The vision at the Zero Carbon Hub for the future of energy efficiency of buildings & policy developments

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This session will cover:

• What is meant by ‘Zero Carbon Homes’ and nZEB

• Provide insights on risks to Energy Efficiency Homes
  • The Performance Gap
  • Ventilation
  • Overheating
PURPOSE AND STRATEGIC OBJECTIVES

Facilitate the mainstream delivery of low and zero carbon homes working across boarders

- Provide leadership and create confidence
- Reduce risk
- Disseminate information
Where are you?

Academia

Industry
Why Zero Carbon Homes?
THE EFFECTS OF CLIMATE CHANGE

Increase in the number of extremely warm days

Winter: 6-12 days/year
Summer: 12-30 days/year
1998-2007 was the warmest decade on record.

2009 – 5th warmest globally and 14th warmest in the UK

2012 Hottest day ever in Scotland and wettest June in the UK

2013 Wettest winter ever recorded

2014 was the hottest year ever recorded
Culprits: most CO2 from buildings stems from heating. Houses are particularly energy-inefficient.
VIABILITY
Annual Household Energy Spend

- **4-bed Detached house**: £2,379
- **3-bed Semi-detached house**: £1,621
- **3-bed Mid-terrace house**: £1,388
- **1-bed Ground floor flat**: £915

**Victorian**
with modern day improvements

- **New Build**
built to 2006 regulations
  - £1,187
  - £888
  - £864
  - £489

- **Future**
2016 aspirations
  - £504
  - £361
  - £405
  - £346

Indicative costs and savings calculated using Zero Carbon Hub house types modelled in NHER Plan Assessor 5.3/5.4 (SAP2009) with projected energy costs taken from DECC published figures.
Zero Carbon Agenda & the European Policy
The Zero Carbon Hierarchy

Zero Carbon = Solutions addressing the carbon emission reductions that are difficult to achieve on site +

On-site low/zero carbon energy (and connected heat)
Energy efficiency
Building fabric performance
Carbon Compliance = On-site heat and power generation

Postponed

75% Complete
95% Complete
DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 19 May 2010
on the energy performance of buildings
(recast)

DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 25 October 2012
on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC
Under the Energy Performance of Buildings Directive:

- **all new buildings must be nearly zero energy buildings by 31 December 2020 (public buildings by 31 December 2018)**

- EU countries must establish inspection schemes for heating and air conditioning systems or put in place measures with equivalent effect

- EU countries must set minimum energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.)

- EU countries have to draw up lists of national financial measures to improve the energy efficiency of buildings

Under the Energy Efficiency Directive:

- EU countries make energy efficient renovations to at least 3% of buildings owned and occupied by central government

- EU governments should only purchase buildings which are highly energy efficient

- EU countries must draw-up long-term national building renovation strategies which can be included in their National Energy Efficiency Action Plans
Nearly zero-energy Buildings – European Commission

NZEB System Schematic

EPBD Article 2, NZEB definition:
[...] ‘nearly zero-energy building’ means a building that has a very high energy performance [...] The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.[..]

REHVA Journal May 2013
DEVELOPMENT LAYOUTS

Site Conditions:
- Access
- Location (regional weather)
- Ground conditions
- Flood risk
- Existing trees, water bodies etc
- Local energy resource
  - Source for biomass, wind conditions etc
- Existing district heating network

Planning:
- Dwelling type mix/density
- Built form considerations - roof pitch, building height etc
- PV and solar panels
- Local Renewable targets

Site Layout:
- Dwelling types
- Design for solar technologies:
  - Orientation for solar technology
  - Roof pitch
  - Over-shading

Other:
- Localism

What is the Energy Strategy?
Insights on risks to Energy Efficiency Homes – The Performance Gap
DOES IT DO WHAT IT SAYS ON THE TIN?
Insights on risks to Energy Efficiency Homes – Ventilation & Indoor Air Quality
Construction images

Mmmm?
Construction images
**Dryline/Plaster**

**Problem to Avoid:** Air-leakage

**What to Do:**
- Foam fill all penetrations/gaps before drylining
- Stagger ceiling boards and over door openings to minimize future cracking
- Mark continuous ribbon of adhesive to be applied around all openings, along the top and bottom and at internal and external corners of walls, and over service chases

**Good Practice:** Use a purge coat or plaster on blockwork to improve airtightness

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**Ventilation**

**Problem to Avoid:** Poorly specified and installed ductwork

**What to Do:**
- Install rigid ductwork for extract fans, and minimise use of flexi ductwork
- Install similar to commission fans to port F domestic ventilation compliance guide
- Commissioning sheets to be provided to site manager
- Check noise of fan is not excessive
- Check ducts to outside are fully insulated
- Clearly label the ventilation controls

**Good Practice:** Specialist or manufacturer to commission fans

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*Images and text from Zero Carbon Hub Builders' Book.*
Insights on risks to Energy Efficiency Homes – Overheating
Does your organisation have a method or process to assess the risk of your residential properties overheating?

Figure 29. Does your organisation have a method or process to assess the risk of your residential properties overheating? (Number of respondents out of 74 responses)
Does your organisation currently specify overheating related requirements in your contracts with Architects and designers?

- Yes: 13%
- No: 30%
- Don't know: 57%
A concept diagram of the types of factors which should improve the reliability of the overheating risk assessment process for dwellings.
OVERHEATING IN HOMES
THE BIG PICTURE
FULL REPORT

For more information !!
I’d love a new ‘Energy efficient’ home … but soon please !!