

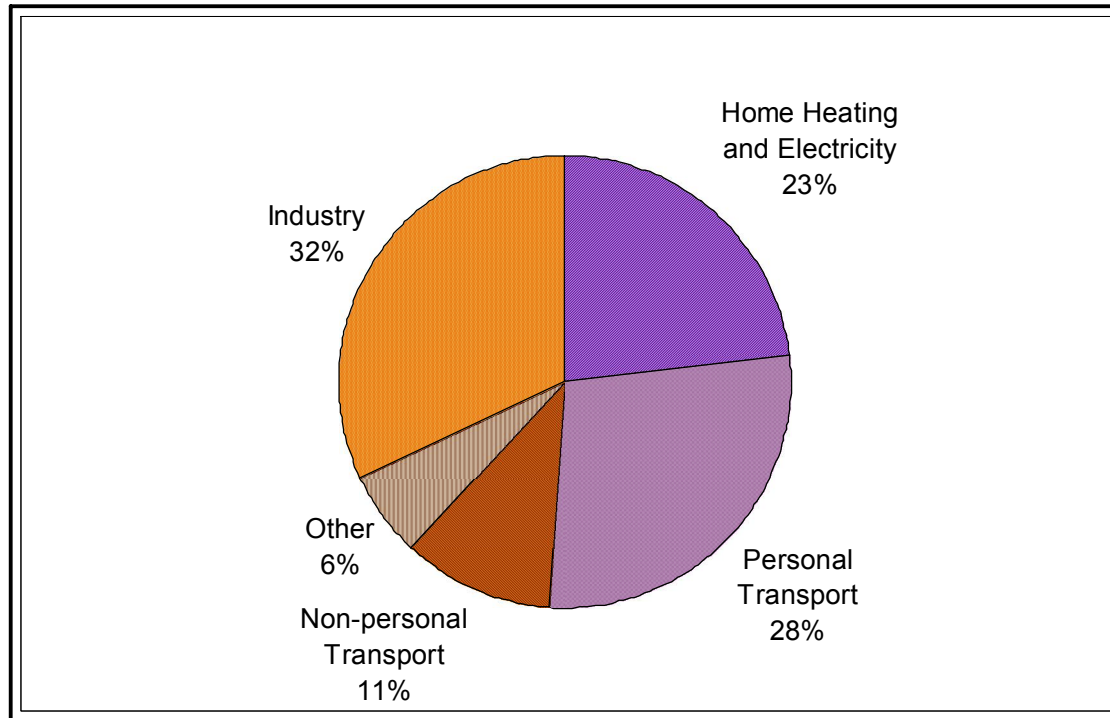


Achieving 60% cuts in CO₂ emissions from housing by 2050

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UK total energy by end-use

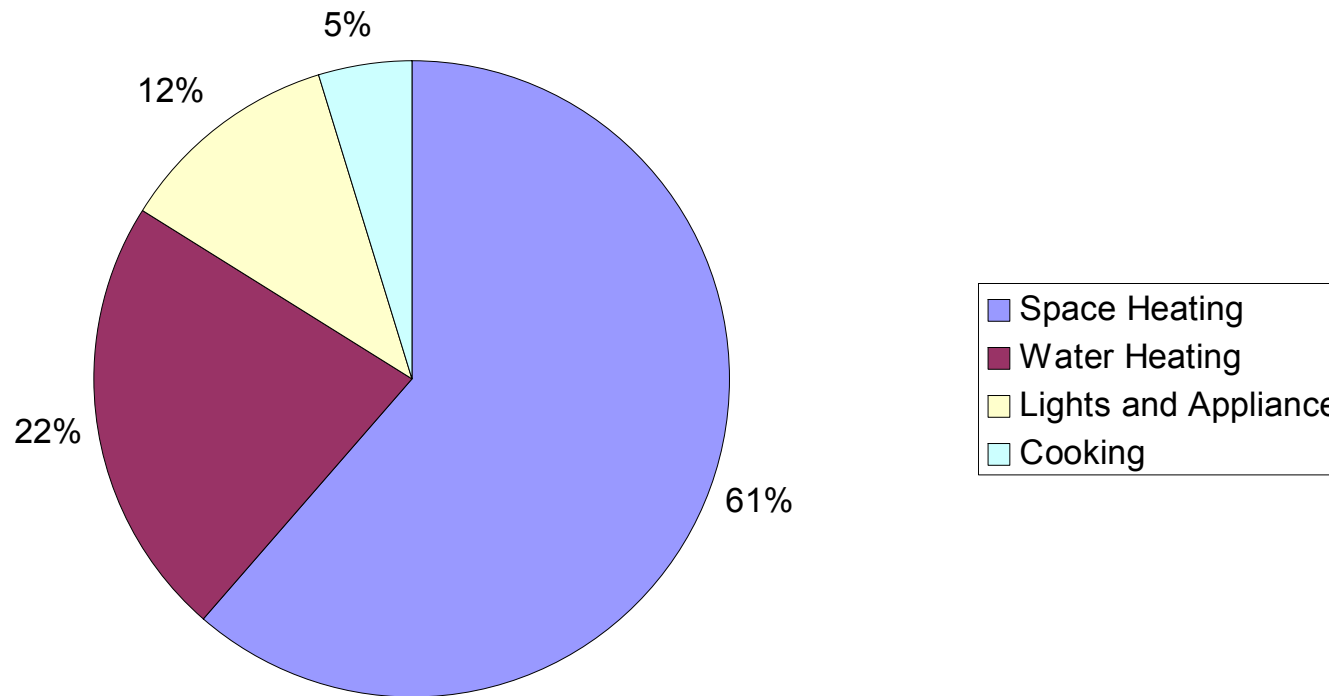


- People actions directly responsible for 50% of emissions
- Emissions dependent on lifestyle

What do we need to do?

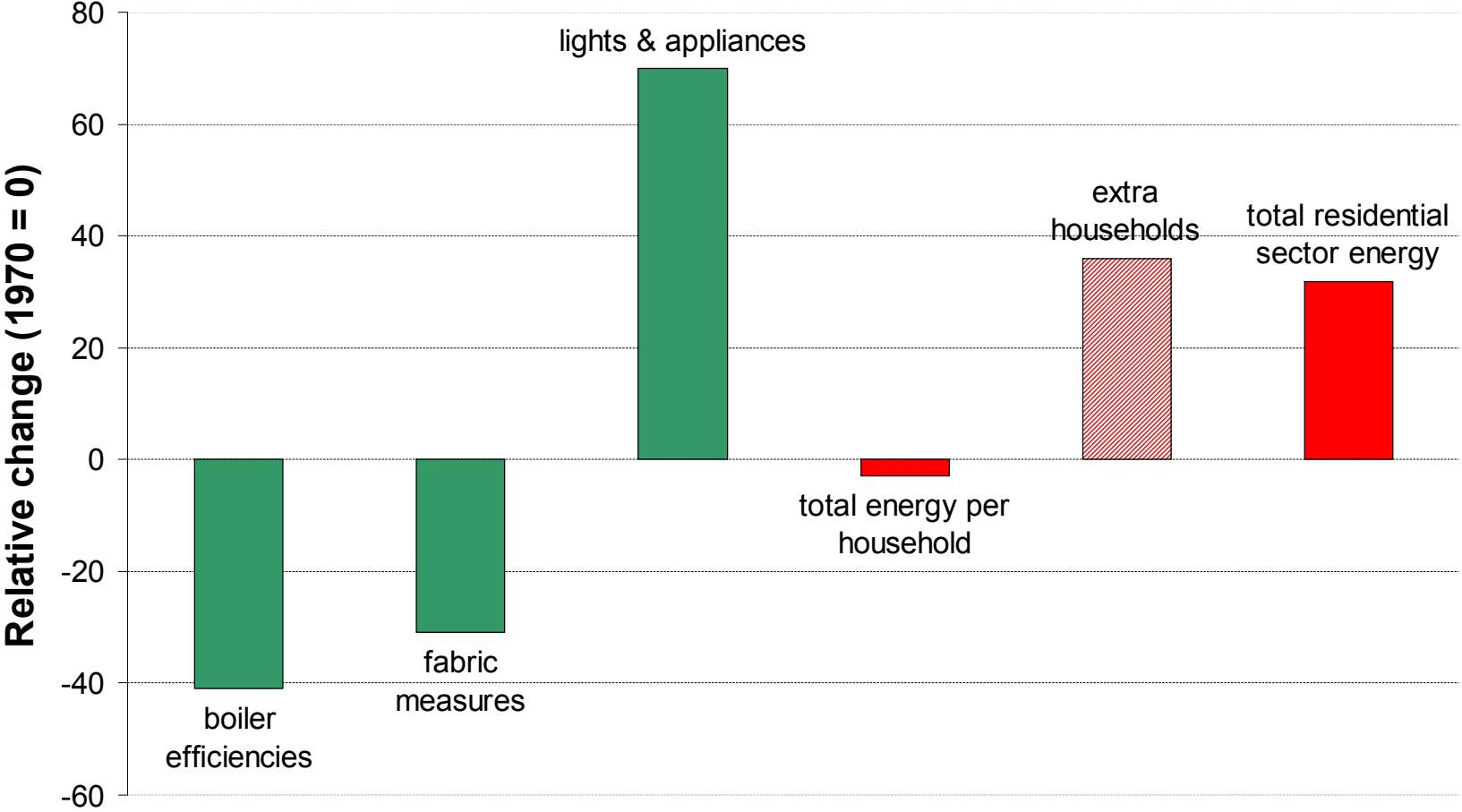
- Climate change can be averted by reducing our emissions of greenhouse gases
- The Royal Commission on Environmental Pollution recommends reducing our CO₂ emissions by 60% by 2050
- Major social changes required.
- New attitudes to energy use and sourcing

Energy Use Within The Home



- Nearly $\frac{2}{3}$ of energy goes on space heating
- $\frac{1}{4}$ of energy used for heating water
- Lights and appliances moderately small, but rising rapidly (digital etc.)

GB residential energy trends, 1970-2001



Based on Shorrock and Utley (2003)

Our context

Four objectives of Energy White Paper 2003:

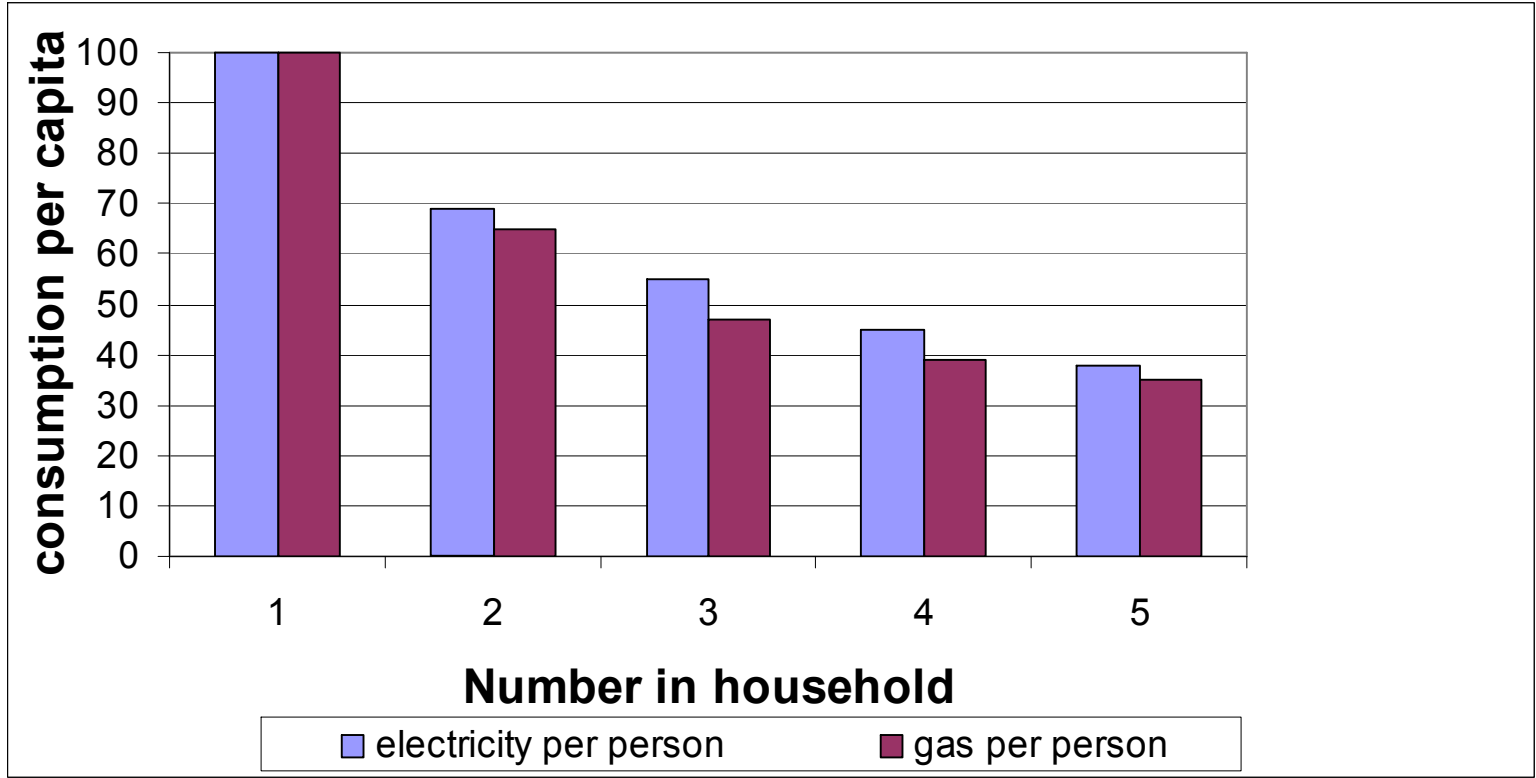
- 60% reduction in carbon dioxide by 2050
 - adequate and affordable warmth
 - security of supply
 - competitiveness
-
- Accounts for likely changes in population and climate

A growing and ageing population

	1996	2050
UK population	59m	67m
Number of households	24m	32m
% of population aged 65+	16	25

- population peaks around 2050
- design for lifetime standards and social inclusion
 - an opportunity to save energy while improving quality of life

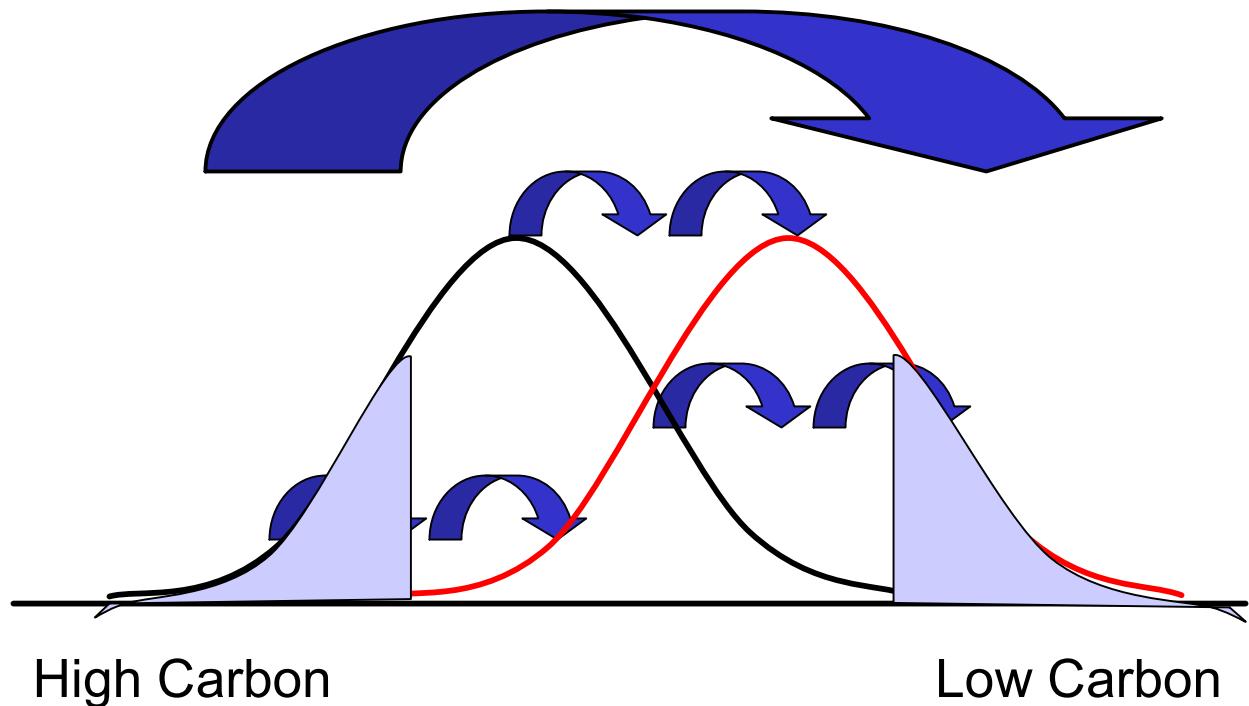
Effect of household size on energy use



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



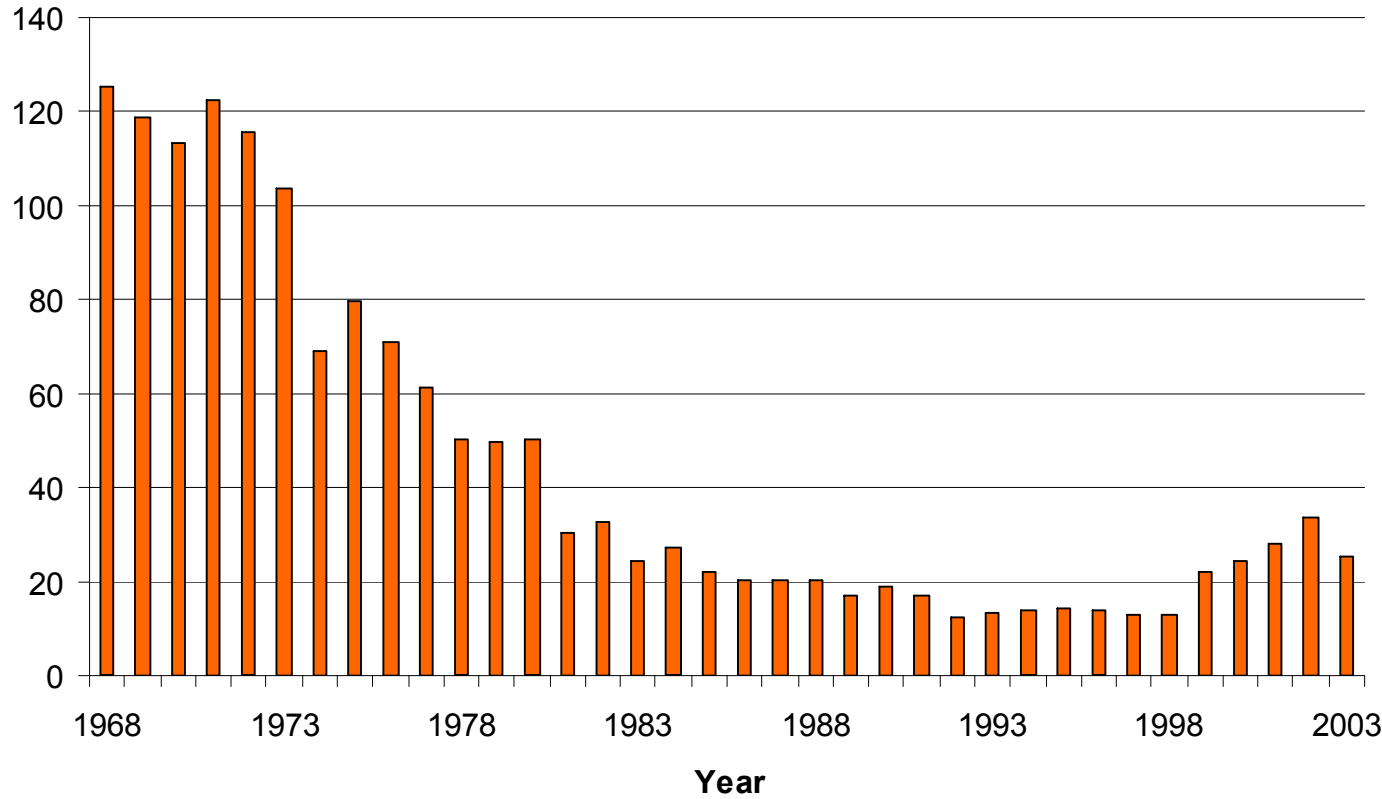
Improving the Housing Stock



- **Decommission and Rebuild**

Demolition rates - UK

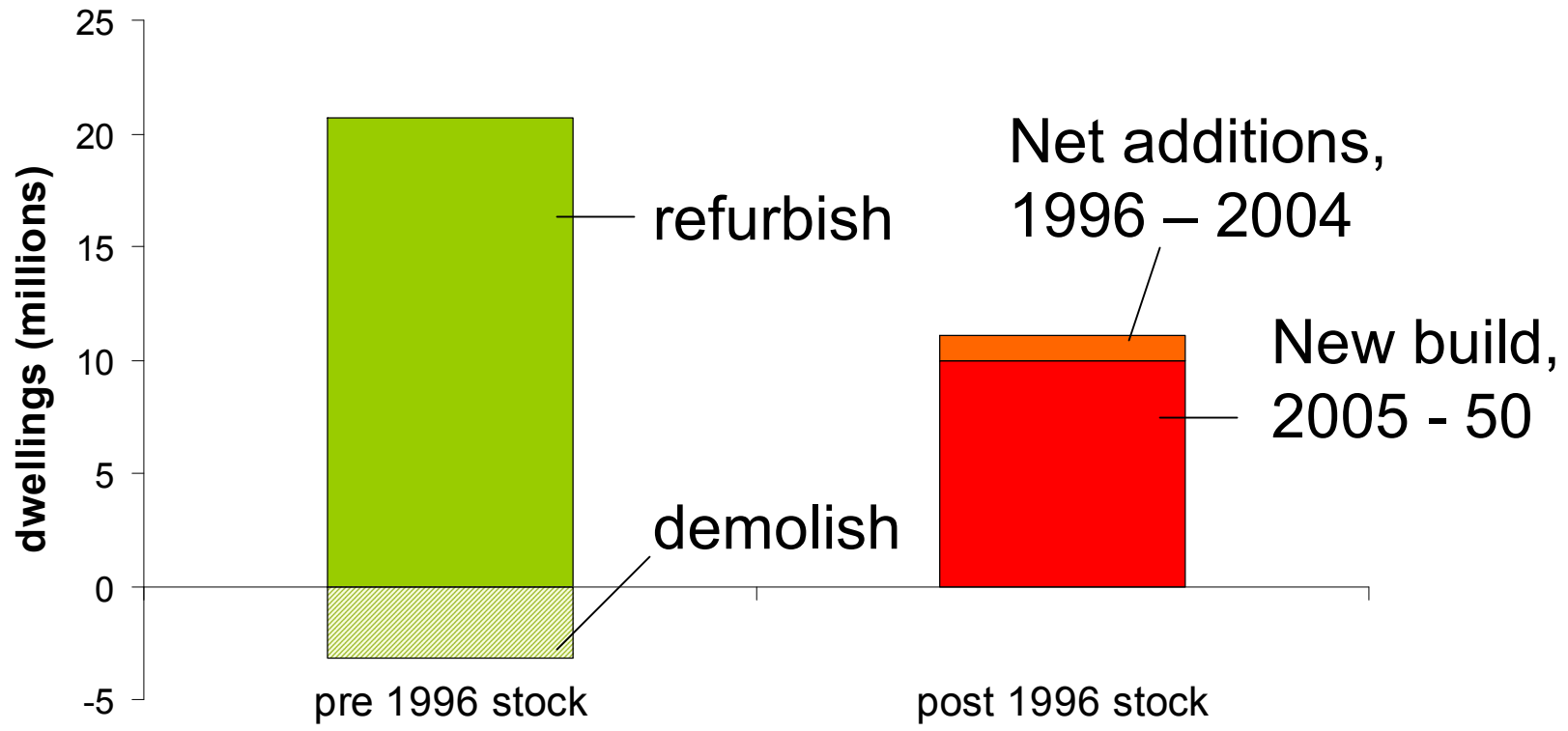
Properties (000s)



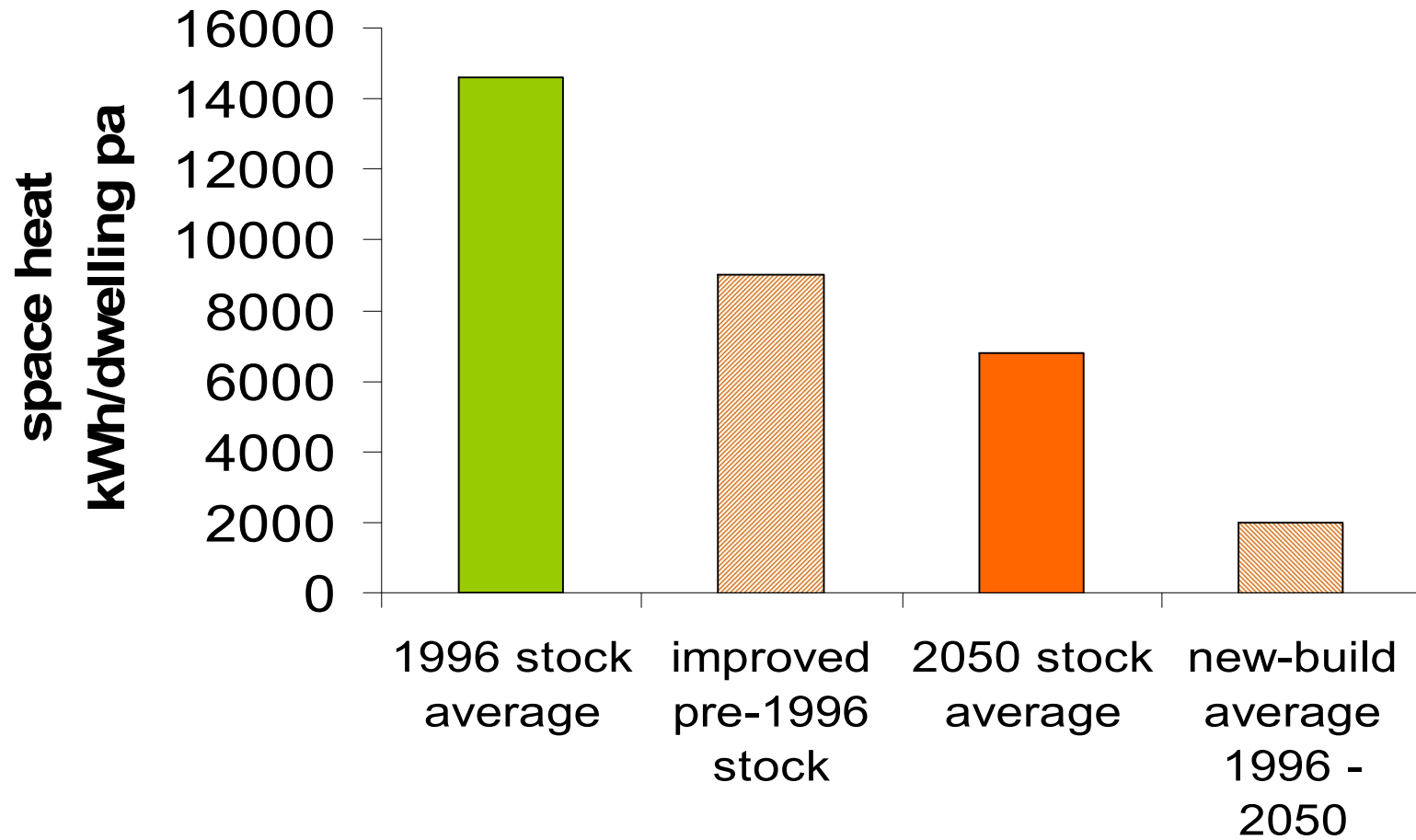
ODPM 2003



Housing stock changes, 1996 – 2050



Fabric improvements by 2050



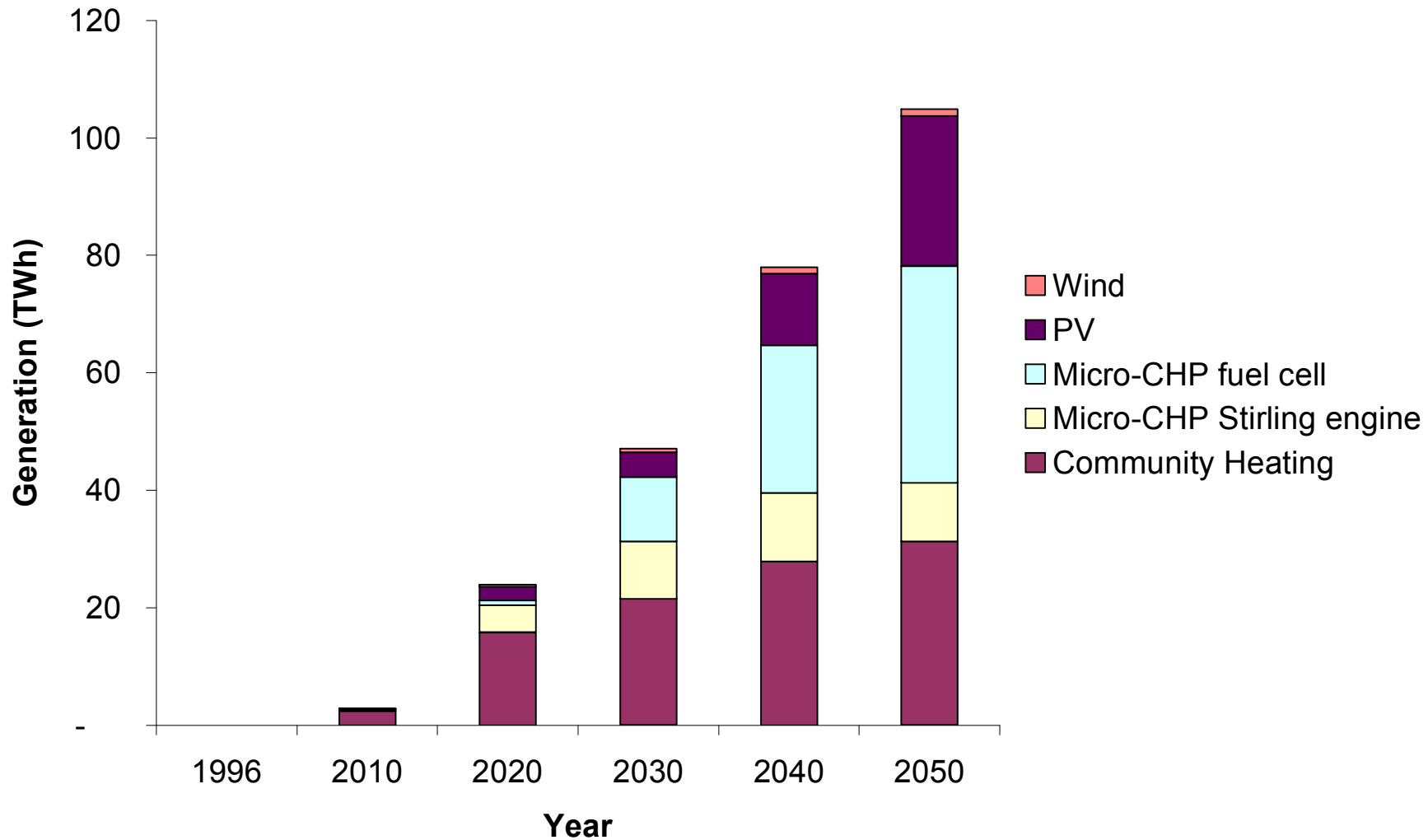
Technical Potential of Appliances

- Major savings to be made from
 - Lighting (LEDs replace incandescent bulbs)
 - Cold appliances (vacuum insulated panels)
- Consumer electronics continues to grow
- Profligate equipment (air conditioning, patio heaters, hot tubs, plasma TVs) not taken up

Low- and Zero-Carbon technologies (LZC)

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

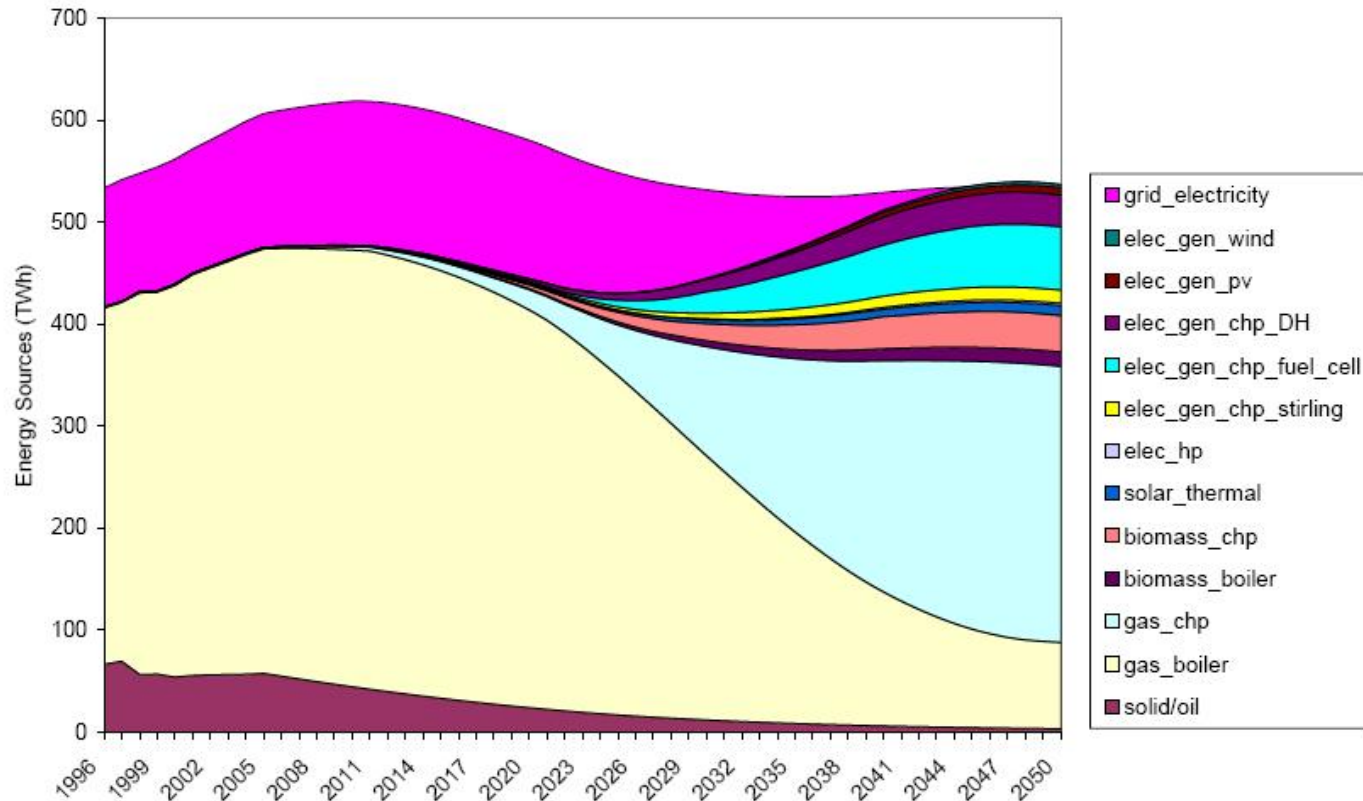
LZC Deployment



Beyond Central Heating

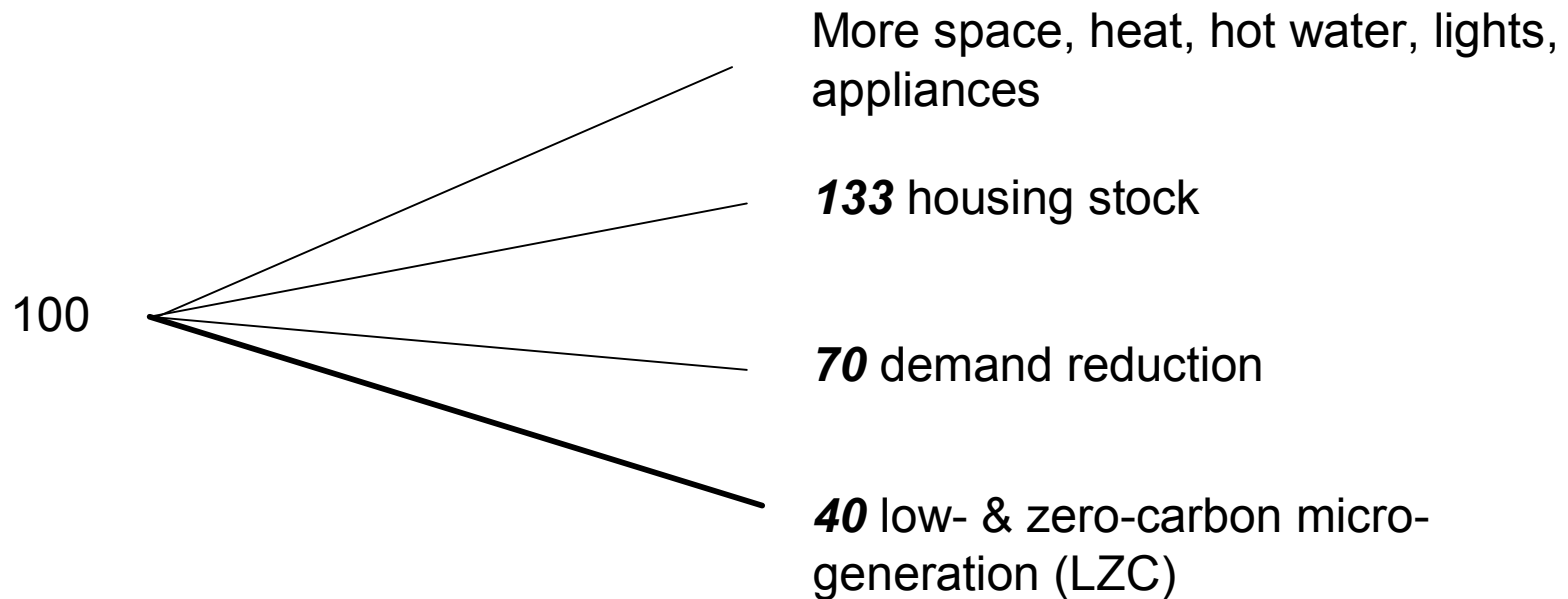
- A chance for change: 45 years = 3 replacement boiler cycles
- Gas boilers in just 20% of homes by 2050 (compared to 90% now)
- Average 0.8 LZCs per home by 2050
- Residential sector is a net exporter of electricity (summer time)

Domestic energy use to 2050



- Energy use declines marginally to 2050
- But CO₂ emissions 43% of present levels
- All electricity and most heat from onsite microgeneration

40% House summary



- It can be done!
- Not a hairshirt scenario