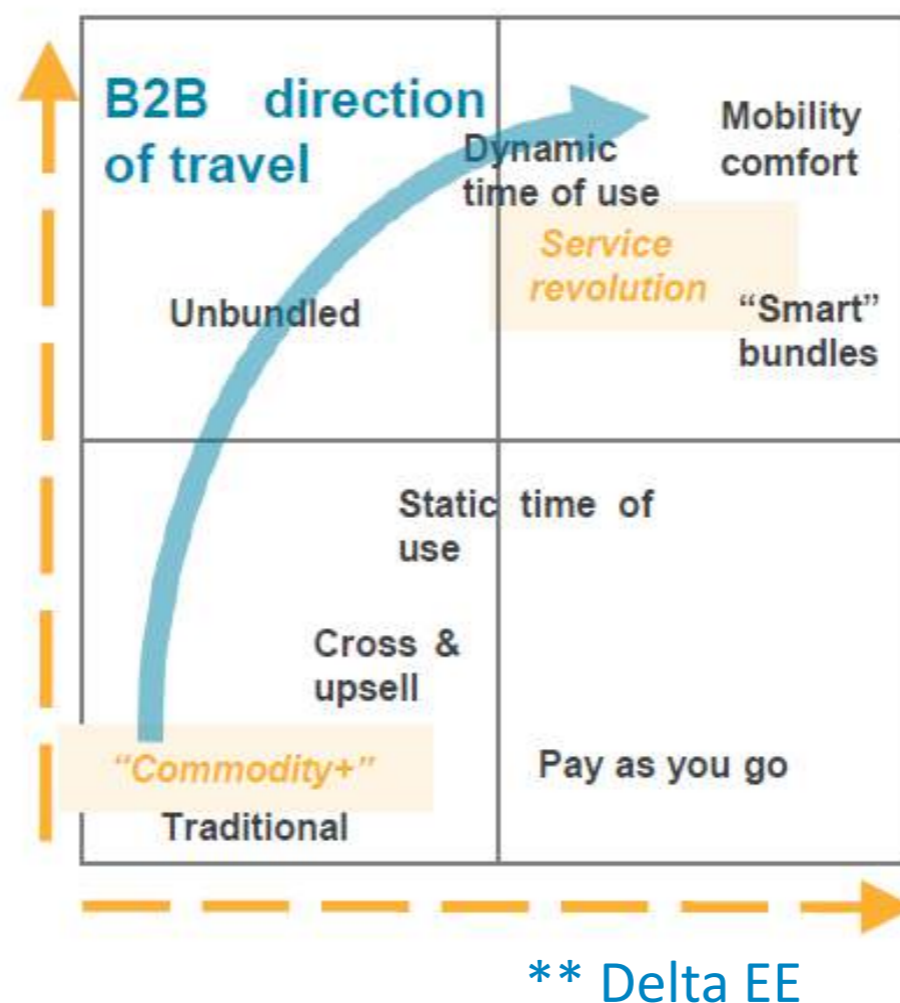
*Afford to Heat Home to level required for Comfort and Health*



## Explore SMART Opportunities around Consumer Value Propositions

We would like to work with you to create package of service / solution to provide —

An offer under ECO3 Innovation using Hybrid heat pumps which would involve smart financing and “in real sense” take people out of fuel poverty by running cost savings.....



people  
planet  
profit  
principles

Thank you

# Pavatex





**The Next generation of  
insulation solutions used  
on 1000's of projects  
throughout the UK**  
delivering cost effective  
thermal performance



Natural  
Building  
Technologies

**Contact NBT**

T 01844 338338

E [info@natural-building.co.uk](mailto:info@natural-building.co.uk)

[www.natural-building.co.uk](http://www.natural-building.co.uk)



8,000,000 solid wall  
homes in the UK

# x2 Solutions



Natural  
Building  
Technologies

# 1. External Wall Insulation EWI

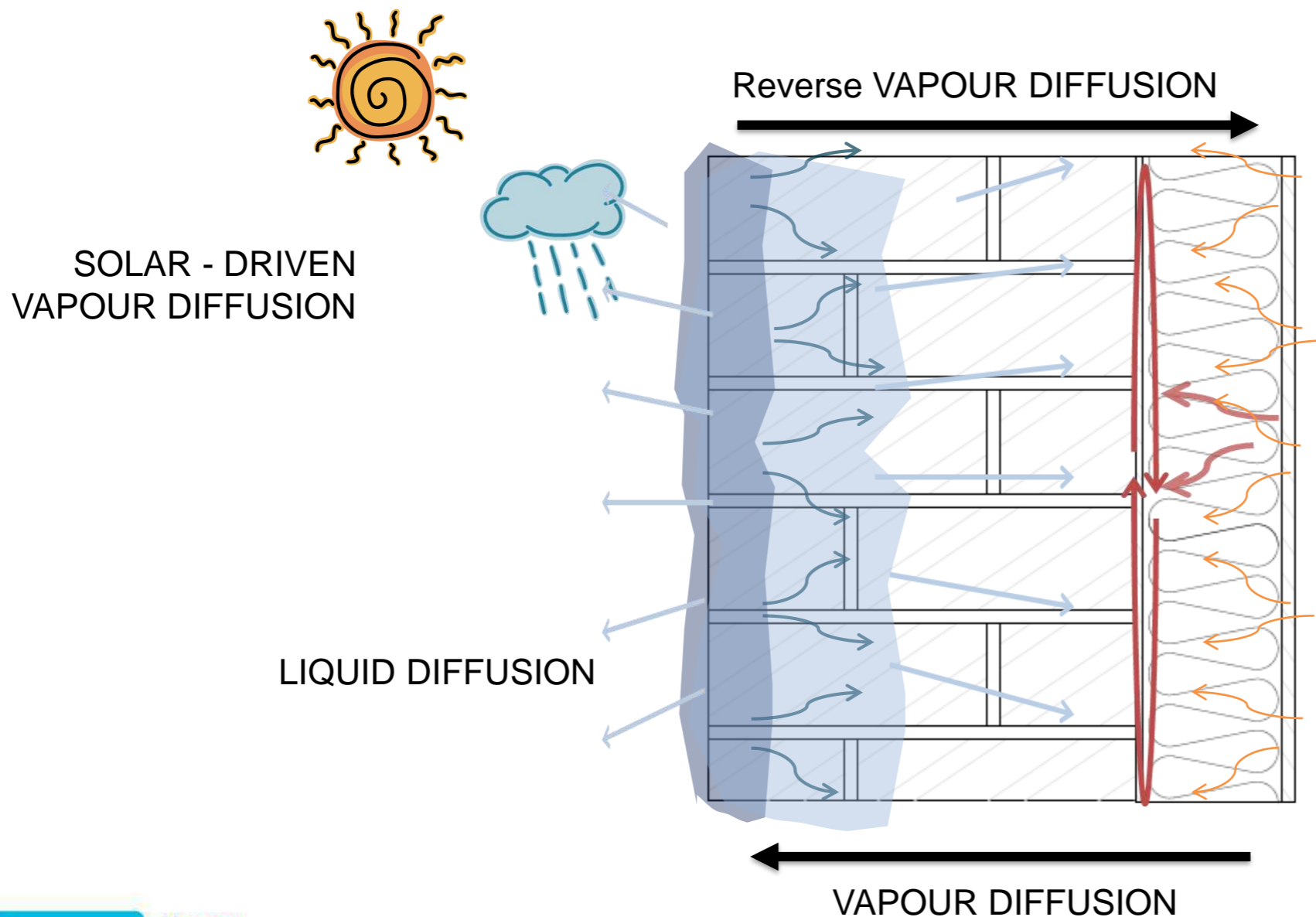
Restricted by;

- boundaries
- downpipes
- short overhanging eaves
- effect on external appearance

## 2. Internal Wall Insulation IWI

However until now there has not been a solution that deals effectively with the control of moisture.

# The complicated bit!



The next generation of  
insulation;

Is able to buffer & wick moisture  
thus regulating it at safe\* levels  
within the building fabric.

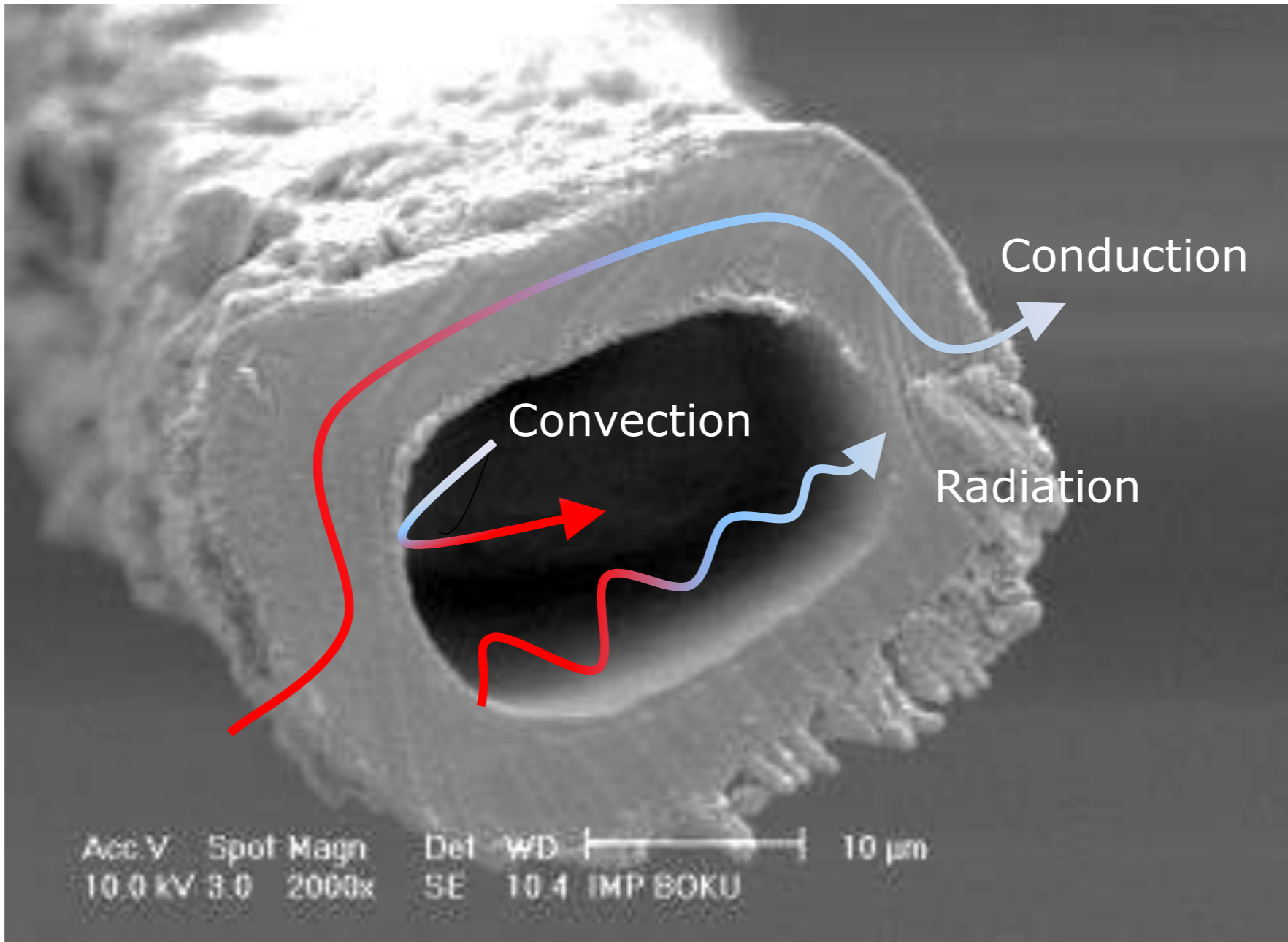
\*below 20% liquid moisture 80% RH

# pavatex

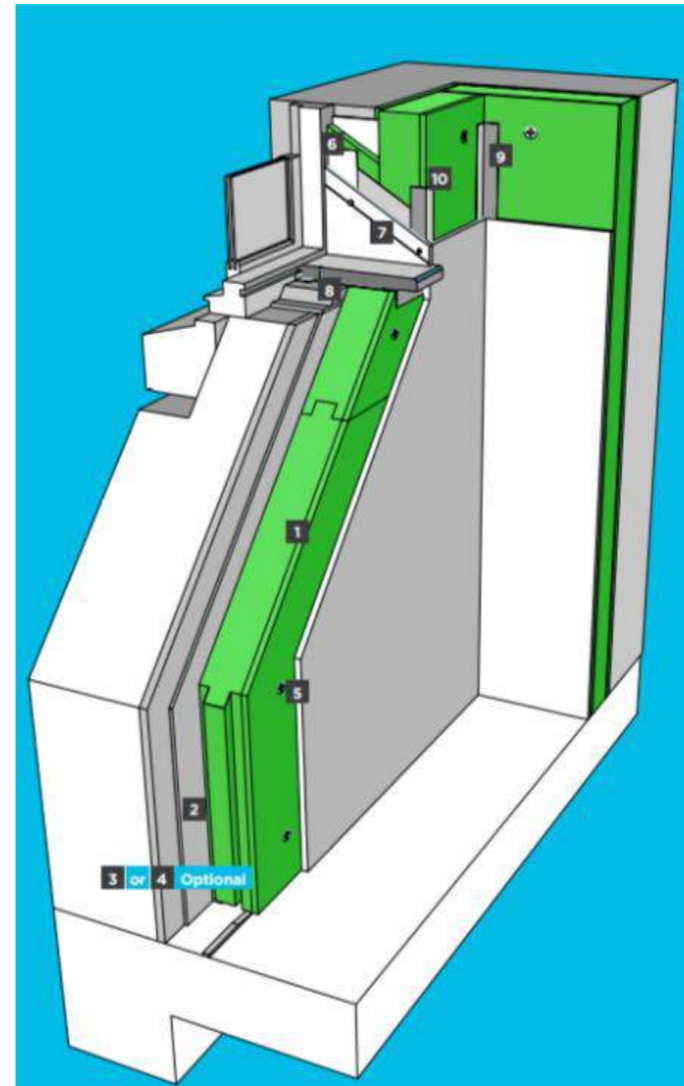


Natural  
Building  
Technologies





# Internal Wall Insulation System Dry Lined



**1 Pavadry** P13



**2 RK70 Internal Bonding & Base Coat** P27



**3 RK38, Internal Levelling Coat (Optional)** P27



**4 Speedfill (Optional)** P25



**5 MRS-U** P24



**6 Pavafix WIN, plaster tape** P19



**7 DDA 8/25 x L Reveal Fixings** P23

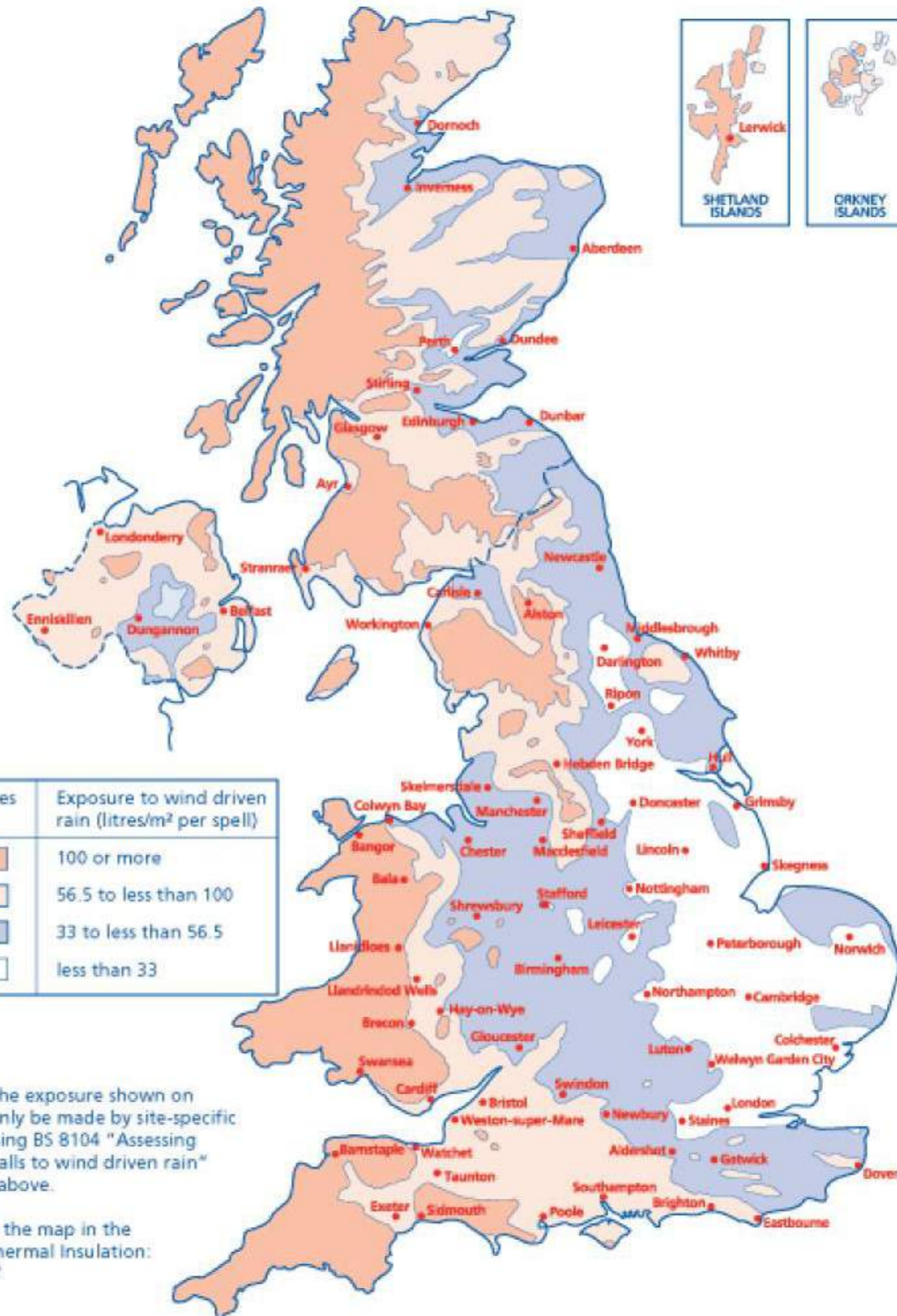


**8 Reveal Board** P15



**9 + 10 Pavafix 20/40 and Pavafix 60 Internal Tape** P18

\* Please refer to [www.natural-building.co.uk](http://www.natural-building.co.uk) or the contents page of this pack to find more information about the range of NBT products



Plus site specific  
assessment  
using **WUFI** pro.



Natural  
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Thermal performance

Breathability





Trinity College Cambridge



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Building  
Technologies

# Simple Solutions for a Complex Problem

[www.natural-building.co.uk](http://www.natural-building.co.uk)



Natural  
Building  
Technologies



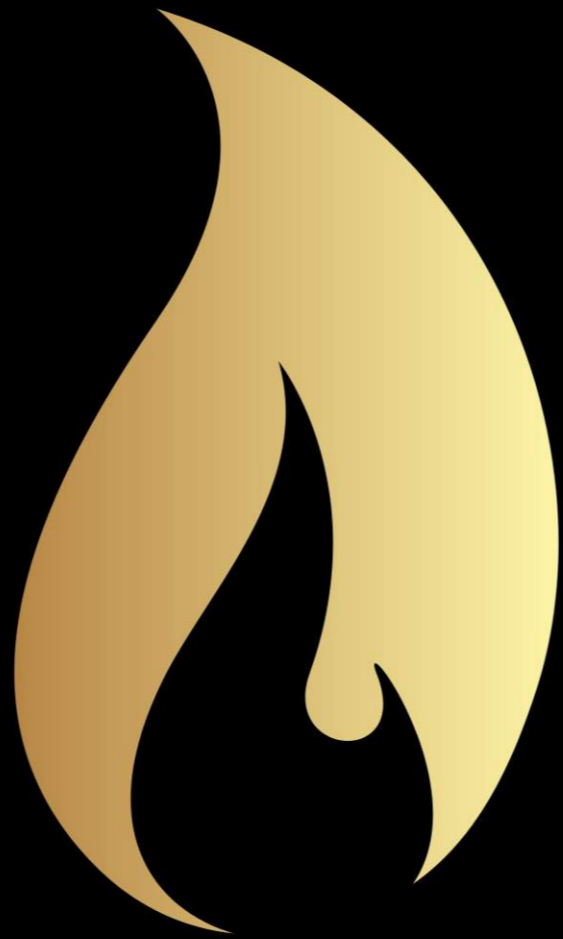
Natural  
Building  
Technologies

Thank you



# CB Energy Products Ltd





CB Energy Products Limited

# Domestic Boiler Optimiser (DBO)

## DBO ECO3 eligibility & benefits

- **Unique technology** – Patent / IP
- **Proven technology**
  - 8,000 commercial installs (UK & EU)
  - BRE certified savings for Commercial unit
- **BRE testing in progress** (residential application)
- **Wireless monitoring** – Savings & Boiler maintenance
- **Meets eligibility requirements set out in ECO order**
  - BRE EMC & CE mark in progress
  - £/tCO<sub>2</sub> saved a fraction of other measures
  - 100% fundable by ECO (scoring & brokerage TBC)
  - Payback in couple of years if not sooner
  - Easy & quick Installation, lifetime exceeds that of boilers installed on



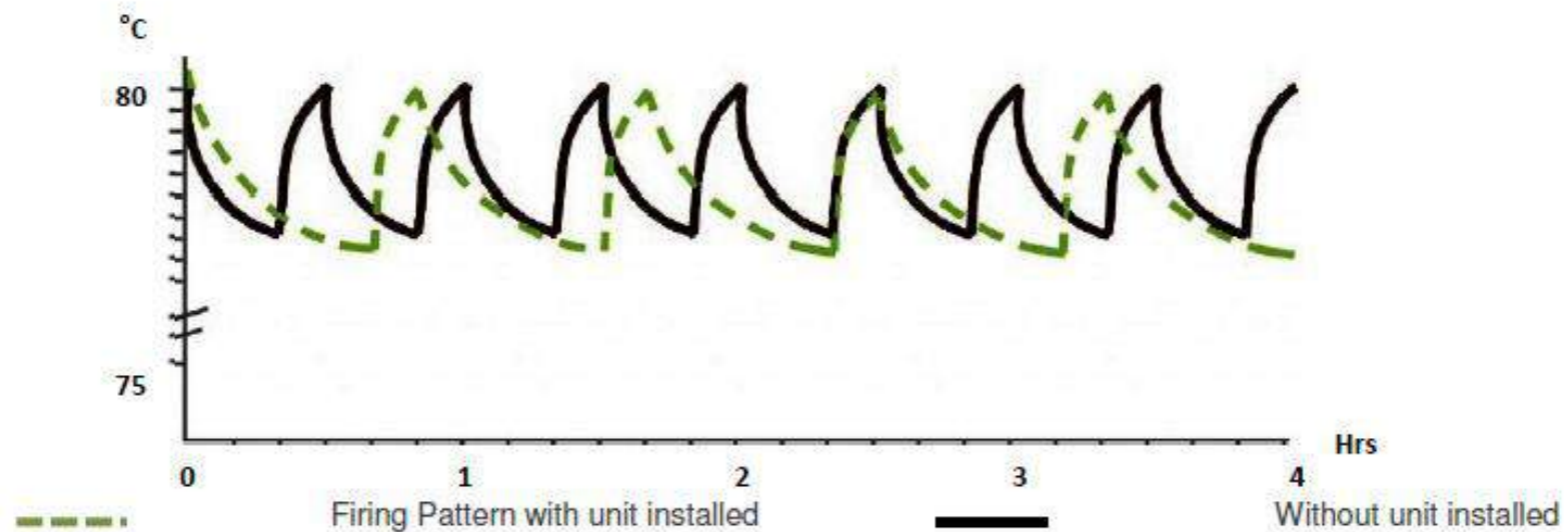
## How it works

### Utilises Sir Isaac Newton's Law of cooling:

□ In layman terms '*heat gain is twice as fast as heat loss*'; i.e. extending the cooling cycle of a boiler by 100% would drop the boiler temperature by around 3 degrees but only require a slightly longer burn cycle.

### Worked example by BRE for Commercial unit:

□ 8 burns of 10 minutes in a 4-hour period will be typically reduced to 5 burns of 12.4 minutes, i.e. a 22.5% reduction as shown below.



	Firing cycles	Av Burn time	Total Burn time	Saving
	A	B	C = A x B	D = 1 - C <sup>with</sup> / C <sup>without</sup>
Without unit Installed —	8	10 mins	80 mins	-
With unit installed - - - -	5	12.4 mins	62 mins	22.5%

## Opportunity:

□ **£750 to £1000 ECO lifetime bill savings** for average\* gas heated home (\*Ofgem 2018)

□ **£200m potential lifetime bill savings and over 1million tCO<sub>2</sub>offset** for each year  
DBO included in ECO3 for UKPLC

## Case studies (for Commercial Unit)

### London Hilton Gatwick Airport Hotel



***“They are by far the most impressive piece of energy saving equipment I have seen, and the savings which they have made are nothing short of amazing.***

*Hilton Head office even asked us to double check our monthly gas meter readings we submitted as they didn't believe we could have made such a reduction. They are now convinced!*

*I wouldn't hesitate to recommend the installation of these BMU's on any commercial boiler which they are suitable for.”*

*Elliott Porter, the Chief Engineer*

### NHS: Leigh Infirmary



*“We installed the BMU's to our boilers at Leigh Infirmary. We use a large amount of gas at Leigh, so we were very interested in reducing our consumption as much as possible without there being any impact on patient care.*

***The savings we have made are fantastic. So much so that we are already rolling out their installation to our other properties. I would thoroughly recommend their installation at any hospital as the savings these units make are excellent.** I would be happy to recommend these units to anyone thinking of installing them.”*

*Mark Hogan, Energy and Environment Manager*

## Arora Hotel Manchester



*"I was a bit sceptical at the beginning thinking surely it cannot be that simple. After careful consideration I decided to give it a go.*

*The Installation was smooth and completed by a professional engineer. Few days later I was able to access a user friendly portal to check the average saving. **This is a product I would definitely recommend.**"*

*Peter Angerman, Chief Engineer*

## East Sussex County Hall & other buildings



East Sussex County Council installed burner management units in 15 buildings. The installer also commissioned the unit, after which it's simply a case of leaving it in place as there is no maintenance requirement.

***"The units have proven to be a very simple and cost effective way of improving our energy efficiency"***

*Chris Horwell, Energy Manager*



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# Leeds Beckett University





# Leeds Sustainability Institute

- Innovation and research in ECO3
- Successful innovation applications

- Substantially **developed coheating test** for measuring heat transfer coefficient
- 30 years experience in **Building Performance Evaluation** tests and methods including retrofit evaluation projects with manufacturers and government
  - Green Deal (60 home retrofits)
  - Thin Internal Wall Insulation
  - Party wall evaluation
  - SMETER

- Three routes
- Suppliers get “free” Lifetime Bill Savings (LBS)
- Persuade suppliers to try innovative products;
  1. All innovations need some **evidence before applying**
  2. Some need **evidence during project**
- All innovation projects must apply to Ofgem panel
- Must have “have a suitable methodology”

# 1. Demonstration actions

5% of obligation

£1.00 spend on action x 5.20 = new life time bill saving

Cost of action includes measurement of performance

It doesn't have to work **but need evidence to think it will**

- **Evidence before applying**

- No deemed score but TRL 8 or higher and some **lab and live testing**

- **Evidence during**

- **Methodology with a lack of bias including**; how and what monitored, expected energy savings, how and when reported

- Could inform new deemed score and SAP

e.g. aerogel paints & blankets, waterproofing, smart technology

# 2. Innovation score uplift

5% of obligation

Deemed score x 1.25 = new life time bill saving

Normally measures that already have a deemed score

No monitoring necessary

It doesn't have to work **but need evidence to think it will**

- **Evidence before applying**

- Has a deemed score but **evidence that more energy efficient**
- Or **evidence that installed more (cost) effectively**

- **Evidence during**

- Only needed **if applying for new deemed score**

e.g. room in roof retrofits, insulated renders, new techniques for installing insulation

# 3. In-situ Performance

10% of obligation

Uplift on LBS based on measured improvement over deemed score

It has to work to be rewarded (risk) and can't claim LBS via 1 or 2

- **Evidence before applying**
  - **Persuade the energy company** and **calculate abatement** rate (e.g. percentage difference between NEED and SAP)
- **Evidence during**
  - Test 20% random representative sample
  - Savings awarded to the whole population
  - Could also lead to a new deemed score being developed
  - “reliability and accuracy of it in **measuring the heat transfer coefficient** of a building and the behaviour of the householders”

e.g. best practice installations or other ways to better deemed scores

# Summary

## **Demonstration Action**

- Non deemed score product but evidence to show it could work
- Must measure **if** it works (doesn't have to)
- Cost of research contributes to LBS (5.2 multiplier)

## **Innovation uplift**

- Deemed score product but evidence of greater efficiency
- Only collect evidence if want new deemed score
- Direct 25% uplift in LBS

## **In-situ**

- Evidence that it is better than its deemed score
- Additional LBS awarded based on evidence

# Example projects

## Electric coheating test before and after

- HTC, costly, empty house for weeks, no ongoing monitoring, winter

## In situ coheating test before and after testing

- HTC, costly, empty house for weeks, no ongoing monitoring, winter

## QUB test before and after

- HTC, empty house for few days, no ongoing monitoring, may need validating with co heating test, winter

## U-value measurements & Air tightness before and after

- No HTC, occupied houses, indication of performance, no ongoing monitoring, not summer

## Long term intensive monitoring before and after

- 1 year before and 1 year after? May give HTC but influenced by occupant, occupied houses, data collection costs, large

## Long term low level monitoring before and after

- 1 year before and 1 year after? No HTC, low cost, very large sample size, occupied houses, use NEED methodology?



# Innovation applications

When making an application to Ofgem consider:

- What evidence does the specific innovation route I a taking need?
- Do I need to measure the HTC of the building? If not what am I measuring?
- Is the error in measurement bigger than the saving anticipated?
- How big does your sample need to be?
- How long will the measurements take?
- Do I have the before data?
- Is my research impartial and robust?

# Thank you

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# End of Pitches

Please reconvene in the other room for a Q&A session with BEIS and Ofgem