

# Sustainable Housing: How can we save 80% of our energy use in existing homes?

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## Why existing homes and communities?

- Over 99% of all homes
- Over 85% current homes still here in 2050
- Demolition and new 'estates' unpopular
- 250 years of urban industrial growth
- 6<sup>th</sup> most densely populated country in the world



# How damaging are our homes?

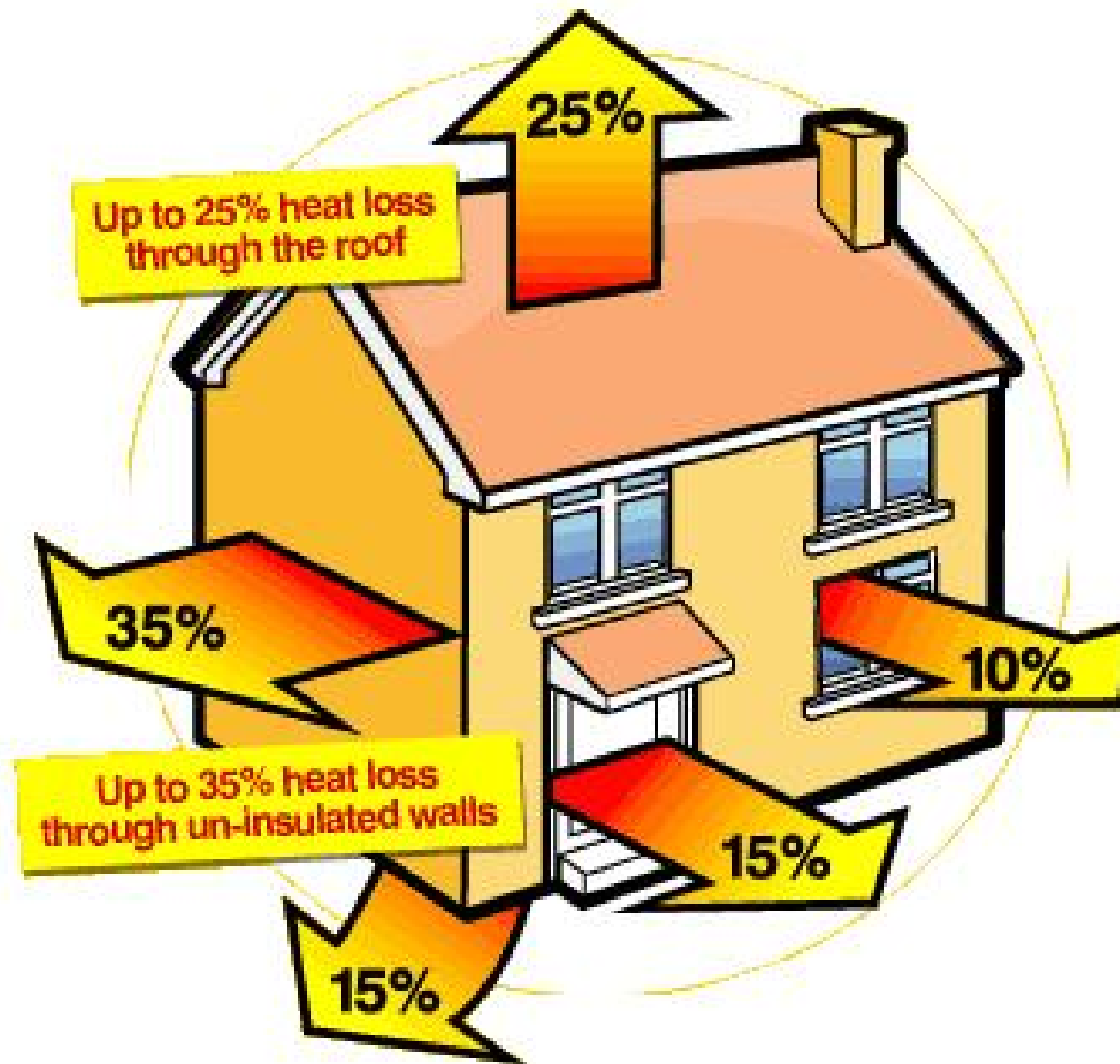
- Homes 27% of CO<sub>2</sub> emissions
  - Buildings 50%
  - Cars 25%
- 6 million detached and bungalows
- 6 million semi-detached
- 18 million pre-efficiency regulations
- Average rating – 51 SAP
- Target minimum – 81 SAP
- Low density – 35 homes per hectare

# Suburban detached



# Semi-detached







# The Task

- 12,000 neighbourhoods
- 3000 deprived neighbourhoods
- 80% energy cut by 2050
- 20% energy cut by 2020
- 16 million individual owner occupiers
- 5 million pre-World War I terraces
- 2 million+ private landlords







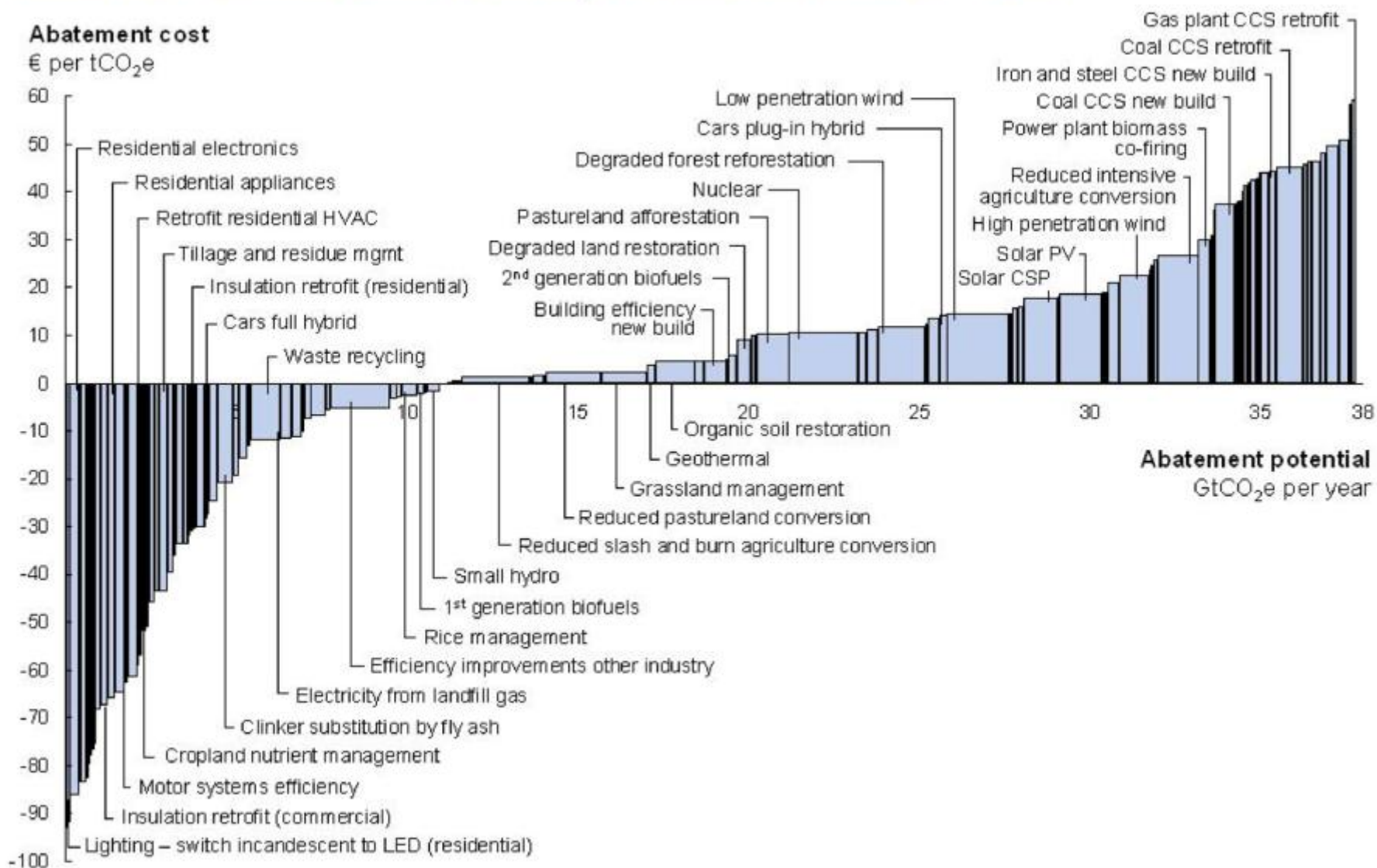


# The incentives

- High energy bills – average £100 per month
- Cold, drafty, leaky, expensive homes
- Fuel poverty
- Waste of £s
- Negative net cost of energy saving
- Known techniques
  - Tried and tested
  - Tea cosy approach

Exhibit 3.0.1

## Global GHG abatement cost curve beyond business-as-usual – 2030



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO<sub>2</sub>e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.  
Source: McKinsey & Co, Global GHG Abatement Cost Curve v2.0





# The Challenges

- High upfront costs - £10,000 - £30,000
- No clear, reliable advice
- Products, builders, techniques confusing
- Unclear standards
- Long-term uncertain payback
- Disruption, e.g. clearing attic
- Internal space, e.g. wall insulation
- Bureaucracy of grants, etc.
- Mistrust of energy companies and builders



## The hard wins/must-do's

- At least 20 million drafty doors and windows
- 10 million homes with solid walls
- 8 million poorly insulated roofs
- 7 million unfilled cavity walls
- 2 million uninsulated roofs









## Big wins/easy targets

- Turn thermostats down from 20°C to 17°C
- Turn radiators off 80% time
- Stop buying stuff
- Halve hot water use
- Water and temperature at 30°C not 40°C
- Curtains, not blinds + thermal lining
- Cling film on all windows
- LED lights – 1/20 energy
- Heat exchanges – save 60% energy



A cross-sectional diagram of a house illustrating heat loss. Yellow arrows show heat escaping from the interior through the walls, roof, windows, and doors. A red arrow points to the walls, and a blue arrow points to the roof. A furnace is shown in the basement, and a chimney is on the roof.

# Secondary Glazing Film





# LED Lights





# Government drive

- Carbon Emissions Reduction Target (CERT)
- Supplier obligation
- Household Energy Management Strategy (HEMS)
- Community Energy Saving Programme (CESP)
- Pay as you Save (PAYS)
- Warm Front/Warm Zones
- Carbon Reduction Commitment
- Climate Change Act – Carbon budgets
- Energy Performance Certificates
- Feed in Tariff (FIT)
- Renewable Heat Incentives
- Low Carbon Communities Challenge

## Energy Efficiency Rating

	Current	Potential
<i>Very energy efficient - lower running costs</i> <div>(92-100) <b>A</b></div> <div>(81-91) <b>B</b></div> <div>(69-80) <b>C</b></div> <div>(55-68) <b>D</b></div> <div>(39-54) <b>E</b></div> <div>(21-38) <b>F</b></div> <div>(1-20) <b>G</b></div> <i>Not energy efficient - higher running costs</i>	<div>37</div>	<div>73</div>



# Ambitious Plans

- Building Regulations energy squeeze

2012	2016	2018	2020
40%	80%	90%	100%

- Enforcement triggers for existing homes
  - 700,000 p.a. → 1 million p.a. by 2020



## Will we get there before the lights go out?

- Small, crowded island
- Less and less sharing
- More and more energy-guzzling
- More and more stuff
- More holidays (mainly abroad)





# But —

- Transition movement driven by Peak Oil
- Boom in food growing
- 150 local authorities leading way
- Beacon social landlords
- e.g. Places for People, Radian
- Recycling rate doubled
- Biking on rise again
- 50,000 builders and suppliers keen to work
- Boom in camping

# Cycling



# Allotments





# Camping



# Hitting the 10:10 pledge in your home

- Easy approximate gains!
- Thermostat/radiators down = 10%
  - From 20° to 17° = 30%
- Sealing drafty sash windows = 10%
- Lined curtains on all windows = 10%
- 1 min showers/1 bowl washing up/ 30° washing = 10%
- All lights off, nothing on stand by = 5%
- Hot water bottle (with own cover) in bed = 5%
- Top of oven 2° lower = 1%

NB Beware digital clocks on gadgets

# Your resident energy spy



# Digital clock on microwave







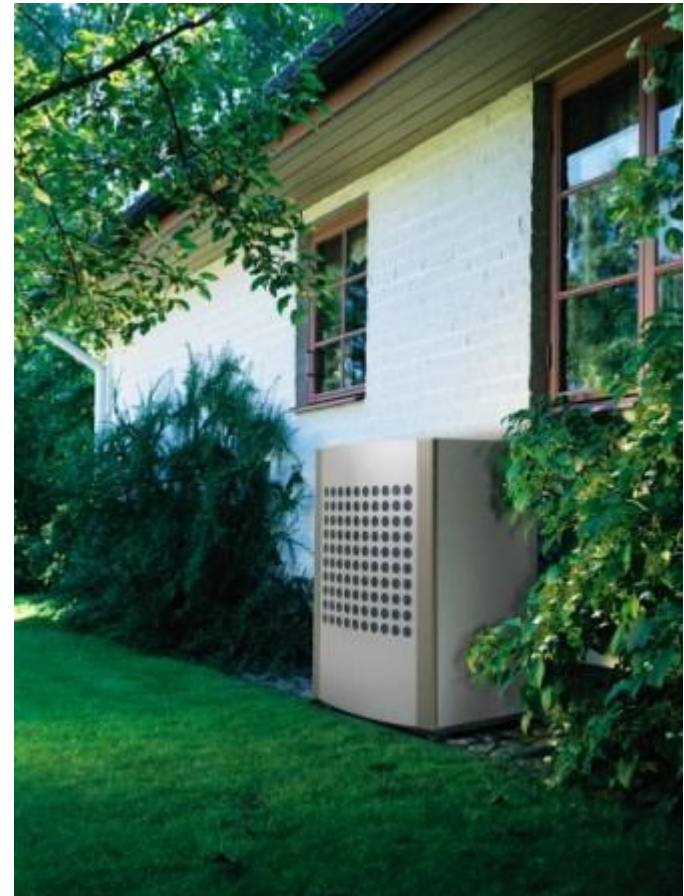
# Hitting the 80% target by 2020

- Serious building action required
- 200-250 mm insulation in roof
- 100 mm outer wall insulation
- Double/secondary glaze, all windows with reflective, coated glass and special gas filling
- Draft proof and curtain all doors and windows
- Add porches (or heavy lined curtains) to all outer doors
- Insulate all ground under floors – 50-100 mm
- Condensing boiler/heating/hot water
- Solar thermal water heating
- low energy lighting and other appliances
- Heat exchange in bathroom/kitchen
- Renewable energy options
- Turn down/turn off/don't use/don't buy

# Solar PV on residential rooftops



# Ground and air source heat pumps





# Trafford Hall Porch





## Are we really running short? Is it true?

- Space is at a premium/land is fought over
- Road congestion is worst in Europe
- Number of cars, distance travelled rising steeply
- Number of small households rising fast
- Far faster than population
- Oil production expected to decline within generation
- Saving energy in homes is *not* rocket science
- We're waiting...what for?

We did this!





We can do this!

