



## Session 3

# OUR PEOPLE:HEALTHY COMMUNITIES

Exploring the links between  
energy efficiency improvements  
and health and wellbeing

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# Energy Agency



## South, North, East Ayrshire and Dumfries & Galloway

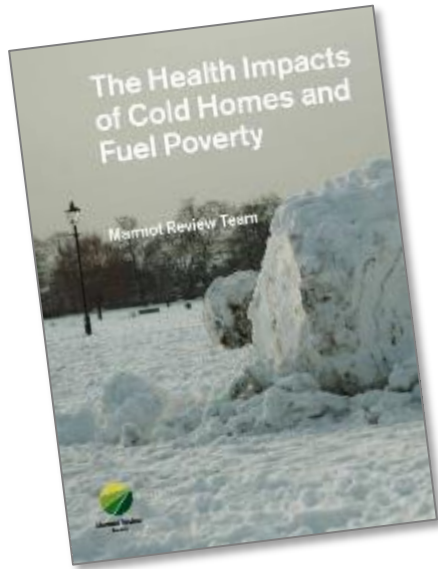
- HEEPS:ABS
- Home Energy Scotland advice centre
- Training
- Consultancy
- Sustainable Design & Construction-CPD Series
- Energy Use /Lessons in Schools



Registered charity established 1999, providing free, impartial and expert advice on energy efficiency, renewable energy and sustainable issues.

*The Energy Agency's aim is to reduce energy consumption and promote sustainability locally thus contributing to national targets.*

# Background



2011

Poor health



Fuel Poverty



Housing  
energy-  
efficiency



2012

Cold homes



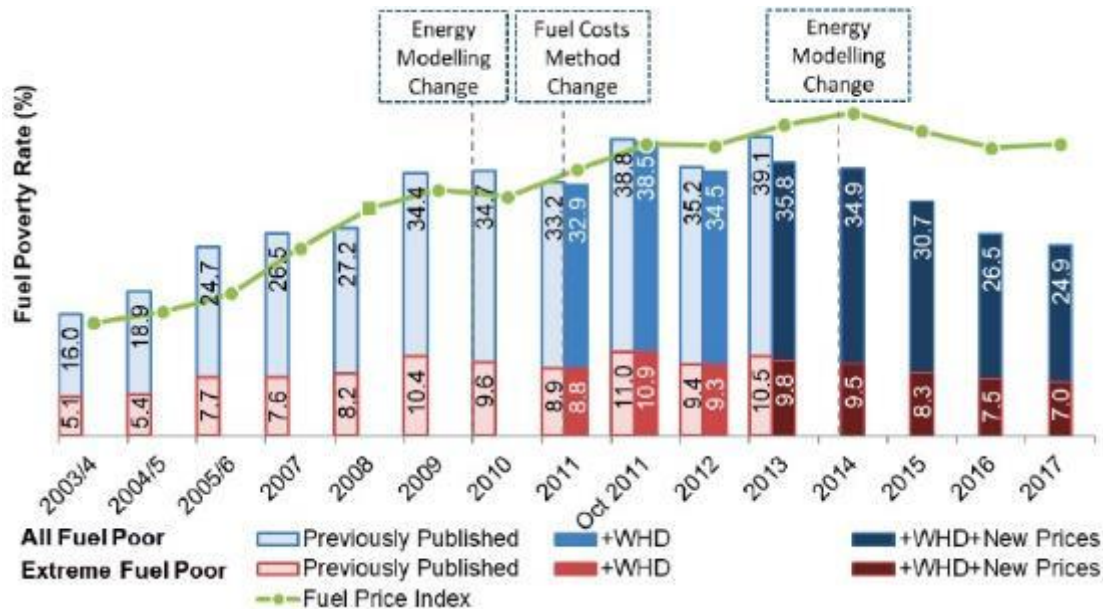
# Background

## Fuel Poverty:



**25%** of Scottish households are spending more than **10%** of their income on fuel

**7%** of Scottish households are spending more than **20%** of their income on fuel



## Main drivers

- Poor energy efficiency of the dwelling
- Low disposable household income
- High price of domestic fuel
- How energy is used in the home

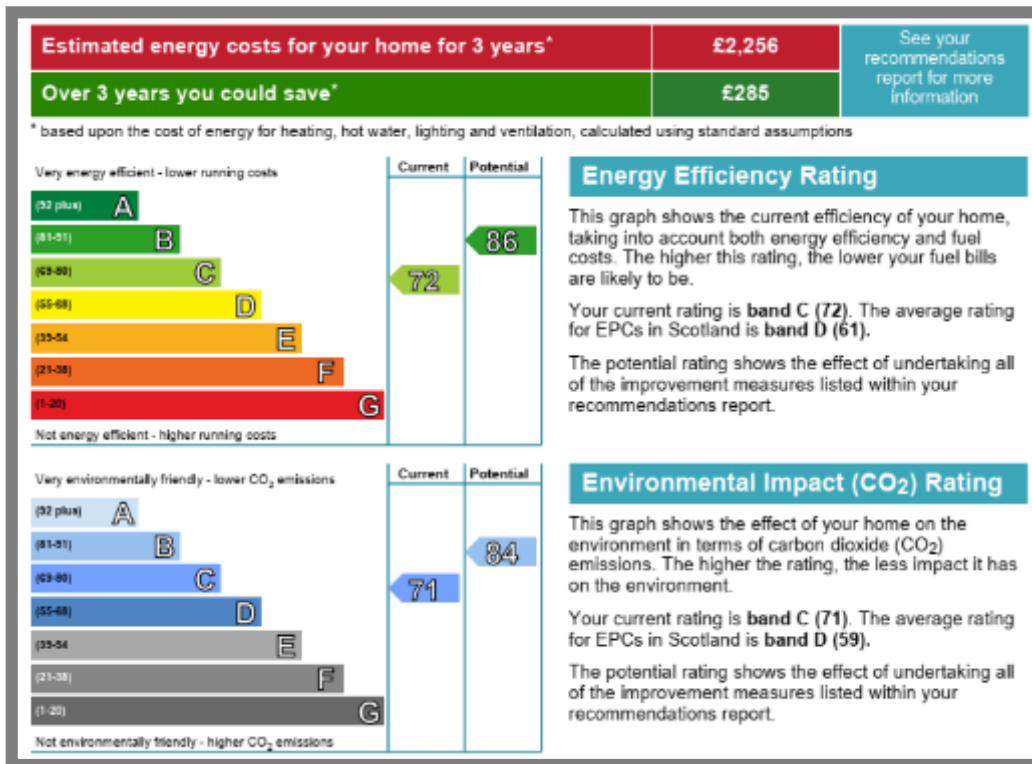
# Background

Cold homes:



65% of households in the west of Scotland are classed as 'cold homes' with an EPC rating of between D and G

## Energy Performance Certificates



### Standard heating regime:

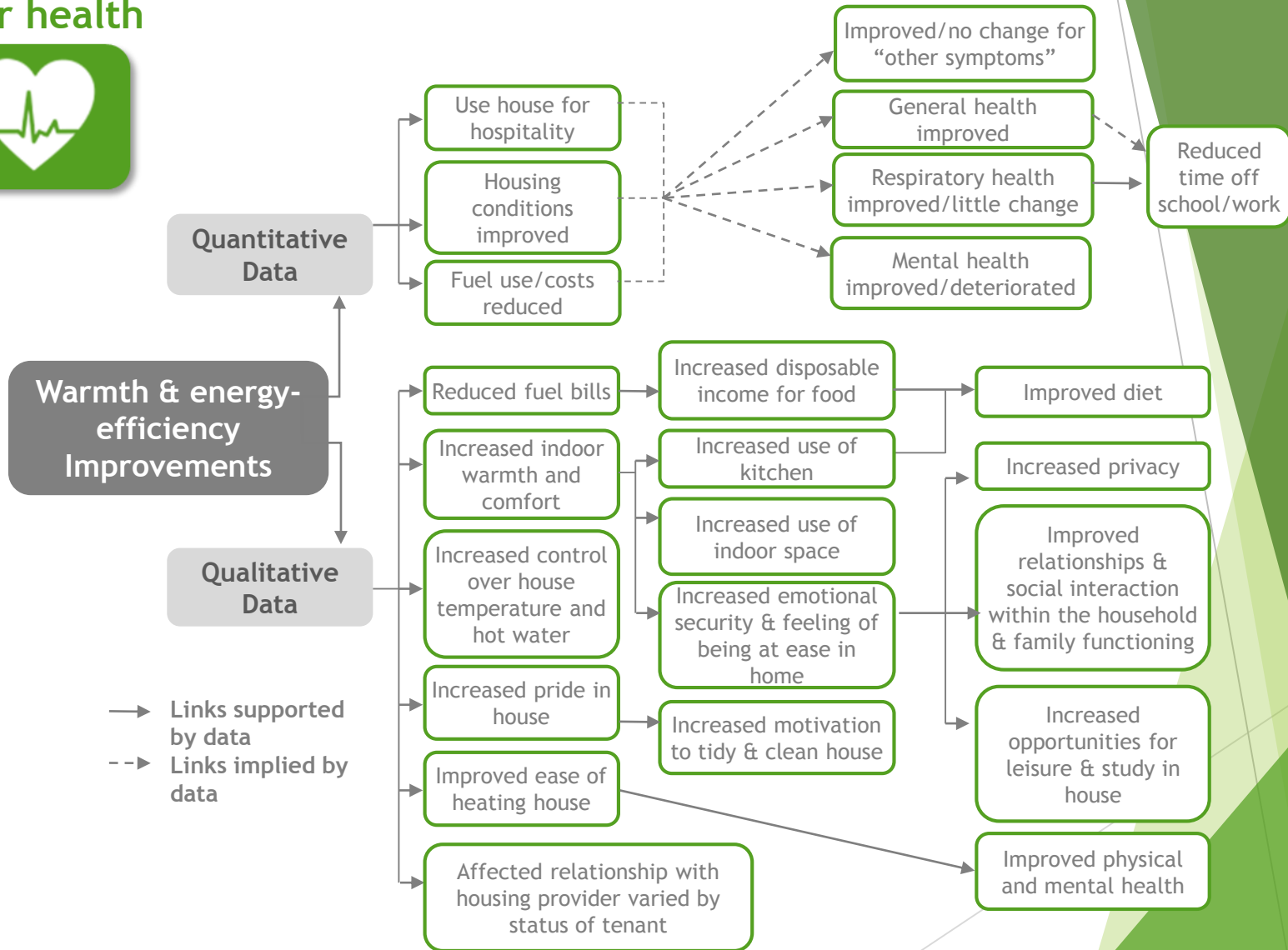
21°C (living room)  
18°C (other rooms)

9 hours (weekdays)  
16 hours (weekends)

Higher targets for  
'vulnerable'  
households

# Background

## Poor health



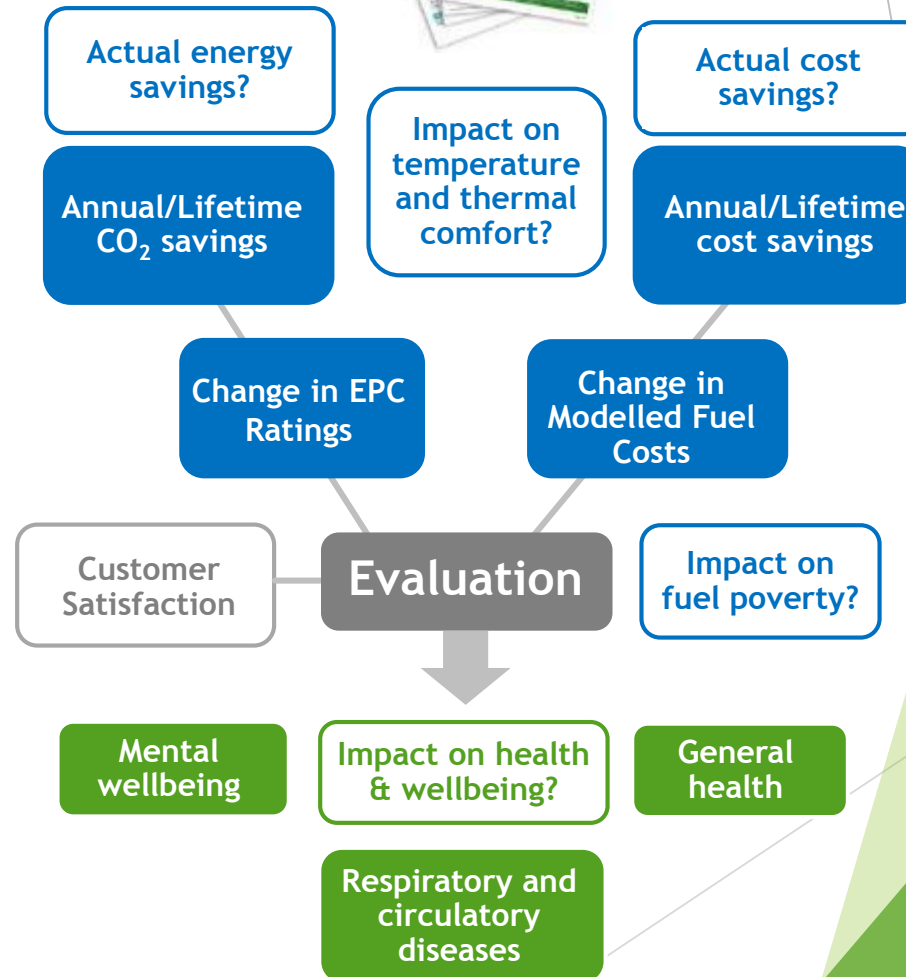
# HEEPS:ABS

## Home Energy Efficiency Programmes for Scotland: Area Based Schemes



- Funding allocation for each local authority in Scotland
- Targeted at fuel poor areas
- Primarily external wall insulation
- Open to all tenures

### Energy Performance Certificates (EPCs)





# Development



Initial Discussions (2014)

Anecdotal Reports



Feasibility Study (2015)

Literature Review & Pilot Study



Full-scale Evaluation: (2015 - present)

Baseline & Follow-up Assessment



Household Questionnaires  
Health Questionnaires



Environmental Monitoring  
Temperature, relative humidity  
and energy use

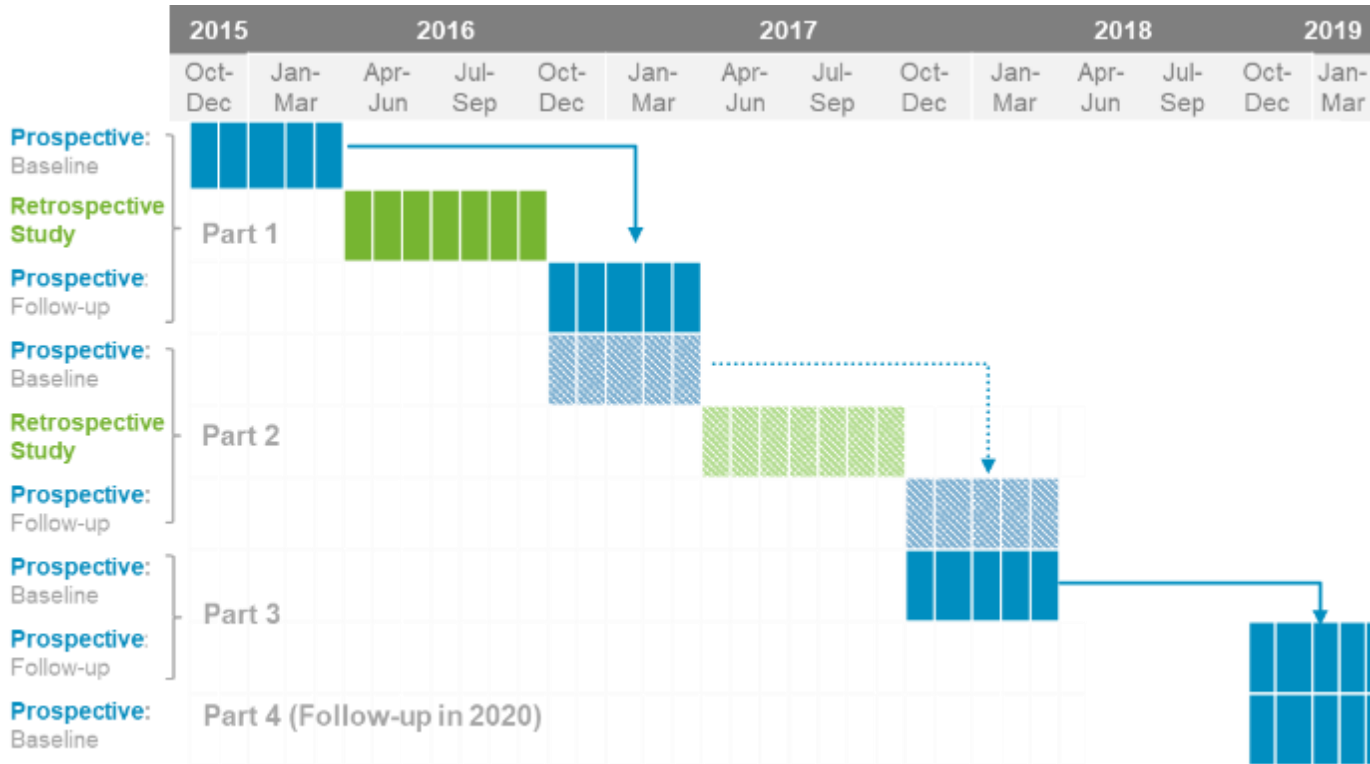


EPCs  
Energy performance certificates



# Background

## Project Timeline



Prospective			Retrospective		
South Ayrshire	East Ayrshire	Dumfries & Galloway	South Ayrshire	East Ayrshire	Dumfries & Galloway

74

97

33

39

39

42

400+ households engaged

# Findings to date

Aggregate results (~300 properties)



**93%** of respondents agreed that the **appearance** of their home had improved a lot



**79%** also felt that the **street or neighbourhood** had improved a lot



**33%** of participants who reported having a problem with **condensation or dampness** said that this appears to have been improved



There was a reduction in the number of households reporting issues with **cold spots, draughts** and the **lack of insulation** in the property.



**23%** had noticed a reduction in the level of noise



*“I think it’s improved the street, definitely...Not even just the street, the whole village”*

*“You used to get up in the morning and the window would just be running with condensation...now it’s not”*

*“I always liked it to be nice but now I take more pride in it. I even got my hedge cut shorter so everybody could see my house. I think it’s lovely”*

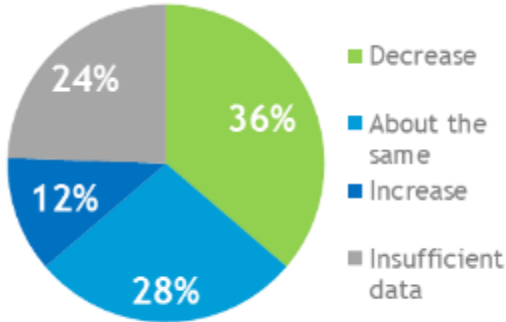


*“More folk talk because they’re talking about the houses. Folk speak to you that’s never spoke to you before”*

# Findings to date

## Fuel costs

Reported savings (n=229)



Modelled EPC savings (n=174)

Fuels bills were reduced by

**21%** (on average)

This equated to average annual fuel saving of:

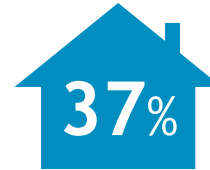
**£210**

Fuel poverty (estimate)

Old definition (n=147)



Before



After

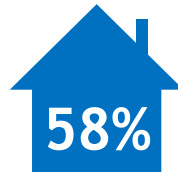
Before



Properties achieving a Band C rating



Average EER increase of 9 points (n=266)



After



Properties achieving a Band C rating

# Findings to date

Thermal comfort (n=229)



**46%** have decreased the number of heating hours required per day



**22%** have decreased the temperature of their main thermostat



The need for **additional room heaters, hot water bottles, electric blankets and extra clothing** and has been reduced

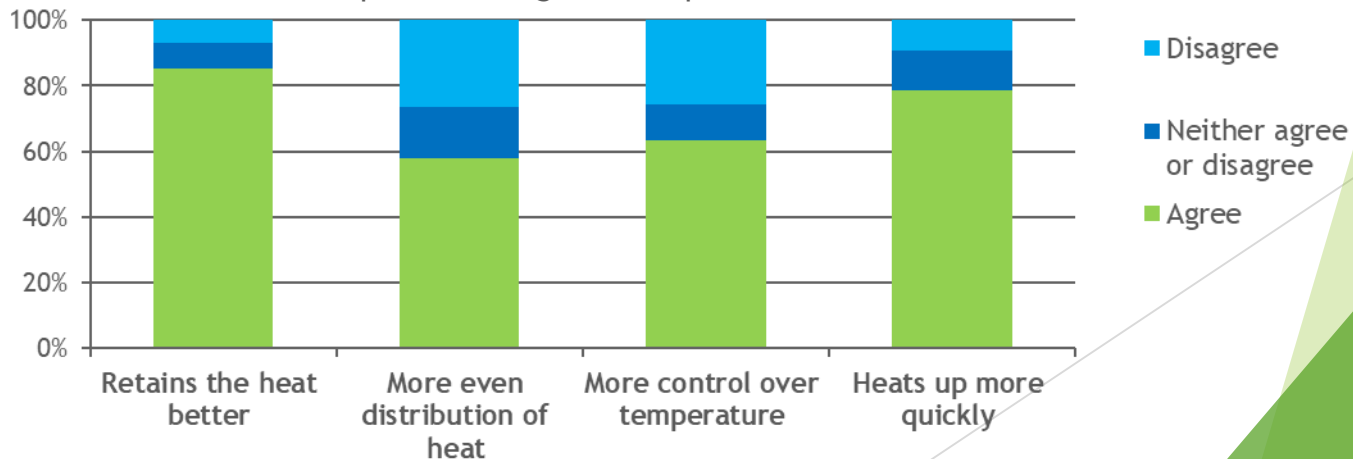
**80%** agreed that the overall temperature had increased

**38%** described their home as 'much warmer'

*"In the winter the upstairs is used, whereas the last couple of winters it hasn't been...We were all sleeping in here [living room] but last winter we were in our own rooms"*

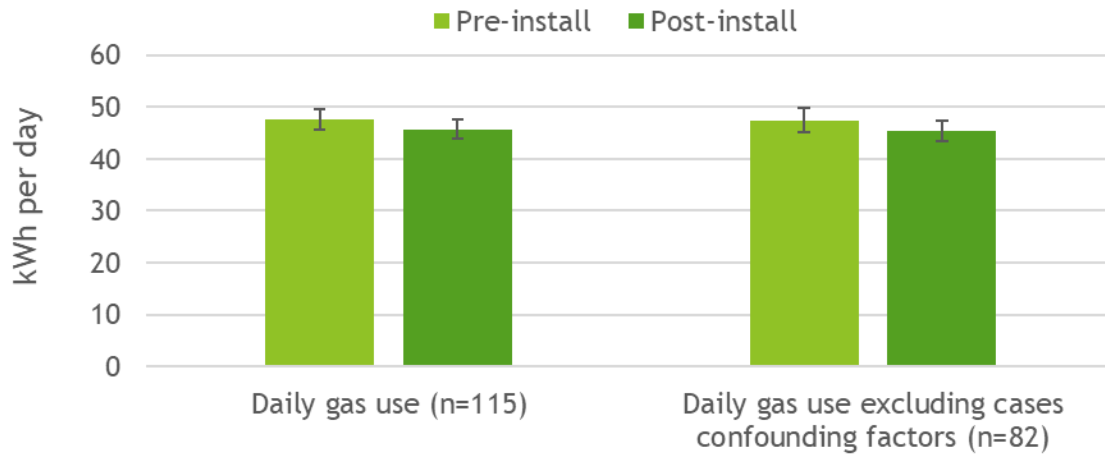
*"We maybe put it on for an hour or so. Since this [insulation] got put up, the house seems to hold the heat"*

Reported Changes in Temperatures

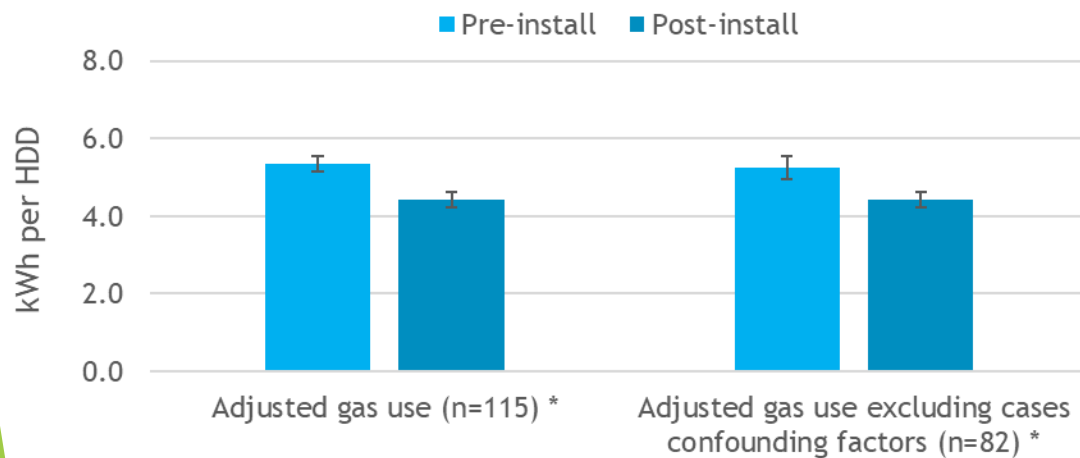


# Findings to date

## Energy Use (Measured)



**1%**  
**reduction**  
Daily usage



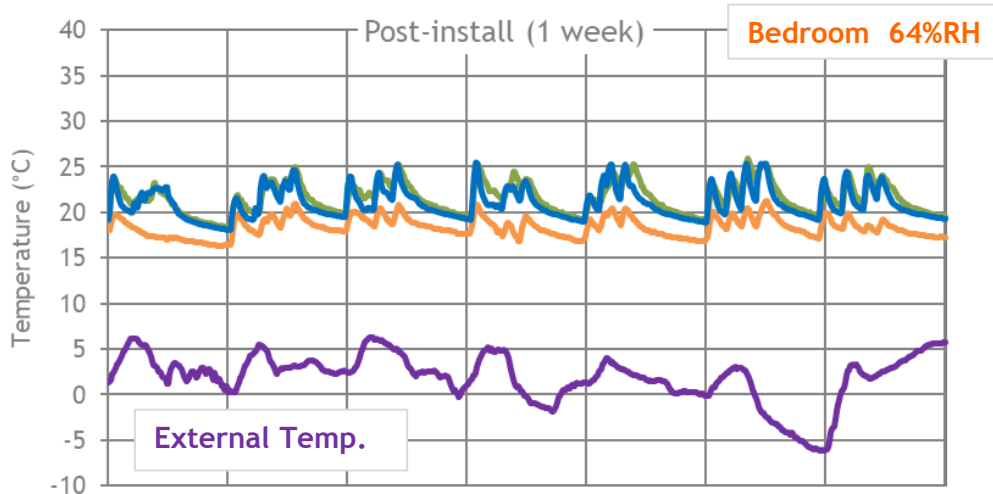
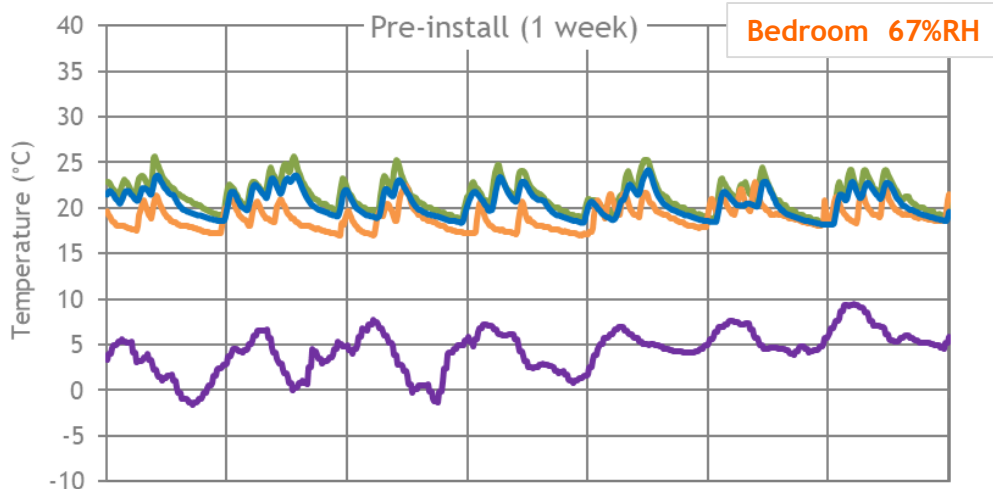
### Measured vs modelled

- 17% - Exceeded EPC benchmark
- 23% - Close to EPC benchmark
- 61% - Below EPC benchmark  
includes energy *increases*

**16%**  
**reduction**  
Adjusted for  
weather

# Prospective Study

## Monitoring example



### Monitoring results:

Weather adjusted daytime temperature:

Living room +1°C

Kitchen 0°C

Bedroom 0°C

Gas consumption decreased by

**20%**

Close to EPC benchmark (19%)

### Reports from the occupant:

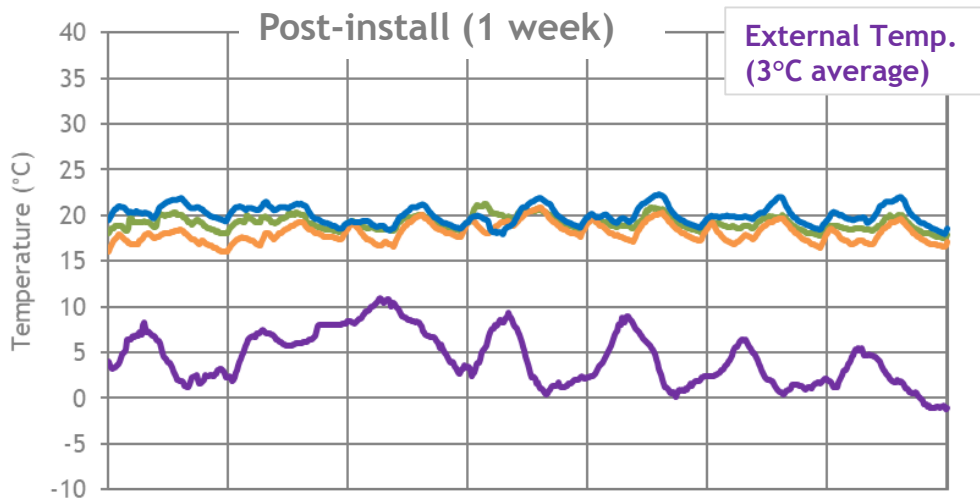
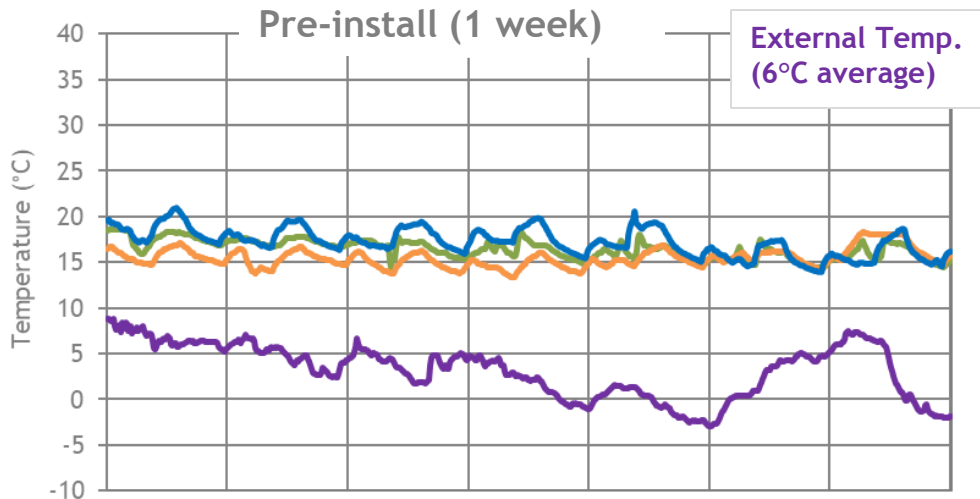
- Decreased use of the heating system
- Fuel bill savings of £20 per month
- Feels more comfortable and less worried about losing heat
- Reduction in traffic noise
- Reduction in window condensation
- Fewer colds
- Finds it easier to get about and do things at home

### Average Temperatures (non-adjusted)

LR Pre	LR Post	K Pre	K Post	B Pre	B Post
21 °C	22 °C	22 °C	22 °C	19 °C	19 °C

# Prospective Study

## Monitoring example



### Monitoring results:

Weather adjusted daytime temperature:

Living room +2°C

Kitchen +2°C

Bedroom +1°C

Gas consumption decreased by

**10%**

(increase of 15%

based on daily average)

### Reports from the occupant:

- Decreased use of the heating system
- Described property as 'much warmer'
- Reduction in draughts
- Reduced need for blankets/additional heaters
- Reduction in traffic noise
- Uplift to the area - likes the place better now
- Positive comments from visitors
- Fewer hospital visits
- Respiratory problems improved - breathing a bit easier

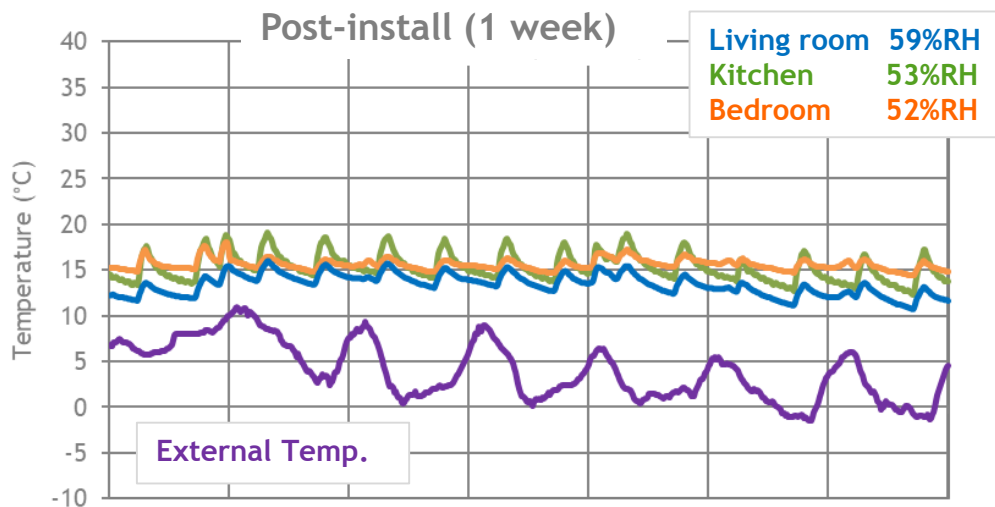
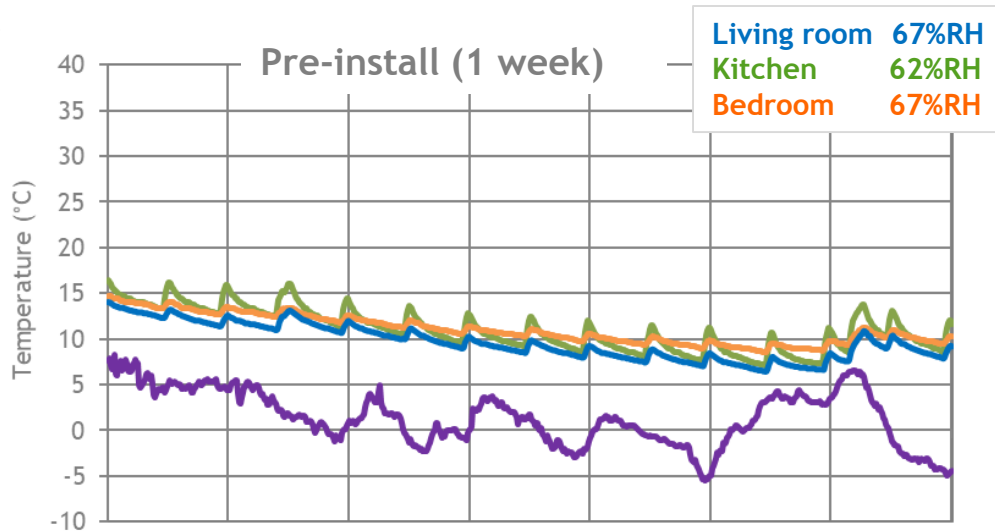
### Average Temperatures (non-adjusted)

LR Pre	LR Post	K Pre	K Post	B Pre	B Post
19 °C	20 °C	18 °C	19 °C	17 °C	18 °C



# Prospective Study

## Monitoring example



### Monitoring results:

Weather adjusted daytime temperature:

Living room +2°C  
Kitchen +3°C  
Bedroom +4°C

Relative humidity:  
All rooms now below 65%RH

Gas consumption *increased* by  
**40%**

### Reports from the occupant:

- Increased use of the heating system
- Increased usable space in the home - spare room can be used for guests
- Improved ventilation - able to open windows more often
- Finds property 'much warmer'
- Feels more relaxed and at ease at home
- Asthma symptoms improved
- Less frequent use of inhaler

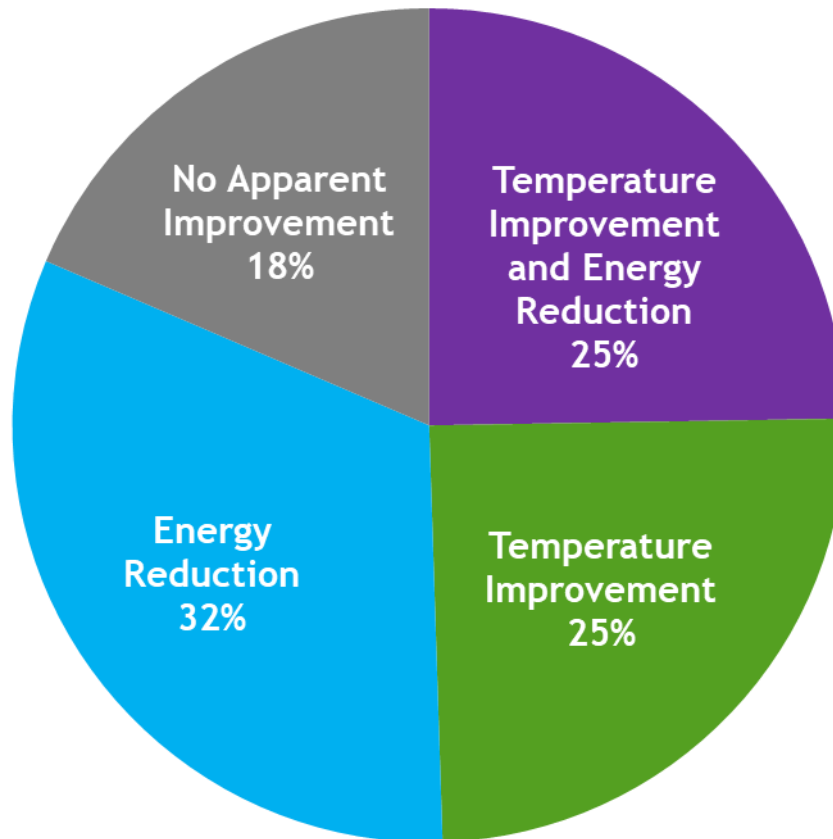
### Average Temperatures (non-adjusted)

LR Pre	LR Post	K Pre	K Post	B Pre	B Post
10 °C	12 °C	11 °C	14 °C	11 °C	15 °C

# Prospective Study

## Monitoring results (preliminary)

Overall Results (n=97):  
Excludes properties with confounding factors



Results shared with participants

# Health Findings (Anecdotal)

Aggregate results (n=300+\*)



## 35 physical health improvements



Asthma, COPD & seasonal illnesses

Pain reduction/improved mobility (e.g. arthritis)



## 65 mental health improvements

Linked to increased comfort and satisfaction with the home



8 improvements in children  
(~20 participants)

\*Includes cases with confounding factors, medication/lifestyle changes

*"I believe I feel better and more comfortable about the house, I really am....With the dampness...it helps my breathing a lot and I sleep better"*

*"You are a bit more content that you know you're coming into a warm house"*

*"I feel a lot happier...Just with the appearance of the house 'cause it had been looking so dowdy for so long...I love it"*

*"We genuinely believed that those [condensation & damp problems] were factors in how unwell we were in the house and I think it has improved"*

*"I think with the house being warmer its helped my arthritis a lot cause I'm not as sore now... It doesn't take me 3 hours in the morning now to get moving"*

*"We're a lot happier in the house now since it's been done."*

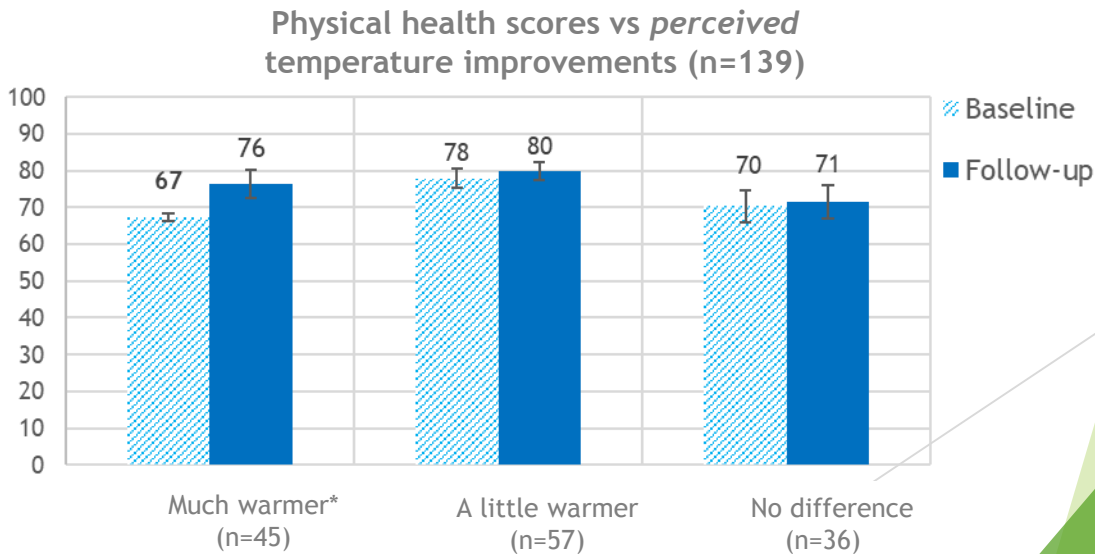
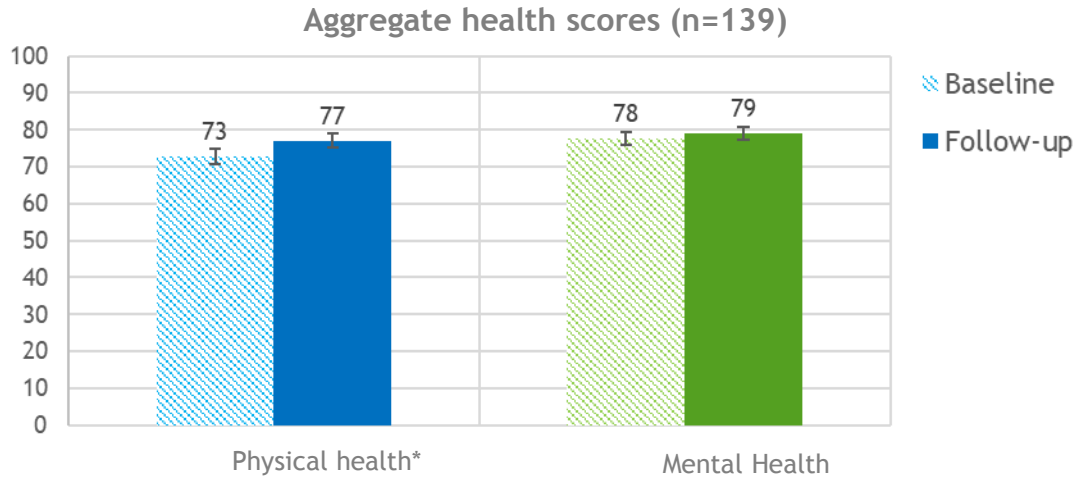
# Health Findings

## Preliminary Results

### SF-36 Scoring System

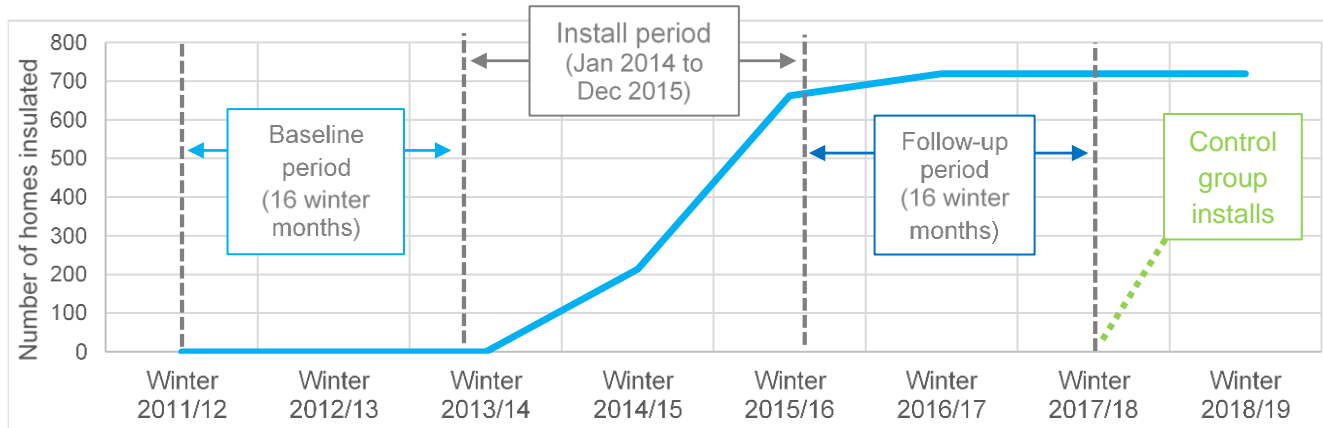
**Physical Health:**  
General Health, Physical functioning, Role limitations (physical), Pain

**Mental health:**  
Social functioning, Emotional well-being, Energy and fatigue, Role limitations (emotional)



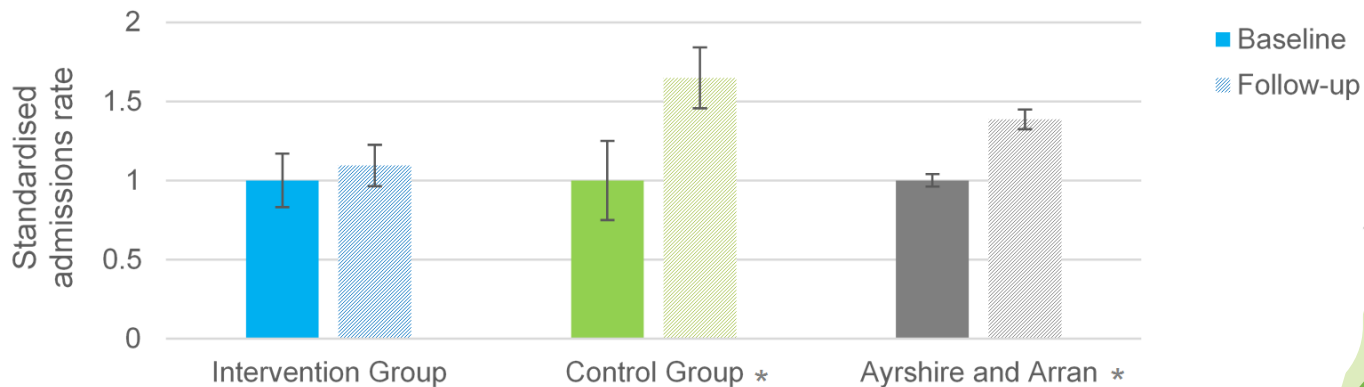
# Postcode level analysis

## Preliminary Results

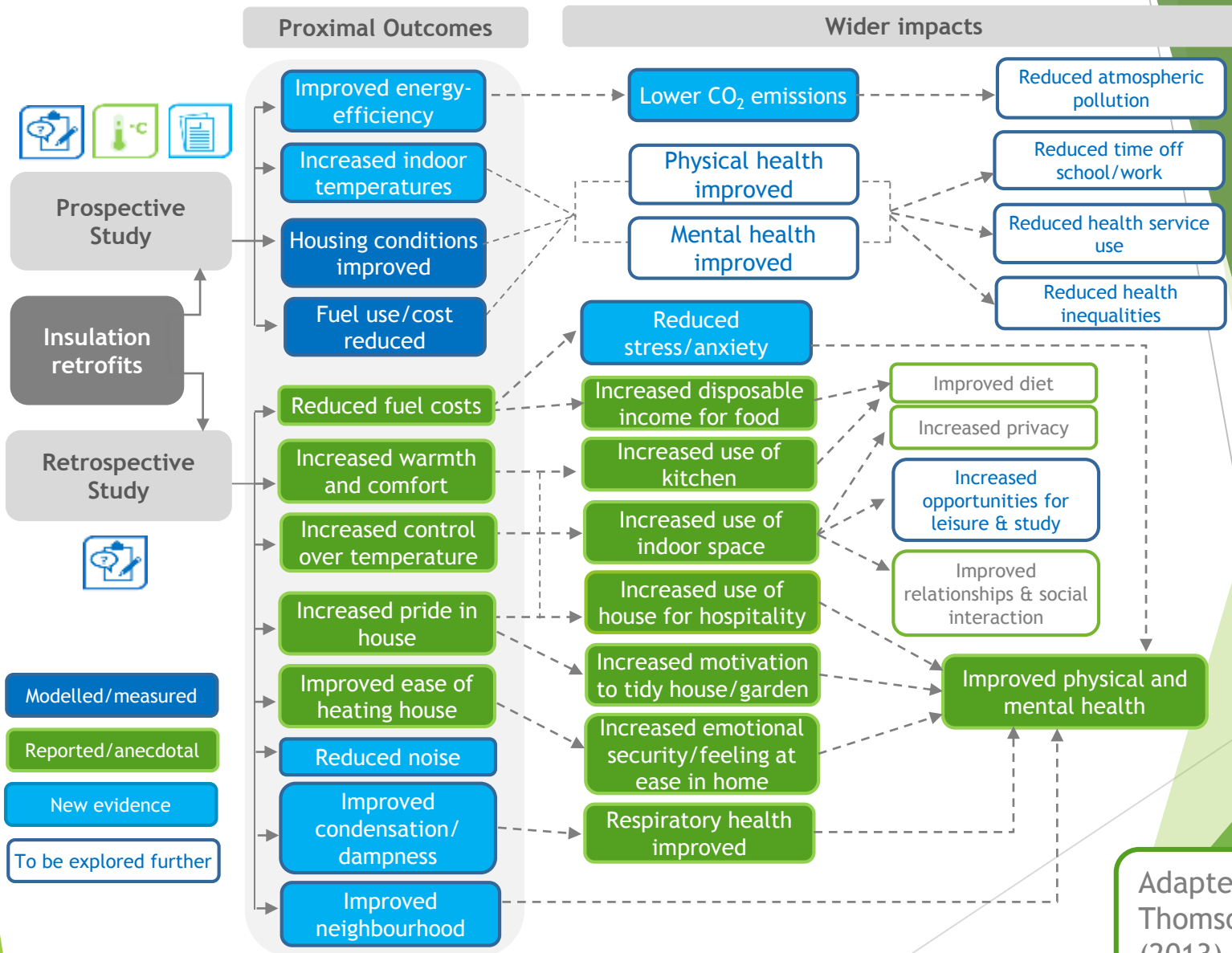


### Hospital admissions for respiratory events

(16 month data set)



# Theory of Change



Adapted from Thomson et al. (2013)

# Conclusion

## What we have achieved:

- Development of a practical evaluation procedure for ABS
- Ongoing partnership with NHS (Ayrshire & Arran)
- Recruitment of households - 400+ visits conducted to date

## Outputs:

- Prospective Study Wave I & II (Completed in 2017/18)
- Prospective Study Wave III (Complete Sept 2019)
- Retrospective Study Wave I (Complete - Mar 2017)
- Retrospective Study Wave II (Complete - Mar 2018)

## Next Steps:

- Wave IV - Follow-up in 2020
- Further NHS collaboration - health data linkage/postcode level analysis
- PhD project in collaboration with University of Glasgow





Thank you

[www.energyagency.org.uk](http://www.energyagency.org.uk)

<https://youtu.be/m0WmqErEYHg>

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