Summary Report

Name of sponsoring supplier	Innovator / manufacturer	Name of demonstration action / product
EDF	U-Floor Technologies Ltd (Trading name: Airex)	Airex

Description of measure

Airex is an IoT-enabled smart ventilation control that replaces conventional airbricks in pre-1950s dwellings. It monitors relevant environmental parameters like temperature and humidity and subsequently opens or closes air-vents to optimise ventilation. Using cloud-based algorithms, Airex minimises cold airflow whilst ensuring sufficient air exchange to prevent moisture build-up and poor IAQ.

Sample size and composition

The sample sizes in the trial differed for each key metric monitored:

- SmartHTC monitoring: 82 properties, with 62 experimental and 16 control properties
- Floor void temperature monitoring: 115 properties, with 99 experimental and 16 control properties
- U value monitoring: 17 properties

The majority of these homes were located in the South East (Portsmouth) area and in the Midlands (Walsall) area. The sample contained a combination of mid-terraced, end-terraced and semi-detached properties with between 1 and 6 bedrooms and between 1 to 8 occupants.

Parameters monitored

The project team monitored three key metrics pre & post AirEx installation during the trial:

- **SmartHTC monitoring**: measuring whole house heat transfer coefficient. Before, midpoint and after meter reads were completed, alongside internal temperature monitoring across 4 different indoor locations with half hourly intervals.
- **Floor void temperature monitoring**: underfloor void temperature monitoring monitored throughout the winter season with half-hourly intervals pre and post state. Temperatures were monitored at multiple locations in the underfloor void, and 4 different locations internally (typically 2 locations downstairs and 2 locations upstairs).
- **U-value monitoring**: before & after U-values were obtained using 3-4 heat flux plates (measurements taken with 5 minutes intervals, throughout the winter season.

Across the properties, AirEx collected 5 million data points describing the sub-floor and indoor environment over the duration of the trial. The results have subsequently been independently validated by a team of researchers, building physics experts and statisticians.

Monitoring duration

The monitoring occurred between November 2019 and March 2020, with a variation in monitoring duration between individual properties:

- **SmartHTC monitoring**: The average duration of HTC monitoring for Phase 1 (dynamic stage) was 5.5 weeks, the average duration of HTC monitoring for Phase 2 ('fully open' stage) was 4.7 weeks and the average duration of HTC monitoring for the control group properties was 9.2 weeks. The minimum duration (both in pre & post stage) was 3 weeks.
- **Floor void temperature monitoring**: The average duration for floor void temperature monitoring was 12.5 weeks.
- **U-value monitoring**: U-values were monitored for 3 weeks pre and 3 weeks post installation of Airex.

Average annual cost saving	Expected lifetime cost savings
• Average annual cost savings: 12% (±9.1%) – 16% (±9.5%) • Basis for percentage: annual space heating costs • Main heating source[1]: gas central heating • Main house type: Midlands-based gas-heated 3-bedroom semi-detached house • Average annual cost savings: 12% (±9.1%) – 16% (±9.5%) • Basis for percentage: annual space heating costs • Main heating source[2]: electric heating • Main house type: Midlands-based electrically-heated 3-bedroom semi-detached house	• **£1,311** at 12% improvement on average. [between £324 @ 2.9% and £2,357 @21.1%]. • **£1,845** at 16% improvement on average. [between £745 @ 6.5% and £2,923 @25.5%]. • Basis for LBS: annual space heating costs • Main heating source: gas central heating • Main house type: Midlands-based gas-heated 3-bedroom semi-detached house • Expected lifetime: _25__ years • **£3,318** at 12% improvement on average. [between £820 @ 2.9% and £5,964 @ 21.1%] • **£4,670** at 16% improvement on average. [between £1,885 @ 6.5% and £7,396 @ 25.5%] • Basis for LBS: annual space heating costs • Main heating source: electric heating • Main house type: Midlands-based electrically-heated 3-bedroom semi-detached house • Expected lifetime: _25__ years

Summary of Discussion and Conclusion

Cost savings have been determined using SmartHTC data collected from the field:

- an average property type (that represents the ECO DA sample size the most) was taken into consideration: a 1930-s cavity walled semi-detached 3-bed house with suspended ground floor;
- the measured whole house HTC values (obtained from the ECO DA trial) – 12% (±9.1%) -16% (±9.5%) average;
- these HTC values were then normalised to 3 different climate regions: South-England, Midlands and Scotland to obtain the energy use (kWh) – using the relevant degree day data from each region;
- The annual bills savings and lifetime bills savings based on two options: a) gas heated; b) electrically heated homes.

Key limitations included variables which may have introduced bias to the results. These included:
Occupancy – varying occupancy, and potential occupancy pattern changes due to the March 2020 lockdown may have impacted the results as Airex showed larger gains when occupancy was lower.
Property type – some properties such as those with exposed floorboards, of a smaller size, and larger number of airbricks per m2 showed larger gains after Airex was installed, however more research is required in this area. The sample may also not be fully representative to the entire UK housing stock as only ECO-eligible properties could be included in the sample.
Difference in weather in before & after periods – The winter the trial took place in had an unusually cold winter, with milder temperatures in the latter half and resulted in the dynamic and open periods for Airex taking place in different weather conditions. As the dynamic phase took place during the coldest period, this may also have impacted results.

Summary of costs				Total Cost: £265,849 (inc VAT)		
Recruitment	Product / installation	Performance monitoring	Analysis / reporting	Technical monitoring	Supplier administration	Aftercare
£33,876	£83,790	£83,166	£52,290	£0	£12,727	£0