

MEET THE NET ZERO CHALLENGE: THE ROLE OF DATA

3RD MAY 2023 | 1:00 PM - 3:00 PM | ONLINE EVENT



LEEDS BECKETT UNIVERSITY
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INSTITUTE

Demonstration of
Energy Efficiency
Potential

DEEP Retrofit

Professor David Glew
Director of the Leeds Sustainability Institute



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& Net Zero



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DEEP retrofit
literature review



Core Cities
retrofit



Thin IWI
retrofit



Sustainable Behaviour

Insights to understand how people can make more sustainable, healthier choices in their home, work, and travel decisions.



Sustainable Buildings

Research for more sustainable buildings based around building physics, building performance evaluation, operational steady state, and dynamic energy modelling, and hygrothermal simulations.



Sustainable Urban Environments

Exploring air quality, heat islands, embodied carbon, and environmental monitoring to promote healthier, more sustainable cities and communities.



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DEEP Retrofit research design

Case studies



Laboratory tests



Modelling



14 DEEP Retrofit case studies

41 Retrofits

7 Airtightness

4 Loft

4 Room in roof

5 Glazing

12 Ground floor

1 Internal wall (IWI)

3 External wall (EWI)

1 Hybrid wall (IWI & EWI)

4 Whole house approach



DEEP Retrofit case studies methods

43 Coheating tests & over 50 QUB tests

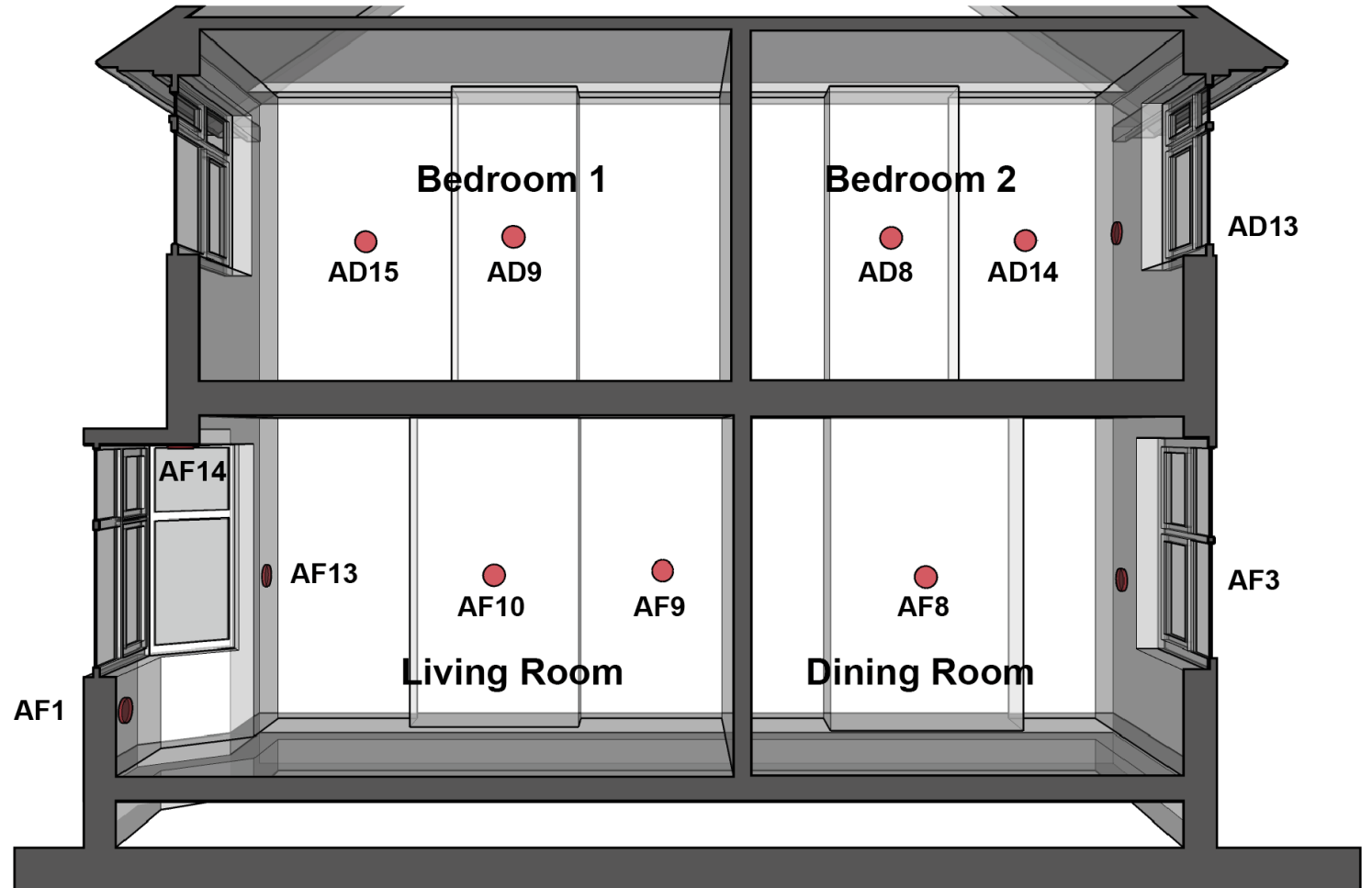
- Whole house heat loss or Heat Transfer Coefficient (HTC)
- Compare pre vs. post retrofit HTC
- Compare measured vs. modelled HTC



DEEP Retrofit case studies methods

410 Heat flux density measurements

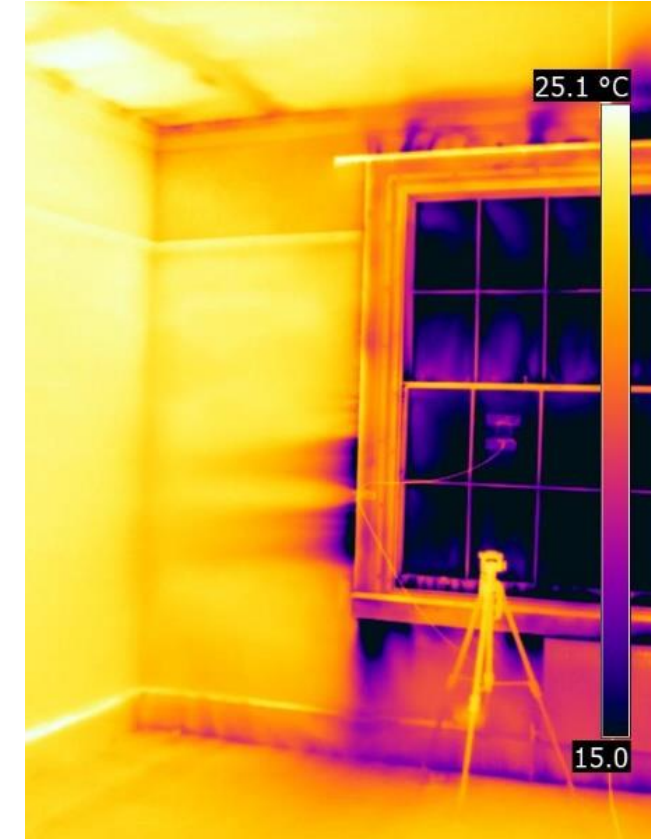
- U-values ($W/m^2.K$)
- Compare pre vs. post retrofit U-values
- Identify the performance gap & the modelling gap



DEEP Retrofit case studies methods

118 blower door tests & 77 pulse tests

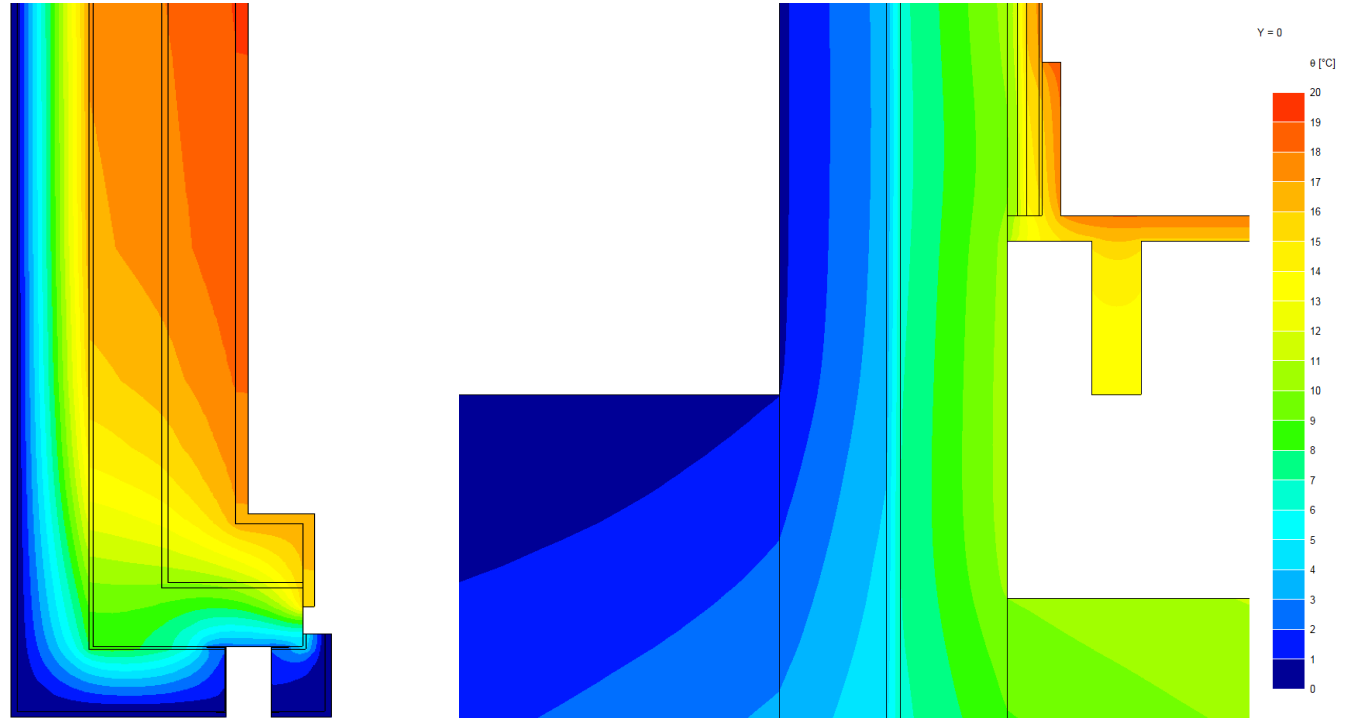
- Mean air permeability ($\text{m}^3/\text{m}^2@50\text{p}$ & ACH)
- Compare pre vs. post retrofit airtightness
- Compare measured vs. default RdSAP assumptions
- Air leakage detection & thermography
- 11 homes Co pressurised



DEEP Retrofit case studies methods

116 Junctions modelled

- Thermal bridging software (TRISCO)
- Compare pre vs. post retrofit thermal bridging heat loss (γ -values and ψ (Ψ) values)
- Compare and pre vs. post retrofit surface condensation risk via temperature factor (f_{RSi})
- Evaluate severity of discontinuities



1. EPC accuracy

Findings

RdSAP default inputs do not capture the variability of homes' construction or occupants, and this contributes to the prebound effect.

Recommendation

RdSAP inputs could more comprehensively and accurately reflect building characteristics and occupants.



3. EPC Band C

Findings

Only solid wall insulation is likely to bring solid walled homes up to an EPC band C, or significantly reduce condensation and overheating risks.

Recommendation

Retrofit policy mechanisms should better reflect the significance of solid wall insulation in achieving broader policy goals.



2. Is PAS2035 worth it?

Findings

Whole house approach retrofits have lower risks than piecemeal retrofits but may have similar fuel bill reductions and higher costs.

Recommendation

Guidance and models could inform which retrofit measures, installation techniques, and interactions have high or acceptable risks.



4. Measuring energy savings

Findings

Coheating tests in DEEP had an average uncertainty of 6% and was able to identify significant differences in 13 of 27 cases.

Recommendation

Use of smart meter data which have uncertainties above 15% are not likely to be able to give house-by-house savings, so alternative approaches are needed.



Conclusions

The DEEP retrofit project could have significant impact on retrofit policy and industry practice

- Identifies how models can be improved
- Quantifies the significance of solid wall insulation
- Provides recommendations on how to implement the whole house approach and adopt risk-based approaches to retrofits in solid walled homes

22 DEEP reports to be published in July 2023 (launch event sold out)

Preliminary launch at the Building Centre Retorfit23 exhibition in London on 14th June



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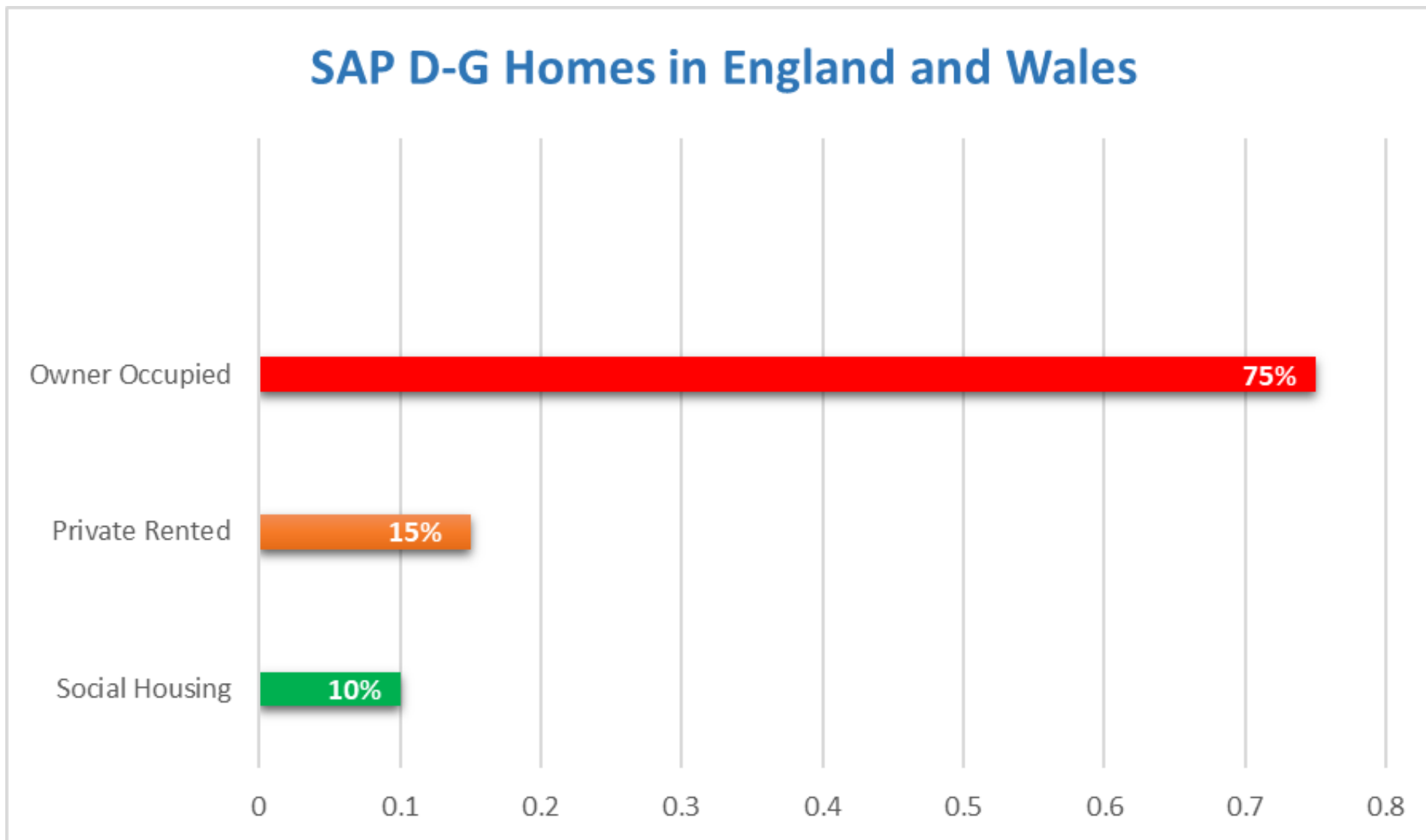
Housing Stock Data – Develop, Target and Deliver

Jamie Browne – Senior Business
Development Manager





Scale of the challenge



17.2M

Total homes in England
and Wales rated SAP D-
G

2050

Net Zero target date

617K

Required rate of
improvement,
per year



17.2M

Total homes in England
and Wales rated SAP D-
G

2035

Net Zero target date

1.3M

Required rate of
improvement,
per year

Average costs of upgrades, per home

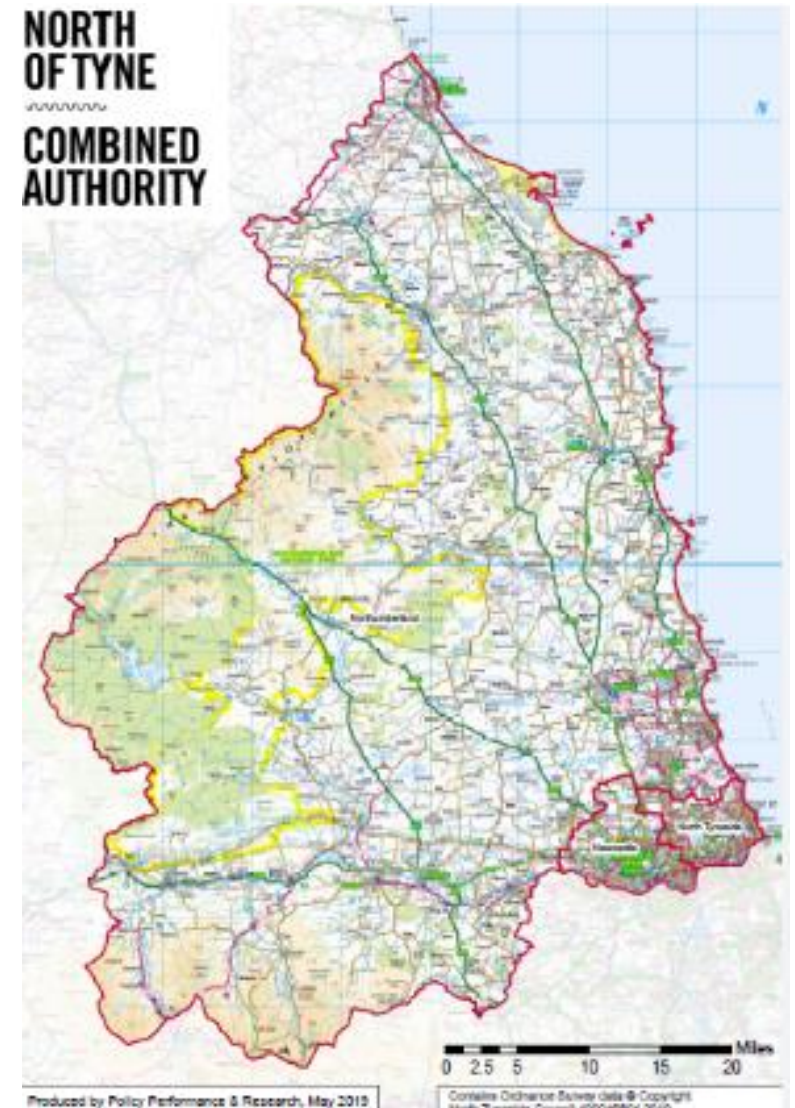
£23,300

Case Study

NORTH OF TYNE

~~~~~

## COMBINED AUTHORITY



# Targets



**100,000** NEW GREEN  
JOBS CREATED



RETROFIT **100,000**  
HOMES



ACHIEVE NET ZERO BY  
**2030**

# Starting Point

- Profiling NTCA housing stock, using Home Analytics. 67,000 archetypes were created.
- Scenario creation; BAU and Net Zero pathways.
- Optimal packages of retrofit measures were identified for each archetype, estimating **anticipated investment cost, carbon savings** and **SAP uplifts** across the region.



# Challenges Identified



80,000 homes will need to be retrofitted per year by 2027 – 10 times the current rate.



The cost of achieving Net Zero will require an estimated £13bn in funding



Electrifying heat through the mass deployment of heat pumps will not enable the NTCA to achieve Net Zero by 2030

# Opportunities

10.2 jobs are supported for every £1m spent on retrofitting (above BAU)

Peak labour requirements to achieve net zero by 2050 will reach 10k FTE jobs in 2036

A net zero retrofit approach can deliver significant energy efficiency gains, improving the NTCA stock from an average of SAP band D to a high B.

# Recommended actions



Adopt a fabric first approach to retrofits



Consider a blend of council-led and regional retrofit programmes



Identify the most common types of multi-owner mixed use buildings



Target owner occupied homes, which account for 70% of the investment required



Explore and test a range of funding models at as large a scale as possible



Direct investment towards the skill areas that will most be in demand over the next decade





Measure

Plan

Act

# What needs to happen?



Policy certainty



Advice and awareness



Boost the supply chain



Demand strategy



Delivery, delivery, delivery





# Is your housing data helping you tackle the de-carbonisation challenge?

Andy Flook, Sava

- Is housing data fit for purpose to drive net zero actions?
- Is data helping us to inform decisions and assist with improvement planning analysis?
- Data as a longer term strategy



# Introducing Sava

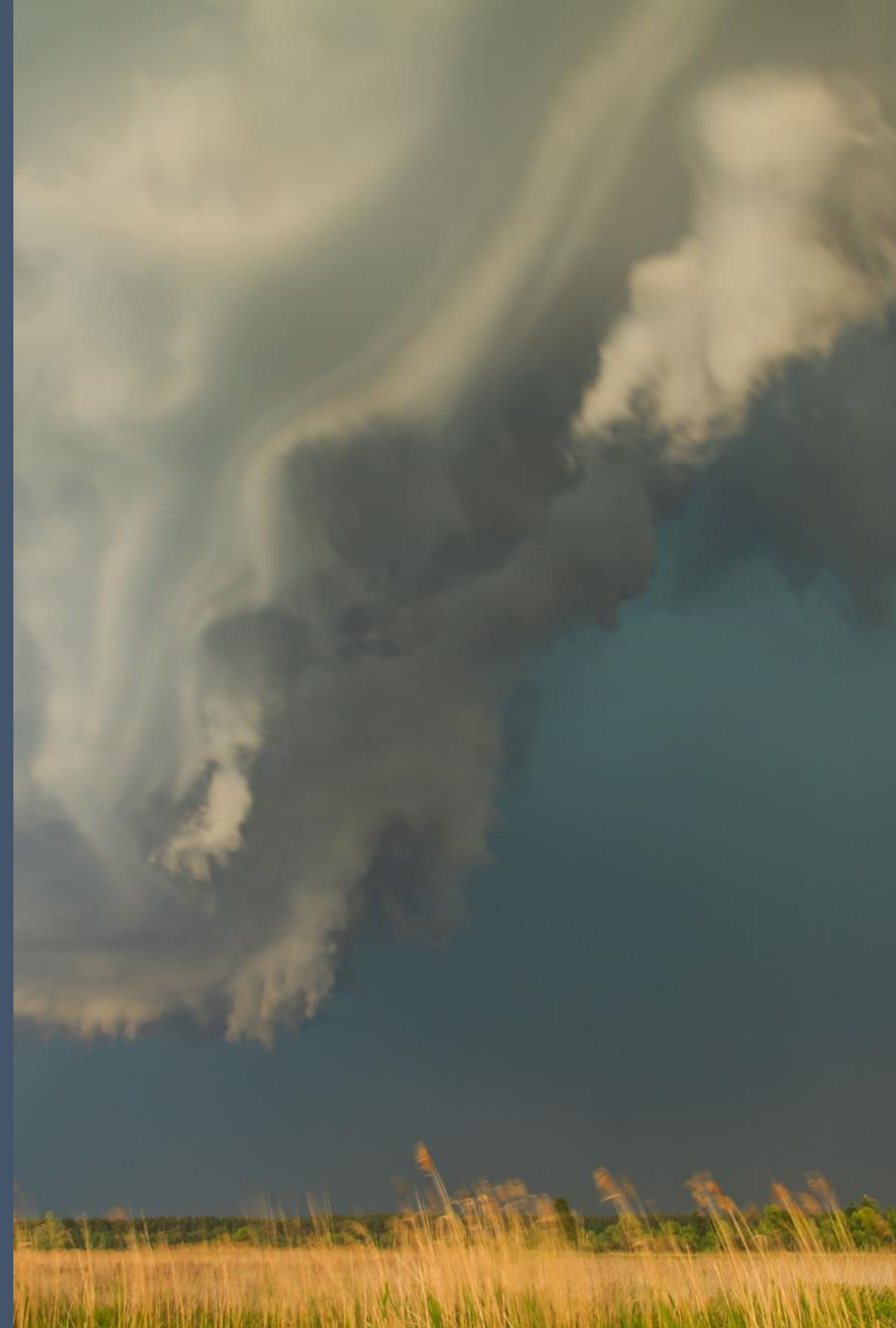
- ✓ Over 35 years supporting Housing Providers with energy analysis
- ✓ 200 Housing Provider customers
- ✓ 3,000,000 properties reported on each year
- ✓ Integrated with major asset management systems





# A perfect storm

- ✓ Ambitious target setting
- ✓ Limited investment capital
- ✓ Limited resource
- ✓ Limited rental yield
- ✓ Imperfect data
- ✓ Fuel poverty
- ✓ Lack of knowledge



# Regulatory drivers:



  
Department for Levelling Up,  
Housing & Communities

Change is afoot...

  
2022

Key Changes to Take Effect  
from 12th June 2022

  
BUILDING  
REGULATIONS

Primarily Effecting New  
Builds and Renovations

**CO<sup>2</sup>** ↓  
emissions ↓

In a Bid to Achieve Net  
Zero Emissions by 2050

**?**

What does this  
mean for you?



# High Level Overview

- ✓ 50,000 jobs
- ✓ PAS2035
- ✓ 600,000 Heat Pumps per year by 2028
- ✓ £1 Billion added to Green Homes Grant
- ✓ Wave 2 SHDF awarded



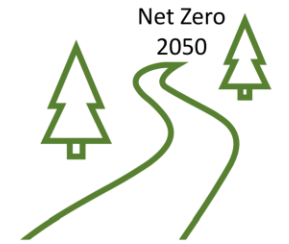
Fabric First

Ensures heat loss prevention measures are installed before other energy efficiency measures, to maximise the dwelling's suitability for low carbon heating either now or in the future, and to benefit tenants (comfort, health, wellbeing and bills).



Worst First

Facilitating the treatment of the worst performing homes through a scaled cost cap that allows for greater spend on those homes with a lower starting EPC Band.



Lowest Regret

Minimise the potential of measures having to be replaced in the future on the journey to Net Zero.

# SHDF Wave 2



HM Government

**£778m Government funding  
made available for energy efficiency  
upgrades in social housing through the  
Social Housing Decarbonisation Fund (SHDF)**



#SHDFsupport

The illustration at the bottom of the banner shows a row of social housing buildings. Above the buildings are several circular icons: a leaf, a gear with a lightning bolt, a house with a leaf, a house with a gear, a house with a leaf, a house with a gear, and a house with a leaf. There are also clouds and a crane lifting a box onto a building.

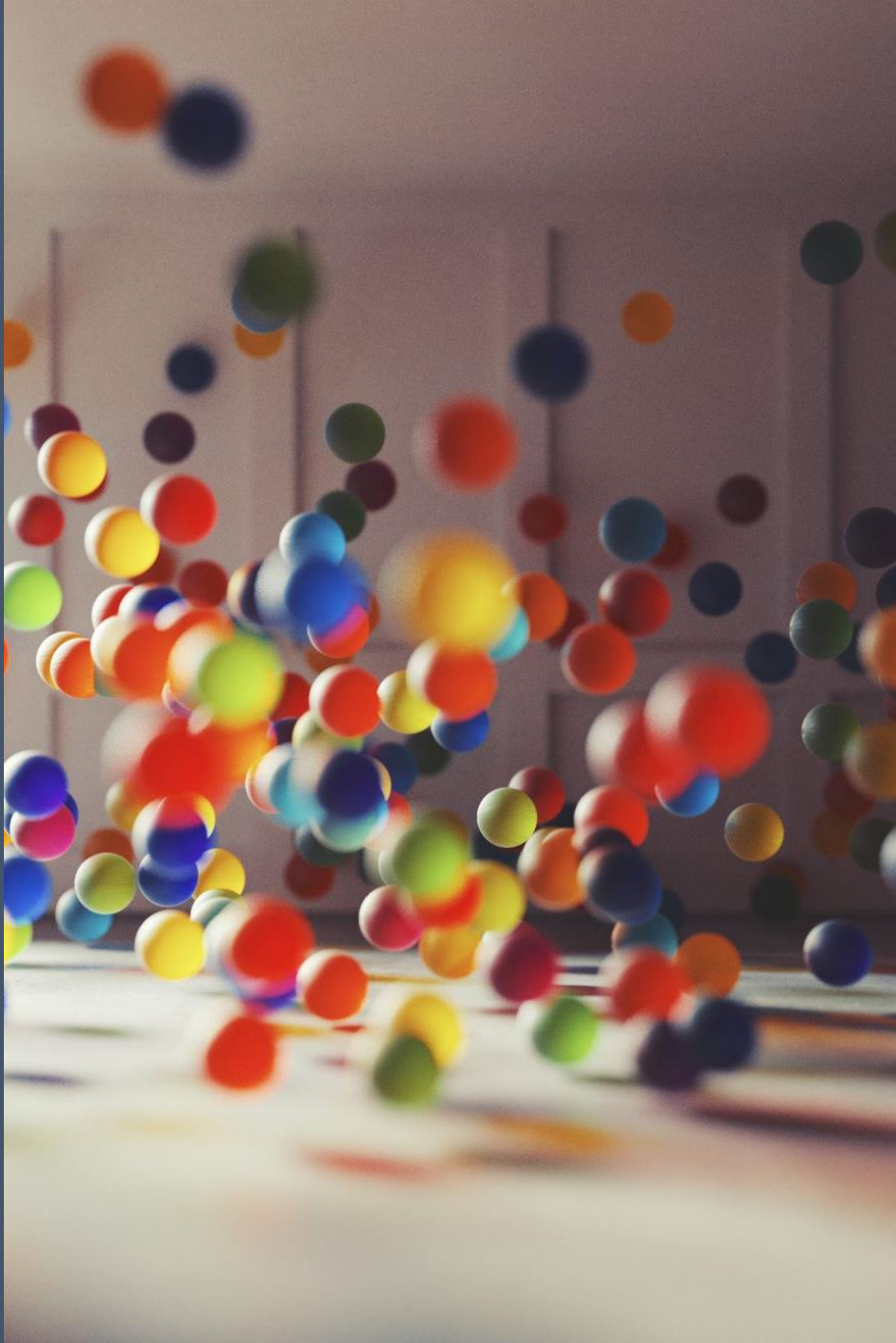
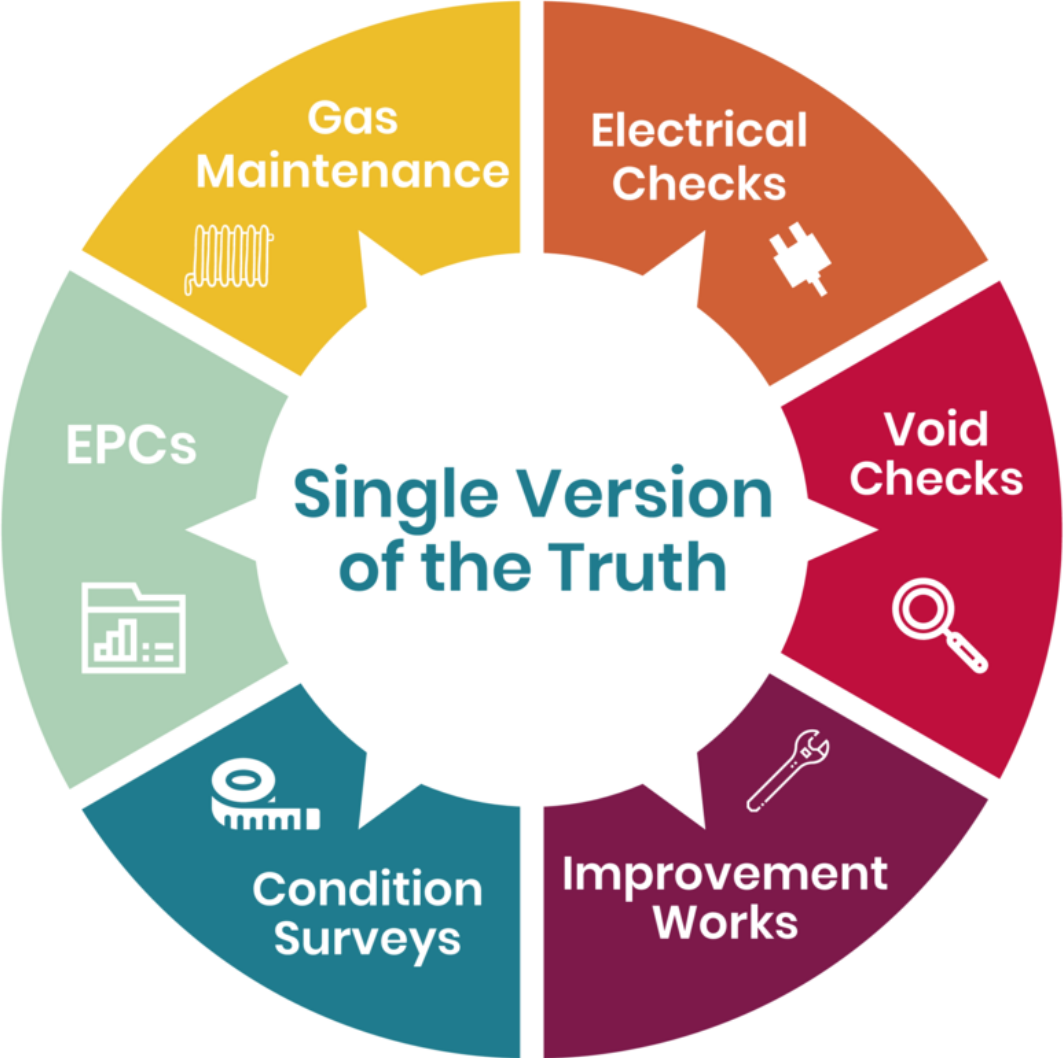


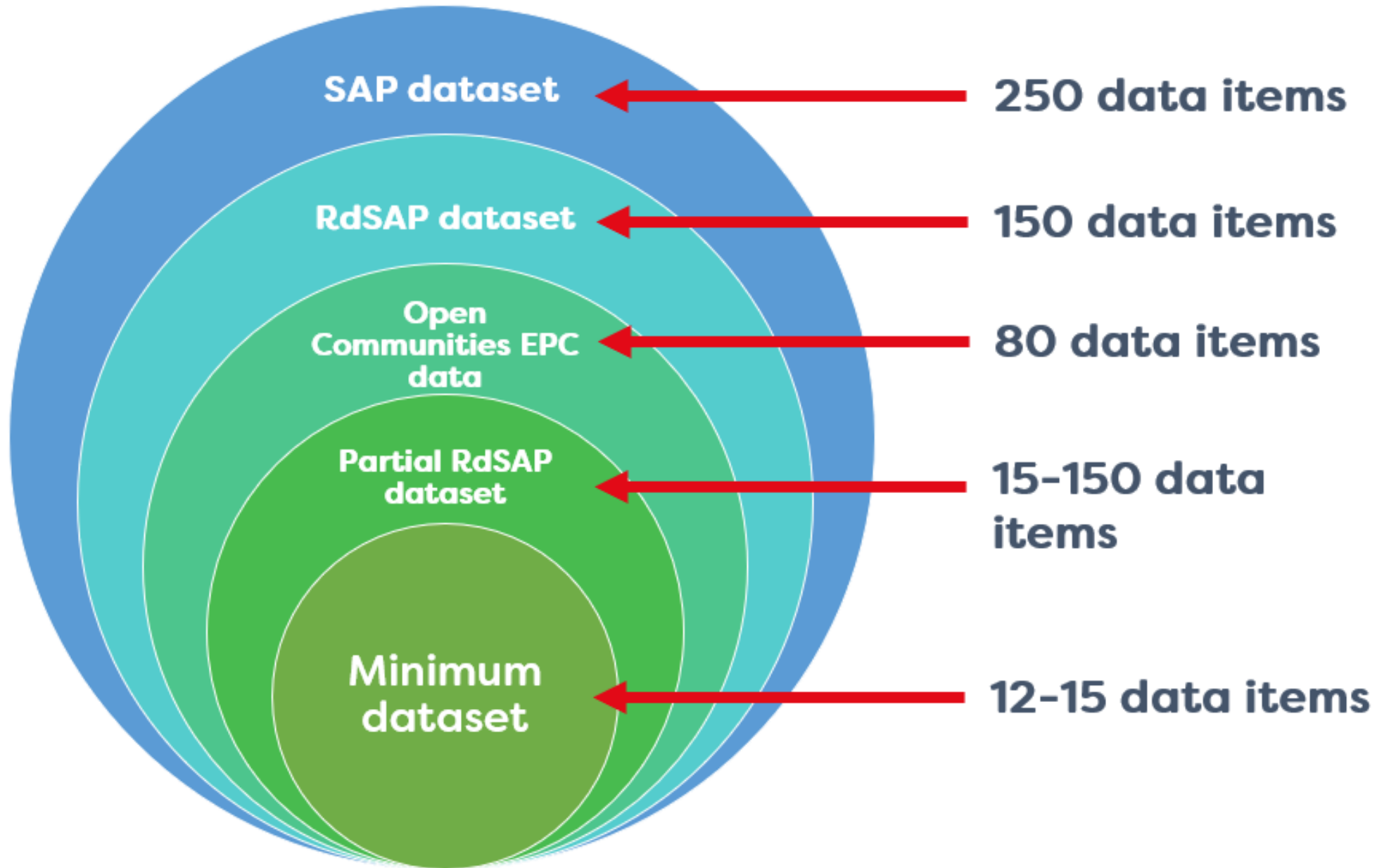
# Establishing a Data Baseline

- ✓ What level of confidence do you have in your data?
- ✓ Do you have a number of data sources you need to consolidate?
- ✓ Can you establish a data hierarchy?
- ✓ Do you have an energy rating for all of your stock?



# Single Version of the Truth

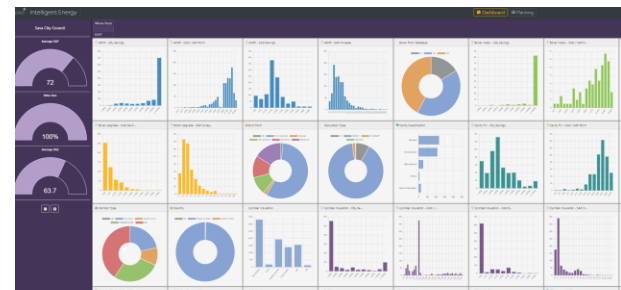




# Example of Data Value

|                                                          |               |
|----------------------------------------------------------|---------------|
| <b>Total Housing Stock</b>                               | <b>10,000</b> |
| Average additional SAP points achieved with index number | 2             |
| Average cost/value of 2 SAP points                       | £326          |
| Number of boilers which do not have an index number      | 3,000         |
| Average additional SAP points achieved with index number | 2             |
| Total cost/value                                         | £978,000      |

# The Retrofit journey



**Social Housing Decarbonisation Fund Application Form**

Section 2: Declarations

Please affirm the following declarations:

20. Please provide an explanation if you have answered "Unaffirmed" to any of the above statements.

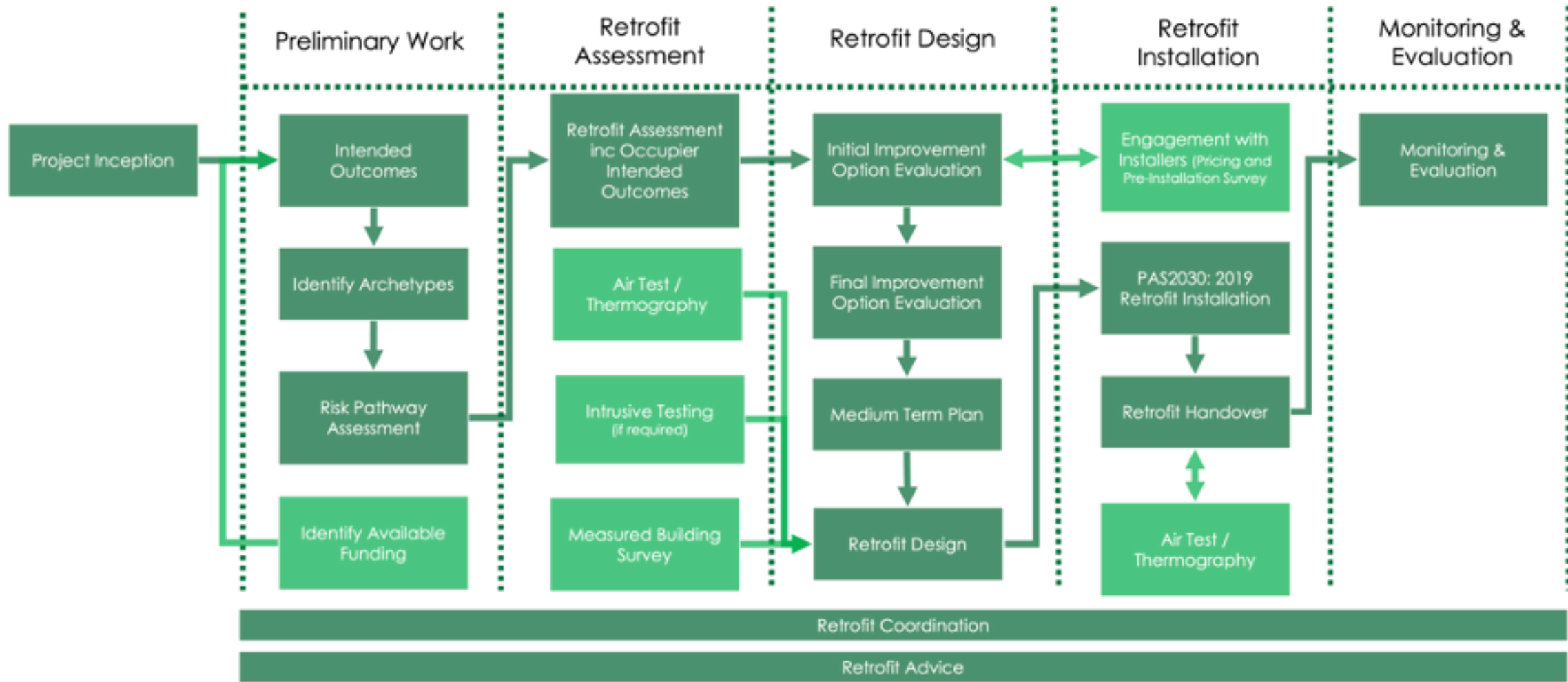
21. If you have answered "Unaffirmed" to any of the above statements, please provide brief evidence to support this position.

22. Please confirm whether your application is subject to UK Subsidy Control Requirements.

| UPRN    | Address                            | Postcode | # | Hit | Result | Initial | Final | Impact | £ total |
|---------|------------------------------------|----------|---|-----|--------|---------|-------|--------|---------|
| ANST020 | 20 Anticise Close                  | W4 2RJ   | 4 | ✓   | +5     | 50      | 74    | 24     | £8,822  |
| BAIN027 | 27 Bain Avenue                     | GU15 2RS | 6 | ✓   | +10    | 49      | 79    | 30     | £25,159 |
| BELE004 | 4 Belle Vue Place                  | SL1 2AY  | 2 | ✓   | +8     | 52      | 77    | 25.2   | £8,478  |
|         | Window replacement                 |          |   |     |        |         |       | 0.1    | £3,787  |
|         | Air source heat pump               |          |   |     |        |         |       | 25.1   | £4,691  |
| BLCK009 | 9 Blackmore Crescent               | GU21 5NP | 6 | ✓   | +7     | 45      | 76    | 31     | £11,160 |
| BNEL013 | 13 Bracknell Close                 | GU15 4BQ | 7 | ✓   | +10    | 45      | 79    | 34     | £24,767 |
| BRA002  | 2 Braybrooke Drive                 | MK2 1AF  | 7 | ✓   | +5     | 34      | 74    | 39.4   | £25,890 |
|         | Loft insulation                    |          |   |     |        |         |       | 6.9    | £396    |
|         | Draught-proofing                   |          |   |     |        |         |       | 1.1    | £139    |
|         | Cavity fill                        |          |   |     |        |         |       | 1.2    | £284    |
|         | External wall insulation           |          |   |     |        |         |       | 14.8   | £11,696 |
|         | Window replacement                 |          |   |     |        |         |       | 5.5    | £5,428  |
|         | Floor insulation (suspended floor) |          |   |     |        |         |       | 0.2    | £639    |

PAS 2035 journey







# The data journey



# Thinking about the customer journey. Avoiding 'Retro-Fear'



Capture and analyse data

Plan improvements  
(consider the future improvement strategy also)

Commence PAS2035 journey. Continue to capture data.



Resident engagement

Educate our organisations

Focus on resident priorities.  
(Affordability, reducing energy bills)



# Boosting our technical knowledge

ISSUE 6.1

MCS

MICROGENERATION PRODUCT STANDARD: MCS 007

MCS Product Certification Scheme Requirements:

Heat Pumps

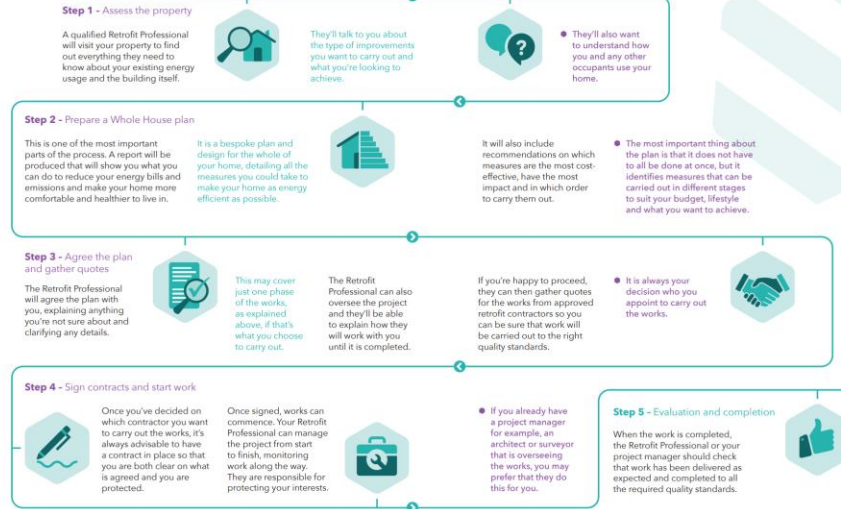


A guide to Retrofitting your home

The Retrofit journey

## How does Retrofit work?

A typical project would include the following steps:



## Free Technical Webinars

Sava provides free 1 hour webinars which have been designed to improve your knowledge of energy analysis and maximise the value you get from our software.

Is your housing data helping you tackle the decarbonisation challenge? [View >](#)

Plugging into the future [View >](#)

The Future of SAP [View >](#)

[VIEW ALL WEBINARS >](#)



# Creating an accurate investment trajectory

Determine the target

Determine the criteria

Establish a fully costed improvement strategy

A milestone approach to Net Zero

Funding Opportunities

# Measuring, monitoring and reporting on progress



Quarterly reporting against targeted milestones



Monitoring data quality at baseline level



Identifying quick wins





## Closing thoughts...

- ✓ Achieve a data baseline
- ✓ Deploy a data improvement programme
- ✓ Education
- ✓ Seek out funding opportunities
- ✓ Ensure that data is being updated regularly
- ✓ Single version of the truth
- ✓ Collaboration





# Questions?

Andy Flook

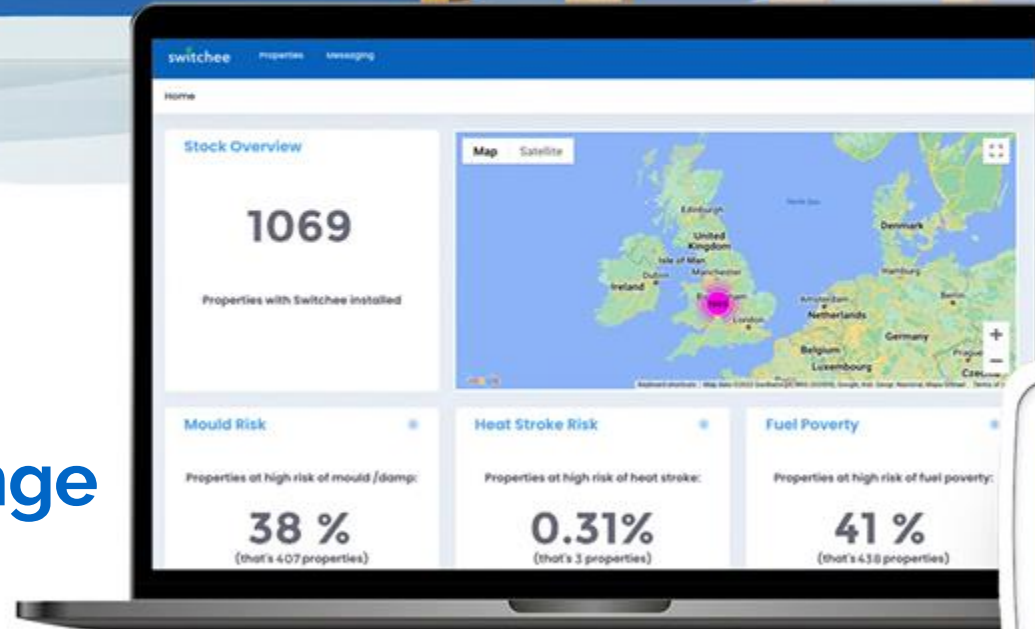
[andy.flook@sava.co.uk](mailto:andy.flook@sava.co.uk)

# switchee



## Meet the Net Zero Challenge

The role of data





## Why Switchee?

For their residents, Dudley Metropolitan Borough Council's goal was to reduce fuel poverty and increase energy efficiency; helping residents homes to be safer, warmer and improving their standard of living, whilst not adding any additional burdens.

- 1** EDRF for Heating Replacement on EPC Band E properties.
- 2** Validate projects and reduce energy consumption
- 3** Enhance the service provided by the warm homes team



# Project growth

Although the devices were installed with a particular use case in mind since then we have gone onto do a number of campaigns:

- Energy Advice
- Warm Homes Discounts
- Damp and Mould
- Vulnerable resident outreach
- Secondary Heating







Helen Langley Dudley Energy Advice Line (DEAL)

[helen.Langley@dudley.gov.uk](mailto:helen.Langley@dudley.gov.uk)

01384 813751

# Dudley Energy Advice Line DEAL

## Energy Advice Service Supporting residents with:

Billing issues

Offering debt and budgeting advice

Applying for grants for insulation and replacement heating

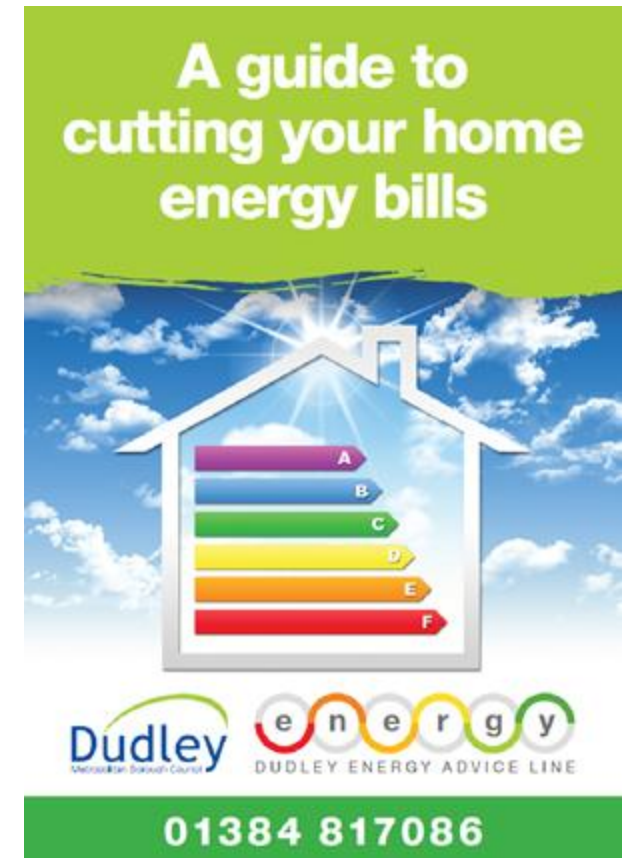
Providing crisis measures – vouchers, heated throws

Providing energy efficiency tips on a room-by-room basis

Advice on usage costs of appliances

- Ranked 6<sup>th</sup> highest authority – number of measures implemented through ECO3 LA Flex
- Lead on green retrofit schemes – LAD2 LAD3 HUG1 HUG2
- ERDF funded boiler replacement scheme
- Greener Homes Greener Lives, LAD2 programme – nominated for 3 awards
- Nominated with Switcher for national award – engaging with hard to reach groups
- 3rd in the UK at National Energy Efficiency Awards

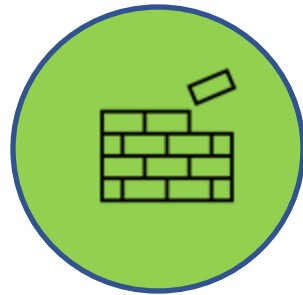
**2022/22** Assisted over 3,700 households with energy advice 28% increase on 2021/22



# Switchee - Added Value



Preventative  
maintenance



Reduce  
disrepair  
claims



Health  
and  
wellbeing



Support  
those in  
fuel  
poverty



Communication



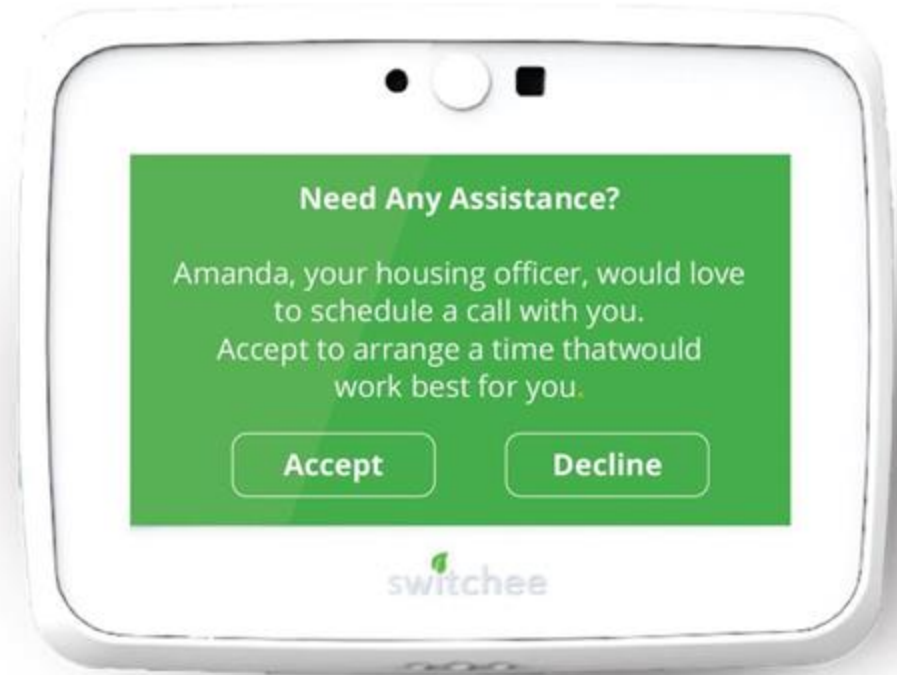
Strategic  
asset  
management

## Switchee Messaging Tool



Using Switchee's risk metrics we are able to communicate with households through the Switchee device to provide new, safe ways to engage with our residents.

- High response rates
- Messages to all
- Dashboard to target groups or individuals



# Switchee Dashboard



WHAT DO WE LOOK FOR?



LEVELS OF  
HEATING



TEMPERATURE



HEAT LOSS  
RATE



SPIKES IN  
HUMIDITY  
LEVELS



ABNORMALLY  
LOW OR HIGH  
TEMPERATURES



# Energy Advice Campaign

**413**

Messages  
sent

**93%**

Responded  
to the survey

**388**

Responses

**97%**

Within  
24 hours

**107**

Requests  
for Advice



# Energy Advice Campaign Outcomes



## Outcome - 215 Energy Saving Actions

### Total saving of over £10,000

- Energy saving tips – **107 tenants**
- Priority Services Register – 44 tenants
- Warm Home Discount – 30 residents, saving £140 per household.
- Water Meter – 24 tenants
- Switching Tariff – 10 tenants saving an average of **£220 per household**

## Additional Support & Advice

### To stay warm safe and independent

#### - 180 Actions

- Adaptations – 8 tenants
- Benefit Entitlement – 4 tenants
- Care Alarm – 5 tenants
- Informal carer support – 3 tenants
- Support with debt management – 4 tenants
- Falls Service – 14 tenants
- Fire Service Safe & Well Visit – 7 tenants
- Flu vaccination – 6 tenants
- Support during coronavirus lockdown - 61 tenants
- Health Support Groups – 21 tenants
- Making Every Contact Count Support – 13 tenants
- Wellbeing support to reduce loneliness & isolation – 40 tenants
- Power of Attorney Assistance – 3 tenants
- Referrals to Repair Management Centre – 12 tenants

## Condensation Damp & Mould Campaign

**248**

Messages  
sent

**91%**

Responded  
to the survey

**225**

Responses

**69**

Requests  
for Advice

**51** Households helped with advice, and intervention to reduce risk of CDM



# Case study - High risk of mould

Property is a 2 bedroom gas centrally heated semi detached house with solid walls and loft insulation to 250mm.

Average room temperature between 16 and 17 degrees.

Mould risk of 70%

## Survey

Extractor fans broken  
Leaks in bathroom  
Slipped tile on roof

## Advice

Heating controls  
Ventilation  
Energy behaviour

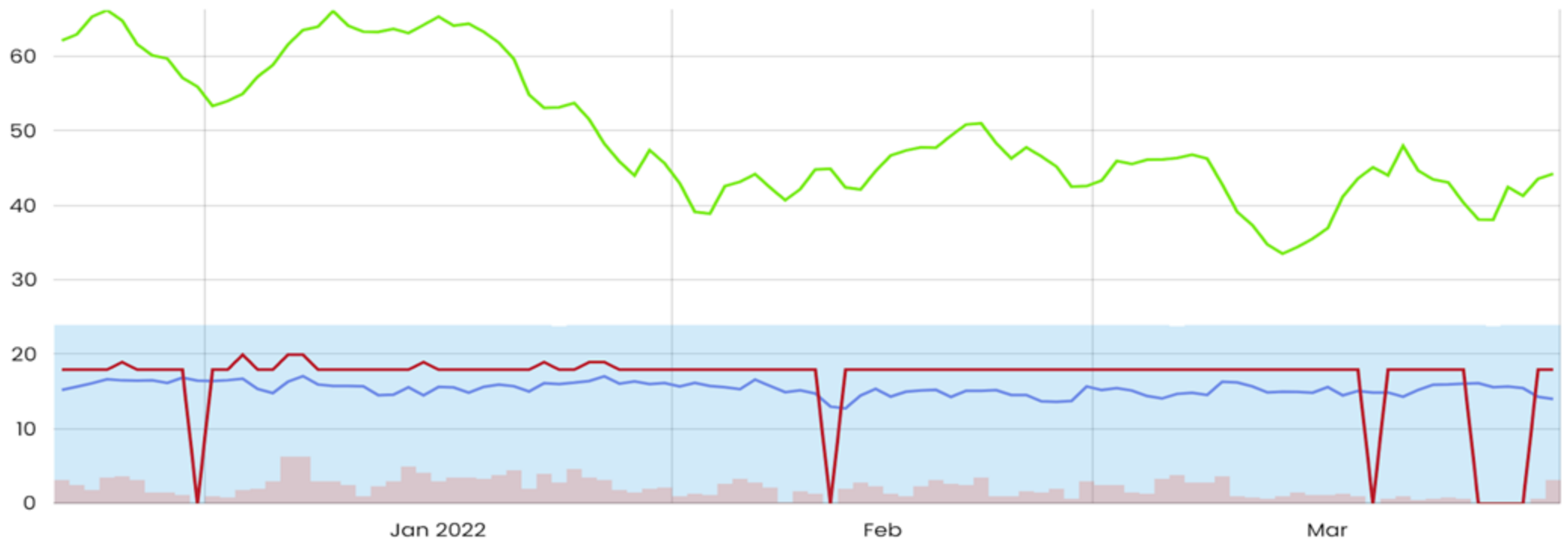
## Outcome

Mould risk reduces  
substantially

# Repairs completed mid January 2022

Metrics Date Range

22-12-2021 / 31-03-202





# Greener Homes Greener Lives LAD2 project



**External Wall Insulation - 35 Properties**



**High Heat Retention Storage Heaters - 208 Properties**



**Solar PV – 53 Properties**

# LAD 2 Objectives

LAD2 funding - Scheme Budget £2.5m

## Objectives

- Pilot EWI to PAS 2030 standard
- Target homes that are expensive to heat
- Target those most likely to be living in fuel poverty
- Target those most at risk from the cold
- Switches installed in the 35 EWI properties
- Provide energy advice and carbon reduction advice to residents receiving measures

## Equans Role

- Retrofit Co-Ordination Role
- Retrofit Design Role
- Principal Contractor
- Support with engagement



# The Work – lessons learnt

## Design Considerations

Insulation below DPC & ground Level

Existing items (Ramps/Steps/Access Paths)

Windows changed, sealed for airtightness & aligned with EWI

Roofline extended to accommodate EWI

Soffits insulated

Ventilation

Decoration details internally





# Challenges – lessons learnt

## Planning

Work carried out under permitted development (time constraints)

Render colour & finishes had to be agreed by Planners

Brick effect render used for cost and compliance

## Residents Journey

Making contact

Multiple visits

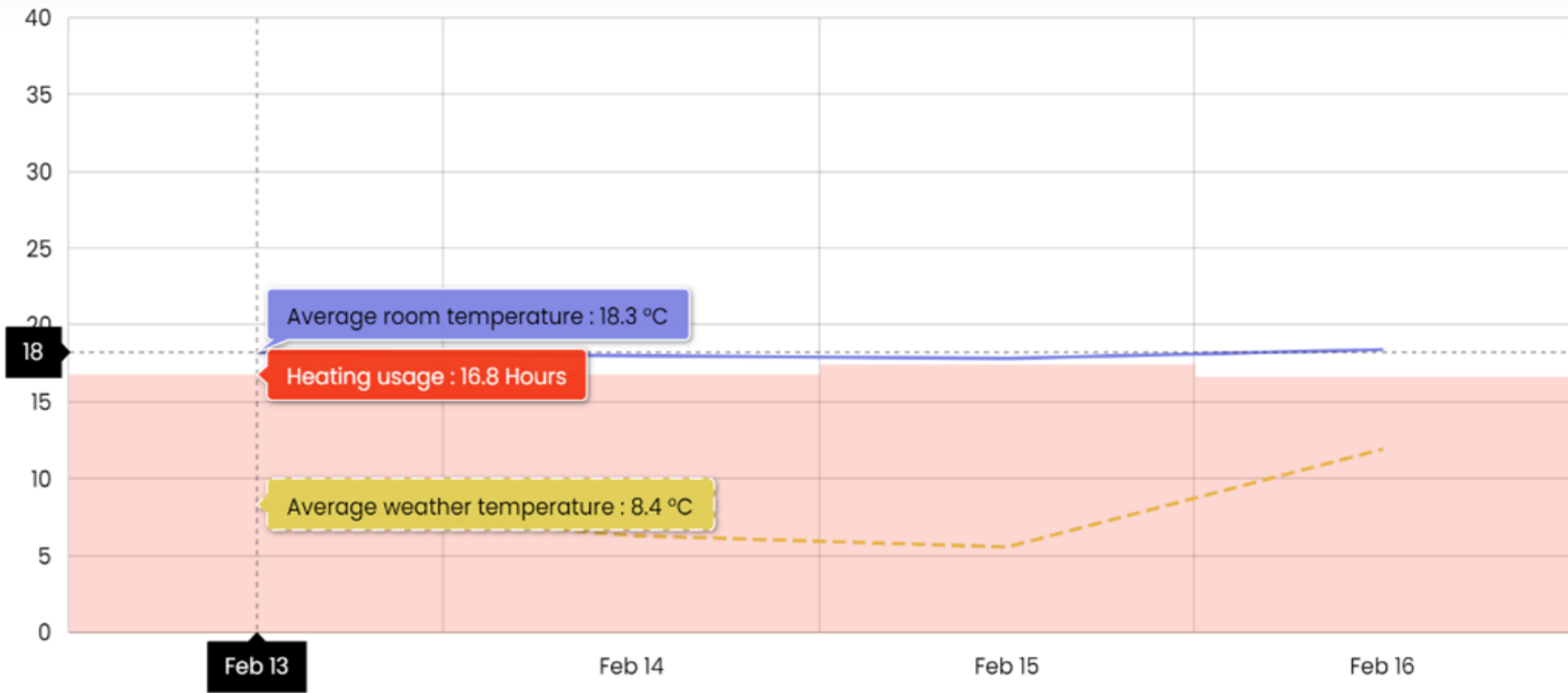
Residents withdrawing from the process part way through

Long time from initial contact to completion

Good Resident Liaison Officer

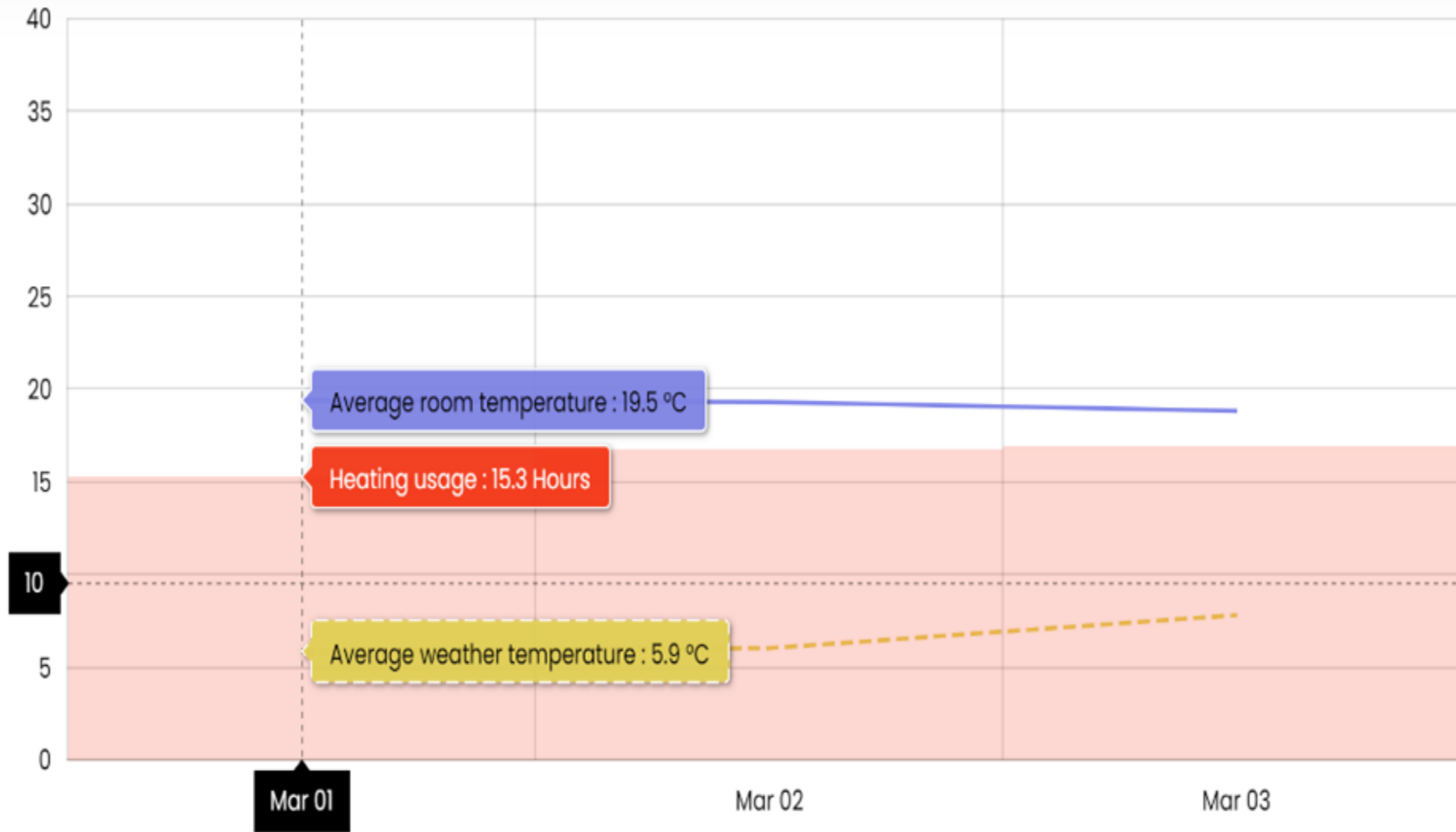
DEAL Officer – Council





Pre EWI – average temperature

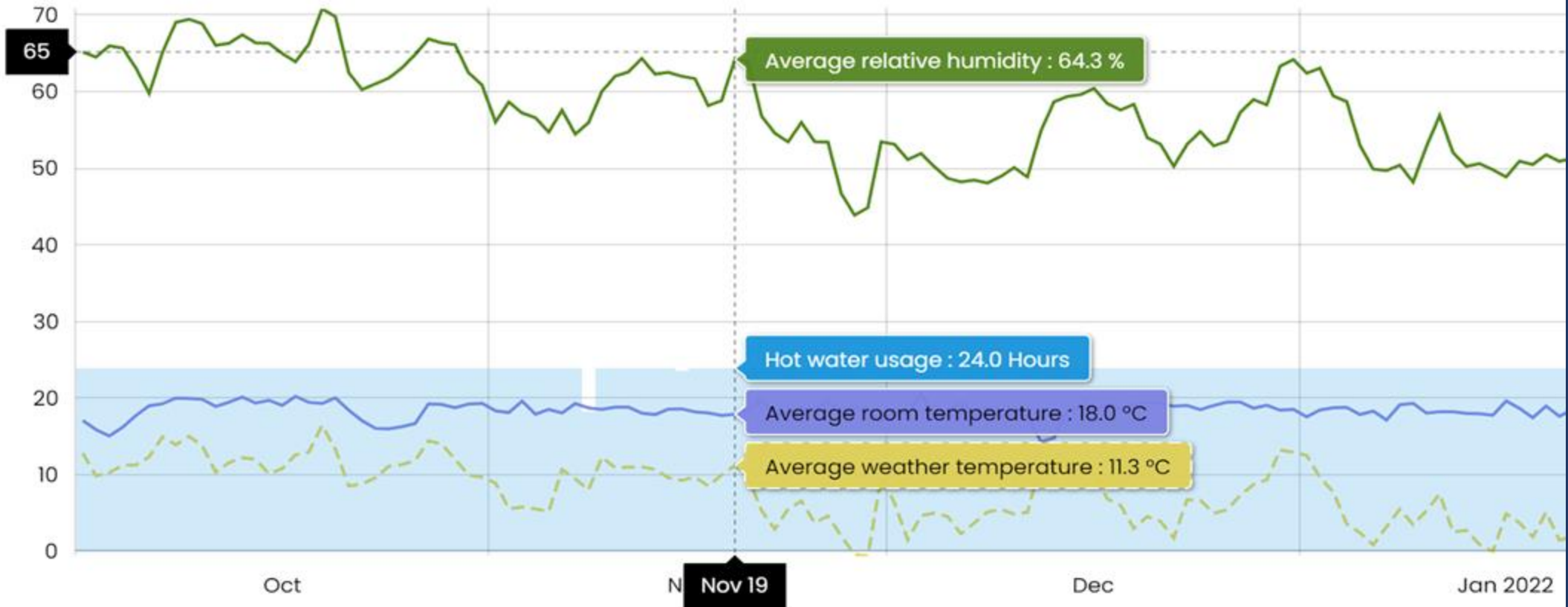




Post EWI – average temperature

Metrics Date Range

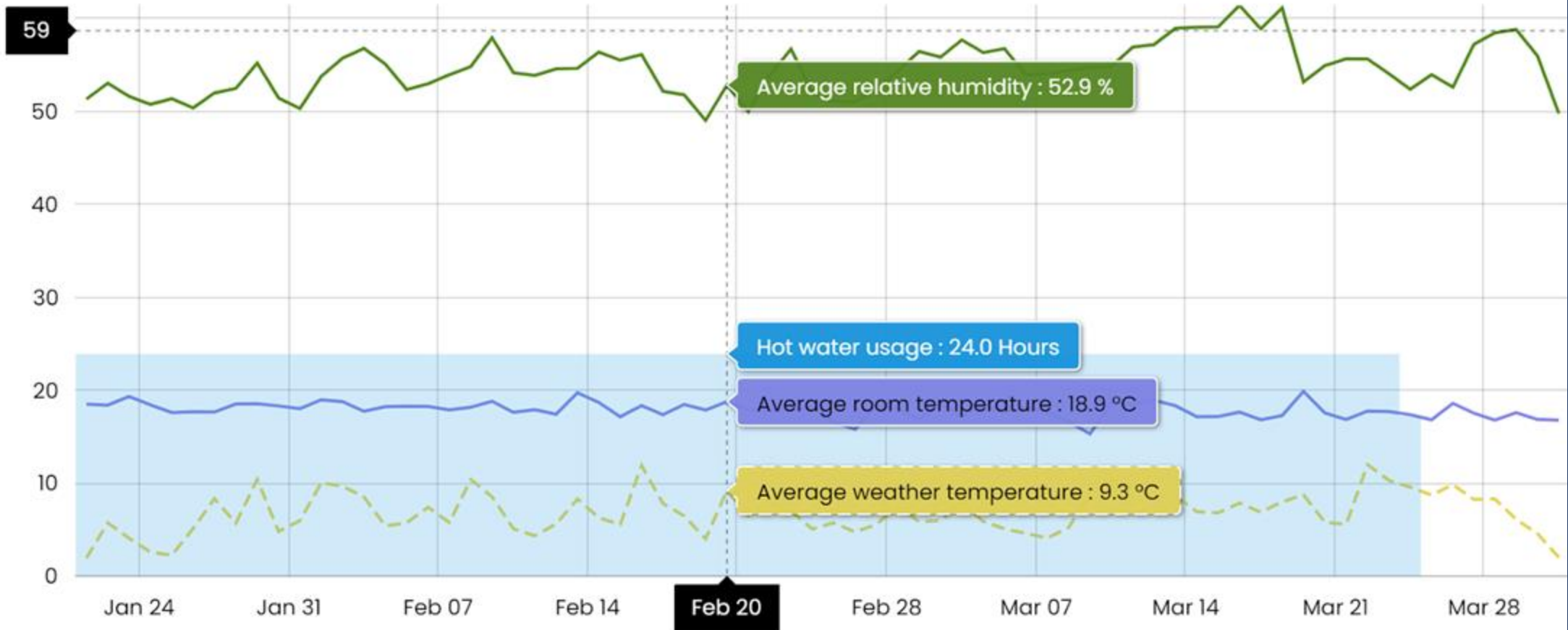
01-10-2021 / 21-01-2022



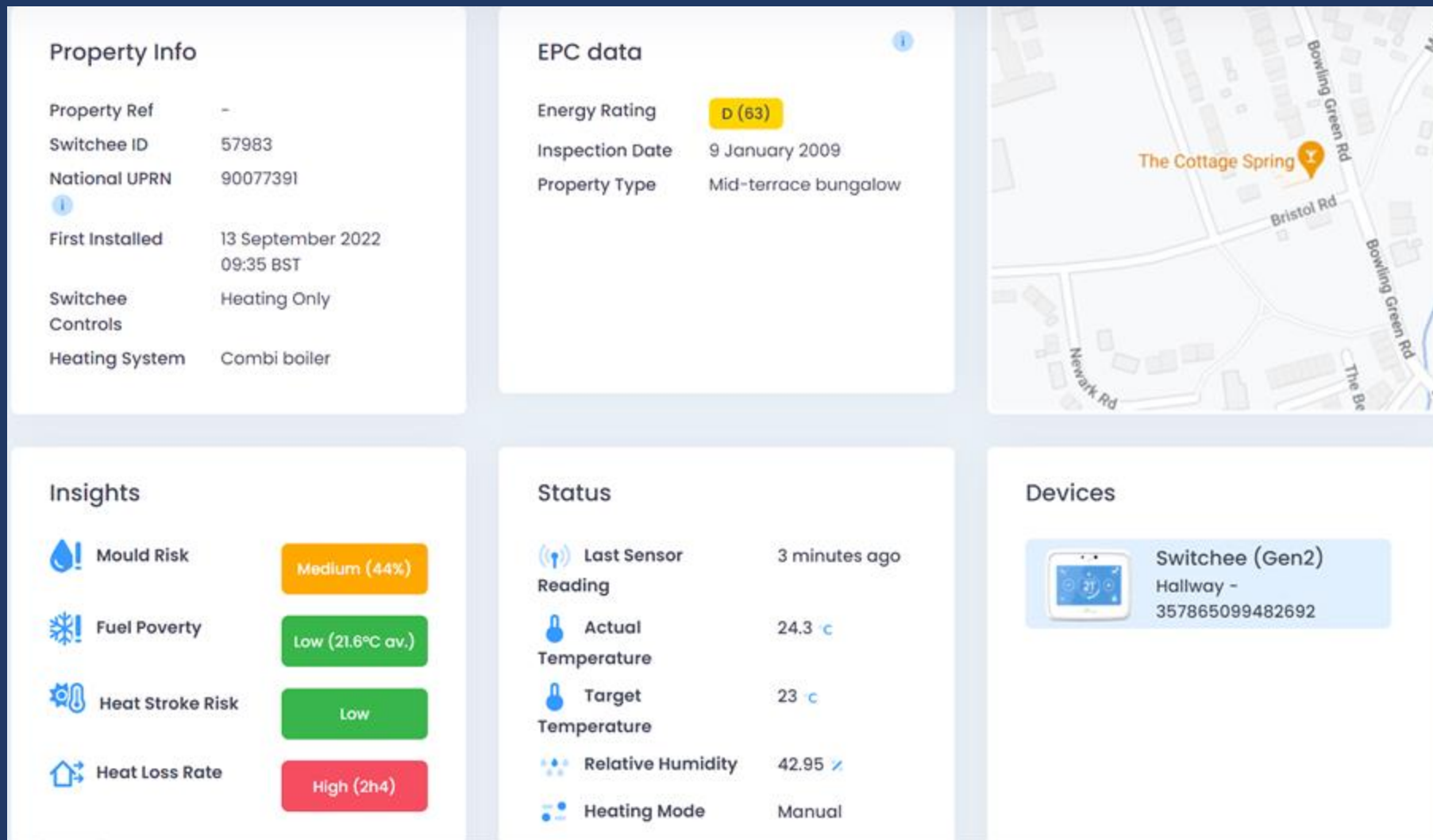
EWI pre measures – relative humidity

Metrics Date Range

21-01-2022 / 31-03-202



EWI post measures – relative humidity



Doesn't always go to plan



# Feedback

**“I noticed almost Immediately that I could turn my thermostat down.”**

**“You could tell it made a difference from the moment you woke up.”**

**“The neighbours have commented about how smart it looks”**