



New tricks with old bricks: **Greening** our existing building stock

Greenbuild Expo, Manchester 17 June 2009

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Building and Social Housing Foundation

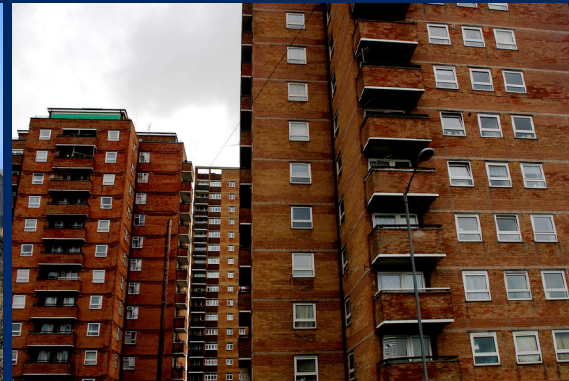
Sustainable refurbishment - why bother?

- Need to reduce greenhouse gas emissions by 80 per cent on the 1990 levels by 2050
- 27 per cent of total carbon emissions are accounted for by residential housing
- Days of cheap, abundant and secure energy supplies are coming to an end
- Addressing current fuel poverty issues for residents
- Taking up economic opportunities presented by the low carbon economy
- There is no quick fix!



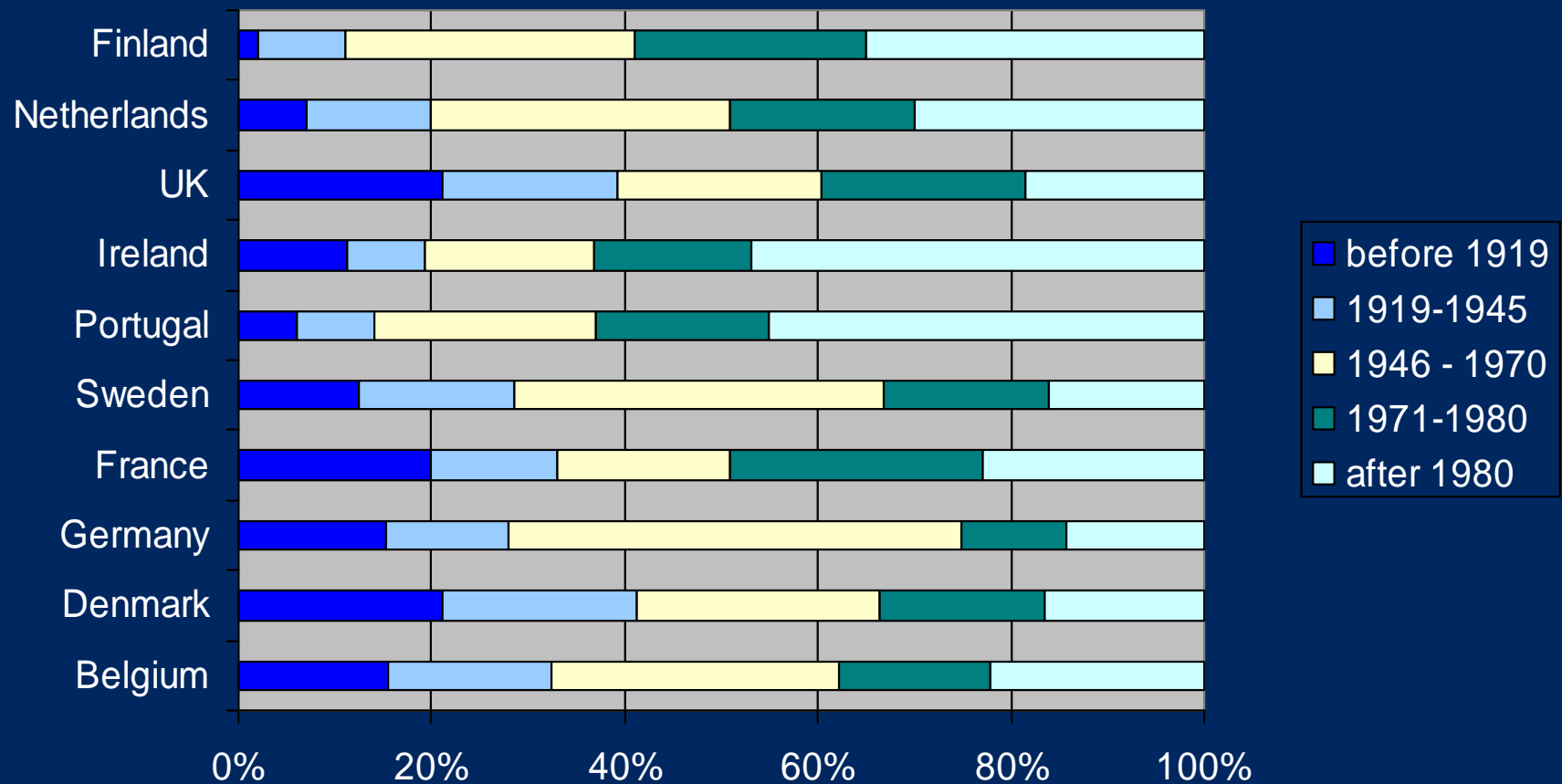
Dwelling stock in 2050

80 per cent of 2050's dwelling stock is already built

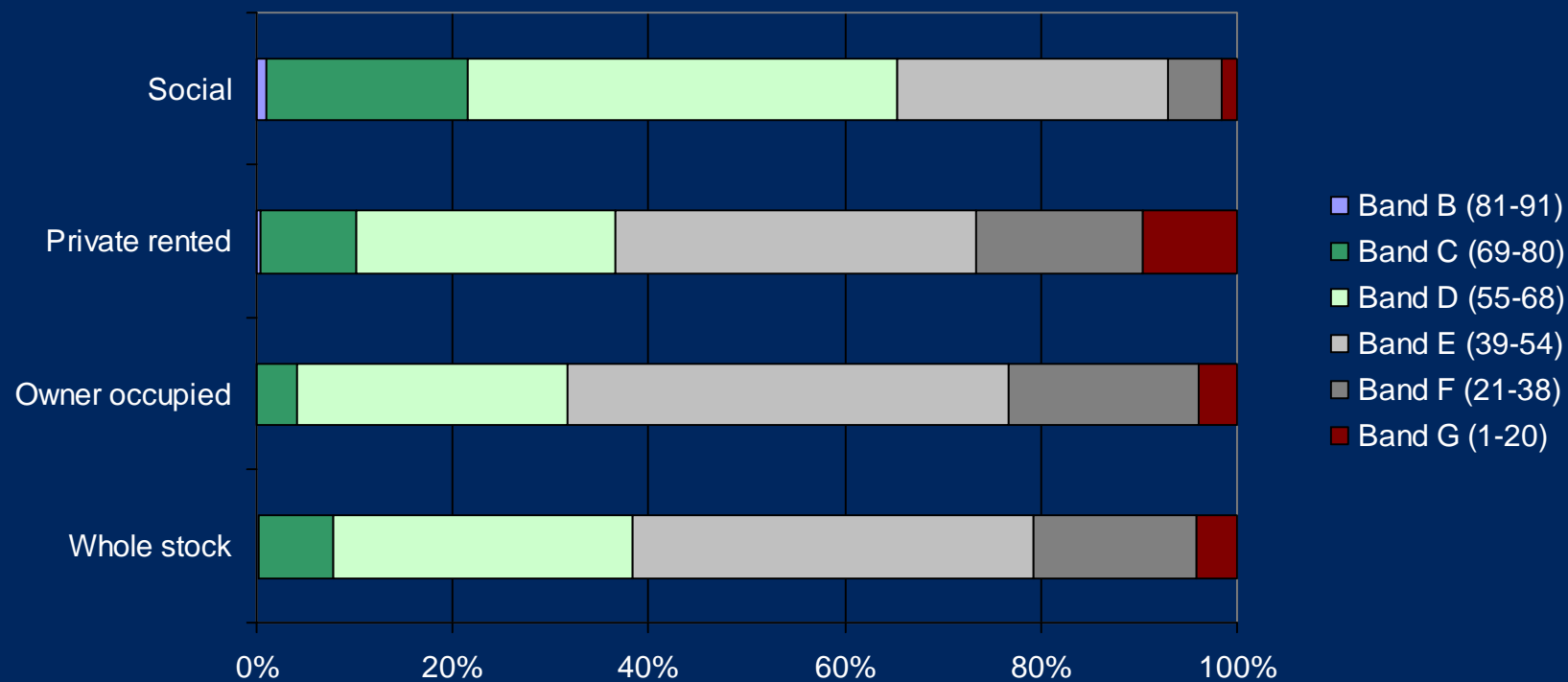


400,000 - 500,000 whole house refurbishments will be needed every year until 2050

Age of dwelling stock in Europe



Energy Performance Certificate Band (by tenure)



Source: English House Condition Survey 2006

What are the key challenges?

- Short-term thinking
- Finding the money
- Identifying the most appropriate whole house technical solution for the various properties (esp. heritage and hard-to-treat)
- Getting resident understanding and buy-in
- Shortage of appropriate skills and knowledge in the construction and design industries
- Setting up the regulatory framework

Current government approaches to reducing carbon emissions

- **Obligations on energy suppliers (CERT)**
An obligation placed on suppliers to install a number of measures in homes to make them more efficient and deliver carbon reductions
- **Energy Performance Certificates**
Now required on the sale or rent of residential and commercial properties, these certificates provide information on the efficiency of a building and ways to reduce energy consumption and carbon emissions
- **Market Transformation Programme**
A generic name for policies and interventions aimed at bringing more efficient appliances to the market, as well as stimulating consumer demand for these products
- **Zero Carbon Homes**
A requirement that all new homes should have net zero emissions by 2016, through a mixture of more efficient buildings and renewable energy

Heat and Energy Saving Strategy Consultation, DECC

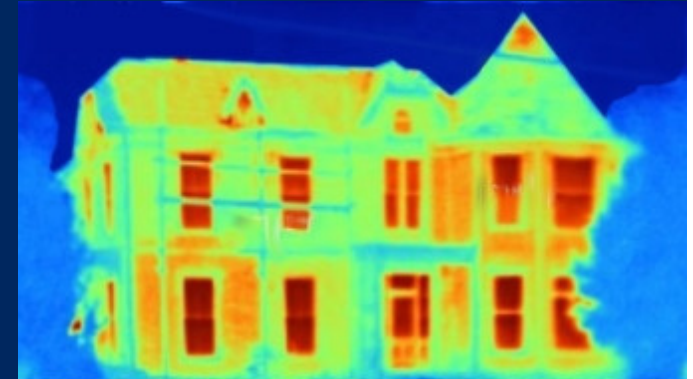
- Policies being proposed aim to reduce emissions by 44 million tons by 2020 (30% reduction on 2006)
- All homes to have received a whole-house package by 2030, with all lofts and cavity walls insulated by 2015
- Widespread awareness raising
- New funding mechanisms
- New delivery models
- District heating and combined heat and power systems

Likely changes in regulations

- Emphasis on using existing regulation more effectively by ensuring better compliance (details to be set out alongside proposed changes for 2010)
- Review of whether HHSRS standards are high enough (currently only to an EPC rating of E) in 2009/2010
- Assessment in 2012 as to whether sufficient progress has been made in reducing carbon emissions
- Reduction in regulatory barriers to low carbon energy
- Ongoing work with the Energy Savings Trust to explore the role for a Code for Sustainable Refurbishment

How to reduce carbon emissions from existing housing : **technology**

- **Cheap and easy options**
 - Low energy light bulbs
 - Hot water tank insulation
 - Heating controls
- **Medium cost and/or moderately disruptive**
 - Insulation to walls and roofs
 - New windows and doors
 - Condensing boilers
 - Heating control systems
- **More disruptive and considerably more expensive measures**
 - External wall insulation
 - Internal wall insulation
 - Floor insulation
- **Low carbon and renewable technologies**
 - Communal biomass systems
 - Solar thermal and photovoltaic panels



How to reduce carbon emissions from existing housing : **people**

A huge programme of physical renovation of the housing stock is not enough!

- How people live in their homes is crucial
 - Written information
 - Events and advice services
 - Smart meters
- Profile of occupants
 - Mismatch of house size and occupancy – political minefield to address



What will it cost and who will pay?

- Average upgrade cost per dwelling to achieve the saving required is between £25,000 and £30,000
- Total cost likely to be £500 - £600 billion (£12 - £15bn per annum for 40 years)
- Various options to pay identified by Existing Homes Alliance
 - The German model
 - Pay as You Save Scheme
 - A typical mortgage with grant attached

Practical guidance and case studies

The Energy Saving Trust has developed a number of interactive and helpful tools to help implement sustainable energy measures:

[Best practice house](#)

[Enhanced construction details](#)

[Hard to treat homes](#)

[Whole house boiler sizing wizard](#)

Sustainable Energy Academy promotes education and action to reduce the carbon footprint of buildings and communities. SEA are currently spearheading the Old Home SuperHome Project to establish a nationwide network of completed projects for people to visit

www.sustainable-energyacademy.org.uk/

Existing Homes Alliance is a coalition of organisations calling for urgent action. It is working with all sectors including financial institutions, builders and installers, energy utilities, manufacturers, suppliers, retailers, social housing managers, homeowners, landlords, local authorities and government

www.existinghomesalliance.org/

Green street A web-based refurbishment tool to help more environmentally friendly and sustainable refurbishment solutions with case studies of work carried out by local authorities and housing associations

www.greenstreet.org.uk

Nottingham Eco-Home

Semi-detached Victorian villa with five bedrooms. Work was carried out over period of six years from 1998.

Aim

To reduce emissions by 85 per cent with an additional focus on using low environmental impact materials.

Achieved

Running costs reduced from £3,536 to £867 per annum.
Carbon emissions reduced from 18.9 to 2.8 per annum

Cost

Approx £100,000 in total (not all relating to the carbon reduction work)



www.sharedenergy.org.uk/Reports/NottinghamRefurbishment.pdf

Nottingham Eco-Home



- 1 Flat-Plate solar collectors for heating water
- 2 Roof insulation 300/400mm thick (shredded newspapers)
- 3 Roof lights with insulating low-emissivity glass
- 4 Natural plasters- clay and lime based
- 5 Super insulated hot water tank
- 6 100mm ozone friendly drylining to front face to maintain brick appearance
- 7 150mm external wall insulation with rendered finish
- 8 Space saving bath and thermostatic shower controls
- 9 Heat recovering fans
- 10 Environmental-friendly paints
- 11 Draught lobby
- 12 triple- and double-glazed timber windows treated with natural fungicides and stains
- 13 Energy efficient appliances
- 14 Second hand reclaimed furniture
- 15 tripped floorboards
- 16 Copper rainwater goods with filters for rainwater harvesting
- 17 160mm natural floor insulation
- 18 Rainwater storage for use in WCs and washing machine
- 19 Low-flush toilets
- 20 Non-PVC waste pipes
- 21 Composting chamber for solid waste from WCs
- 22 Separator lets liquids drain off and solids into composting chamber
- 23 Decking
- 24 Organic garden utilizing the principles of permaculture

New Progress Housing Association

Burneside, Cumbria



10 rural properties largely unmodernised

Improvements included

- New roofs, kitchen and bathroom upgrading and rewiring, increased insulation and central heating / boiler replacement.

Sustainability features

- Loft insulation using local sheep's wool
- Condensing boilers
- Double glazing
- Thermal solar absorber panels
- Photovoltaic panels
- Biodegradable paints / FSC timber
- Water butts and other water saving

Burneside performance monitoring

3-bed semi	Before	After	Saving/impment
SAP rating	25	92	67
Est. CO ₂ emissions	8.91	1.97	6.94 tonnes /yr
Est. fuel costs	£791	£185	£534

	Cost (£)	SAP increase	Saving (£)	Est. Payback
Central heating	3,000	27	203	15 years
Loft insulation	250	16	153	2 years
Double glazing	4,000	5	36	??
PV solar panels	6,800	1	36	??
Cavity wall insulation	500	18	106	5 years
Thermal absorber solar panels*	6,800		100	??

* Not originally included in SAP assessment

EU guidance on sustainable refurbishment

18 projects for retrofitting of social and co-operative housing have been funded by the Intelligent Energy Europe programme since 2006. Issues addressed include:

- Providing **technical information** on good retrofitting practice in detailed 'How to' guides – actual projects and techniques
- Establishing **advice forums** for multiple stakeholders
- Identifying good practice in **involving tenants** in energy saving
- **Financial partnership** schemes established
- **Education** for building professionals

http://ec.europa.eu/energy/intelligent/library/doc/ka_reports/buildings08_en.pdf



Improving the social dialogue for energy efficient housing (ISEES)

Aim: To identify the role of consumer choice in energy use in social housing

- Identifying energy behaviour of tenants
- Developing model for social dialogue
- Establishing guidelines for improving the dialogue with tenants in social housing

UK Project Partner:
Energy for Sustainable Development (www.esd.co.uk)

Further information: www.isees.info



Tool-kit for Passive House Retrofit

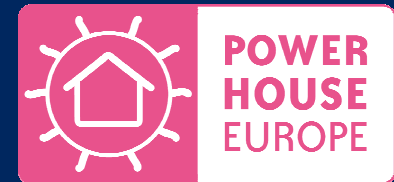


Aim: To adapt the passivhaus technologies for retrofitting and make them more accessible

- Web-based tool-kit describing costed measures to reduce primary energy consumption for typical buildings in 11 countries, including UK
- 35 energy saving measures for low energy retrofitting using the Passivhaus technology, provided in respect of five typical housing types in the UK
- Links to manufacturers of products, components and materials to help the implementation of such measures are provided

Further information at www.energieinstitut.at/Retrofit/

Power House Europe



Project being carried out by the European Liaison Committee for Social Housing throughout Europe:

- Identify RSLs' needs and barriers to improving the environmental sustainability of their housing stock
- Identify any expertise or experience RSLs have to share
- Establish an on-line one-stop knowledge platform providing a range of tools available to help RSLs improve energy efficiency (link to English language version from the NHF website)
- Run local communication campaigns to maximise take-up of good practice
- Matching of organisations for direct exchange – partnerships, study visits and ongoing links (nationally or internationally)

Leinefelde, Germany

- Depopulation and a deteriorating housing stock, in former East Germany
- Large monolithic blocks constructed of concrete panels, typically five or six stories high
- Very poor energy performance



New ideas for existing housing

Architectural competitions identified new designs and ideas



Energy efficient renovation of concrete panel apartment blocks in Gothenburg, Sweden

Traditional and new technologies were used to **reduce** the use of water and energy

- energy for heating reduced by 35%
- electricity use reduced by 25%
- water consumption reduced by 40%



Energy saving measures

Traditional measures

- Improved ventilation
- Additional insulation to roof, floor and walls
- Glazing of balconies
- Inner window panes replaced by low-e glass

New measures

- Roof-integrated solar collectors
- White goods replaced with low energy equipment
- Individual metering
- Presence controlled lighting in public areas
- Computer-based supervision system



Water - this needs to be saved as well!



Guidance and case studies

- www.est.org.uk/bestpractice
Further information on energy efficiency best practice in housing
- www.practicalhelp.org.uk Practical guidance for planners and developers (free training materials)
- www.ecovation.org.uk
examples of sustainably refurbished properties
- www.sustainabilityworks.org.uk
A complete development tool for housing professionals dealing with sustainable housing (writing policies, setting targets, eco-homes predictions)
- www.sustainablehomes.co.uk
A Housing Corporation funded organisation promoting sustainability to RSLs through training, courses, exhibitions and other awareness raising events, case studies
- www.greenstreet.org.uk
A web-based refurbishment tool to help more environmentally friendly and sustainable refurbishment solutions

For further information



Building and Social Housing Foundation

For further information, please visit:

www.bshf.org

www.worldhabitatawards.org

Email: bshf@bshf.org