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

Rob Pannell, Managing Director, Zero Carbon Hub

# TODAY

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

# The Zero Carbon Hub

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# ROLE OF THE ZERO CARBON HUB

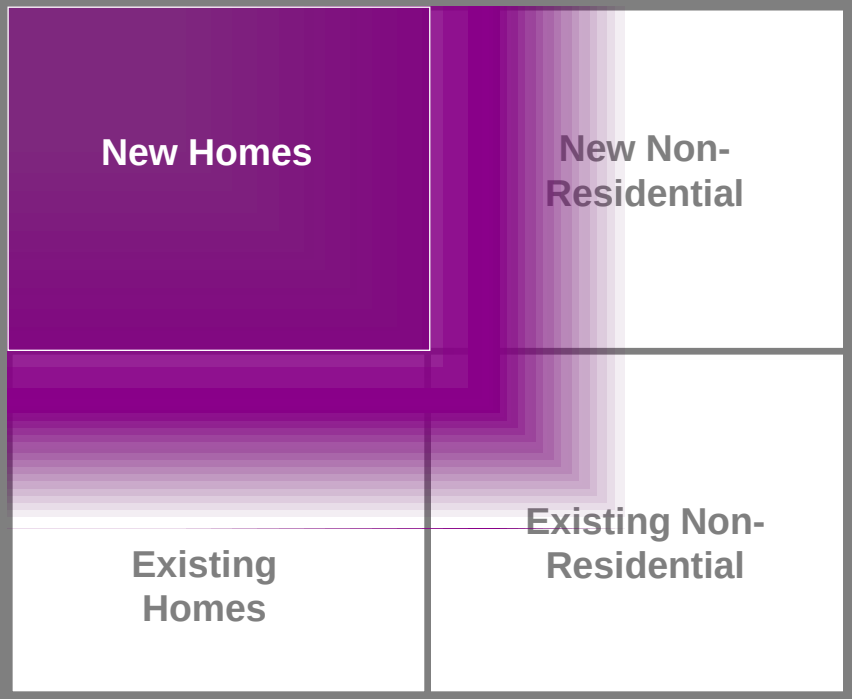
## PURPOSE AND STRATEGIC OBJECTIVES

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

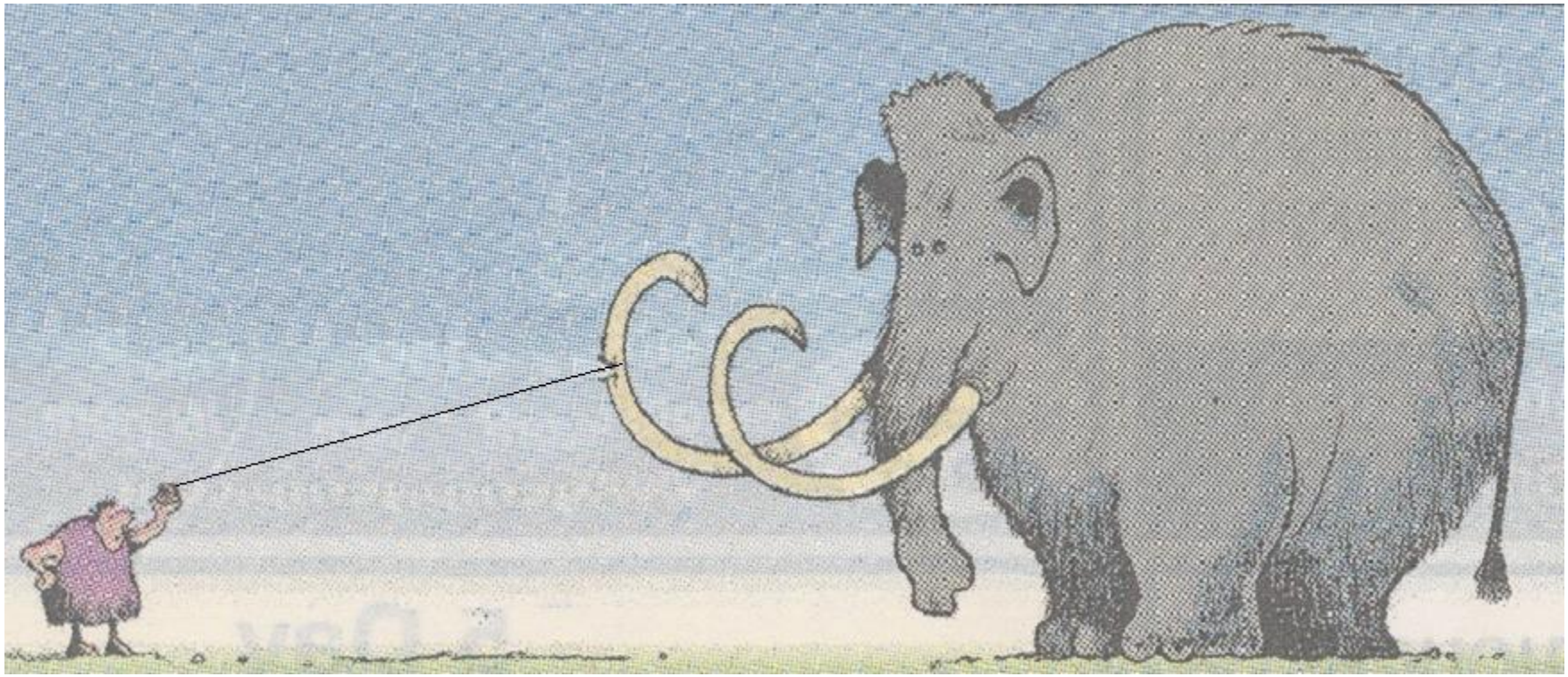
- Provide leadership and

create confidence

- Reduce risk
- Disseminate information



# Where are you?



**Academia** **Industry**

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# Why Zero Carbon Homes?

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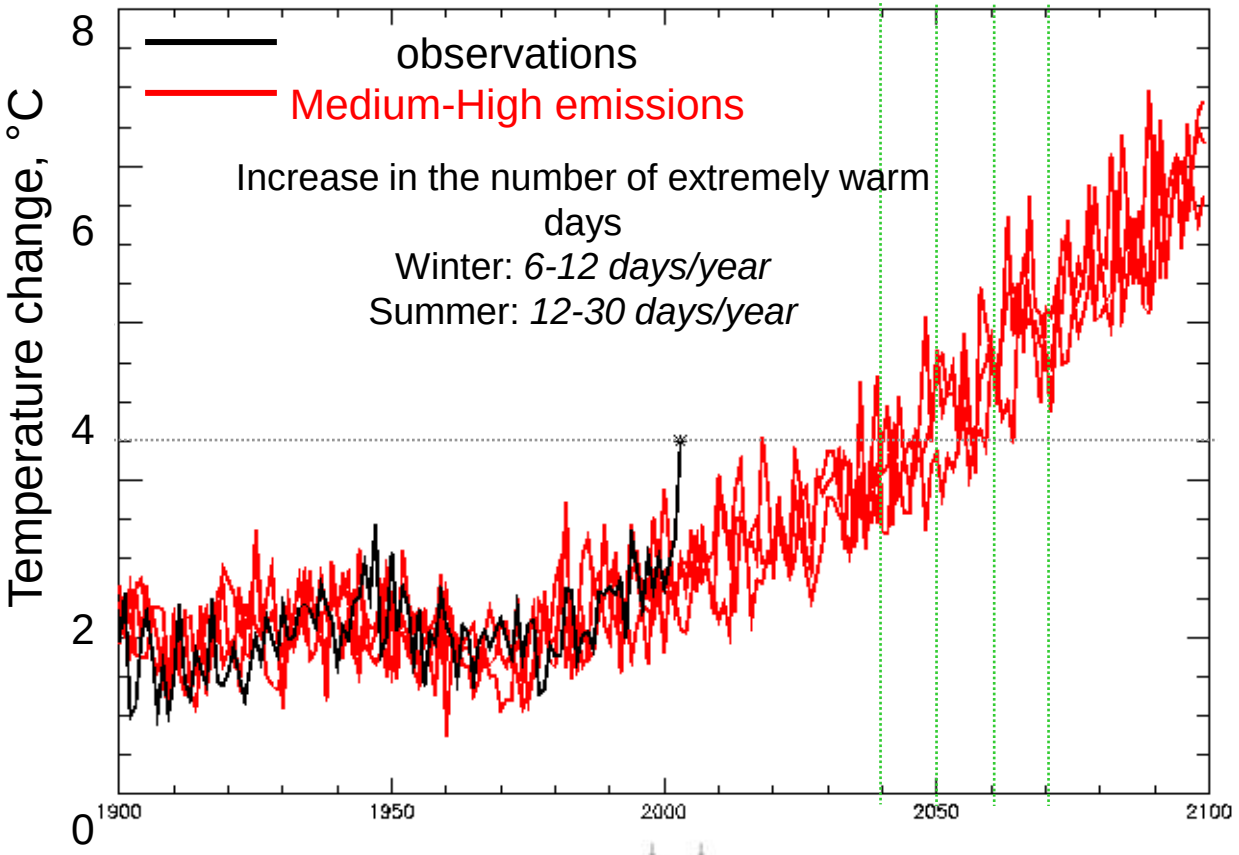
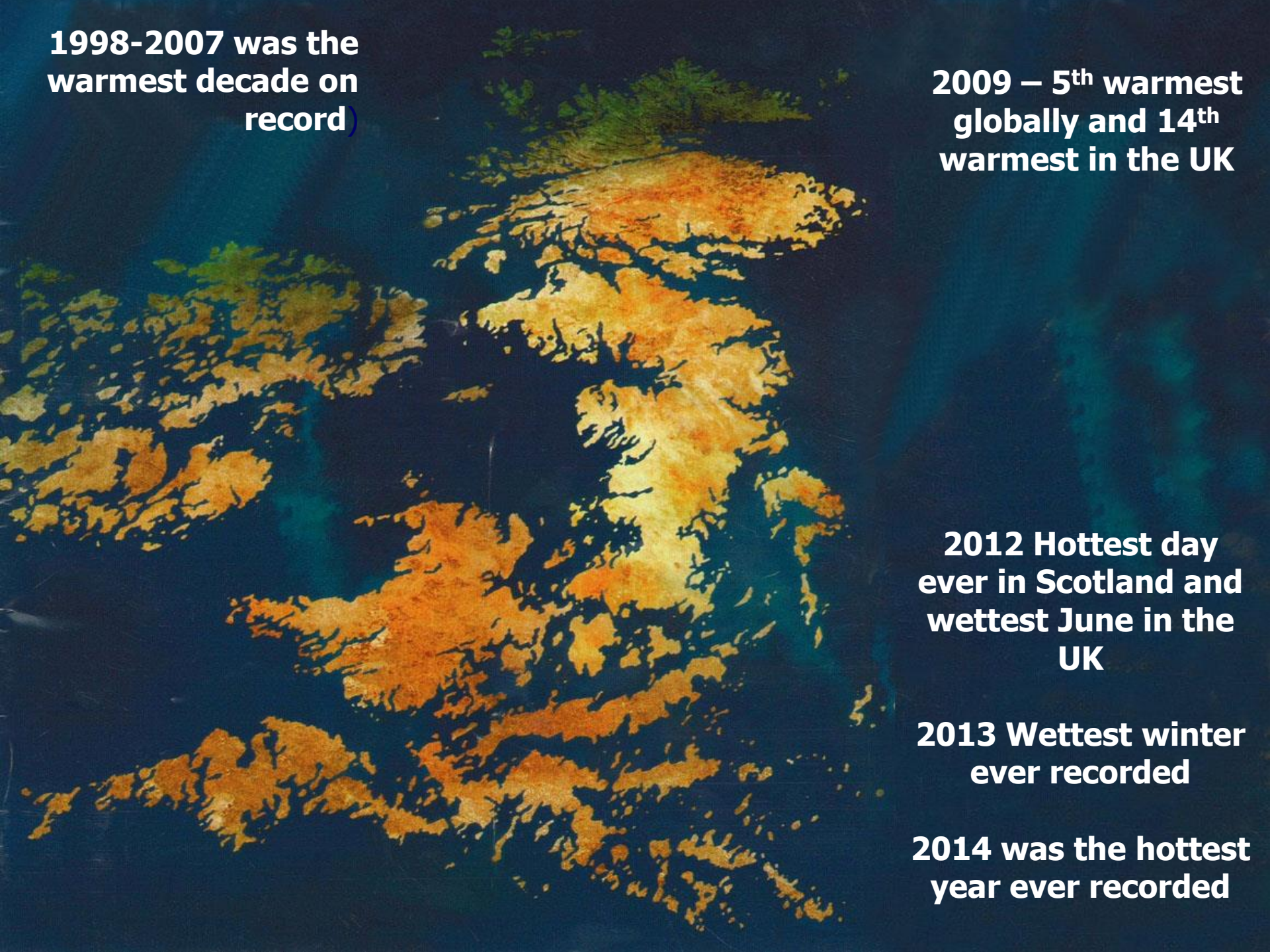
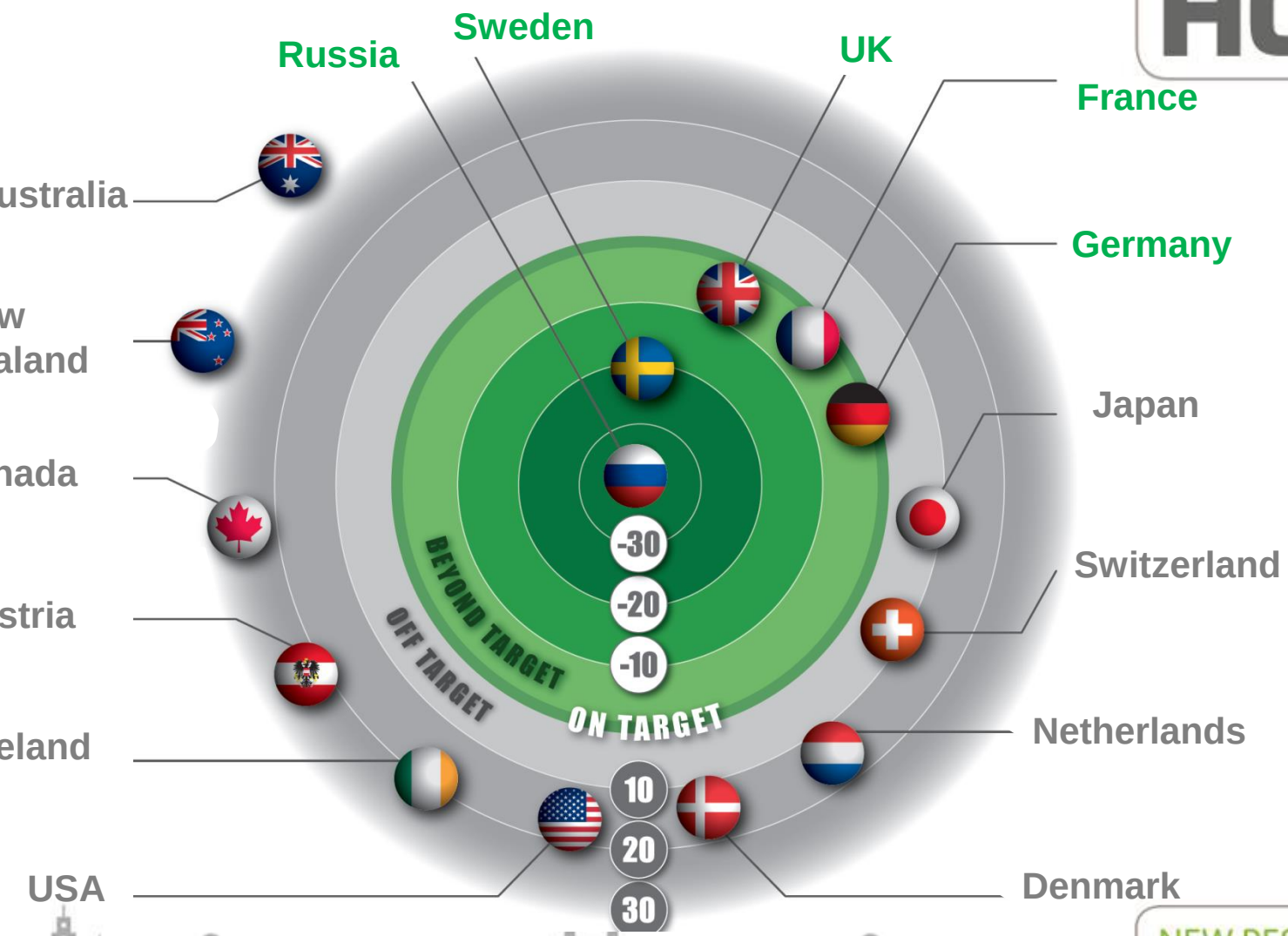
# THE EFFECTS OF CLIMATE CHANGE





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

# KYOTO – WHO'S ON TARGET

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# CARBON CULPRITS

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Culprits: most CO2 from buildings stems from heating. Houses are particularly energy-inefficient

# VIABILITY

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# Annual Household Energy Spend


**Victorian**
with modern day improvements

**New Build**
built to 2006 regulations

**Future**
2016 aspirations

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.

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# Zero Carbon Agenda & the European Policy

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# The Zero Carbon Hierarchy

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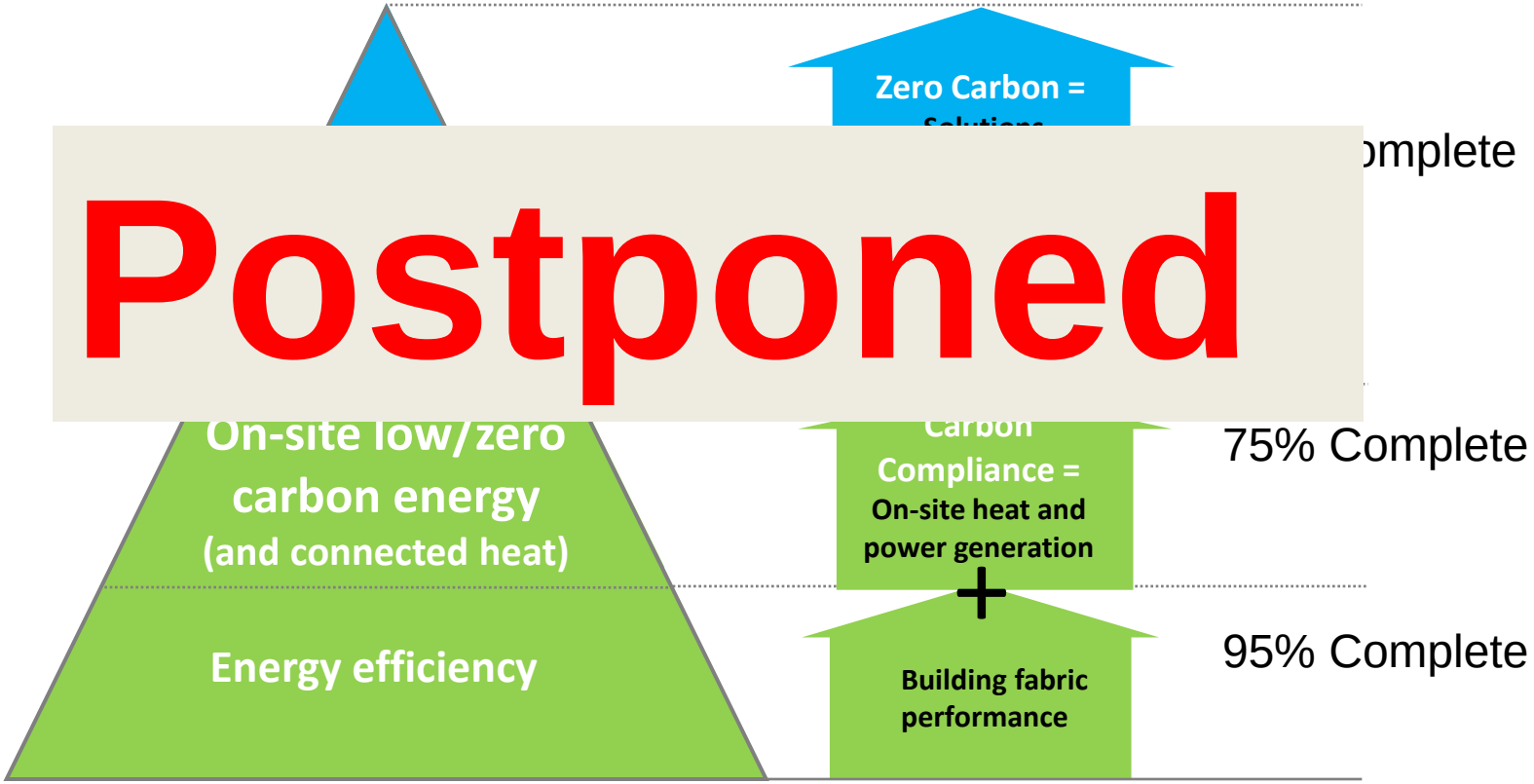


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European Commission

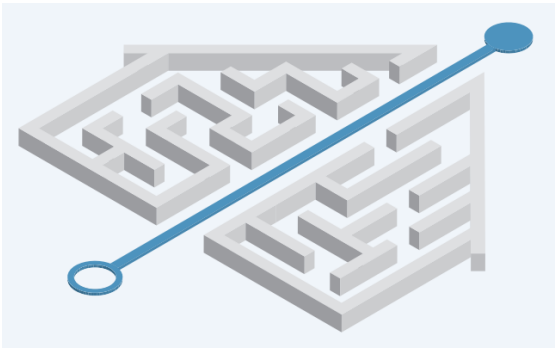
ENERGY

**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**

# Energy Efficient Buildings – European Commission

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## 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

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# Nearly zero-energy Buildings – European Commission

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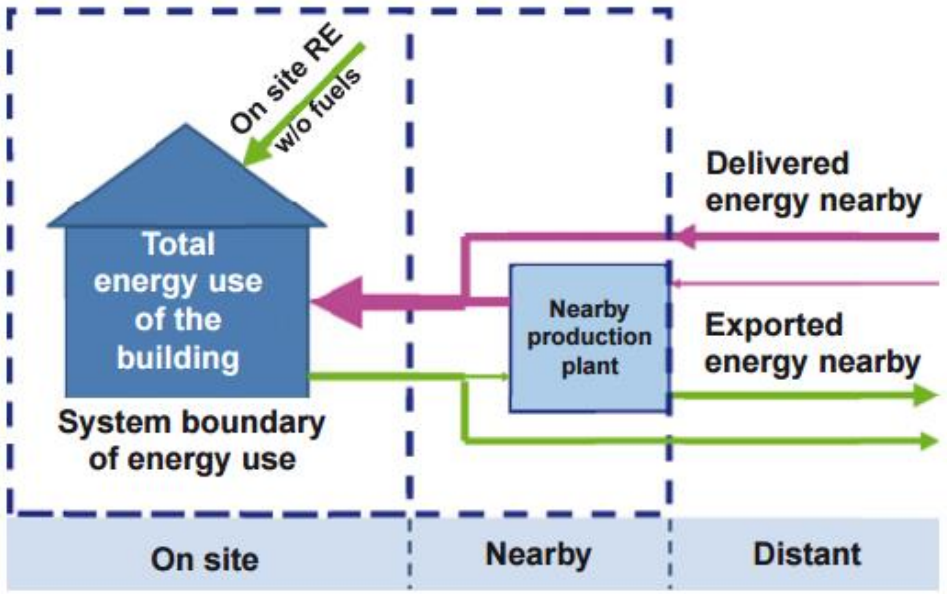
## NZEB System Schematic




**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

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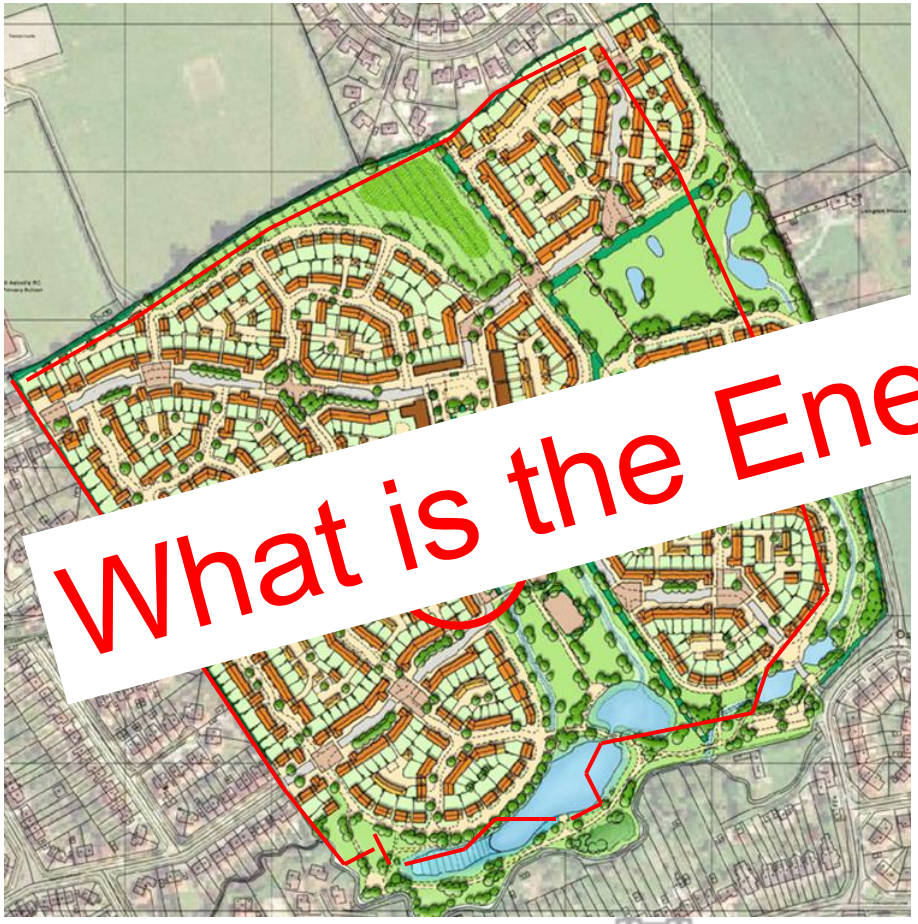

What is the Energy Strategy?

**Site Conditions:**
- Access
- Location (regional weather)
- Ground conditions
- Flood risk
- Existing trees, wat
- Local en

elling 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

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# Insights on risks to Energy Efficiency Homes – The Performance Gap

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# DOES IT DO WHAT IT SAYS ON THE TIN?

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# Insights on risks to Energy Efficiency Homes – Ventilation & Indoor Air Quality

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# VENTILATION AND INDOOR AIR QUALITY

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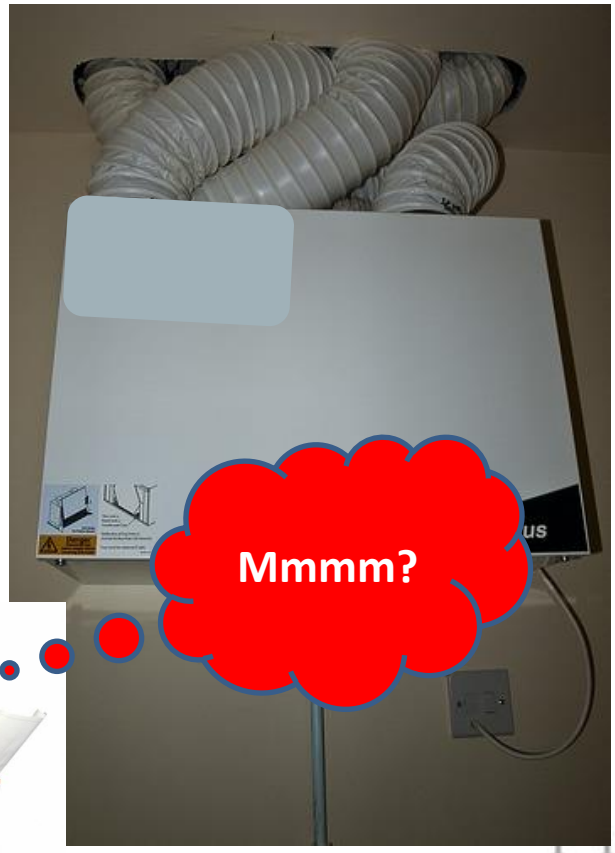
# Construction images





# Construction images

# DRYLINE/ PLASTER 14.0

**PROBLEM TO AVOID** AIR-LEAKAGE



NOT SEALING SERVICES

## WHAT TO DO?

- Foam fill all penetrations/ gaps before drylining
- Stagger ceiling boards and over door openings to minimise 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 chasers


**GOOD PRACTICE** Use a parge coat or plaster on block work to improve airtightness





# VENTILATION 15.0

**PROBLEM TO AVOID** POORLY SPECIFIED AND INSTALLED DUCTWORK



FLEXI DUCT TOO LONG AND NOT SUPPORTED = FANS WILL BE NOISY / INEFFICIENT
VENTILATION COMMISSIONING NOT DONE CORRECTLY

## WHAT TO DO?

- Install rigid ductwork for extract fans, and minimise use of flexi ductwork
- Installer to commission fans to part 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


MEASURE AIRFLOW WITH APPROPRIATE DEVICE

**GOOD PRACTICE** Specialist or manufacturer to commission fans

GROUND WORKER · BRICKLAYER · CARPENTER · PLUMBER · ELECTRICIAN · PLASTERER · WINDOW FITTER · ROOFER · DECORATOR

# Insights on risks to Energy Efficiency Homes – Overheating

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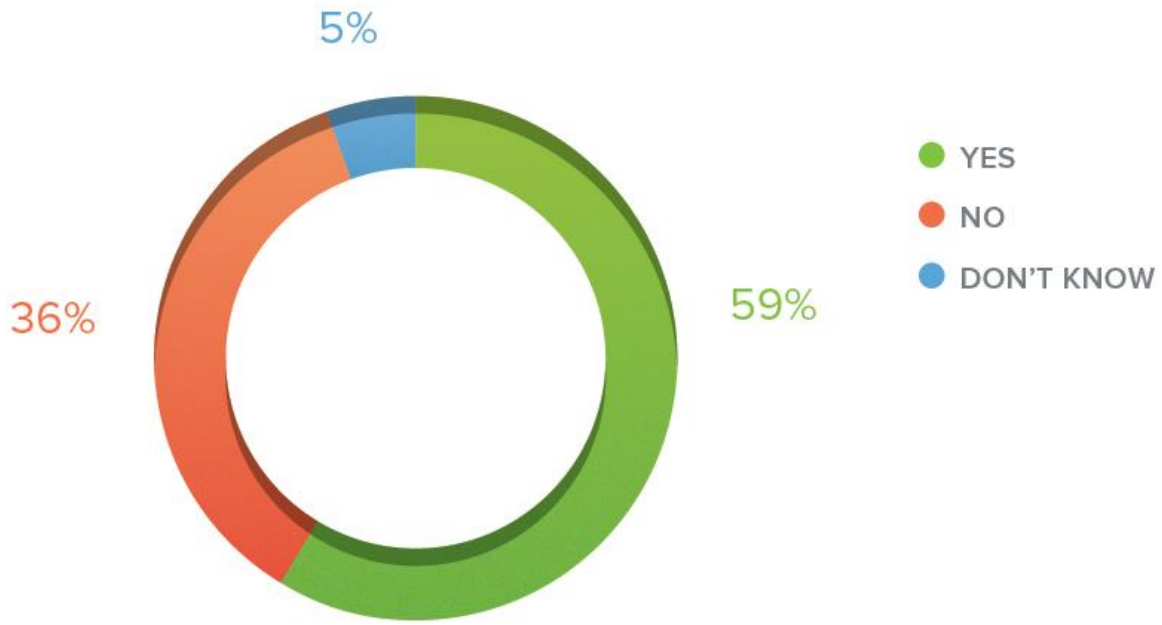
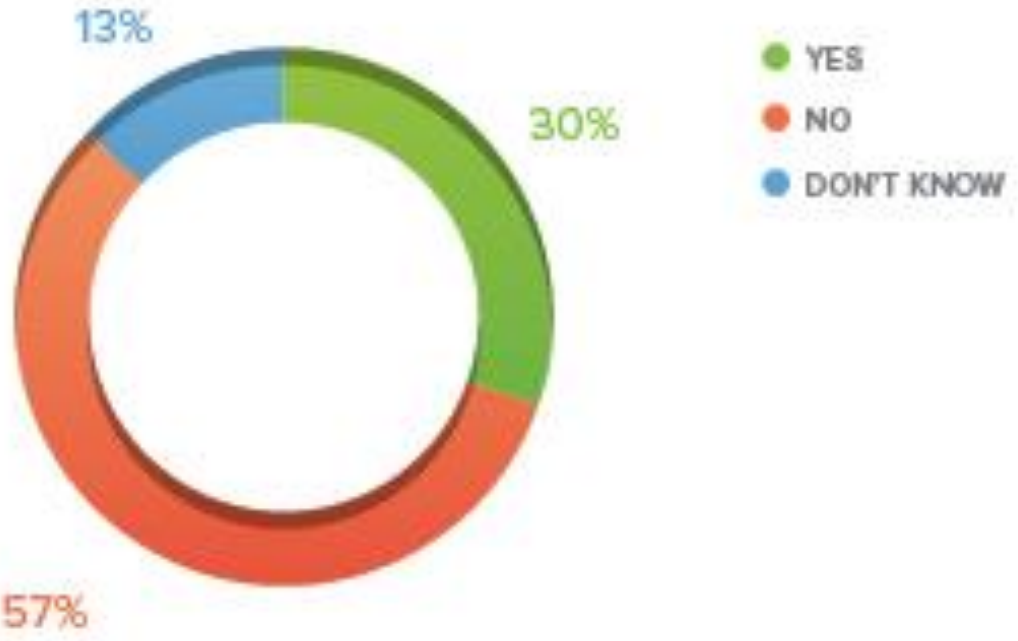
# Does your organisation have a method or process to assess the risk of your residential properties overheating?

*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?




A concept diagram of the types of factors which should improve the reliability of the overheating risk assessment process for dwellings

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# OVERHEATING IN HOMES

## THE BIG PICTURE

FULL REPORT

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For more information !!


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# THANK YOU

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