August 2024

# CASE STUDY

## UTILISING IOT TECHNOLOGY TO VALIDATE RETROFIT INTERVENTIONS

# A CASE STUDY EXPLORING HOW THE DATA FROM HOMELINK ENVIRONMENTAL SENSORS CAN BE USED TO VALIDATE SUSTAINABILITY INTERVENTIONS.

## CONTENTS

The UK is investing billions in upgrading the country's ageing housing stock to enhance energy efficiency. Data validation is crucial to efficiently assess the impact of these retrofit interventions. This case study explores the progression of a York-based property, examining its energy performance before and after the implementation of these energy-saving measures.

## PROPERTY ASSESSMENT

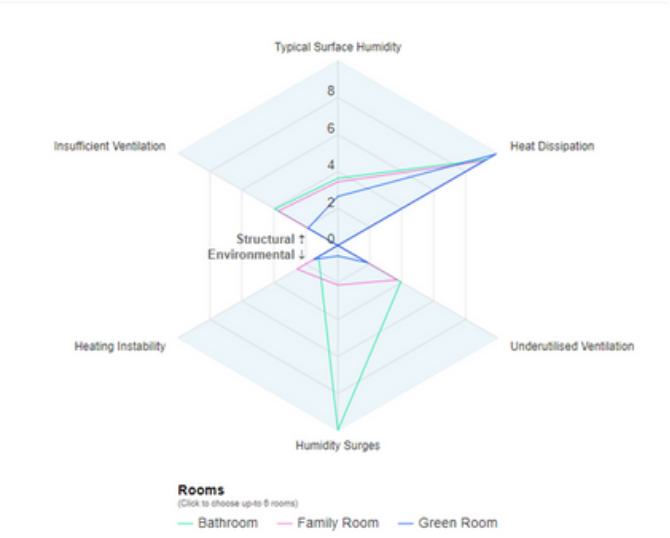
The property at the centre of this case study is a 1930's semi-detached house in York. Constructed with solid brick, the original render to the front and side of the property was inefficient, while the rear extension, covered in cracked and discoloured monocouche rendering, further contributed to heat loss.

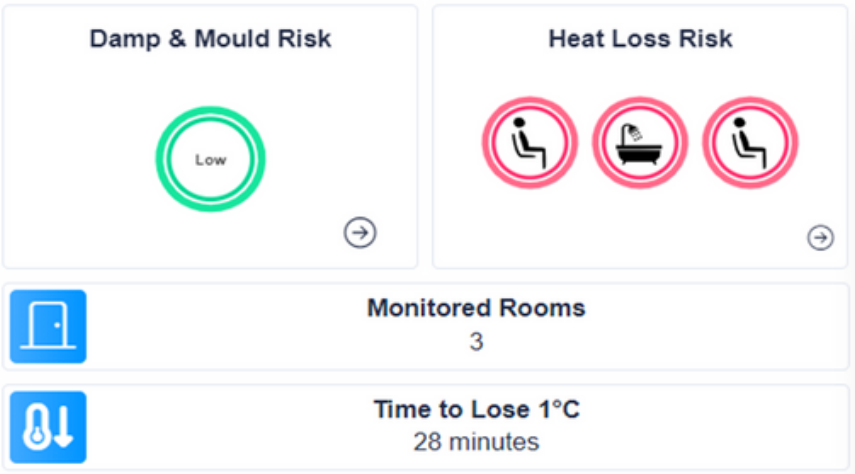
Following a comprehensive assessment, the property's Energy Performance Certificate (EPC) displayed a score of D (60), indicating a relatively low energy efficiency level. However, the EPC also suggests that the property could achieve the potential C rating (79) by addressing the walls of the property as they did not hold a cavity.

| Feature | Description | Rating |
|---|---|---|
| Wall | Solid brick, as built, no insulation (assumed) | Very poor |
| Wall | Cavity wall, as built, no insulation (assumed) | Poor |

# UNDERSTANDING THE PROPERTY THROUGH DATA

In addition to the EPC data, HomeLINK Environmental Sensors were installed in the property 12 months prior to the intervention work. These sensors collect temperature, humidity, and CO2 data at 15-minute intervals to capture a detailed picture of the property's indoor environment. The collected data was uploaded to the HomeLINK portal, where it was analysed using innovative algorithms and presented back to the user with actionable insights about thermal efficiency, ventilation and humidity.




The data collected from the sensors echoed the EPC, identifying that the property had a high heat loss risk across the 3 rooms monitored: the bathroom, family room and green room. Additionally, the average Time to Lose 1 degree (TTL) of 28 minutes indicates a quicker rate of heat loss. The actionable insights show that heat dissipation is an issue across all monitored rooms and, when compared to humidity and ventilation, is the biggest problem in the home. This reflects the lack of insulation in the walls, confirming the assumptions in the EPC.

The TTL value can be used to provide a comparison of heat loss across different homes. It is calculated by utilising both internal and external temperature conditions, meaning we have the ability to understand how quickly a room is losing heat to the outside world. With machine learning models, the relative impact external temperatures have on internal temperatures - and the impact internal temperature have on each other - can be captured. This allows us to produce an accurate prediction of the temperature a room will be cooling down to.

# THE INTERVENTION

Considering the EPC assessment indicating a lack of wall insulation in the solid brick construction of the property, it made sense to tackle this area by improving the fabric of the building to increase energy efficiency.

The property's design presented specific challenges to this, as the first metre from the ground is exposed brick before stepping in slightly and becoming rendered. As such, any external wall insulation system of 100mm—150mm would cover this, which wasn't desirable. Furthermore, all the windows of the property would have to be removed and reinstalled.

The decision was made to try a new innovative cork-based render system. CorkSol offered a perfect solution as their exterior wall coatings use a thin layer of spray-applied natural cork, one of the world's most sustainable natural resources. It is highly water and weather-resistant resistant, providing a stylish and modern finish that is natural, eco-friendly, and low maintenance as no repainting will be required.

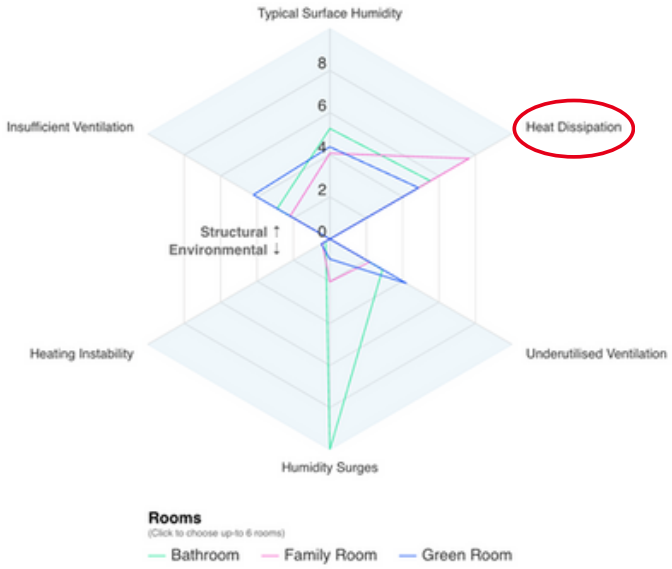
In addition, and more importantly, the natural thermal performance of the cork in CorkSol can reduce heat loss by up to 30%. The coatings are seven or eight times more insulating than traditional lime or sand renders, with a total installation thickness of 6 - 8mm. In this case, it meant that the existing render system could be hacked off and replaced without coving the lower brickwork or moving the windows.

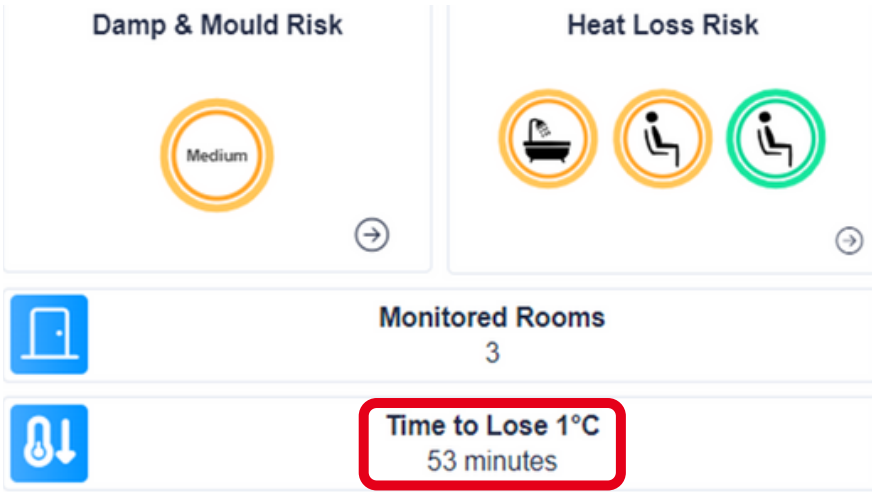
The installation was carried out by JMB Plastering Specialists, a well-established, CorkSol UK-approved applicator. The process involved removing all the existing render, investigating the area and tying any cracks in the brickwork. The brickwork was then sealed and primed before a new scratch coat was applied. There was no need to remove the existing monocouche as this could be sprayed straight over the top. All the windows, fascia and soffits were then taped up, ready to be sprayed.

The spraying was completed within a few days, and the home looked fantastic once complete. However, the crucial question was yet to be answered; could the claim of reducing heat loss by up to 30% be validated?

# THE OUTCOME

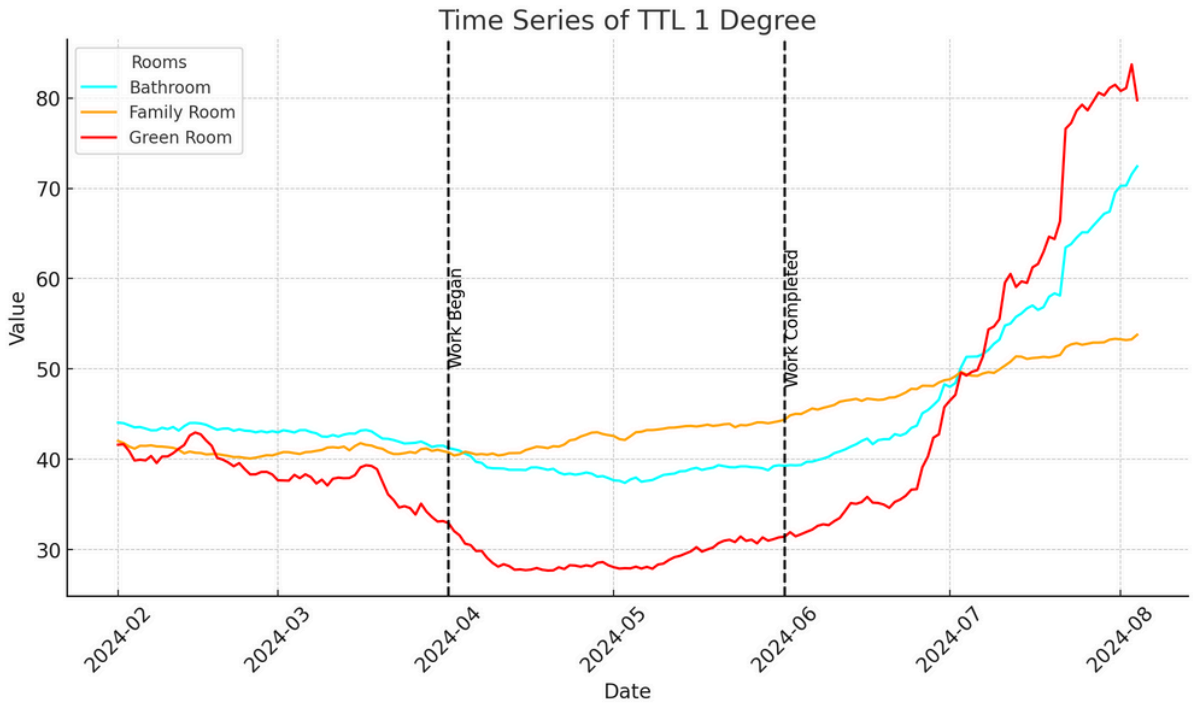
To evaluate the effectiveness of the CorkSol solution, the property was monitored for two months following the intervention. The results, including Time to Lose 1 Degree and Heat Loss Risk, were then compared to pre-intervention data, both of which were available through the HomeLINK dashboard.

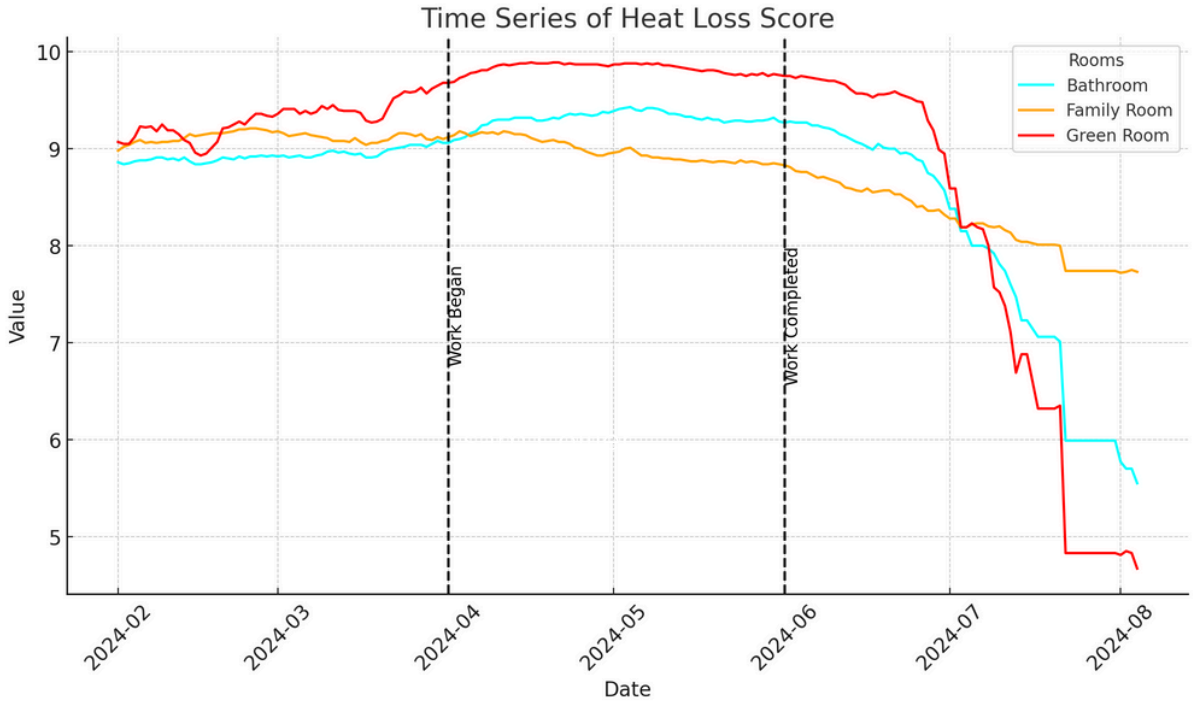



The results showed a significant improvement in the property's energy performance. Heat loss risk had changed from high across all three rooms to medium in 2 and low in 1. In line with this, the TTL 1 degree had increased from 28 minutes to 53 minutes, a huge increase of 25 minutes. This demonstrated a huge improvement in the energy efficiency of the home.

Comparing the changes to TTL and heat loss scores over time demonstrates the positive impact the intervention has had. In addition, heat dissipation improved across all rooms, with more than a 50% improvement in the 'Green Room.' This suggests that CorkSol has doubled the fabric's ability to retain heat within the building, with a notable impact in this room due to the presence of a poorly insulated bay window. Ongoing monitoring by the landlord will be essential to assess the long-term impact of the intervention.



Retrofitting properties is vital for the UK's existing housing stock. Testing and providing useable data to homeowners and social housing providers ensures they can mitigate risk, uplift efficiency, and have the confidence in specifying innovative and sustainable materials. This collaboration between Aico and CorkSol is really important in doing this and is a big step forward for the retrofit sector.

James Erskine, Sales Manager, CorkSol

Effective evaluation of retrofit interventions is imperative to validating a return on investment. Data will soon allow us to evaluate a property's individual data and make recommendations on the most effective intervention. This will help maximise any investment made.

Daniel Little, Regional Director, Aico

To find out more about HomeLINK Environmental Sensors and how they can help provide safer, healthier and more sustainable homes, please visit: www.aico.co.uk/homelink