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Health and our homes

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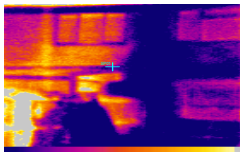
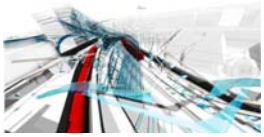


Understanding, Challenging and Shaping the Built Environment

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Structure of presentation

1. What are the current health problems associated with UK housing?
2. How much ventilation and why?
3. Most of us live in healthy homes, but will we in the future?

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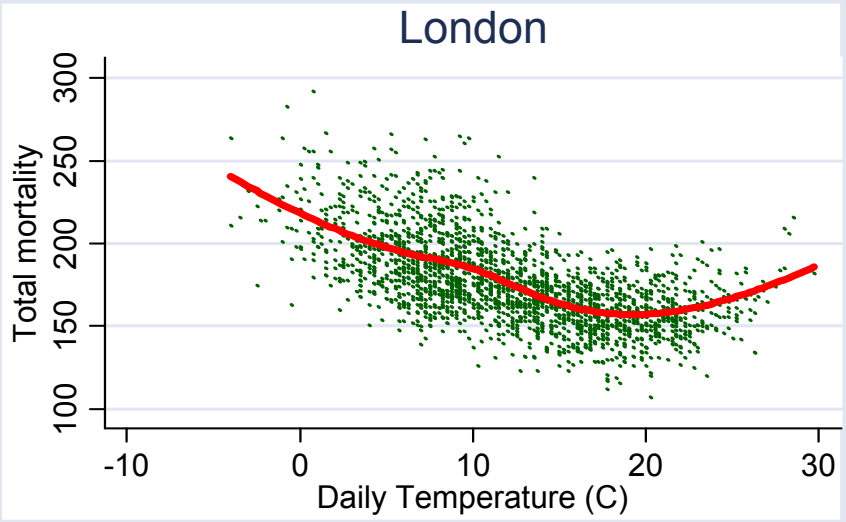
25,700 excess winter deaths in UK 2005/06



Kovats et al, London School of Tropical Hygiene and Medicine

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Warm Front Grant

- Insulation
  - Loft
  - Cavity
  - Hot water tank
  - Draughtproofing
- Heating
  - Gas or electric room heaters
  - Central heating
  - Timer controls for electric space and water heating
- Other measures
  - Two low energy light bulbs
  - Energy advice
  - Security measures
- Up to £2,500

Insulation measures
- Loft insulation.
- Draughtproofing.
- Cavity-wall insulation.
- Hot-water-tank insulation.

DEFRA
Department for Environment, Food & Rural Affairs

eaga partnership

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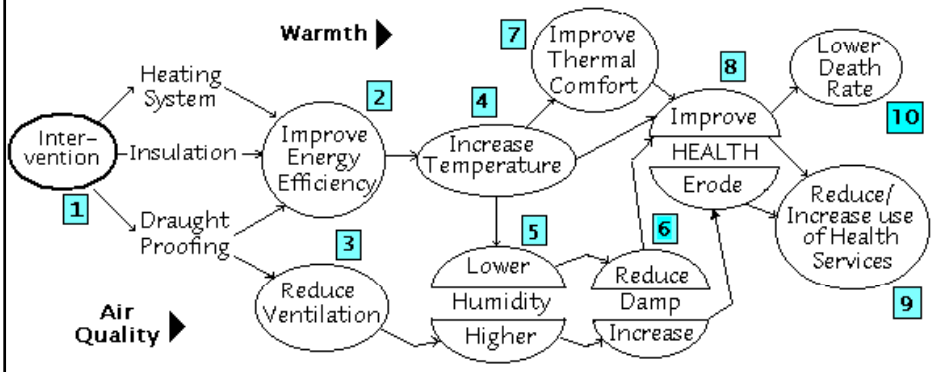
Hypothesisied pathways from *Warm Front* intervention to improvements in health



Survey data gives the study sufficient power to detect clinically important changes in temperature, thermal comfort and quality of life (2-8) as well as the use of primary care services (9). Changes on mortality (10) and hospital admissions (part of 9) are measured indirectly

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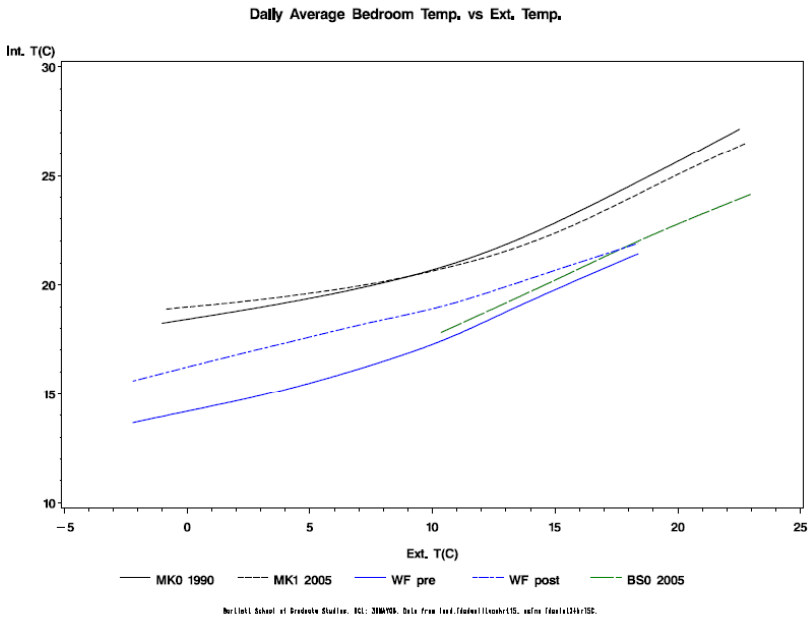

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WARM FRONT CONCLUSIONS

(1) Energy efficiency may influence health through multiple routes

(2) WF heating + insulation up-grades increase temperatures by approx. 2 °C

(3) No evidence of adverse impact on damp or air quality

(4) Evidence of improved mental status & thermal comfort

(5) (Indirect) evidence of reduced risk of winter morbidity/mortality

(6) Interview evidence of benefits to social interactions, well-being

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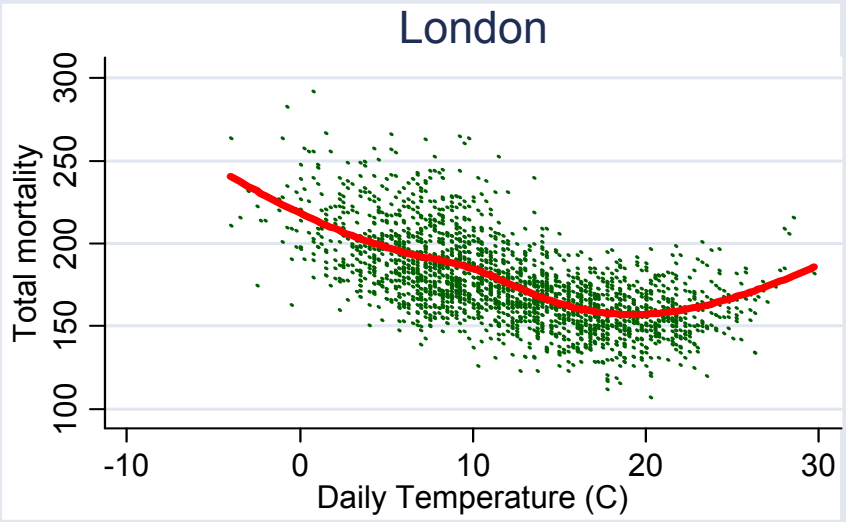
2,139 excess summer deaths in 2003, 680 in summer 2006



Kovats et al, London School of Tropical Hygiene and Medicine

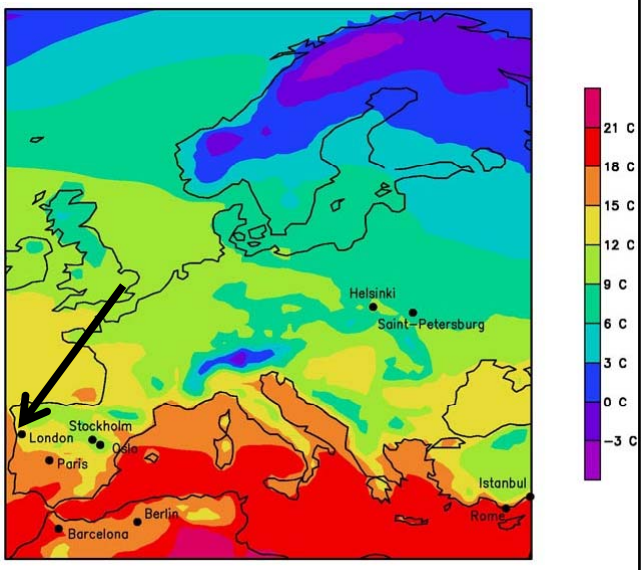
Climate 2071

In the UK the climate we are changing too somebody else is already living with?

The UK is not at the extreme ends of climate change

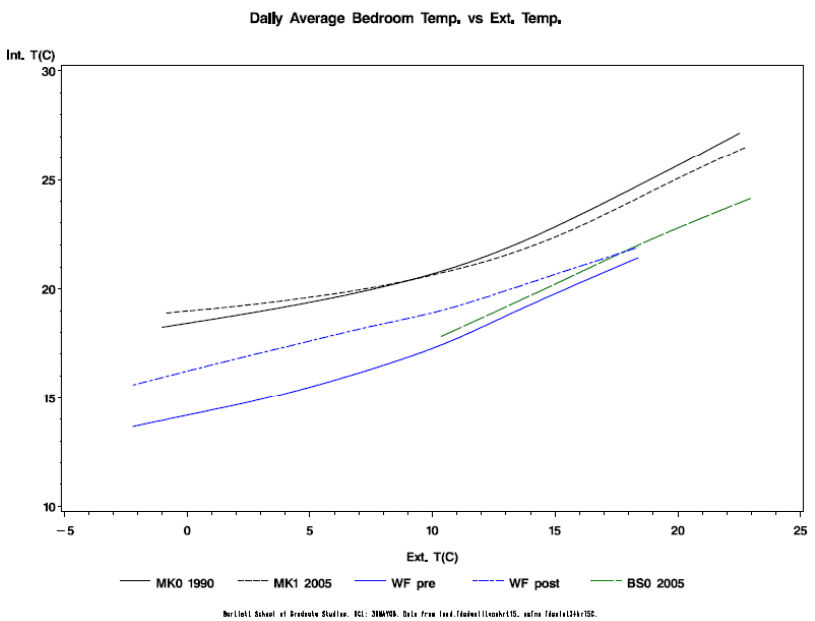
Old buildings can not adapt as easily as new?

Biggest risk is one nobody has thought of.



This "map" shows the equivalent climate cities can expect in the future: for example, London of 2071 most closely matches the climate of the west coast of Portugal today.

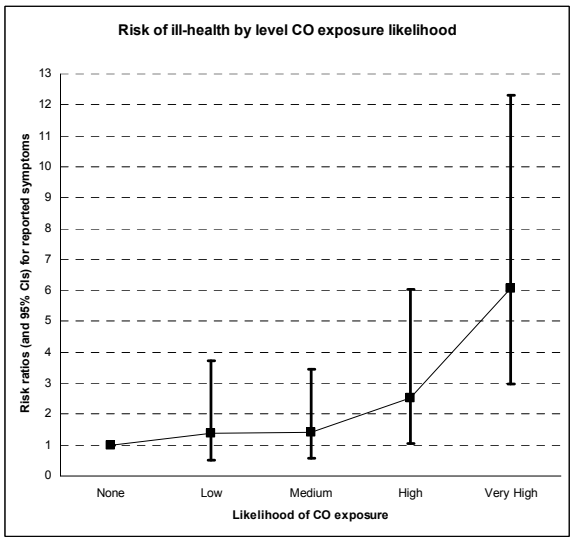
Photograph: Centre International de Recherche sure l'Environnement et le Développement and Ecole Nationale de la Météorologie, Météo-France.



Carbon Monoxide Conclusions

- Around 20% of homes had at least one problem gas appliance installation.
- The presence of a problem gas appliance installation does not mean that the householder is exposed to high levels of CO.
- Gas fires were most frequently the cause; 26% of gas fires being “At Risk” or “Immediately Dangerous”, 7% of cookers and 5% of boilers.
- A high or very high risk of potentially dangerous CO exposure was estimated for 8% of homes.
- CO related health symptoms appear linked to CO exposure.

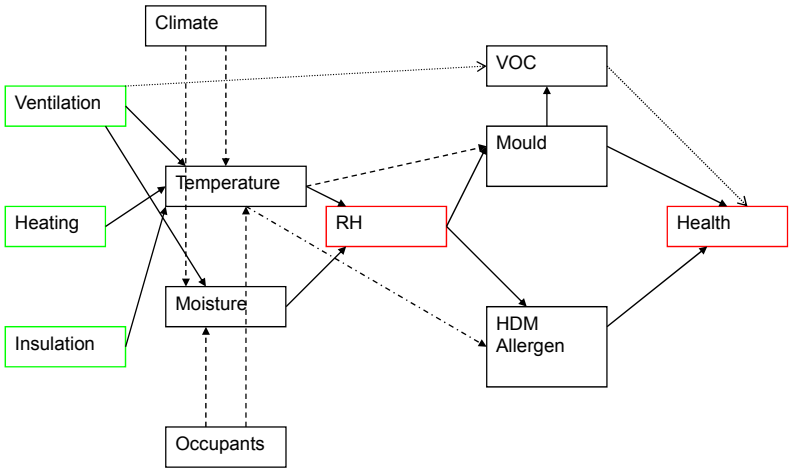
Symptom risk by CO exposure



Asthma, Moulds, Mites and Relative Humidity

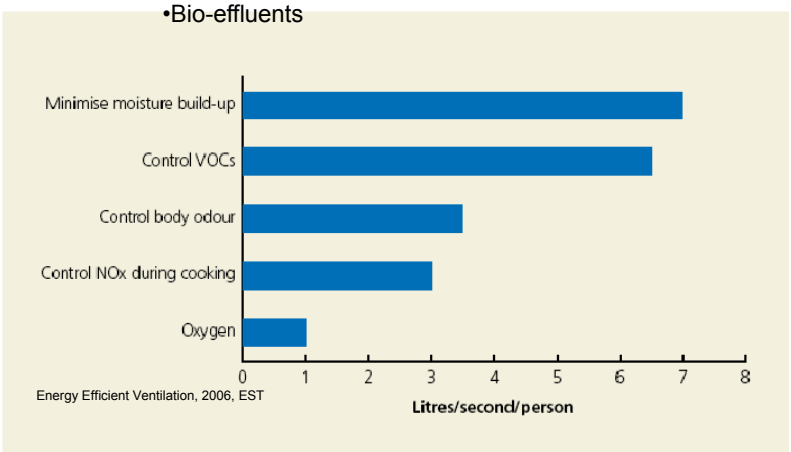
- Asthma costs the UK £2 billion per annum in fatalities, medication, and lost working days[1].
- The majority of asthmatics are sensitised to house dust mite faces and mould spores and that relative humidity is a key environmental parameter in the control of the population of HDM and mould growth
- 15% of English dwellings have mould growth (1996 EHCS)

[1] Mr. Chaytor, Oral Answers to Questions, Commons Hansard Debates text for Tuesday 6 May 2003, Volume No. 404, Part No. 389, Column 666



Ventilation Performance Criteria for Dwellings (BRegs 2006)

- Mould
- NO2
- CO
- TVOC
- Bio-effluents



Energy Efficient Ventilation, 2006, EST

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Mould Growth

- BRegs Performance Criteria
  - No visible mould on external walls
- Maintain relative humidity below 70%

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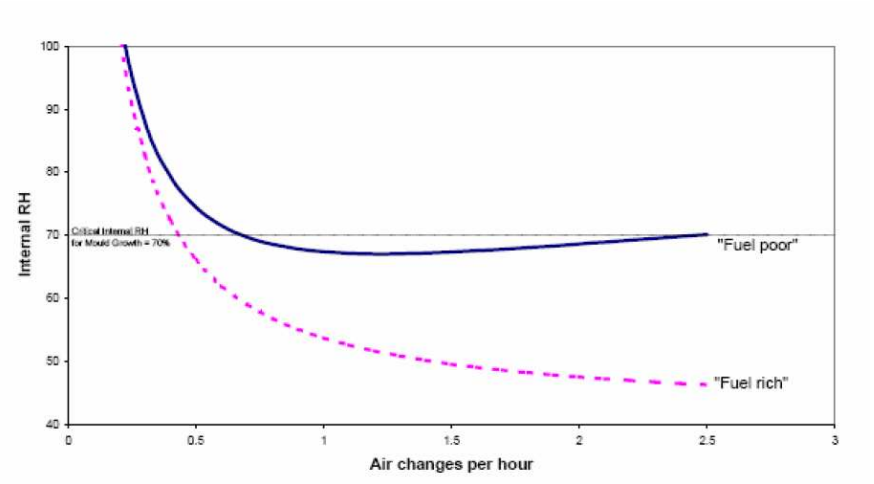

Figure 3 - The impact of increased ventilation on internal relative humidity

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EPSRC

The Environmental Control of House Dust Mites:
Validation of a Combined Hygrothermal Population Model

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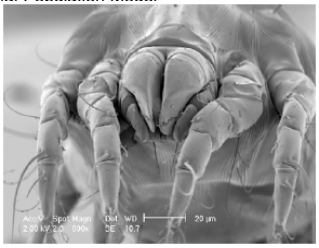

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National Energy Services Ltd.

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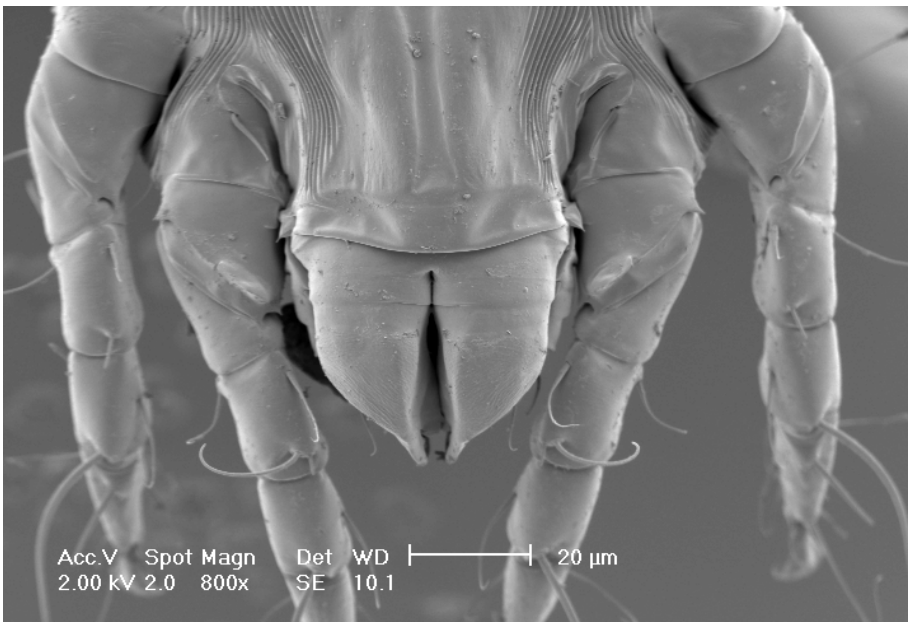
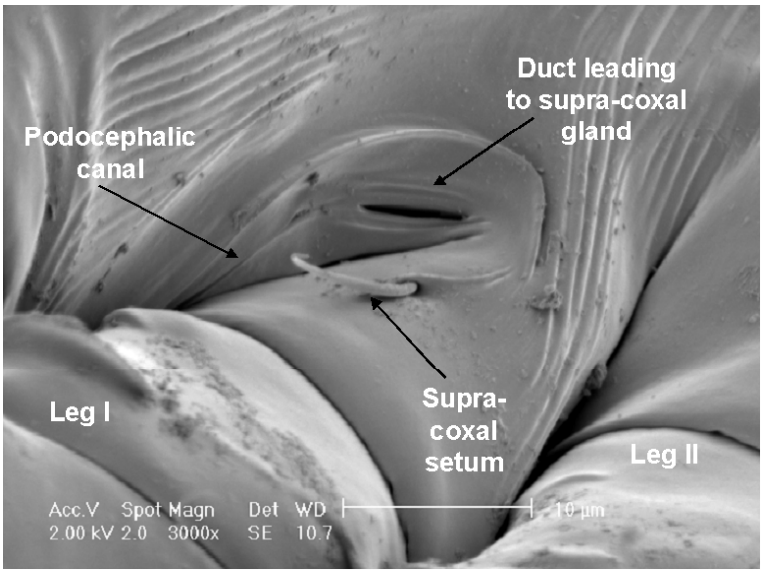
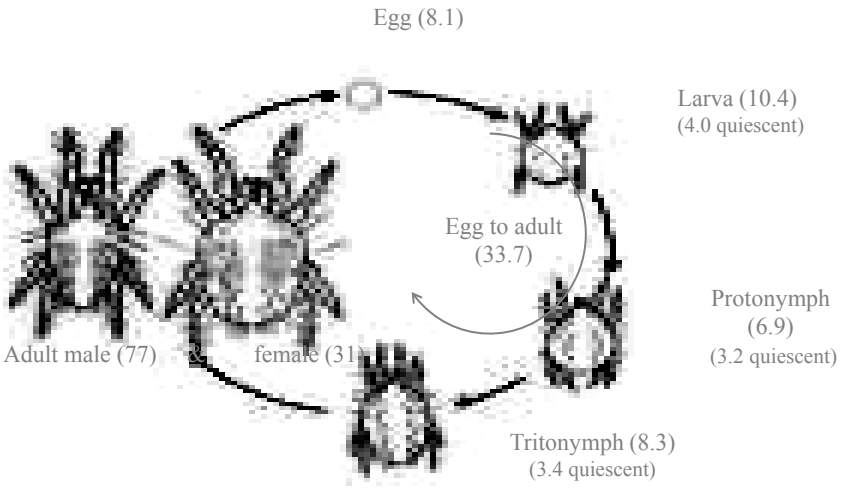




The 5 stages of the mite life cycle

(duration in days at 23°C and 75% from Arlian et al 1990**)**



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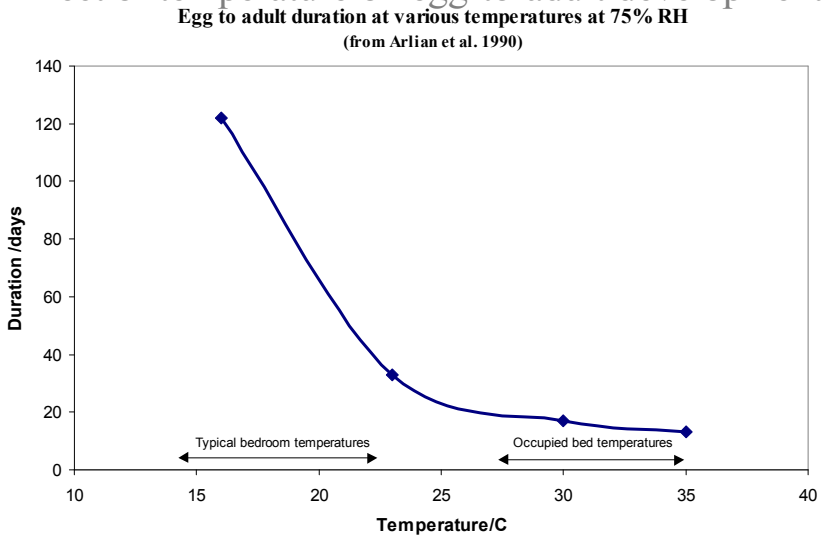
Effect of temperature on egg-to-adult development



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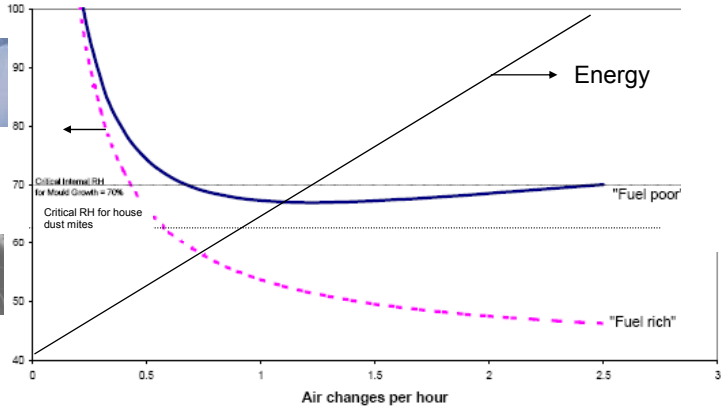
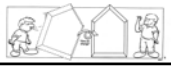
House Dust Mite Results

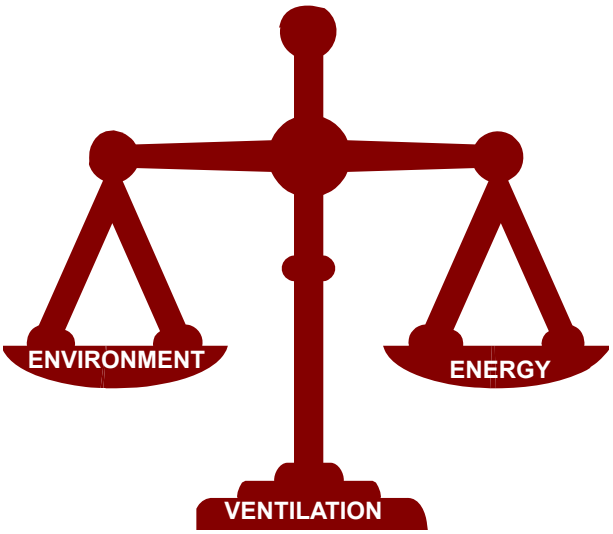
- Reducing ventilation from 0.5 to 0.4 ach = 100 x more mites
- Raising bedroom temperatures from 16ºC to 18ºC = ten times less mites
- Increasing the number of occupants from 4 to 6 = 10,000 more mites.
- Highest mite populations should occur in SW England, followed by Northern Ireland, with London having the lowest.
- Climate change will result in a significant increase in mite populations. For example a typical bed in London is predicted to have 80 times the population of mites in 2050.
- Simple calculations indicate that a mattress may theoretically be able to sustain up to 1.5 million mites

Domestic ventilation the balance between health and energy





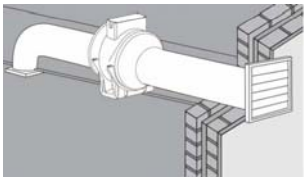
Ventilation 20% of the average UK building heat loss



Build Tight

http://www.greenspec.co.uk/html/lowcarbon/lowcarbonaircontext.html

Ventilate Right



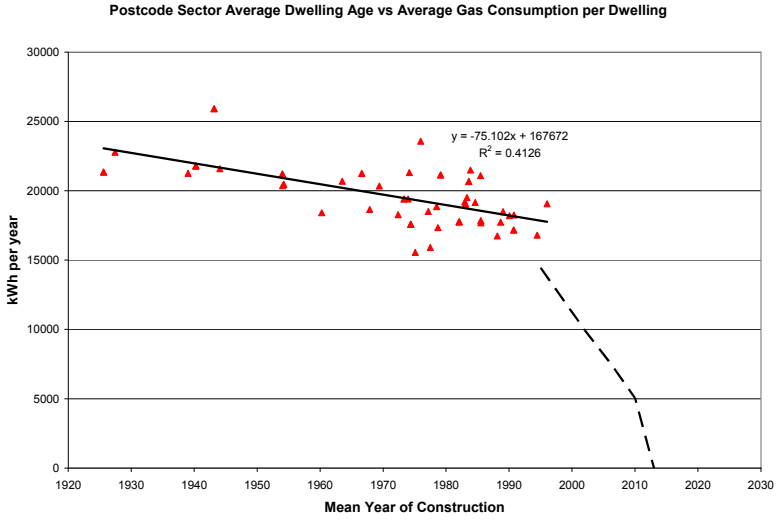
Adapting to mitigation! The challenge

- Over the course of the 20th Century, energy from fossil fuels became an essential input to all categories of goods and services.
- Global fossil energy use and CO_2 emissions grew by more than an order of magnitude, with most growth occurring in industrialised countries.
- Targets are now being set around the world to reduce CO_2 emissions. For example, the UK is currently legislating for a 60% reduction by 2050.
- No developed countries have achieved such large reductions

The Future?

- Will require
  - New occupant behaviour
  - New and better developed technologies and materials
  - Better installation and maintenance.

Mitigating climate change the challenge



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Acknowledgement

Complex Built Environment Systems Group

http://www.cbes.ucl.ac.uk/