

# PROMOTING ENERGY EFFICIENCY IN HOMES:

....by making heat visible through  
thermal imaging?

Julie Goodhew, Dr Sabine Pahl,  
Dr Tim Auburn.



University of Plymouth



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# OVERVIEW

- Introduction (Psychology)
- Study 1
- Study 2
- Conclusion



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# INTRO: Psychological Background

- Used ABC (Antecedent – Behavior– Consequence) Model (Lehman and Geller, 2004)
- Specific behaviours targeted to conserve energy/heat in the home (Gardner and Stern 2002)

Loft insulation, draught proofing, wall insulation, glazing, closing curtains, improved heating system.



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# INTRO: Psychological Background

- Capture attention (Stern 1992)
- Seeing invisible as visible attracts attention (Gardner and Stern, 1996)
- Vivid, self explanatory and positive qualities (McKenzie Mohr, 1999).



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# INTRO: Psychological Background

- ‘Persuasive Technology’ mediate attention, draw it down to specific issues to change ideas about energy usage (Midden, Kaiser and McCalley, 2007)
- Specificity of info (concreteness), can affect ideas/decisions’ (Bettman and Kakkar, 1977, Crosby and Taylor, 1981, Magat, Payne and Brucato, 1983, Winett, 1975)

# STUDY 1

- Using the FLIR S65 HS Camera
- Devon town
- Thermal images of 17 homes, (+ 17 non thermal image condition , 9 control).
- During the 2007 heating season.
- (In conjunction with the Bovey Tracey Climate Action Group)



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1. Thermal Image of Home Taken



2. T1: Home Visit Consisting of:

Questionnaire on home heating habits

Energy use measured over a year previous to visit via.....Carbon Footprint Calculation

Attitude to Environmental Issues measured using the NEP questionnaire

Display the thermal image and discuss what it means to the householder/any opportunity for energy conservation



4. T2: Measures repeated one year on (to measure the year's energy usage).

# MEASURES: Quantitative and Qualitative

- Energy Consumption
- Energy Conserving Behaviours
- Semi structured interviews
- Video and Audio Data



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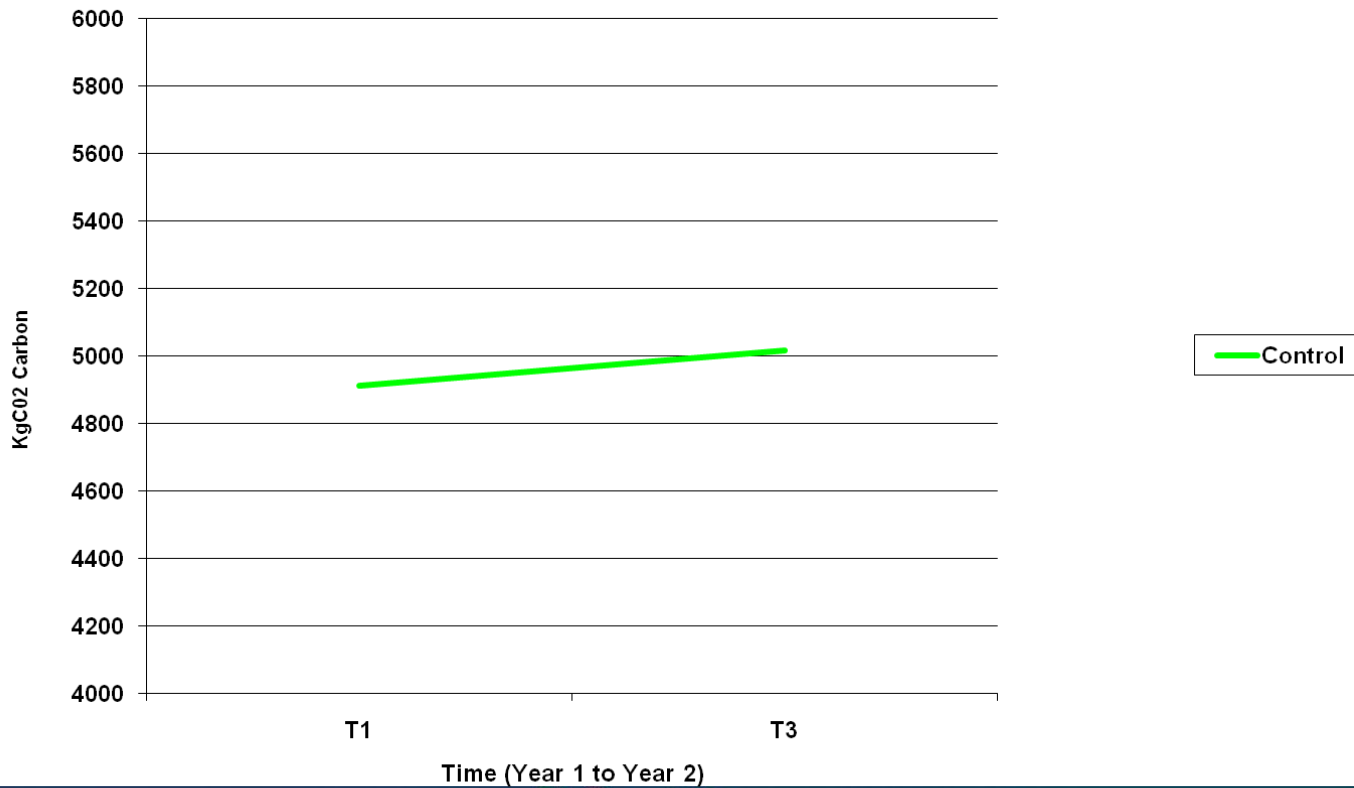
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# EFFECT ON ENERGY CONSUMPTION

Graph Showing Change in Carbon Footprint from Energy Usage in the Home (KgCo2)



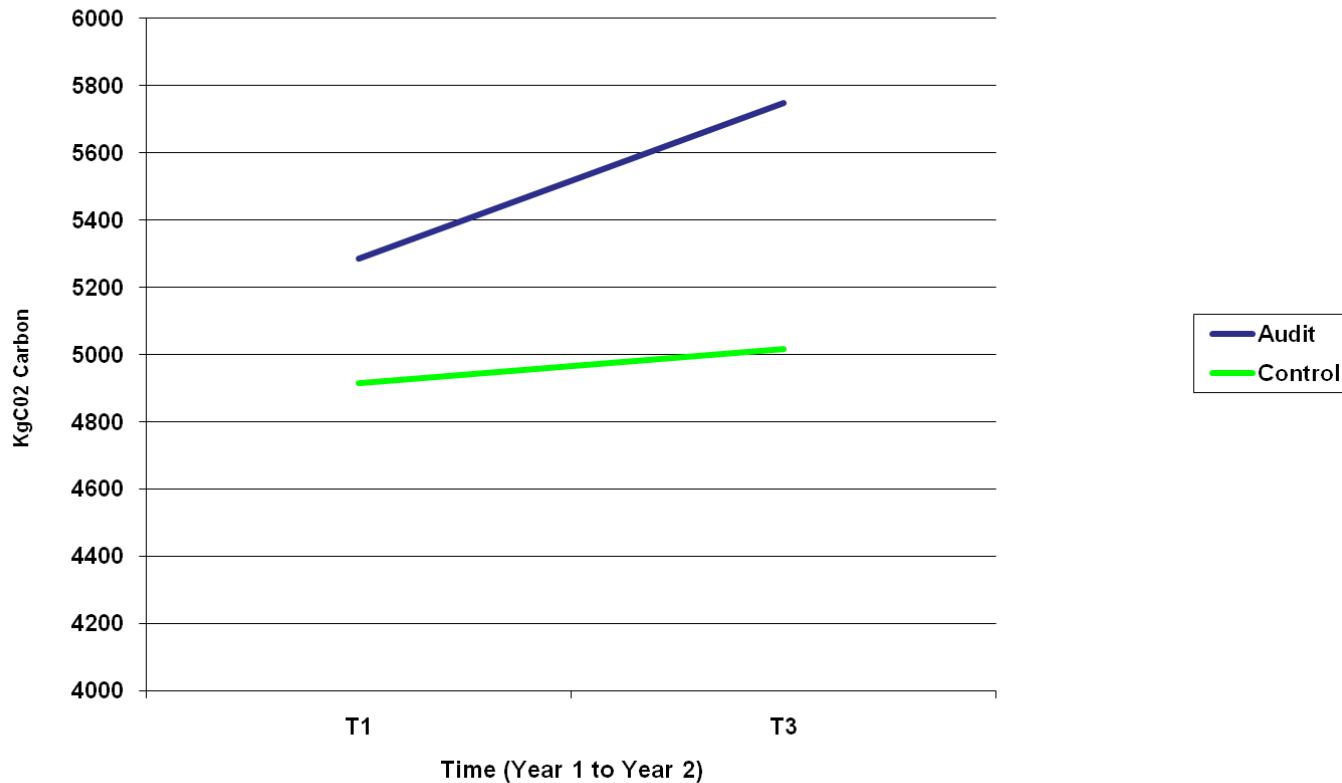
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# EFFECT ON ENERGY CONSUMPTION

Graph Showing Change in Carbon Footprint from Energy Usage in the Home (KgCo2)



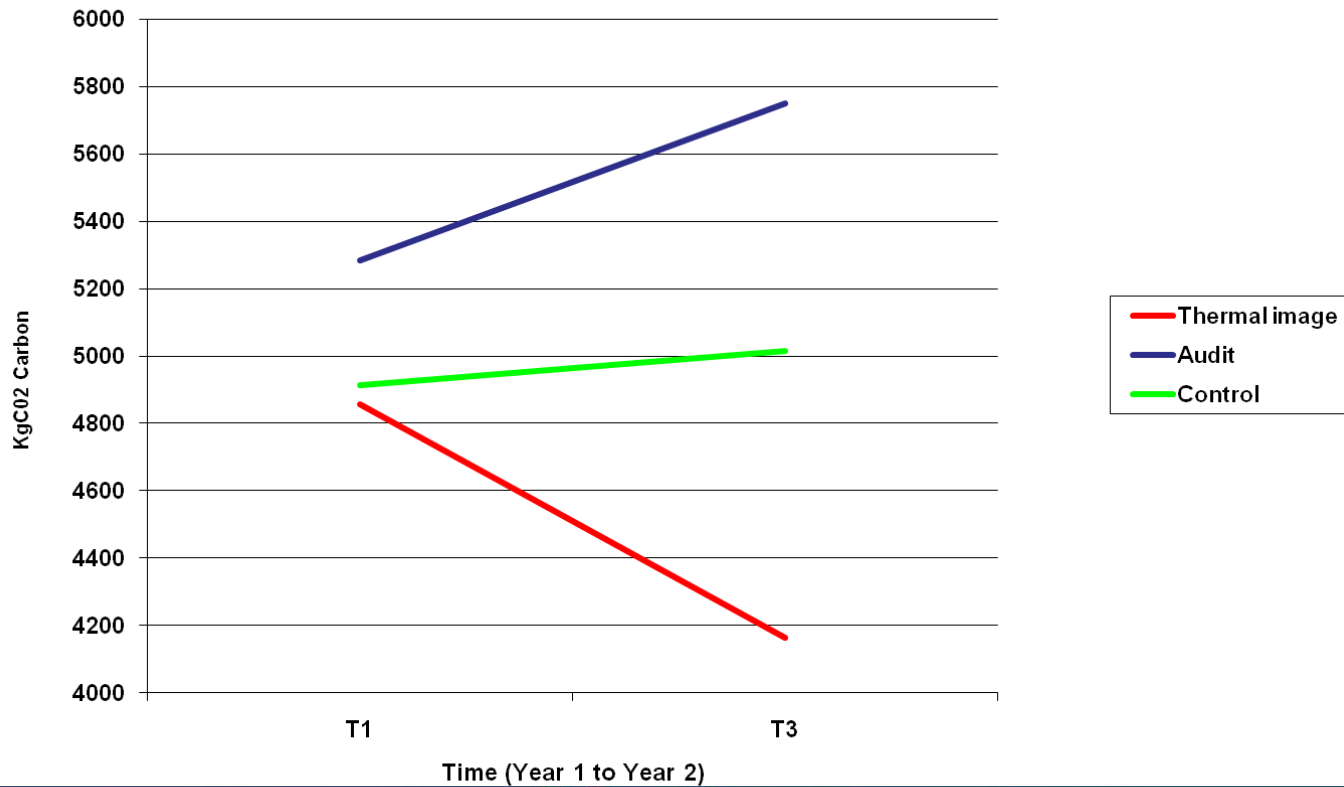
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# EFFECT ON ENERGY CONSUMPTION

Graph Showing Change in Carbon Footprint from Energy Usage in the Home (KgCo2)



# NO OF ENERGY CONSERVING BEHAVIOURS TAKEN

Thermal Image	Audit	Control
		8



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# NO OF ENERGY CONSERVING BEHAVIOURS TAKEN

Thermal Image	Audit	Control
	21	8



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# NO OF ENERGY CONSERVING BEHAVIOURS TAKEN

Thermal Image	Audit	Control
42	21	8

(Significant trend; most actions were taken by the TI group, followed by the CF group with the least actions taken by the control group ( $J = 178.00$ ,  $z = -2.80$ .  $r = -.43$ ,  $p = .005$ ).

**.....the odds of a householder taking at least 1 energy saving action was 5x greater for those who did see the thermal image compared to those who didn't see it.**



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# STUDY 2

- 61 out of 100 homes imaged
- and energy conserving behaviours followed up.



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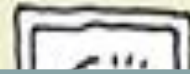
Welcome to the 21st Century Living Project

# 21st Century Living Project



- Exploring energy, water, waste & lifestyle
- Helping to answer householders questions
- Generating & sharing positive ideas
- Getting to grips with 21st century living

THERMOSTAT



Project Start July 2008  
audit of homes



July to January  
environmental interventions



Thermal Imaging  
January - April 2009



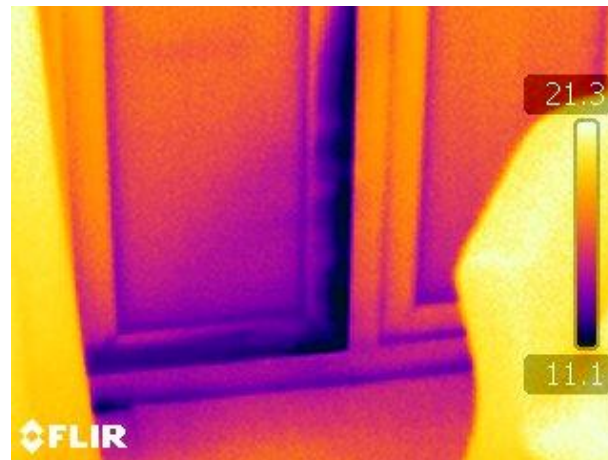
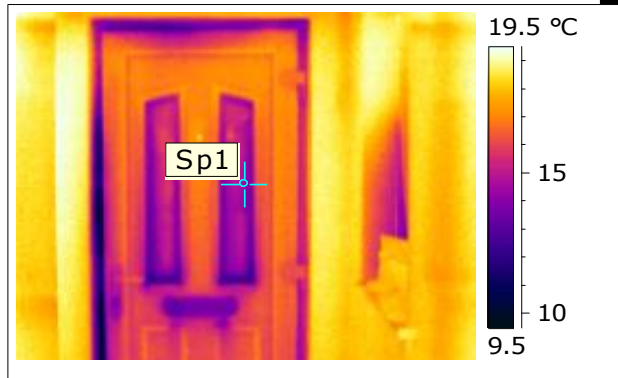
Interim Questionnaire April  
2009



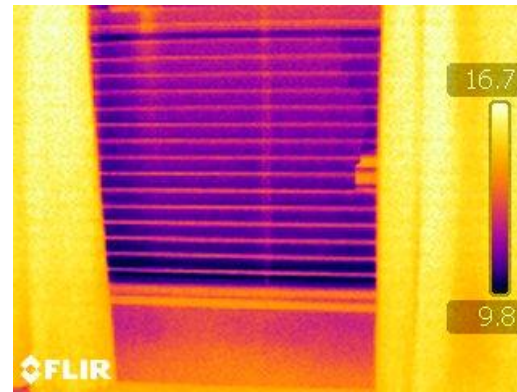
Final Questionnaire and  
Audit October 2009



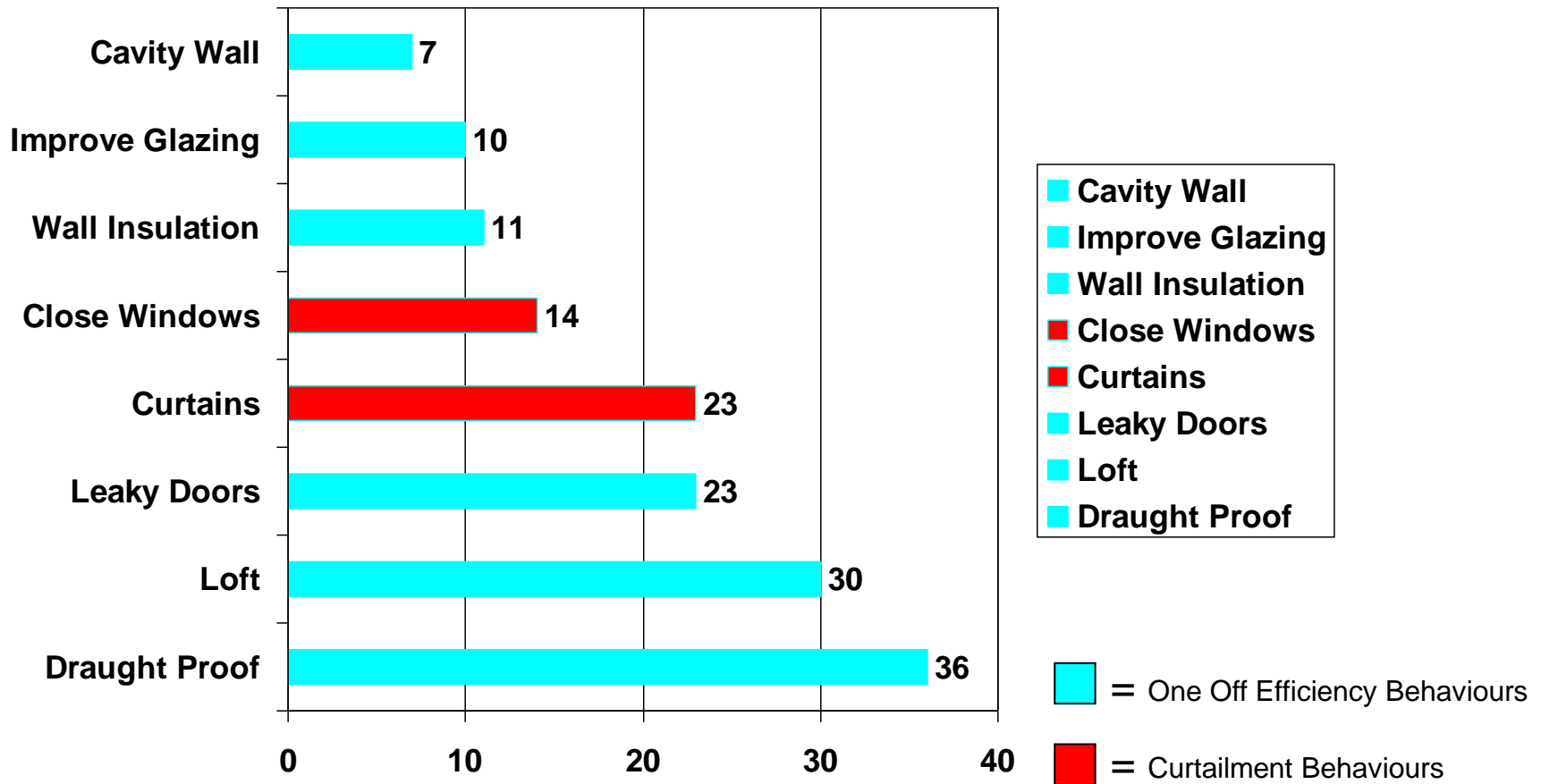
# Antecedent for Draughtproofing Doors?



# Antecedent for Closing Windows & Curtains?



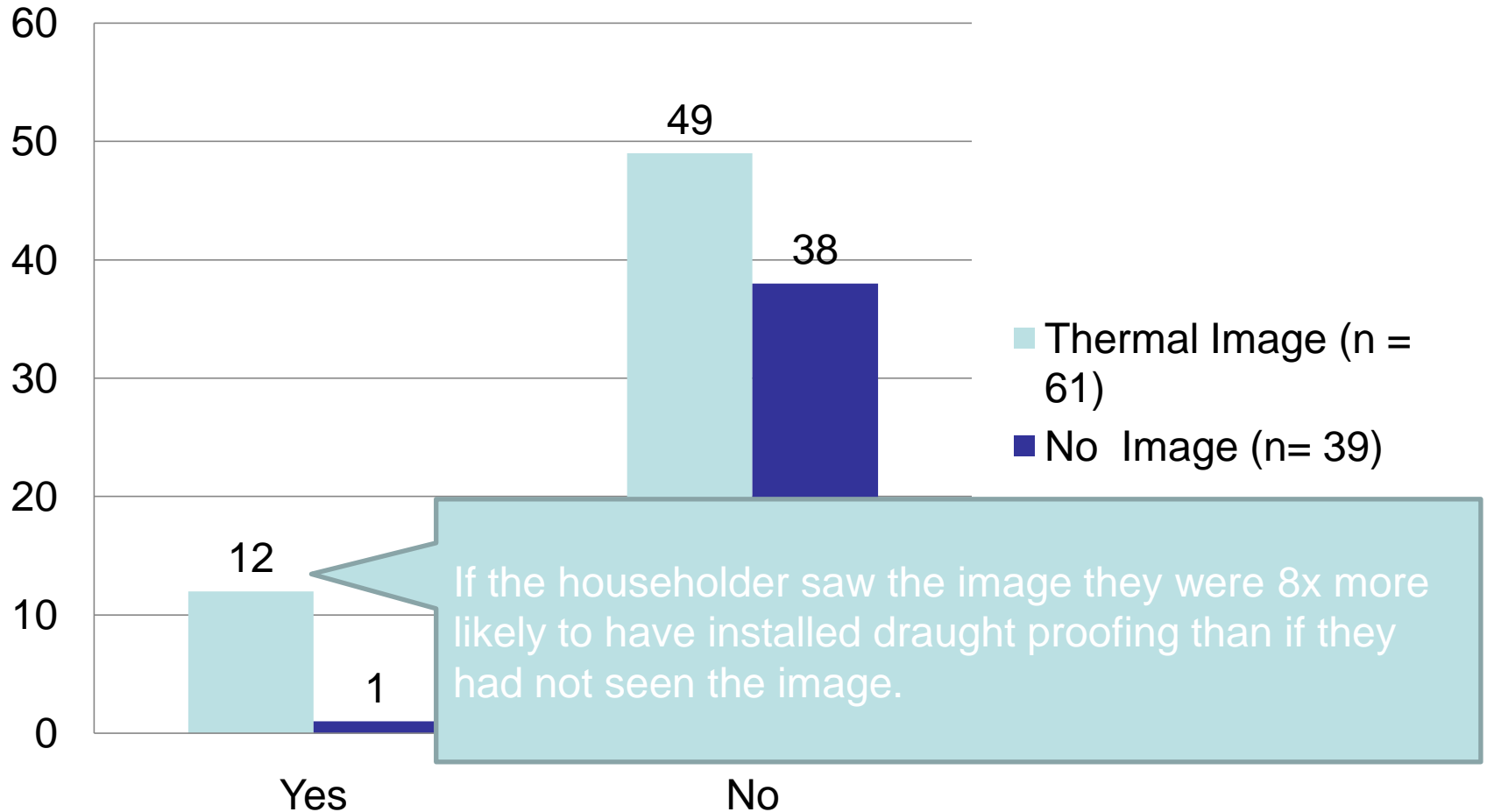
# ENERGY SAVING ADVICE IN IMAGES/REPORTS



# Draughty Doors



# Number of Households Installing Draught Proofing Measures



# QUALITATIVE RESULTS:

## A REASONING PROCESS: Leading to the PROMPTING of ENERGY SAVING ACTIONS

Image 'newness' attracts attention

Viewer orientates the image to their home, superimposing what they know of their home

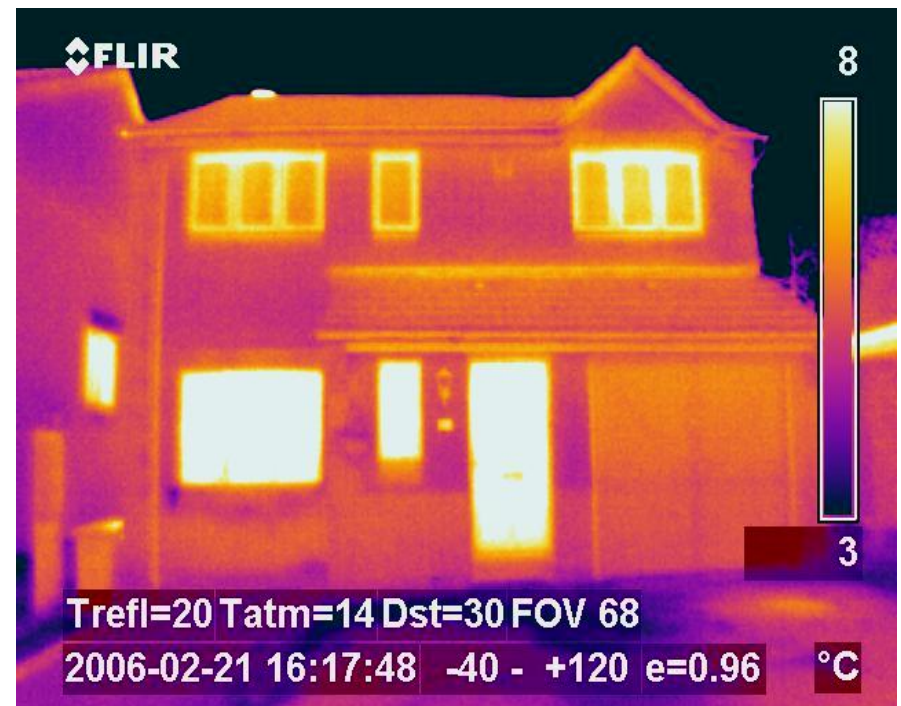
Image contains something salient to the householder

Visual information evaluated - 'correct' knowledge applied, 'cause and effect' identified, action idea retrieved and suggested

Participant accounts for the image information, have I taken action, what action can I take, are their barriers, is this relevant to me?

Reject or Accept Prompt

(Iterative Process)



# Conclusions

- Manner of presentation does make a difference (visual,concrete)
- Householders a little more likely to take simple (one off efficiency) energy saving actions after seeing evidence in the images.
- Reasoning process suggests that ‘cause and effect’ feedback is important.
- BUT.....dependent on contextual factors and individual factors.

- Thank you
- Questions?

– [julie.goodhew@plymouth.ac.uk](mailto:julie.goodhew@plymouth.ac.uk)



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