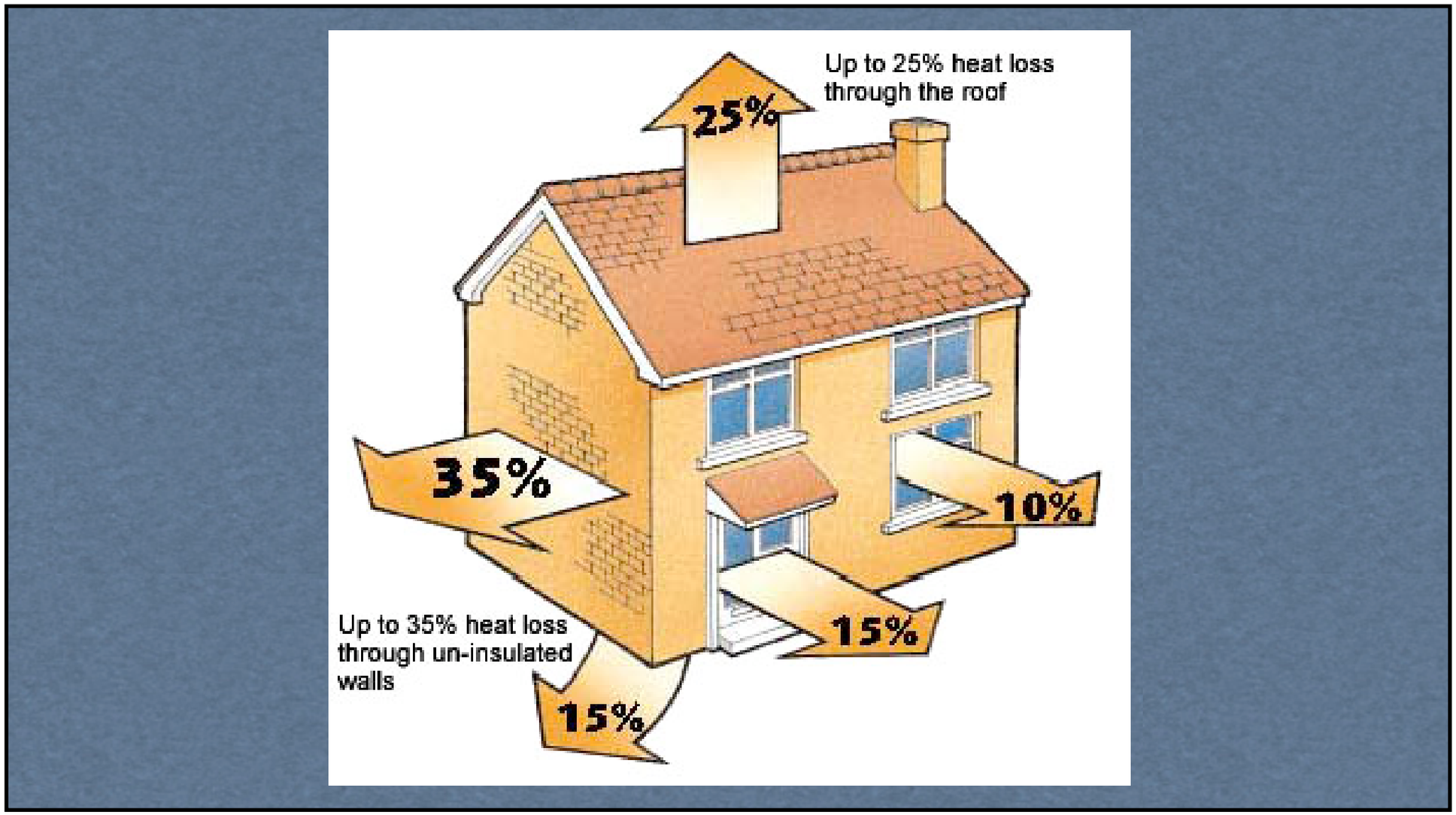
Eco Retrofitting Your Home

don't panic!

You Are Not Alone:
The Scale of the Challenge

- It has been estimated that in the year 2050, 80% of British housing stock will still be poorly insulated.
- On television, we don't so much need programs like *Grand Designs*, as we need a program called *Great Green Retrofit* . . .

Where the heat goes



The Prioritised Hit List:

- Cavity wall insulation (applies to houses built between 1920s and 1980s).
- 50 mm minimum, 100 mm better. May need external insulation as well.
- Typically mineral or glass wool, expanded polystyrene, urea formaldehyde injected into the cavity.
- see resources for guarantees, installers, etc.

Solid wall insulation, internal

- min 50 mm. thermal performance can vary significantly between materials: phenolic, expanded polystyrene, aerogel, tri-iso bubble wrap and foil.
- Not as effective as external insulation due to thermal bridging, and loss of thermal mass in the room.
- Is cheaper to install than external insulation
- see resources for materials and advice

Solid wall insulation

- external eg. acrylic render on solid insulation panels. Typically £8000—12,000 per property.
- Timber cladding over insulation also popular
- Is much more effective due to continuous wrap of house, and integral draught proofing

Roof or loft insulation

- One of the most important, and cheapest, insulation measures
- Roof insulation can include between-rafter material, and an insulated lining on top.
- Eaves ventilation must be maintained
- For loft insulation, aim for 250-300 mm total, some between, some above joists.
- A vapour check layer may be needed: also attention to wiring conduits.

Floor Insulation

- aim for 100 mm minimum.
- Insulation can be suspended on mesh between joists
- On solid floors rigid insulation can be laid beneath floor boards.
- Also, latex underfloor products are available
- Ventilation beneath floor must be maintained.

Other insulation

- Insulation/reflector panels behind radiators on external walls
- Lagging on hot water pipes, where missing
- Lagging on hot water cylinder
- Older external doors may be replaced with better insulated ones. A double-glazed panel will insulate better than timber and allow sunlight in if facing SE to SW.
- Curtains made from thermal/blackout material can significantly improve the comfort level in a room and conserve energy.

Glazing

- Double glazing: ideally with 16 mm spacing bar, low-E glass, Argon filled.
- Consider even tertiary glazing on large or non-opening panes (shrink plastic, double-sided tape).
- Minimum U-value 2; a small increased cost can reduce this to 1.8.
- Try and avoid PVC. Modern timber windows perform very well, including the finishes.

Draught proofing

- Doors, windows, letter boxes, skirting boards, pipe work, exhaust fans, loft hatches: all can be fitted with effective draught seals
- Silicone (flexible) will accomodate movement in materials while maintaining seal.
- Fit louvred or self-closing exhaust fans
- Eradication of draughts may raise air quality issues due to non-eco-friendly materials. Minimum ventilation levels must be maintained: e.g. trickle vents on window frames

Heating: Boilers and controls

- Substantial savings possible when replacing boilers over 15 years old with condensing boilers.
- Room thermostats and programmable timers limit heat to where and when it is needed. Thermostatic radiator valves allow room-by-room control.
- Consider biomass boilers or stoves
- Consider setting up a district heating system with one or more neighbours. This will expand your options: heat pumps, biomass.
- Wood pellet and wood chip boilers can be a bit pricey for most home owners, as can a ground-source heat pump.

Heating: Wood pellet stoves

- Wood pellet stoves, with the option of a back boiler, are a cost-effective option when replacing a gas boiler or other heating system. These are about the size of a large wood stove.
- They are controlled by a room thermostat or programmable timer, and can store enough pellets for several days, or longer, depending on how hard they are working.
- You would be eligible for a 30% grant for one of these.

Heating: Open fireplaces

- There is just no place for an open fireplace in an eco-friendly house! It's that simple.
- If you have one of these, you are in a position to make a really significant improvement in energy efficiency, your heating bills, and the comfort levels in your house. Either block it in with an insulated panel, or replace it with a wood stove or pellet stove.

Lighting and appliances

- Lighting accounts for 15-20% of electricity bill. Appliances account for most of the rest.
- Ratings for appliances from A++ to G. A G-rated appliance uses twice the power of an A-rated one.
- Wrapping a fridge-freezer or chest freezer with additional insulation will improve its efficiency.
- At present a gas hob is more efficient than a mains electric hob due to losses in the power station.

Other measures: Water conservation

- Place a large jar filled with water in your WC cistern to reduce flush volume.
- Fit a low-flow shower head to reduce water use
- Install a water butt to collect rain water from the roof for use in the garden
- If your water use is metered, it may pay you to use rainwater to flush WCs as well, but there will be higher costs up front. Check with council regarding regs.

Lighting and appliances con't.

- Electricity consumption by home appliances is rising rapidly in the UK: greater ownership, larger appliances, standby mode. For example, large plasma TVs use more energy than their predecessors, as do larger refrigerators.
- Compact fluorescents have improved greatly. Warm colour balance is available; they warm up much quicker, and even dimmable ones are available. Ditch those dinosaur bulbs.
- LED replacements are available for halogen light fittings, and are bright enough for many situations.

Grants: Renewable Energy

- Scottish Community and Householder Renewables Initiative (SCHRI)
- Community Stream : SCHRI provides grants of up to £100,000 for communities and has a network of development officers who can provide support and advice to the communities throughout the installation process. Follow the link for your local development officer's contact details.

- Household Stream : SCHRI provides grants to householders of up to 30% of the costs to a maximum of £4,000. The installer and product must be accredited (accreditation scheme run by Clear Skies initiative).

Grants: Renewable Energy, con't

- The technologies available for funding are:

  - solar photovoltaic
  - micro hydro-electric
  - micro wind
  - solar water heating
  - solar space heating
  - automated wood fuel heating systems (boilers and room heaters/stoves)
  - heat pumps (ground, air, and water source)

- In the past grants have been limited to two technologies per applicant, but this is no longer explicit, and the restriction may have been removed.

Grants: home insulation

- First check with your council. They may have grants in place.
- Check with your electricity/gas supplier, they have grant schemes, aimed particularly at those over 65 or 70. *Warm Deal;* £500 to improve energy efficiency of your home*; Central Heating Programme*
- The government is in the process of ramping up the grant schemes run by the energy suppliers to make them more widely available and effective.

Part Two: Case Study
The Yellow House

This site tells the story of how we turned our 1930s ex-council house into our environmental dream home. We wanted to reduce our energy consumption by two thirds and renovate our home using sustainable materials, but without losing comfort or style.

THE SECRET OF AN ECO-HOUSE

- What's the secret of an eco-house? Insulation, insulation, INSULATION! Solar panels, turf roofs, windmills, heat pumps - they are all wonderful, very fancy and visible. What really makes the difference is loads of insulation - not visible, not sexy, but vital.

Thermal zones

Hot zone	20-23°	Bathrooms, airing cupboards, rooms for drying clothes, kitchen
Warm zone	18-21°	Living rooms, study, children's bedrooms
Cool zone	16-18°	Adult bedrooms
Cold zone	under 16°	Rooms that are not in use, storage rooms, garage, basement

PRINCIPLES OF ECO-DESIGN: 5. EMBODIED ENERGY

- If we want to reduce the total environmental impact of a building, we must consider the impact of the materials that have gone into its construction. Clearly no house can claim to be an eco-house if it is constructed from materials that had a major environmental impact elsewhere.

SIX PRINCIPLES FOR MAKING PRIORITIES

- ONE: the best materials are re-used
- TWO: energy conservation has priority
- THREE: aspire to self-sufficiency:
- FOUR: live like granny!
- FIVE: If you do it new, do it well
- SIX: respect the eco-house no nos

The no no's

- Timber from intact ancient forests
- Large single-glazed windows on North facing sides
- Heated conservatories or garages
- Gas patio heaters
- Curtains draped over radiators
- Electric clothes dryers
- Heated outdoor swimming pools and hot tubs
- Incandescent light bulbs

The Eco House goes well beyond energy and insulation

- Composting: yes, even worn out shoes
- Local/organic food, in season, not supermarkets
- Reusable nappies
- Allotments