



AirEx - Smart Ventilation Control

“Quick, hassle-free testing in real-world homes. The Living Lab offers access to consumer homes to trial energy innovations, gather “rigorous evidence” and accelerate to market.”

Introduction

Energy Systems Catapult has developed a Living Lab: a place where innovators can test new products, services and business models in up to 100 real-world homes connected to a cloud-based digital platform by an array of in-home IoT sensors/actuators. The Living Lab has been created to help innovators ensure consumers are at the heart of the UK energy systems transformation.

Tens of millions of homes in the UK were built with low energy efficiency standards. Residents struggle with poor insulation, leading to cold rooms and uncomfortable draughts, meaning occupants often need to turn up the heating, which in turn drives up energy bills. While there has been a concerted effort over the past decade to improve the energy efficiency of homes across the UK by installing insulation – little has been done to improve ventilation.

London-based technology start-up, AirEx, believe they have a solution: a smart ventilation control – or put more simply - an intelligent airbrick. Energy Systems Catapult is helping accelerate the innovation to market through its Living Lab.

The Challenge

Research suggests that traditional air-bricks or vents are responsible for up to 15% of heat loss in the home, while residents that block air vents permanently, can suffer condensation and damp problems, with an average repair bill of £3,000. Not to mention risking indoor air quality and occupants' health.

The Innovation

AirEx has developed an intelligent airbrick that uses sensors to monitor temperature, humidity and air quality in the home. It uses advanced algorithms to manage airflow and ventilation, while also considering local



weather and air quality data. AirEx opens the vents to reduce underfloor humidity and closes them to reduce heat loss and improve overall comfort.

After 12 months in development, AirEx went through two rounds of independent academic validation with Sheffield University in 2017 and Salford University in 2018.

Depending on home design the result showed:

- improved thermal efficiency, with rooms warming faster and unwanted draughts excluded
- heat loss was reduced by between 14%-50%
- airtightness of dwellings improved by 10-20%
- residents require 10-15% less energy
- estimated £150 per year saving on heating bills
- improved air quality, reducing risk of condensation, timber rot and mould.

AirEx calculate that compared with other retrofit solutions, like underfloor insulation (requiring lifting the floor boards), their innovation would achieve half of the savings impact of under-floor insulation, at one-tenth of the cost. Resulting in five times better payback.

Up to 40 million homes across Europe could benefit from the AirEx intelligent airbrick.



CASE STUDY: LIVING LAB AirEx Tech - Smart Ventilation Control



“Living Lab allows innovators to test new products, services and business models in up to 100 real-world homes.”

The Barriers

The primary market for AirEx is social housing properties, with the obvious beneficiary of the technology being the tenant rather than the landlord, with improved energy efficiency leading to a reduction in energy bills of about £150/year.

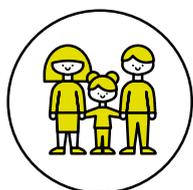
However, the real-time data provided by AirEx would be of significant value enabling landlords and facility managers to carry out run preventative maintenance. For example, flagging-up indicators of damp via an interactive dashboard and simple alerts, rather than carrying out expensive repair works.

While the academic trials were very useful to validate the initial hypothesis, AirEx quickly realised that larger scale trials were needed. If their customer proposition was going to exhibit clear value, real-world evidence was required to enable landlords to build a business case for investing in the product: this is where the ‘Living Lab’ comes in.

The Impact

Energy Systems Catapult’s Living Lab allows innovators to test new products, services and business models in up to 100 real-world homes. Residents get advanced room-by-room temperature control and the chance to be the first to try out cutting edge innovations. While businesses, like AirEx, get vast technical performance data, which combined with consumer research and data science, provides unique customer insight, and commercial value. **The impact for AirEx included:**

- **rapid access to real world testing:** the Living Lab allowed AirEx to gain “quicker, easier, more hassle-free access to residents”. About 20% of the Living Lab households had the style of house to benefit from the AirEx intelligent airbrick, eight households were very quickly engaged, and five were installed.



- **high-value data:** the Living Lab is providing AirEx with the high-value, high-volume, real-time data they require to prove how their product changes the thermal performance of a home. The Digital and Data team provides crucial quantitative evidence on energy consumption, indoor temperature and humidity, and whether resident’s energy costs decreased, and the Consumer Insight team provides qualitative data from residents on the thermal comfort and intrusiveness of installation process.
- **accelerated learning:** AirEx could access years of historic consumer and technical comparative data from previous trials in the same homes, enabling the company to shorten their evidence gathering from 24 months to 12 months. A time scale that is crucial for a small start-up with limited resources.
- **new public and private sector contacts:** Energy Systems Catapult has helped broker new relationships for AirEx to engage, private sector investors and potential customers (e.g. Local Authorities, Housing Associations). It has also helped engagement with other organisations using the Living Lab, including government bodies and energy companies.

The Next Steps

Energy Systems Catapult is working with AirEx to support product validation and accelerate to market:

- exploiting data from the current trial for further product development, such as quantitative data before/after installation (e.g. time taken to heat up rooms) and consumer insight from residents, such as ease of use, hassle of installation, thermal comfort, health impacts
- support on marketing and business planning, including how to access grant funding
- extending the monitoring period from the current 12-month trial of five homes including winter 2018/19, to a larger scale trial with including winter and 2019/20.