South West Wales Best Practice Club and WLZCH

THE PERFORMANCE GAP PROJECT

Closing the Gap Between Design & As Built

ZERO CARBON HUB

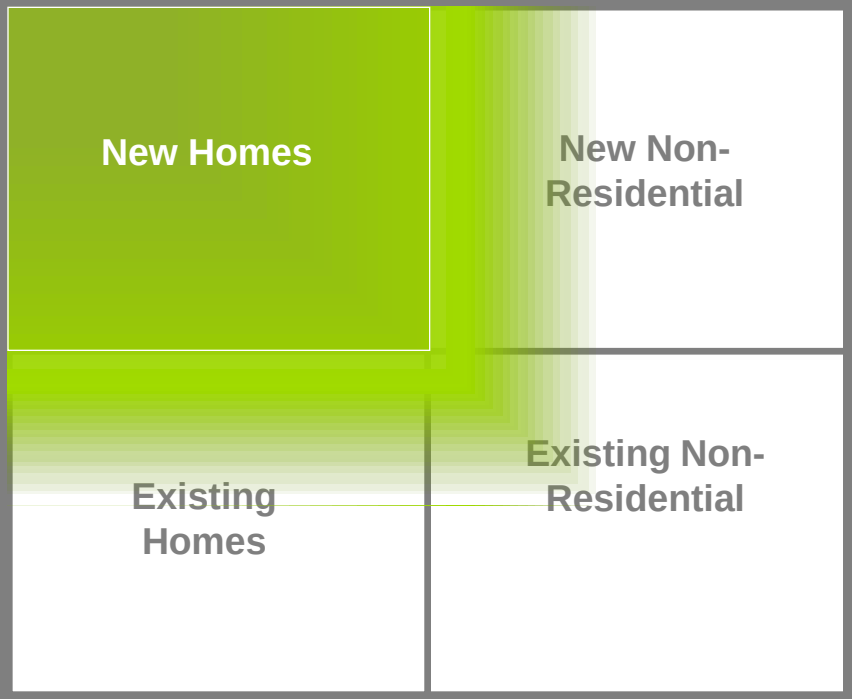
15th. September 2014

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



The Performance Gap

Mending the Gap

FABRIC FIRST - Energy efficiency

Building Fabric:

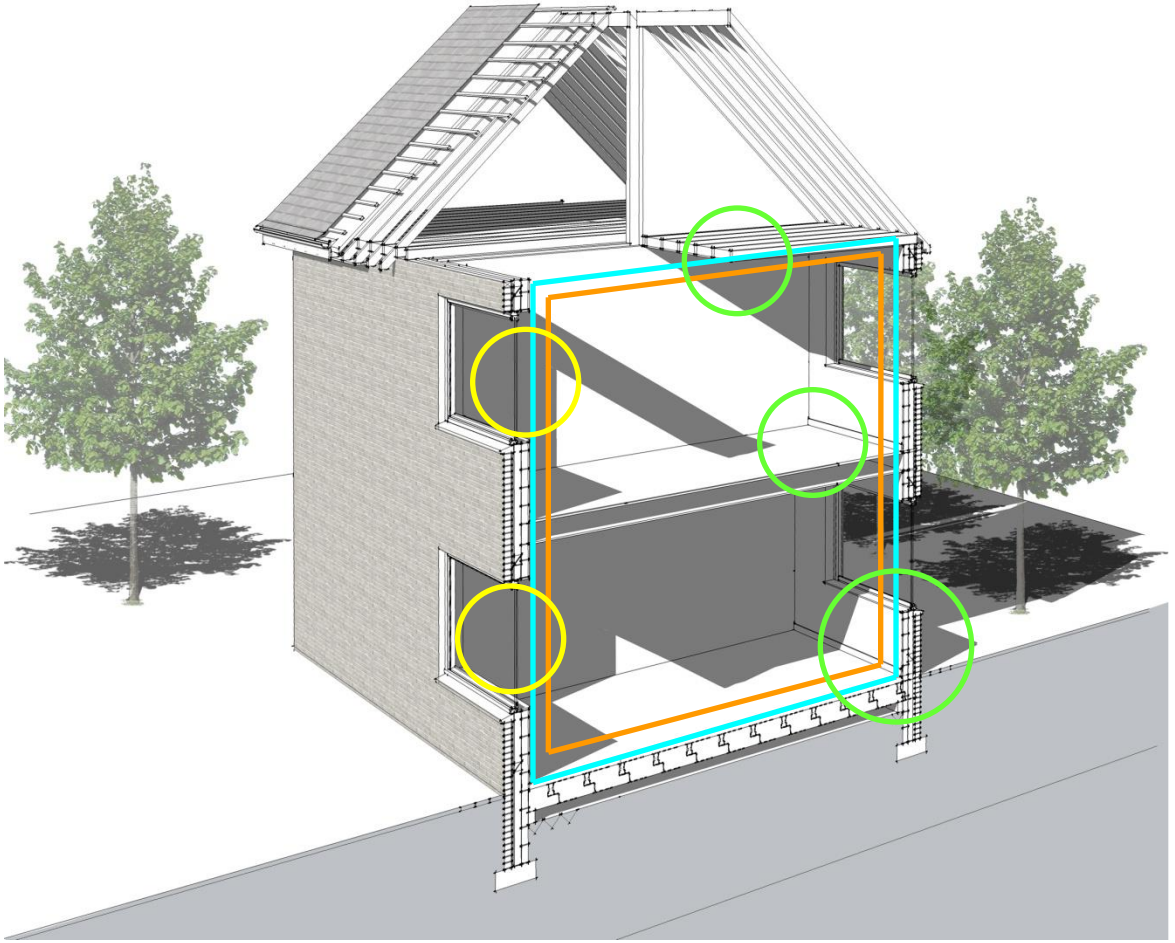
U-values

Thermal mass
Thermal Bridging

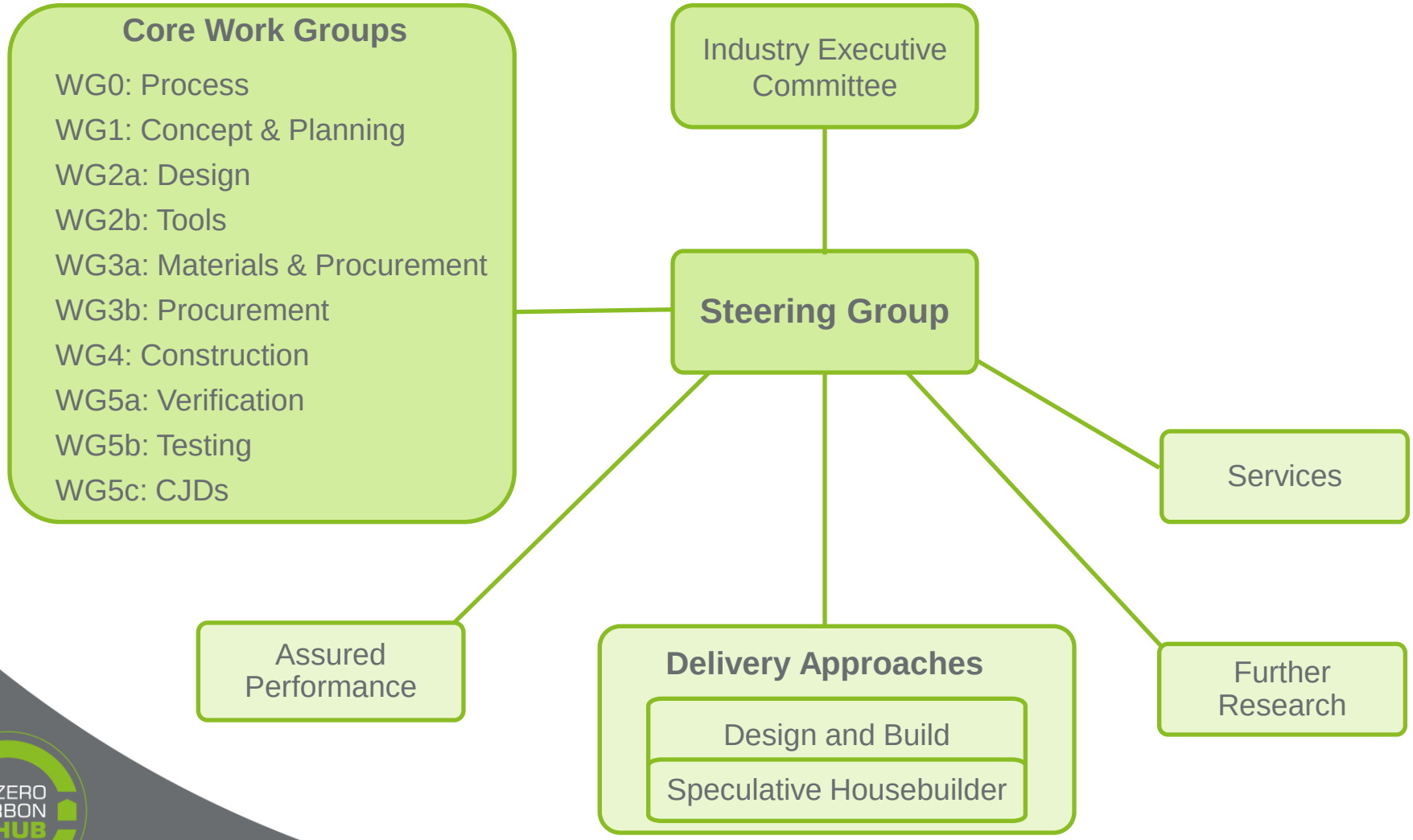
Air-permeability

Orientation, solar gains,

Glazing proportion

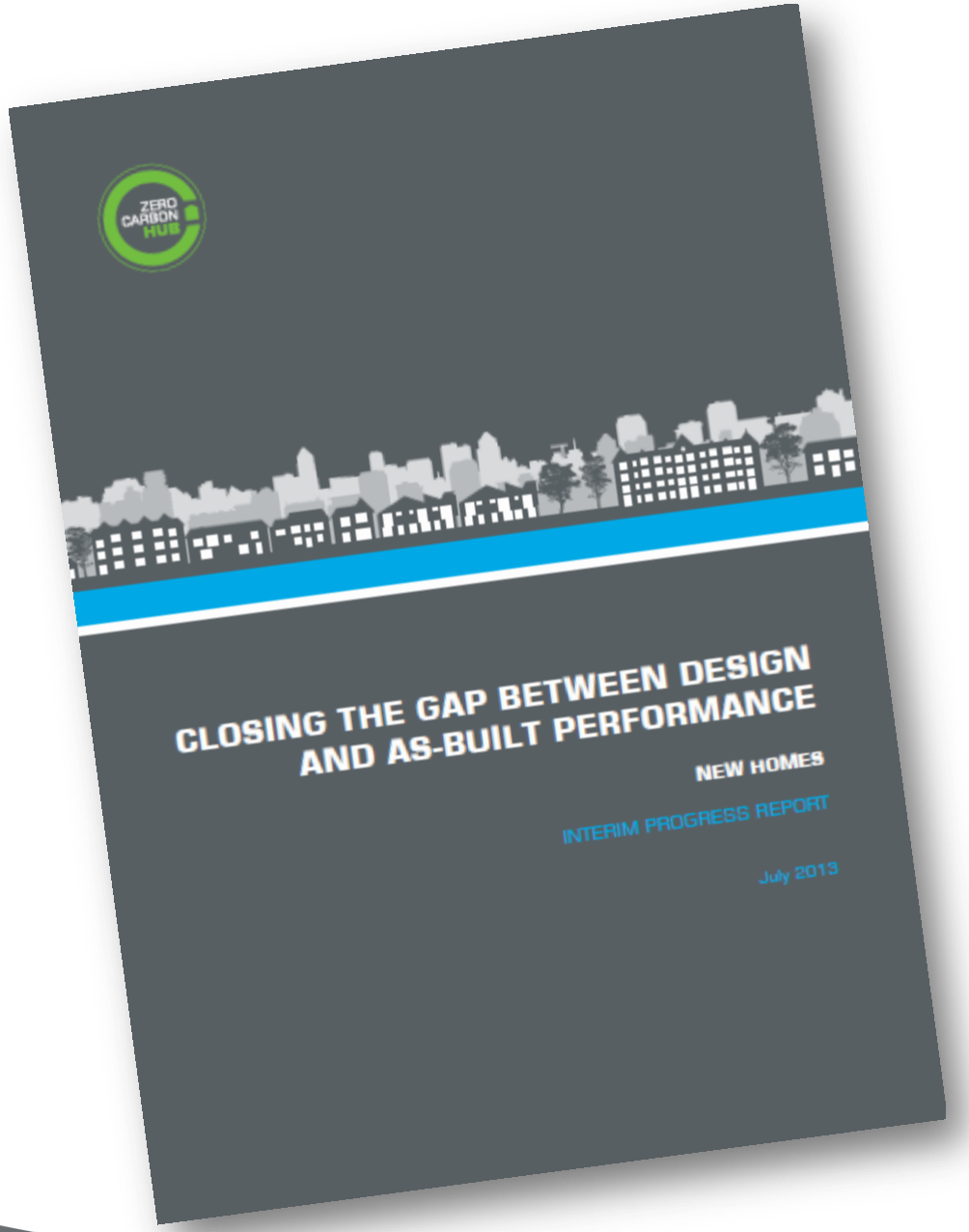


Industry WG Structure



Interim Report

The Problems!



CROSS-CUTTING THEMES

KNOWLEDGE & SKILLS

RESPONSIBILITY

COMMUNICATION

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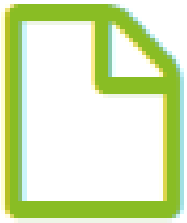
Literature Review



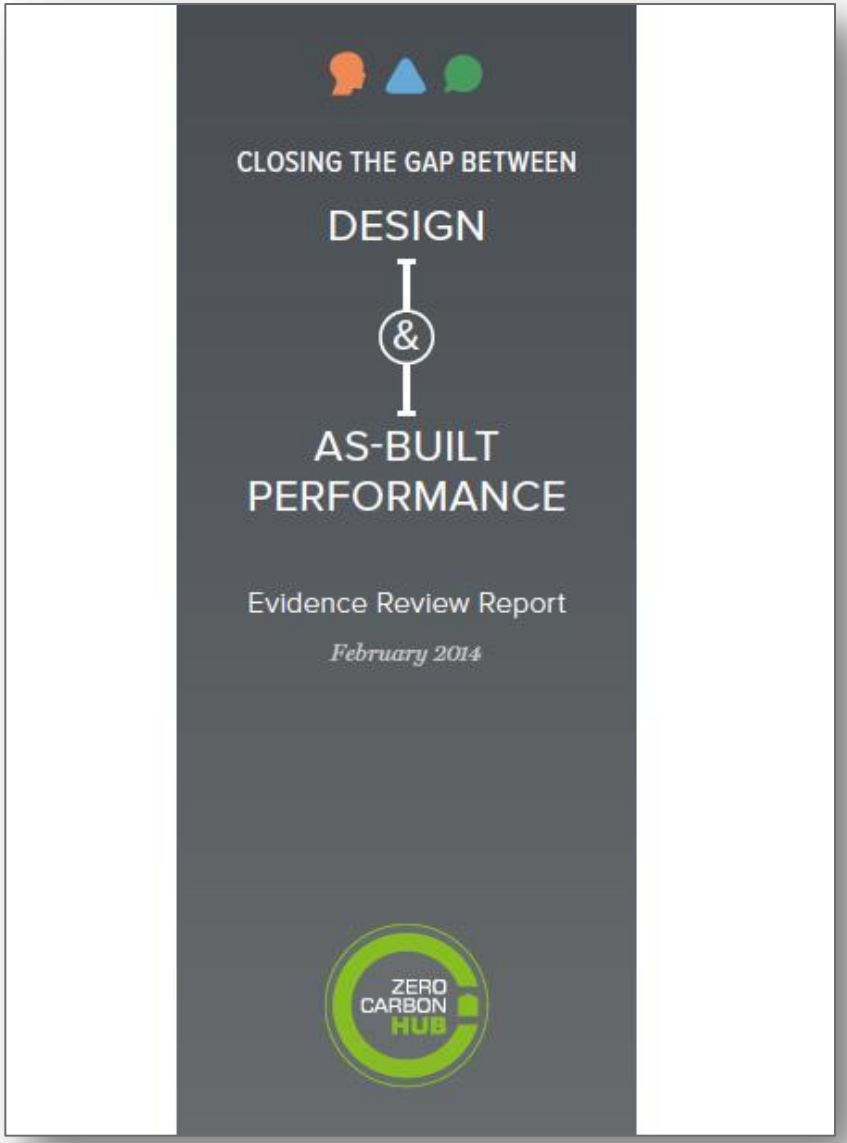
- **State of the industry (*aggregated data*)**
  - NHBC, LABC, SAP software providers, professional institutions, house builders, manufacturers
- **Compliance processes**
  - As-built SAPs, ACD/ECD use, Air pressure tests, commissioning
- **Field trials**
  - TSB Building Performance Evaluation, EST Heat pump trials
- **Academic studies**
  - Stamford Brook, Elmtree Mews, Temple Avenue
- **“Secret” knowledge**
  - Manufacturers, Universities

Housebuilding Process Review

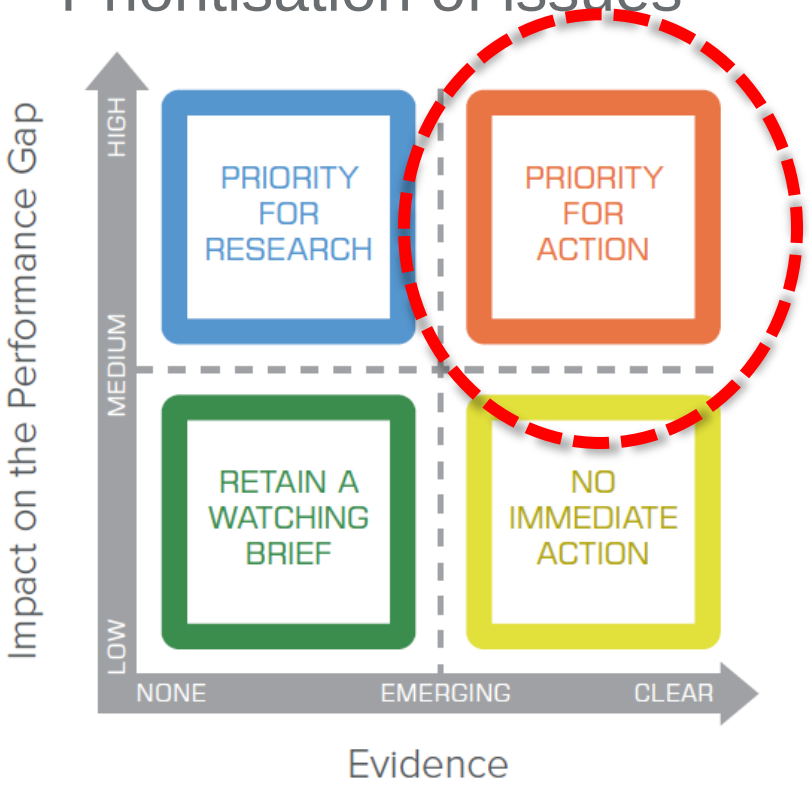
- 21 sites analysed
- Over 200 units
- Completely anonymous
- Identified many issues

Evidence Review

The truth behind the myths.



Prioritisation of issues



- 15 Priority for Action

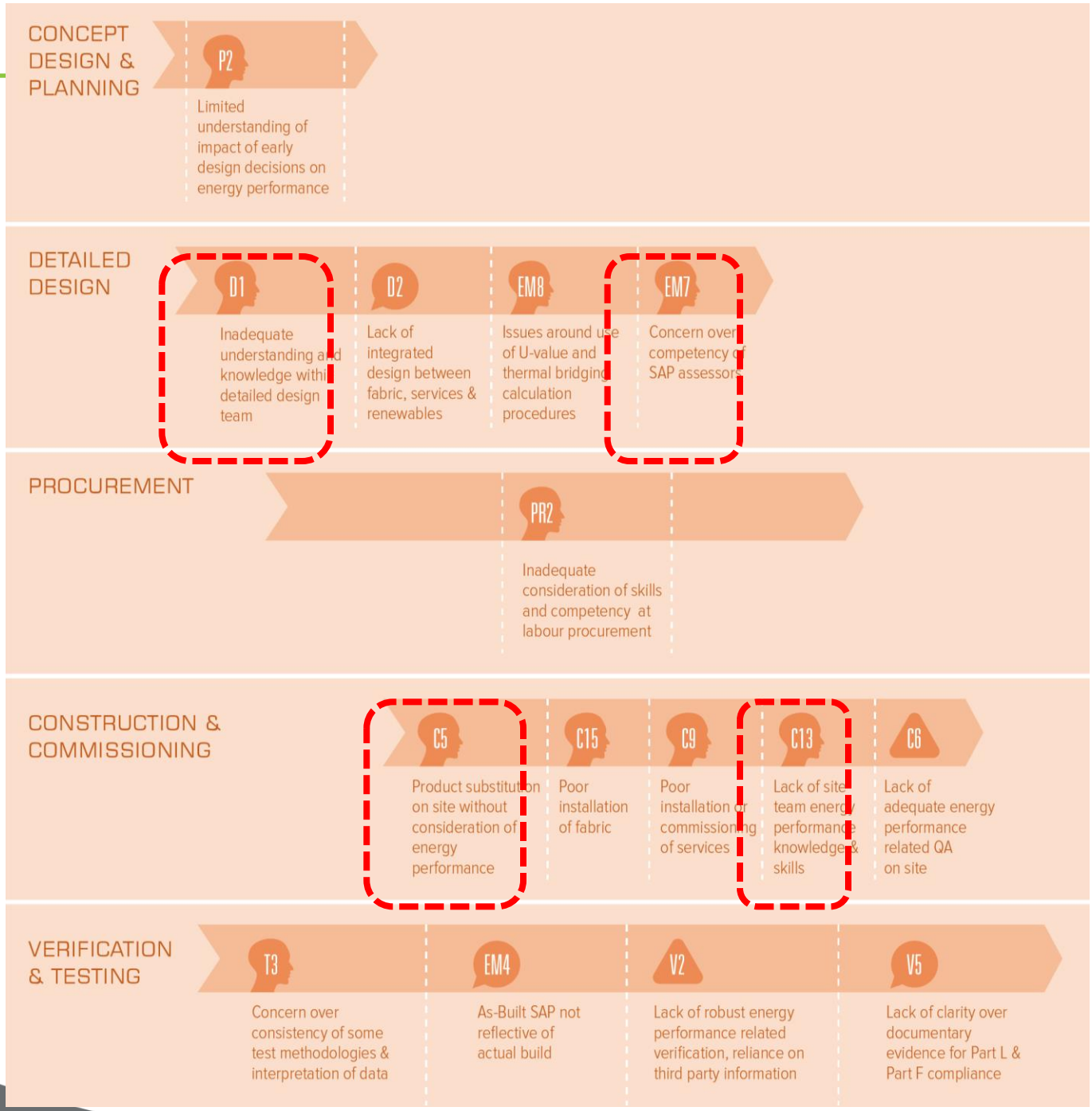
AND cross-cutting themes

KNOWLEDGE & SKILLS

RESPONSIBILITY

COMMUNICATION

Evidence Review Report



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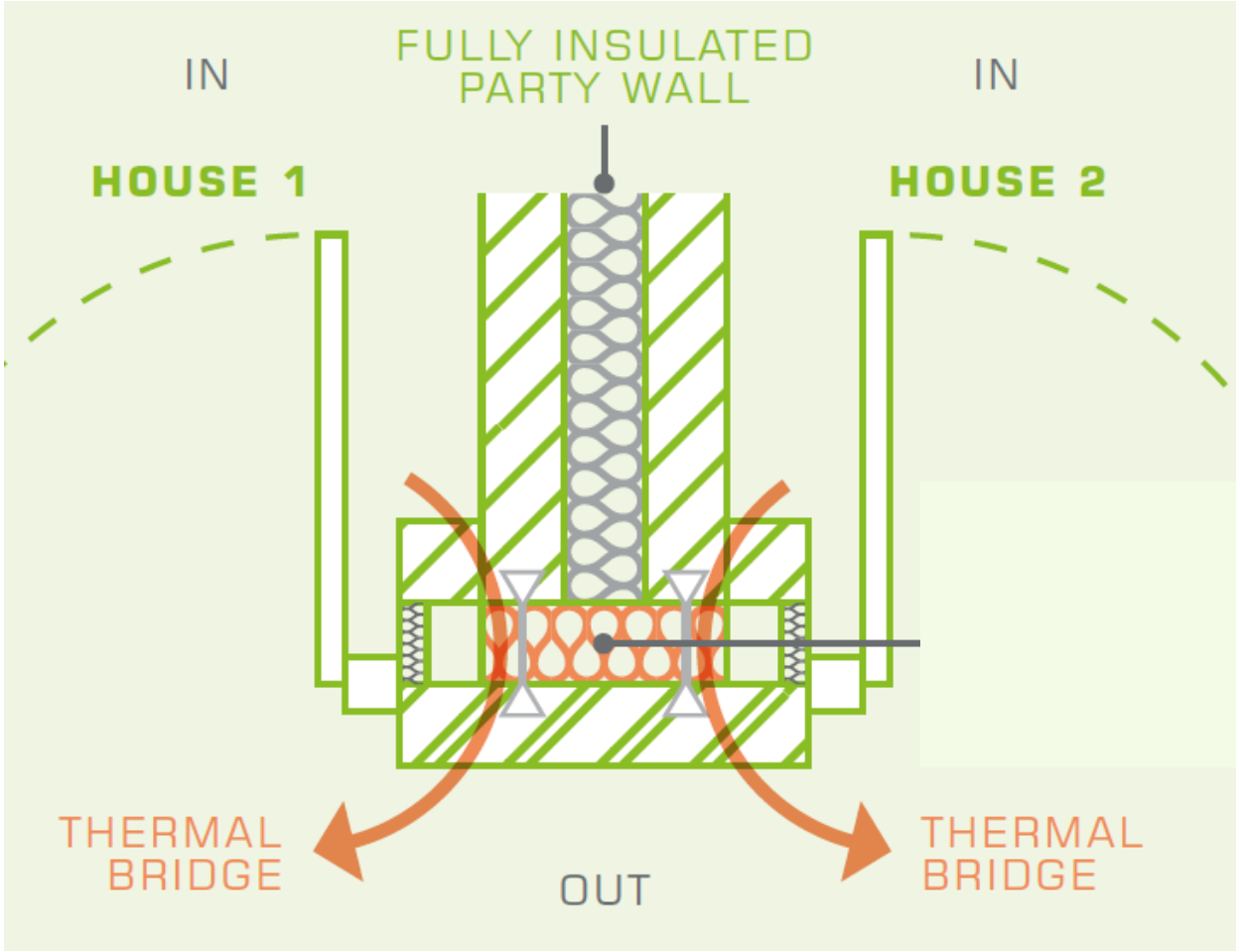
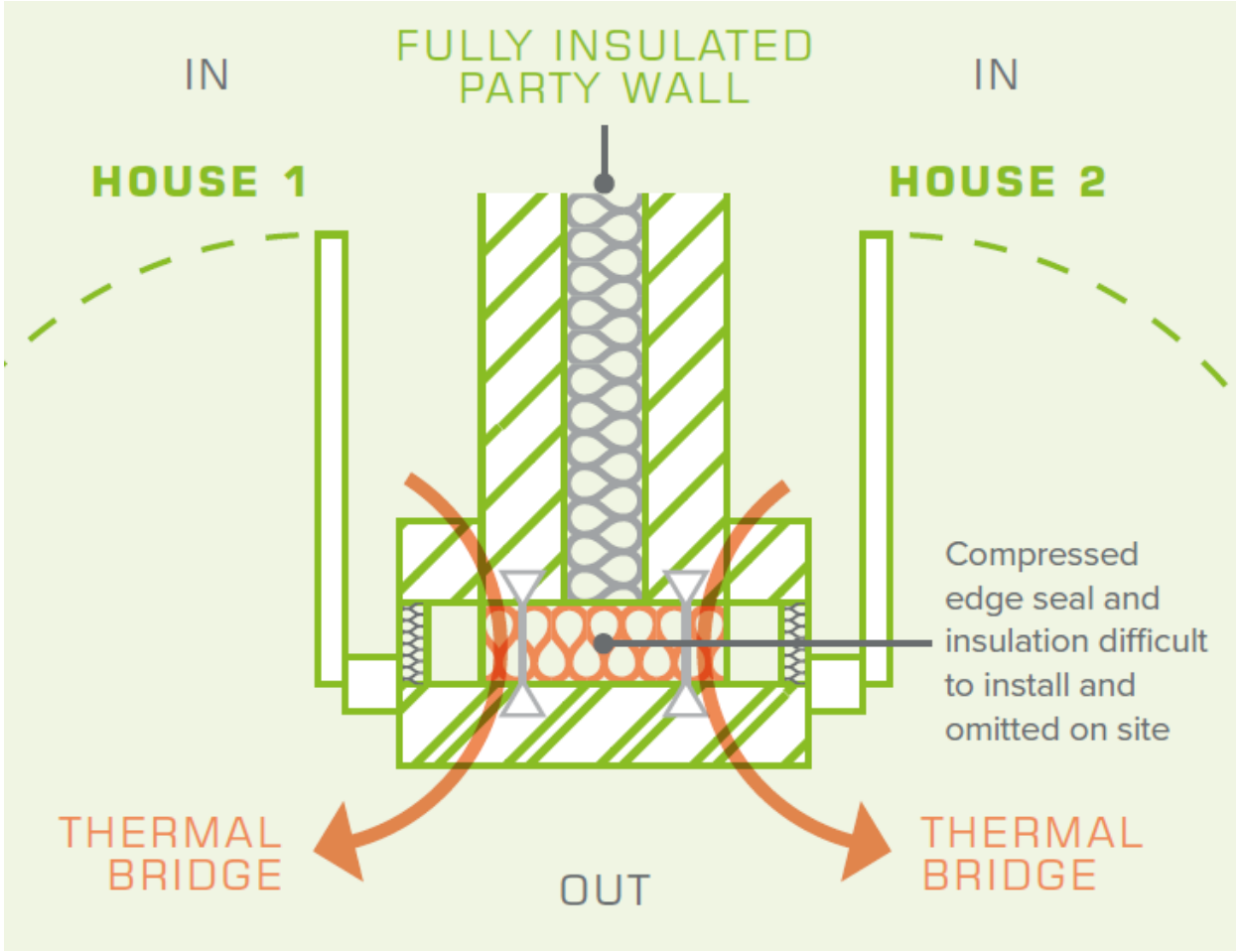
1. Inadequate Understanding & Knowledge within Design Team

- Impact on:
  - Buildability
  - Compatability of systems, materials and services
  - Thermal detailing
- Typical examples:
  - Details into which insulation is impossible to fit
  - No detail on support of screed at ground floor perimeters
  - No consideration of thermal bridges for rooms over garages
  - Etc....

- Design Assumed:
  - Wall ties
  - Compressed edge seal
  - Insulation



- Reality:
  - Wall ties ✓
  - Compressed edge seal ✗
  - Insulation ✗



2. Concern over Competency of SAP Assessors

- Problems with:
  - Accuracy of inputs
  - Following conventions
  - Validating assumptions
  - Evidencing assessments

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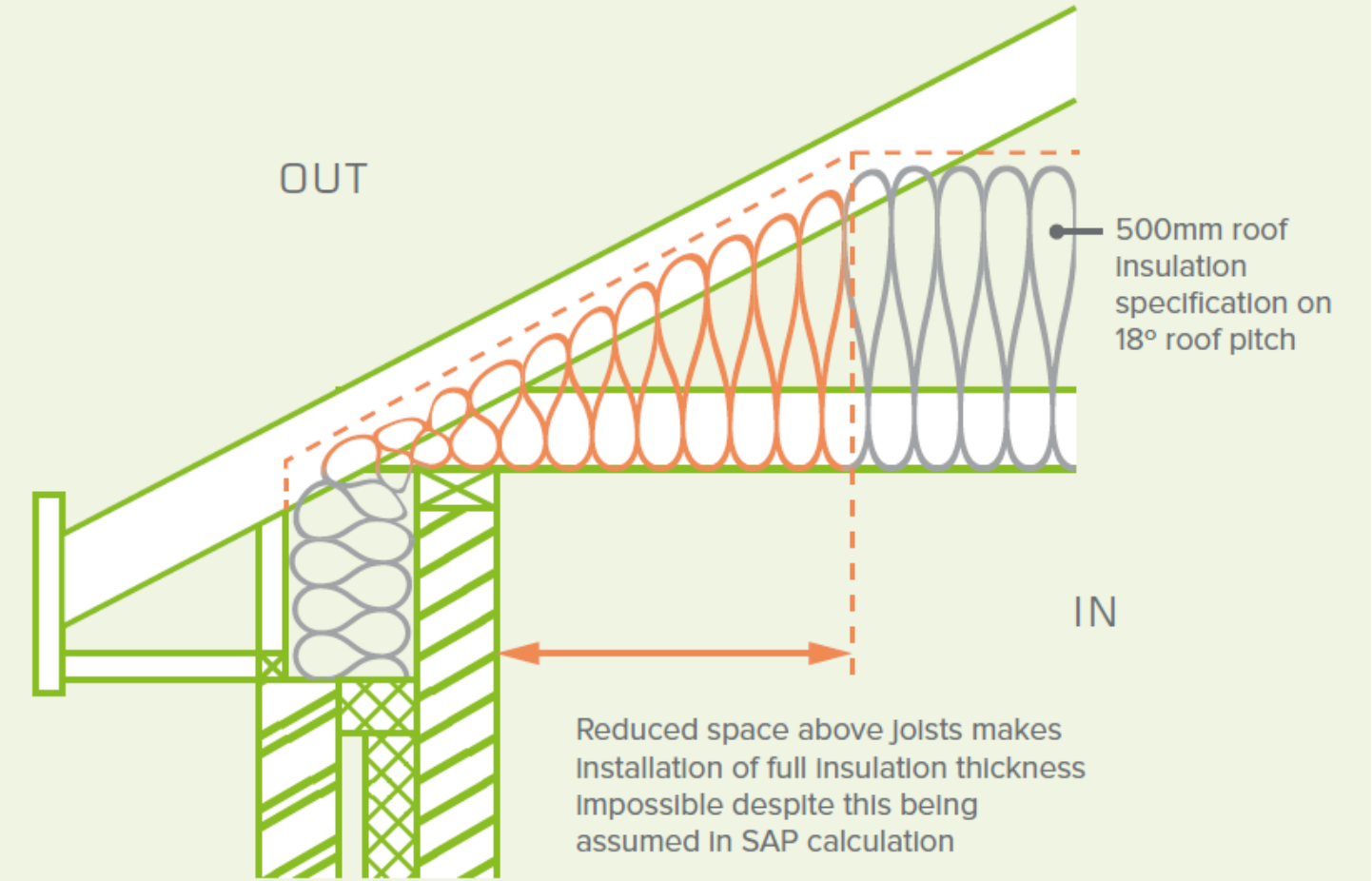
Massive impact where they are giving design advice

- How is the u-value calculated?

Can’t assume same thickness across entire roof



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3. Lack of Site Team Energy Performance Related Knowledge and Skills and/or Care

- Literature Review -
  - *"The lack of proper training of the workforce.....resulted in significant construction faults, unplanned design solutions and wrong system commissioning"*

    Oxford Brookes University, *Understanding the Gap between As Designed and As Built Performance*, 2013

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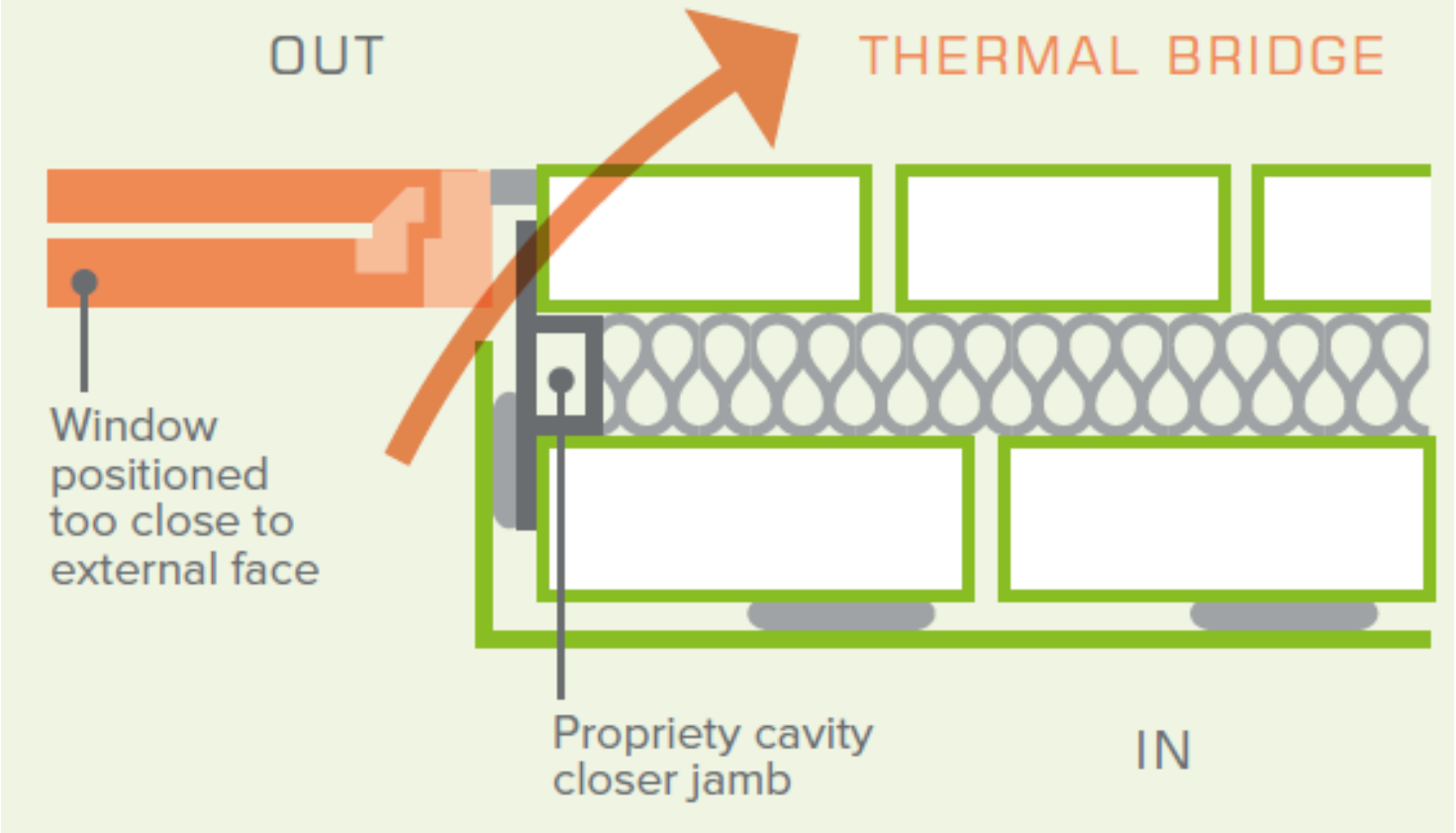
- Windows located in front of design positions
  - Insufficient overlap with cavity closer
  - 8 out of 9 sites visited



4. Product Substitution On Site

- Literature Review -
  - *“The most striking observation about the application of materials and components were the number of occasions on which materials intended for one location were used in another”*

    Leeds Metropolitan University, Lessons from Stamford Brook, 2008

- Housebuilding Process Review -
  - Identified on all sites reviewed
  - Blockwork & windows

INDUSTRY RECOMMENDATIONS

1 - PERFORMANCE ASSESSMENT R&D

Undertake the research and development necessary to create innovative testing, measurement and assessment techniques to understand the performance gap and develop commercially viable methodologies acceptable across industry for 'demonstrating performance'

2 - SKILLS AND KNOWLEDGE DEVELOPMENT

Ensure that as-built energy performance knowledge, including learning from on going research and development, is embedded into training and up-skilling for professionals and trades.

3 - CONSTRUCTION DETAILS SCHEME

Develop an industry owned and maintained construction details scheme providing 'assured' as-built energy performance for the most common major fabric junctions and systems.

4 - CONTINUED EVIDENCE GATHERING

Support further evidence gathering processes and coordinated feedback to ensure accelerated continual improvement across all sectors of industry .

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GOVERNMENT RECOMMENDATIONS

1 - SIGNAL CLEAR DIRECTION

Clearly indicate that, in place of immediate additional regulation, it expects the construction industry to act now and have put in place a number of measures to ensure that the energy performance gap is being addressed and to demonstrate this by 2020.

2 - STIMULATE INDUSTRY INVESTMENT

By funding research and development into testing, measurement and assessment techniques with immediate effect, to support the industry in providing the information necessary to quantify the performance gap and create the learning loops required to drive continuous improvement.

Additionally provide pump prime funding to enable industry to develop a construction details scheme.

3 - STRENGTHEN COMPLIANCE REGIME

Take action by 2016 to ensure that the Zero Carbon Hub recommended revisions to energy modelling practices, SAP processes and verification procedures, together with a strong regime to ensure that only suitably qualified persons carry out energy modelling, can be put in place.

4 - SUPPORT SKILLS & KNOWLEDGE DEVELOPMENT

Accelerate the demand for industry developed qualification schemes by requiring energy certified trades and professionals for all developments on public land from 2017.

ROUTE MAP TO 2020

The challenge ahead

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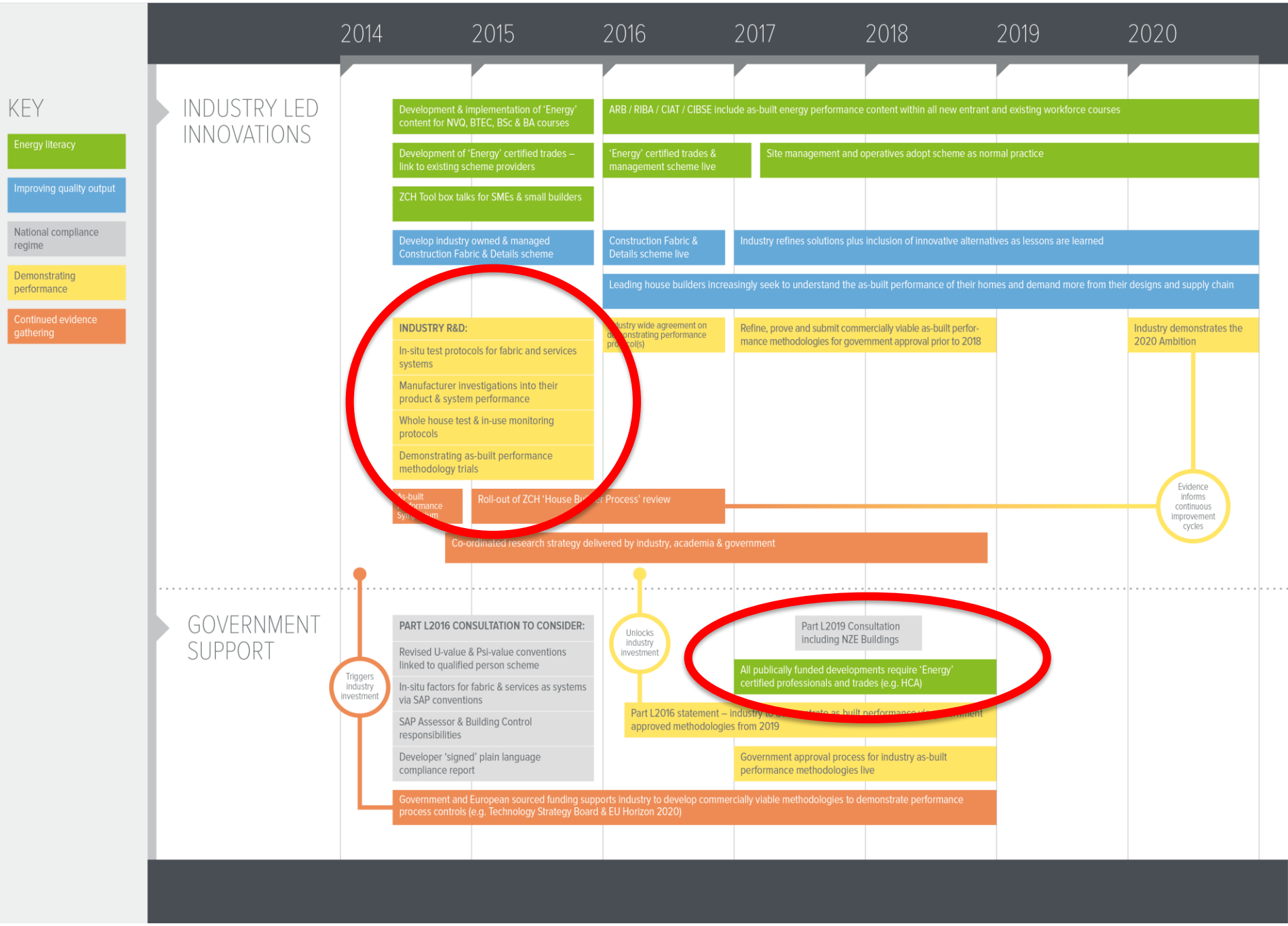
KEY
Energy literacy
Improving quality output
National compliance regime
Demonstrating performance
Continued evidence gathering
2014
2015
2016
2017
2018
2019
2020
INDUSTRY LED INNOVATIONS
Development & implementation of 'Energy' content for NVQ, BTEC, BSc & BA courses
ARB / RIBA / CIAT / CIBSE include as-built energy performance content within all new entrant and existing workforce courses
Development of 'Energy' certified trades – link to existing scheme providers
'Energy' certified trades & management scheme live
Site management and operatives adopt scheme as normal practice
ZCH Tool box talks for SMEs & small builders
Develop industry owned & managed Construction Fabric & Details scheme
Construction Fabric & Details scheme live
Industry refines solutions plus inclusion of innovative alternatives as lessons are learned
Leading house builders increasingly seek to understand the as-built performance of their homes and demand more from their designs and supply chain
INDUSTRY R&D:
In-situ test protocols for fabric and services systems
Manufacturer investigations into their product & system performance
Whole house test & in-use monitoring protocols
Demonstrating as-built performance methodology trials
Refine, prove and submit commercially viable as-built performance methodologies for government approval prior to 2018
Industry demonstrates the 2020 Ambition
Roll-out of ZCH 'House Builder Process' review
Evidence informs continuous improvement cycles
Co-ordinated research strategy delivered by industry, academia & government
GOVERNMENT SUPPORT
PART L2016 CONSULTATION TO CONSIDER:
Revised U-value & Psi-value conventions linked to qualified person scheme
In-situ factors for fabric & services as systems via SAP conventions
SAP Assessor & Building Control responsibilities
Developer 'signed' plain language compliance report
Triggers industry investment
Unlocks industry investment
Part L2019 Consultation including NZE Buildings
All publically funded developments require 'Energy' certified professionals and trades (e.g. HCA)
Part L2016 statement – industry to
approved methodologies from 2019
Government approval process for industry as-built performance methodologies live
Government and European sourced funding supports industry to develop commercially viable methodologies to demonstrate performance process controls (e.g. Technology Strategy Board & EU Horizon 2020)

Thankyou !