

# The 40% House study: achieving 60% cuts in UK residential CO<sub>2</sub> emissions by 2050

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# Context and approach

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Goals of UK Energy White Paper, 2003:

- 60% reduction in carbon dioxide by 2050
- adequate and affordable warmth
- security of supply
- competitive markets

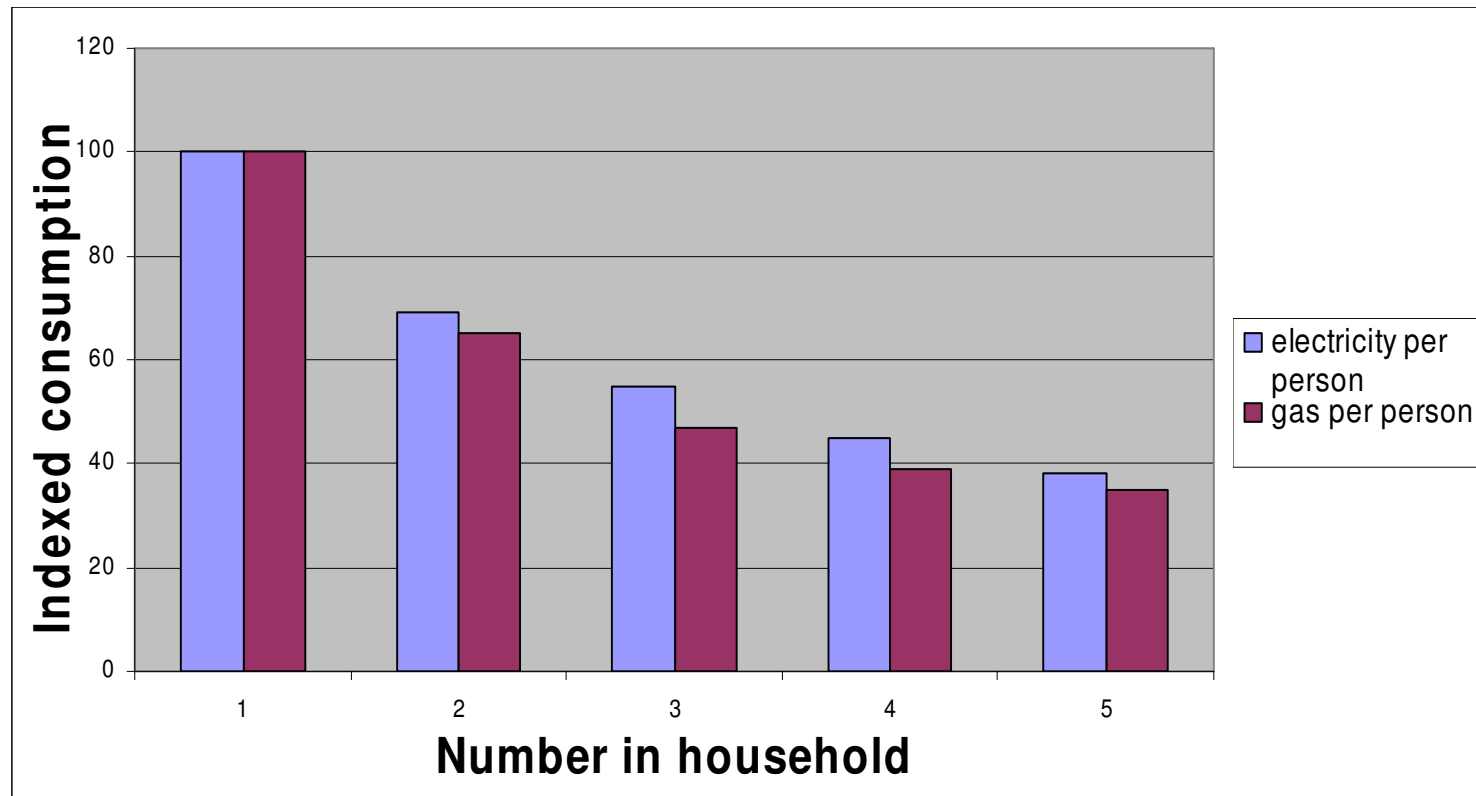
Approach: demand reduction + building-integrated renewables. Find solutions within the housing itself

# 40% House scenario - population and households

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|                          | 1996 | 2020 | 2050 |
|--------------------------|------|------|------|
| UK population            | 59m  | 64m  | 67m  |
| Households               | 24m  | 28m  | 32m  |
| Household size           | 2.5  | 2.3  | 2.1  |
| % of population aged 65+ | 16   | 20   | 25   |

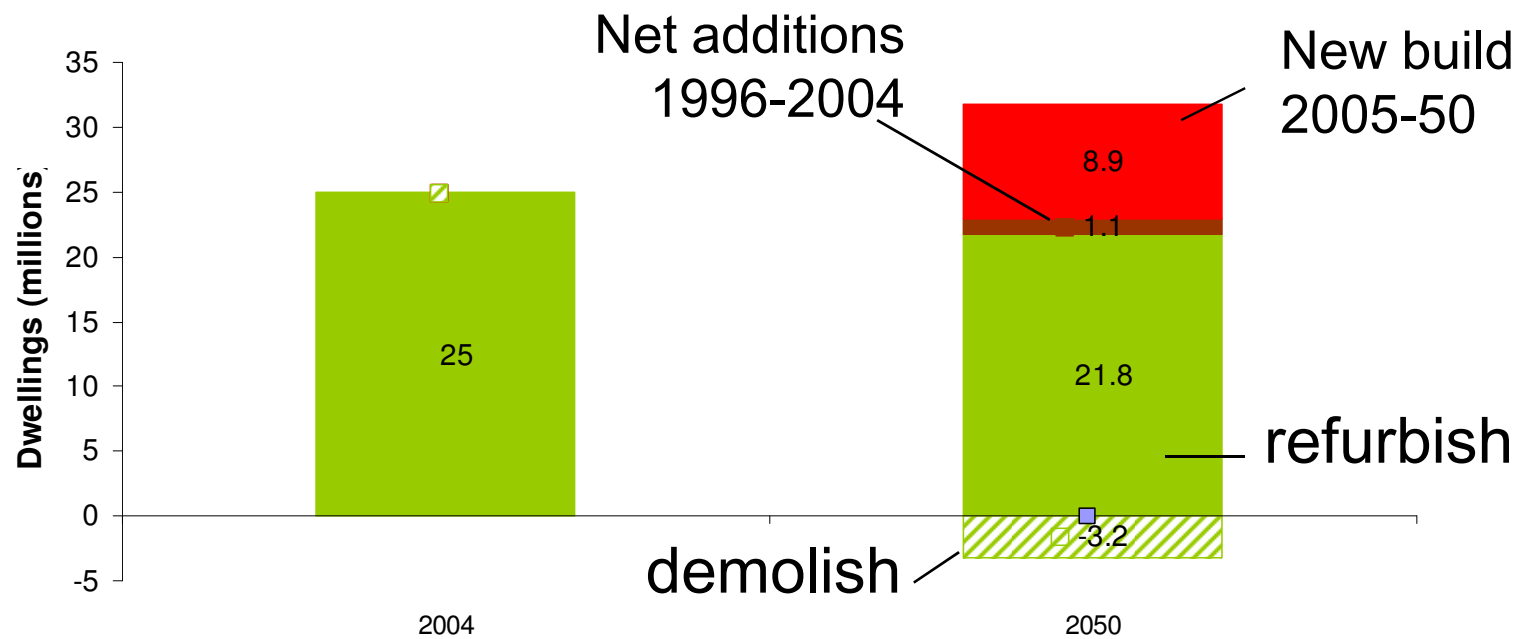
# Effect of household size on energy use per person (1-person household = 100)



Source: Fawcett et al 2000, based on analysis of EHCS 1996 data

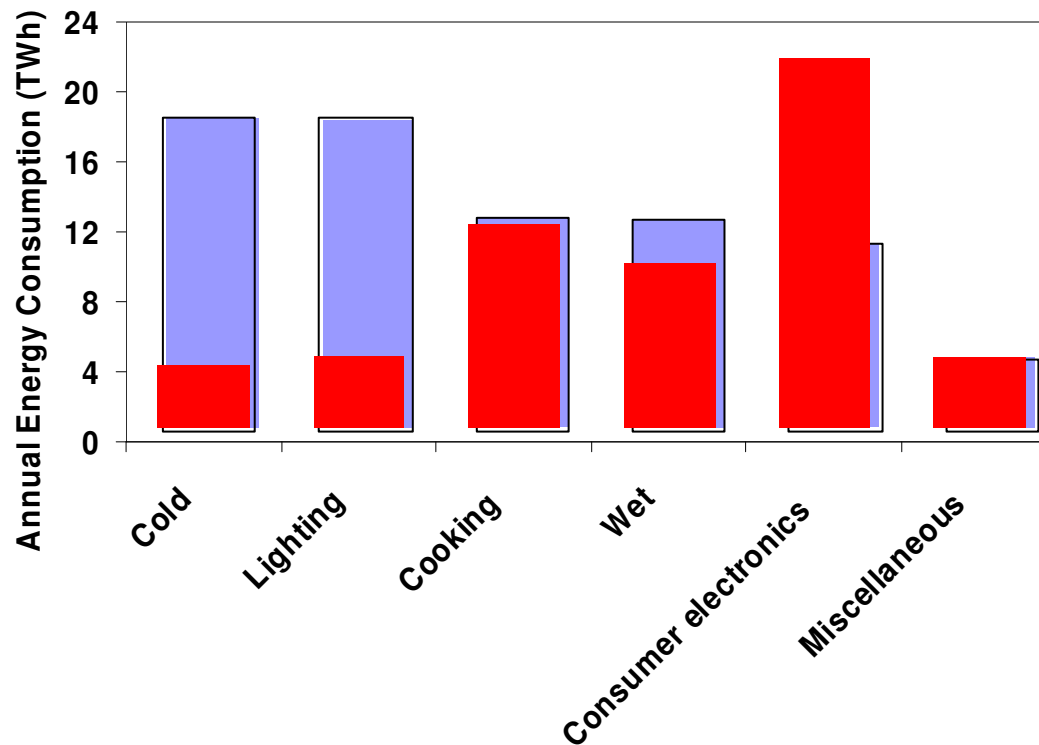
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# Housing stock changes in UK, 2004-2050



# Estimated technical potential savings in lights and appliances = 56% reduction in energy use

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# Low- and zero-carbon technologies (LZC) in the home

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|                    | Heating only                         | Heating & electricity                  | Electricity only     |
|--------------------|--------------------------------------|--|----------------------|
| <i>Low-carbon</i>  | Heat pumps                           | Combined heat & power (CHP)            | -                    |
| <i>Zero-carbon</i> | Solar thermal, biomass boiler/heater | CHP using energy from waste or biomass | Solar PV, Micro wind |

# 40% House scenario - low- and zero-carbon technologies

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- Average 1.7 LZCs per home
- 60% of homes with some form of Combined Heat and Power
- 60% of homes with solar water heating
- 90% of homes with roof-installed technology
- 80% of heat and 118% of electricity from LZC
- finance - half of homes supplied by ESCos?



## ‘40% society’ - learning from living

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- ❑ better feedback information, on consumption and generation, for more aware householders - more informative bills and display panels
- ❑ new technologies at home - generating as well as consuming
- ❑ introduction of personal carbon allowances for all direct fuel use?

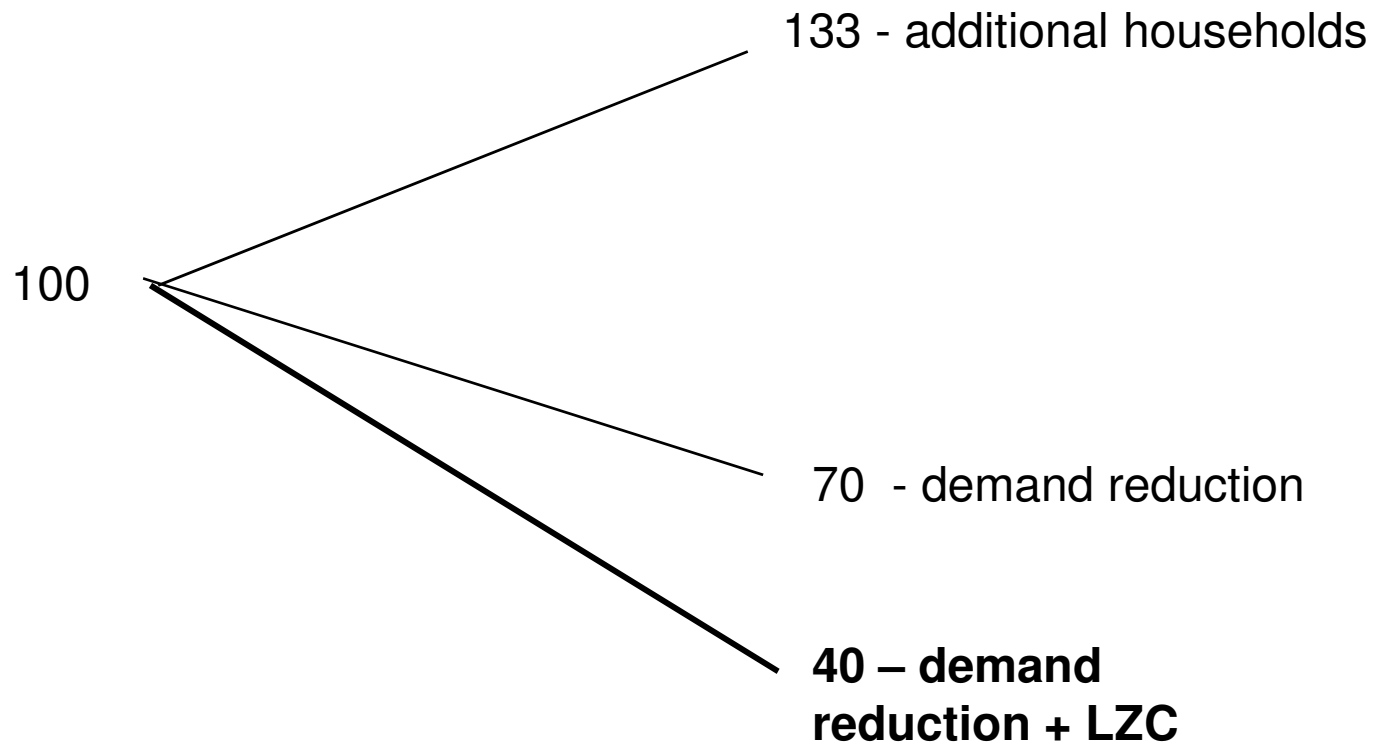
# ‘40% society’ - an infrastructure for low-carbon housing

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- ❑ recruit and train people for planning, construction, inspection, maintenance, regulation...
- ❑ certification of buildings, rewards for improvement
- ❑ minimum standards for appliances
- ❑ demonstrate and develop zero-emission new buildings
- ❑ design for passive cooling to avoid air-conditioning
- ❑ selective demolition (compulsory purchase)
- ❑ development and marketing of LZC technologies
- ❑ strengthen ability of housing authorities to plan, monitor and implement housing + energy policies

# Reaching 40%: 2/3 of savings from demand reduction + 1/3 from LZC technology

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# Summary

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- ❑ 60% reductions in carbon emissions from housing are possible, using known technology, without loss of comfort and allowing for an increase in number of households
- ❑ The solutions are social as well as technical
- ❑ There is an urgent need to shift the perspectives of the housing, appliance and energy supply industries, and to coordinate policy across Government departments.

<http://www.40percent.org.uk/>