

# What do we mean by quality



## Long-term performance for occupants and owners

1. Actual energy costs (& usage)
2. Indoor air quality (linked to ventilation rates)
3. Thermal comfort – avoiding overheating
4. Indoor air quality (linked to indoor pollutants)
5. Moisture/ humidity levels
6. Space, daylight, greenery
7. Noise
8. Maintenance

# Performance gap for energy use in new homes



How much more energy does a typical new home use for heating, compared to its design target?

+10%   + 25%   +50%   **60 - 80%**   +75%   +100%

Source: Zero Carbon Hub, Carbon Compliance for Tomorrow's New Homes: a review of the modelling tools and assumptions – Topic 4 Closing the gap between designed and built performance, NHBC Foundation, Aug 2010.

# Performance gap for energy use in new PH homes



How much more energy does a Passivhaus new home use for heating, compared to its design target?

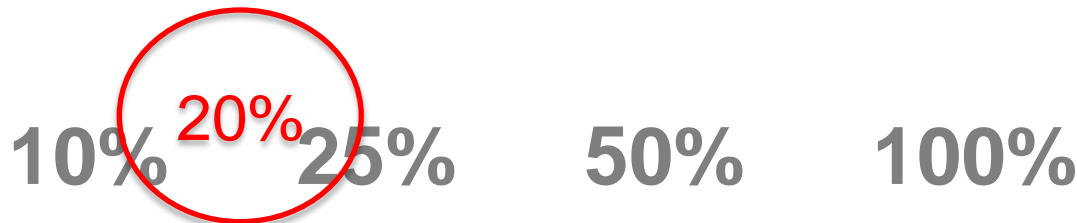


Source: The Performance of Passivhaus in New Construction: post occupancy evaluation of certified Passivhaus dwellings in the UK – early results. University of Bath research. Passivhaus Trust, July 2017.

# Ventilation & healthy indoor air



In new homes tested for DCLG in 2010 (& 2017), how many ventilation systems delivered the required air change rate?



Source: Ventilation dissemination event for Innovate UK Building Performance Evaluation Programme, Zero Carbon Hub, October 8<sup>th</sup>, presentation by Prof Tim Sharpe, Mackintosh Environmental Architecture Unit. Also similar studies by BSRIA (2011) & Four Walls Consulting (2017, unpublished) showing up to 95% failure rate

# Ventilation & healthy indoor air



In equivalent tests on Passivhaus new homes, how many ventilation systems delivered the required air changes?

10%    25%    50% > 80%    100%

Source: Private communication from the Centre for the Built Environment, Leeds Beckett University.