# Defining a Fabric Energy Efficiency Standard for zero carbon homes

## Appendix E

## Task Group Assessment Matrix

The views and recommendations within this report are those of the Task Group and do not necessarily reflect the views of Government

# Task Group Assessment Matrix

## Introduction

This appendix should be read in conjunction with the main report entitled ‘Defining a Fabric Energy Efficiency Standard for zero carbon homes’.

The Task Group realised the importance of considering the full implications of a policy decision such as defining a minimum Fabric Energy Efficiency. An assessment matrix was considered to be the most suitable approach to bring structure and clarity to the inevitable debate this would require.

This section provides greater detail regarding the workshop process used to develop the matrix and identify the Task Group’s thoughts on each of the criteria.

## Assessment criteria

At the beginning of its decision making process, the Task Group agreed a set of key Assessment Criteria by which the consequences of differing levels of performance standard should be considered prior to making any decision:

1. Building Practices

2. Future proofed construction

3. Technically achievable in vast majority of situations. (Buildability at mass scale)

4. Complexity of ensuring householder health and wellbeing

5. Desirable homes for householders on a mass-scale

6. Upfront build cost

7. Longer term maintenance and householder energy costs

8. Energy Security

9. Broader environmental considerations

## Decision making process

The Task Group agreed to form an initial recommendation, and then take this to consultation with wider industry, prior to making a final recommendation.

In order to form an initial recommendation, it was agreed to hold two decision making workshops, the first dedicated to the consideration of the Assessment Criteria, and the second to making decisions against the Key Issues. Once the consultation was complete a final Workshop was then held to form the final recommendation.

## Workshop 01 – Assessment Criteria

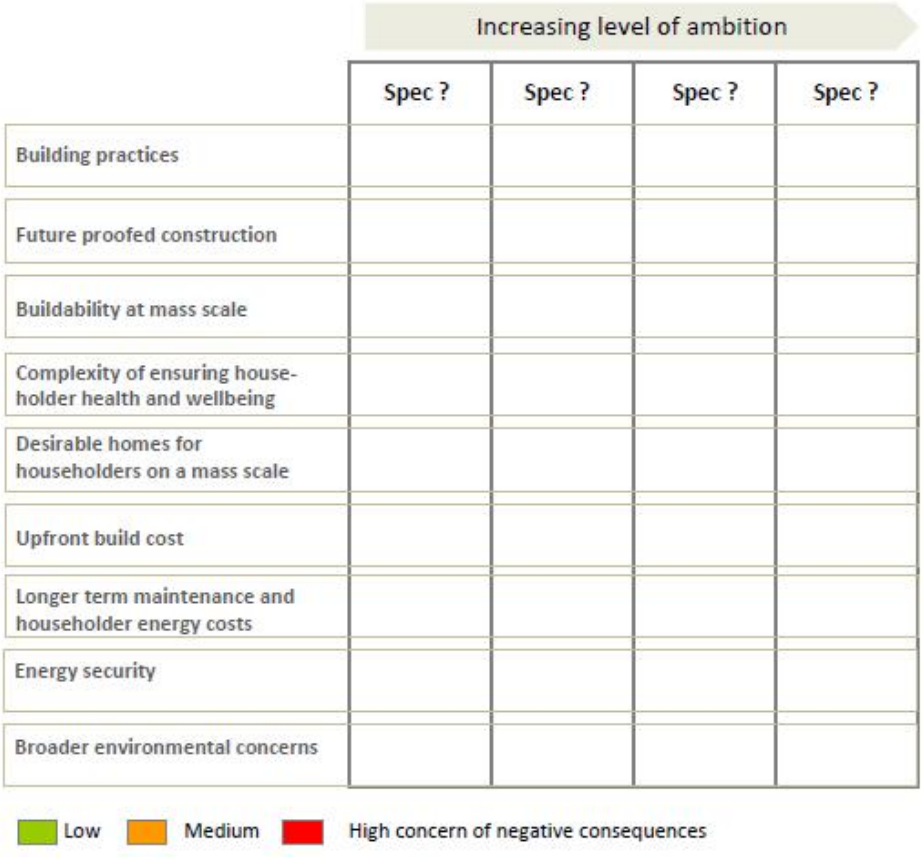
Individual Task Group members with specialist experience in the area of each of the Assessment Criteria were asked to prepare 'Think papers' to assist other members in understanding the areas of interest / concern. These papers were distributed to all Task Group Members in advance of the workshop:

| | **Tink papers presented at workshop** |
|---|---|
| 1 | EESTG- Impact on current dwellings types |
| 2 | Future proofed construction |
| 3 | Building practices |
| 4 | Mechanical ventilation with heat recovery<br><br>Supplementary Expertise |
| 5 | Desirable homes for house builders on mass scale |
| 6 | Upfront build costs |
| 7 | Life cycle costing |
| 8 | Energy security |
| 9 | Wider environmental issues including climate change, pollutants, ozone depletion change, human consumption, resource use and energy/carbon use |

## Decision making matrix

The Task Group members comprised stakeholders representing a large spectrum of the house building industry, whom held disparate views on many issues associated with the Fabric Energy Efficiency Standard. The ZCH spent some time deliberating how best to facilitate agreement on unilateral decisions.

A decision making matrix was designed (as illustrated below) which used graduated traffic light colours to capture Task Group concerns on the impact of differing levels of performance standard against each of the Assessment Criteria, and which therefore allowed opinion to be captured on a qualitative rather than quantitative basis. Simple numerical analysis was avoided because it was considered that this would have inhibited fluid debate, and encouraged polarisation of the disparate member's views.



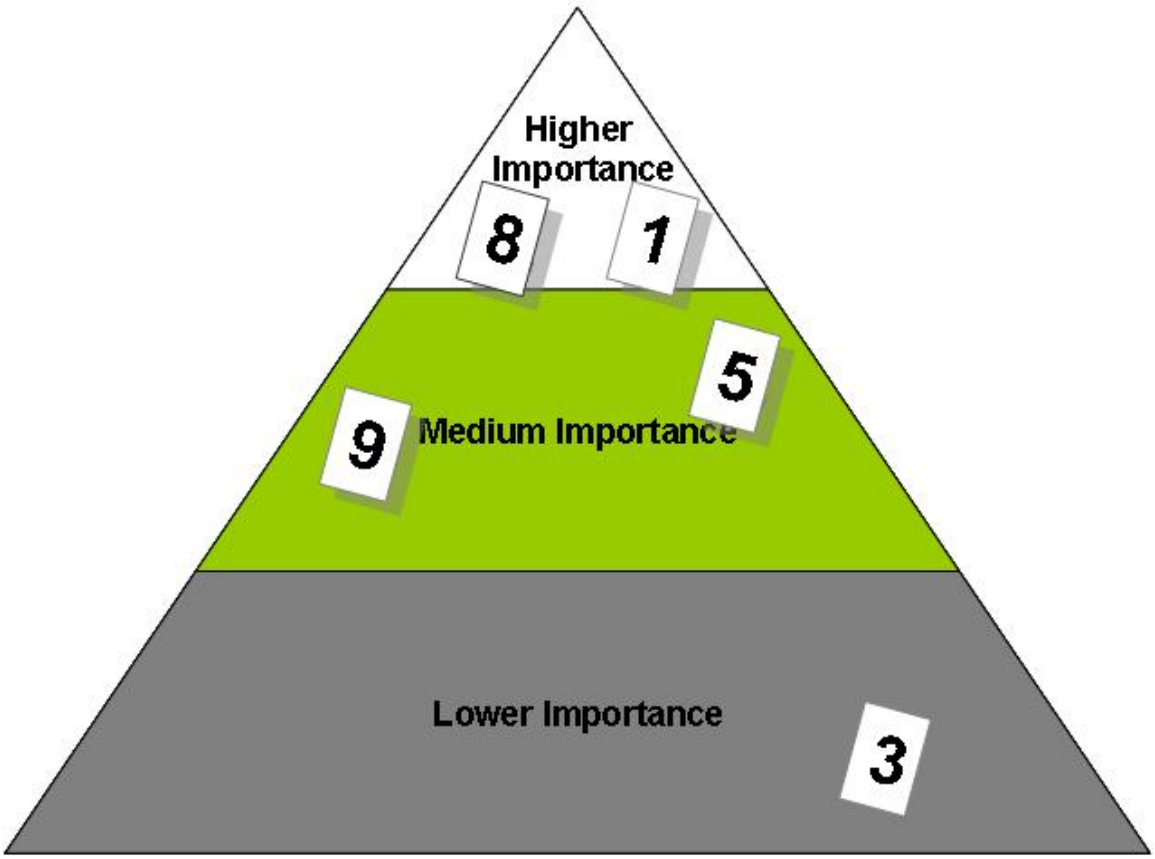
## Hierarchy Matrix

Due to concerns that Task Group members may not be able to reach agreement on the Assessment Criteria, an additional tool was developed which allowed Task Group members to simply grade the relative importance of each of the criteria.

A matrix was designed with three tiers (as illustrated below), allowing Task Group members to rate the importance of the criteria within three bands in relation to one another.

**Please note the illustration below is purely an example and does not actually reflect the voting that took place.**

The matrix was loosely based on Thomas Saaty's Analytical Hierarchy Process, that places a value on points comparatively, which helps the decision makers find the one that best suits their needs and their understanding of the problem.



## Workshop process

The workshop was held over 1 day in a hotel in central London. It was chaired by the ZCH, and attended by approximately 20 Task Group members. At the onset the agenda of the workshop, the outcomes expected from the day, and the context for the Task Group decisions were made clear to all present. The ZCH presented the Task Group activities that had been carried out to date, and the results of the energy, architectural, and financial modelling that had been undertaken to date on behalf of the Task Group.

The main part of the day was spent working through each of the Assessment Criteria, and capturing the Task Group's concerns against each. The decision making matrix was projected on one screen throughout to remind all present of the status of the decisions.

The same process was used for each criteria:

1. Where available, the author of each of the criteria 'Think papers' was invited to present key issues relating to each of the criteria in order to stimulate debate and thinking.

2. The criteria was then thrown open for Task Group debate and wider discussion

3. Pros and cons for each criteria were suggested by Task Group members, recorded by the ZCH on Post-it notes, and then apportioned against a specific level of standard. (See later diagrams) This process stimulated further ideas and debate, and further pros and cons. Post-it notes were chosen for this exercise due to their ease of adaption to reflect when debate changed perspectives and levels of concern, they were positioned on a matrix drawn on a flip chart.

4. After each discussion, the members were asked to summarise their levels of concern against the criteria, by adding colour to the decision making matrix (green minor concerns, orange some concern, and red major concerns). Colour was applied by ZCH after gaining a general consensus through group debate, it was added to and changed until all were in agreement. The matrix was used to display a perspective scale on where standards should be set. For example, the group could define their minimum standard yet where there were concerns or a range of views, a maximum standard could also be set. The resulting matrix was therefore representative of the members' opinions and recommendations.

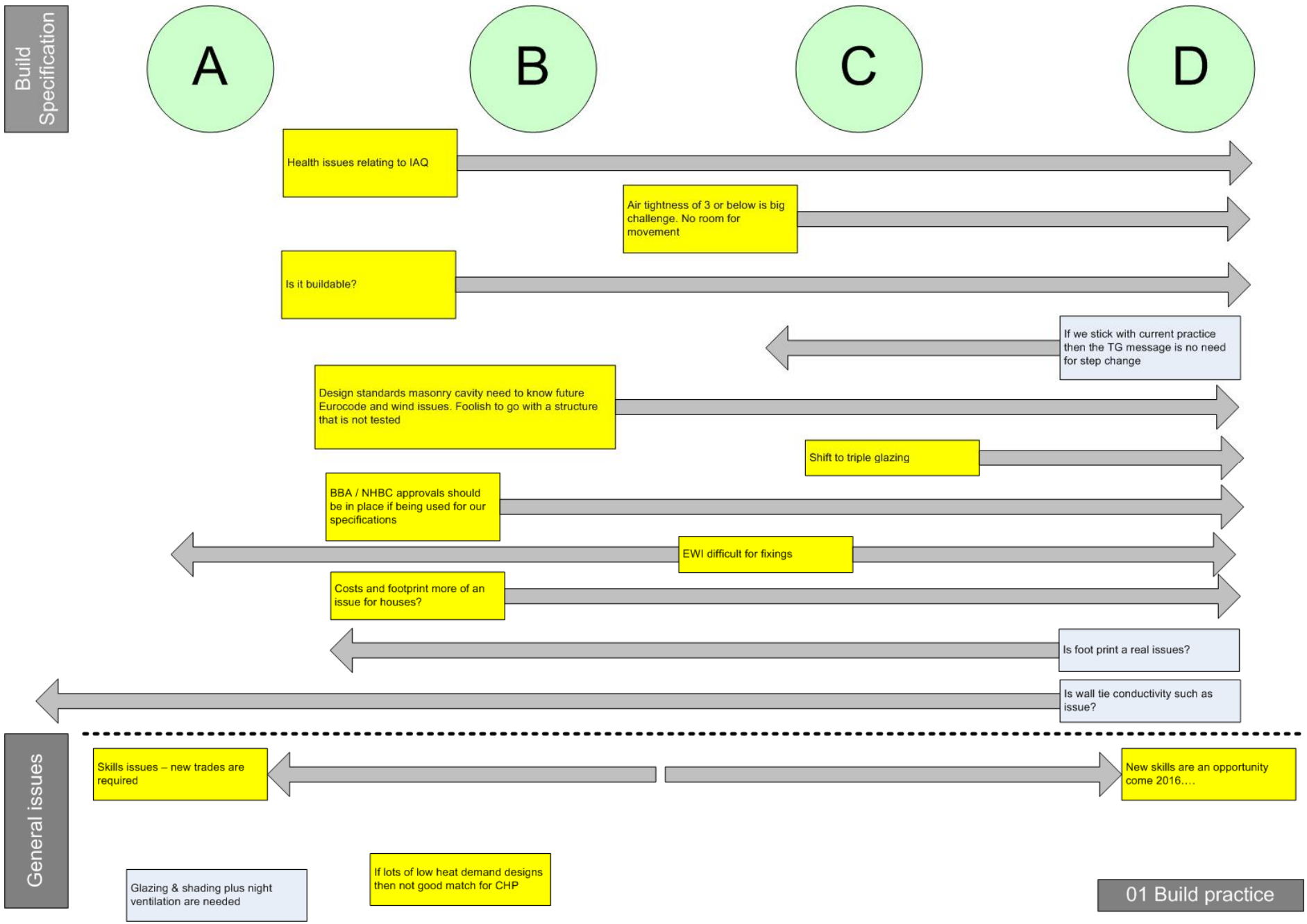
The following diagrams illustrate the specific issues within each criterion:-

- The circled letters at the top related to the construction specifications (A- D)

- Issues in yellow boxes were seen as barriers

- Issues in blue boxes were seen as opportunities

- The arrows from each issue indicate across which range of the construction specifications this was considered to apply


Build Specification
A
B
C
D
Health issues relating to IAQ
Air tightness of 3 or below is big challenge. No room for movement
Is it buildable?
If we stick with current practice then the TG message is no need for step change
Design standards masonry cavity need to know future Eurocode and wind issues. Foolish to go with a structure that is not tested
Shift to triple glazing
BBA / NHBC approvals should be in place if being used for our specifications
EWI difficult for fixings
Costs and footprint more of an issue for houses?
Is foot print a real issues?
Is wall tie conductivity such as issue?
General issues
Skills issues – new trades are required
New skills are an opportunity come 2016….
Glazing & shading plus night ventilation are needed
If lots of low heat demand designs then not good match for CHP
01 Build practice

Build Specification

A

B

C

D

Summer overheating risk

We should do the best we can (Passiv Haus)

Health issue concerns about IAQ

General issues

Glazing & shading plus night ventilation are needed

If lots of low heat demand designs then not good match for CHP

Does the wall allow fittings for shades etc?

Lots of these issues are not linked to EE specification

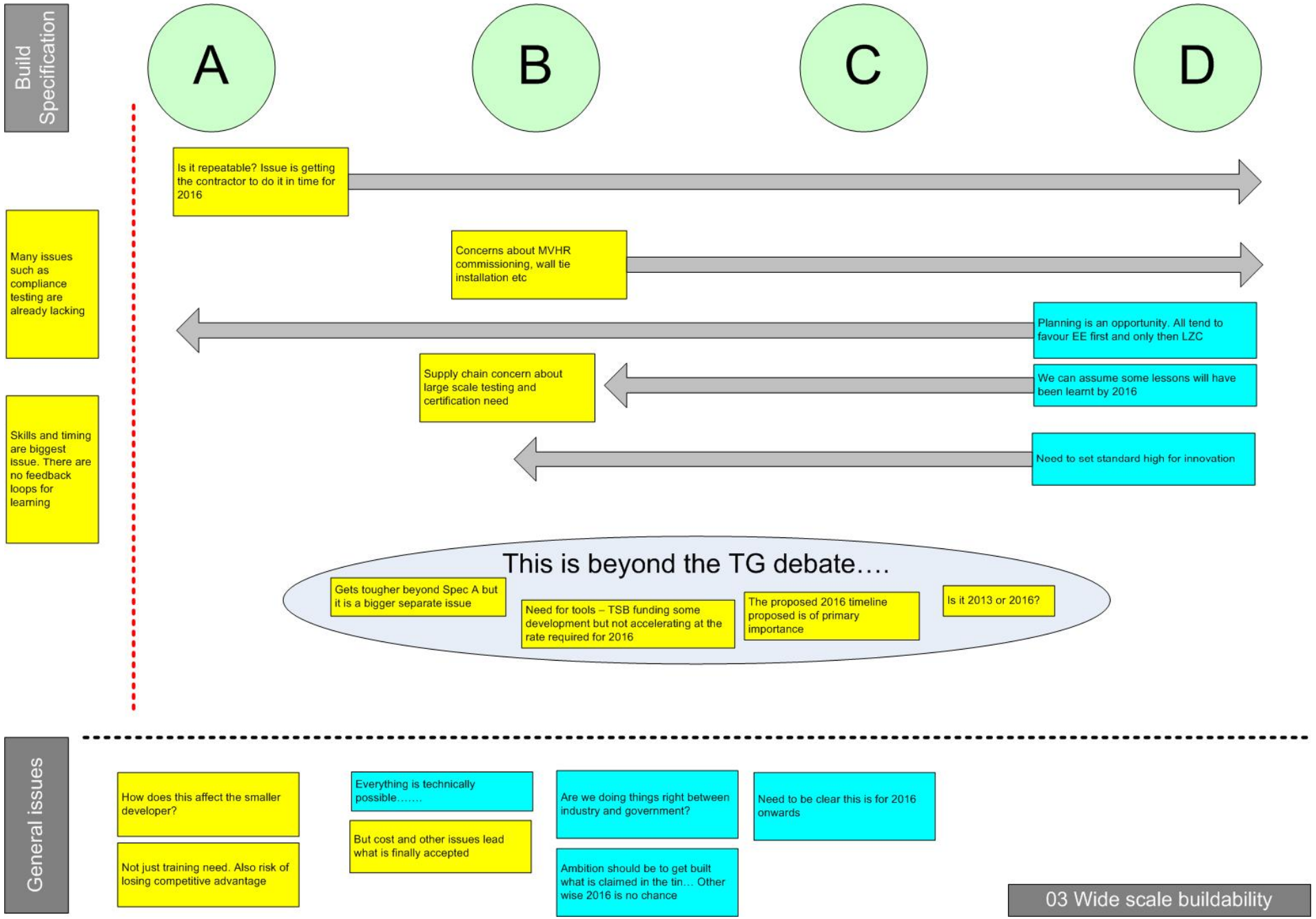
Standard could promote innovation in ventilation systems

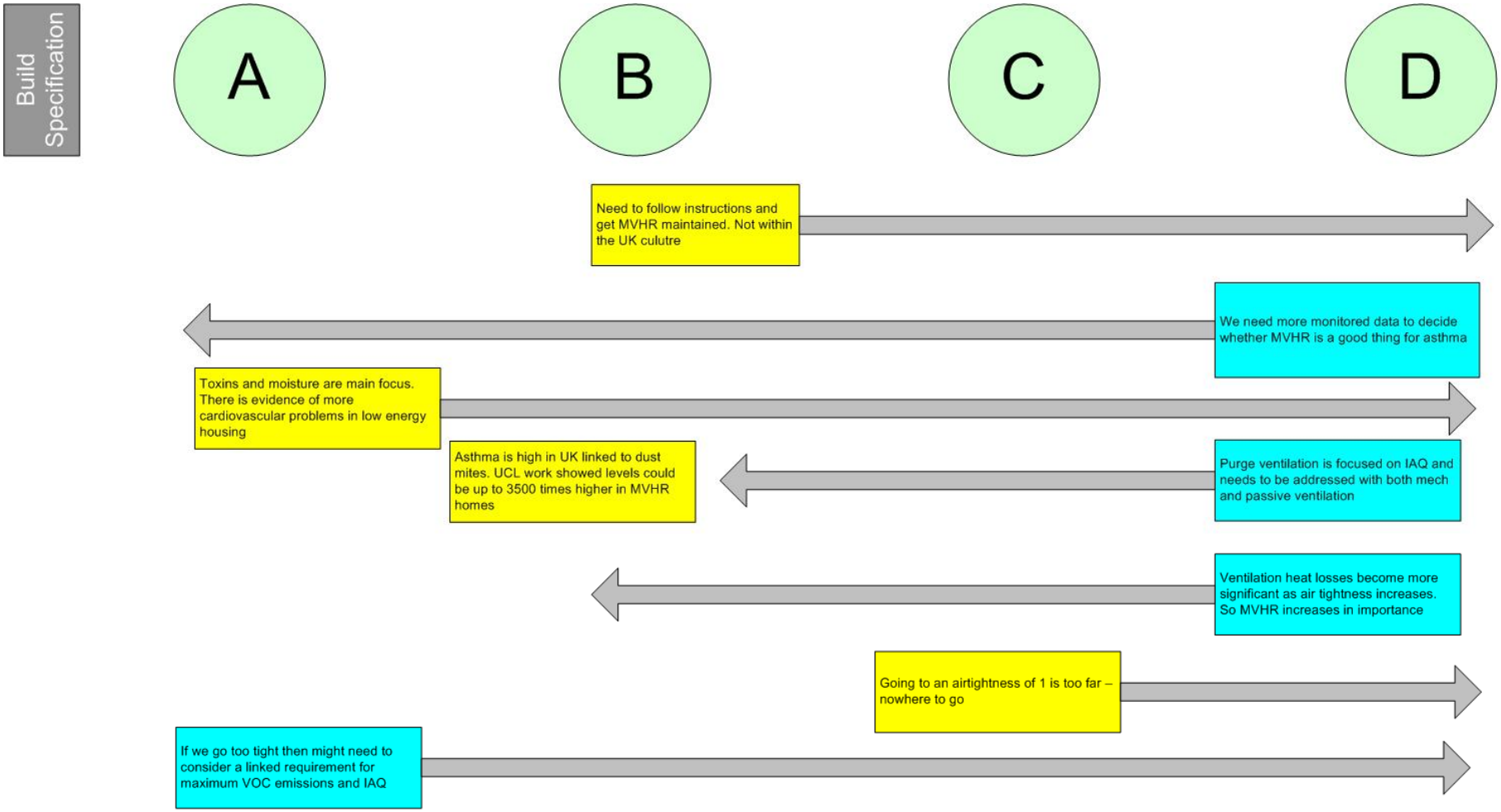
Low heat demand encourages existing stock export / link ups

Concerns around noise due to insulation in party walls

Overly complex systems will restrict retrofit work

D Energy systems could inc internal space


Build Specification
A
B
C
D
Is it repeatable? Issue is getting the contractor to do it in time for 2016
Concerns about MVHR commissioning, wall tie installation etc
Planning is an opportunity. All tend to favour EE first and only then LZC
We can assume some lessons will have been learnt by 2016
Need to set standard high for innovation
Supply chain concern about large scale testing and certification need
Many issues such as compliance testing are already lacking
Skills and timing are biggest issue. There are no feedback loops for learning
This is beyond the TG debate….
Gets tougher beyond Spec A but it is a bigger separate issue
Need for tools – TSB funding some development but not accelerating at the rate required for 2016
The proposed 2016 timeline proposed is of primary importance
Is it 2013 or 2016?
General issues
How does this affect the smaller developer?
Not just training need. Also risk of losing competitive advantage
Everything is technically possible…….
But cost and other issues lead what is finally accepted
Are we doing things right between industry and government?
Ambition should be to get built what is claimed in the tin… Other wise 2016 is no chance
Need to be clear this is for 2016 onwards
03 Wide scale buildability


Build Specification
A
B
C
D
Need to follow instructions and get MVHR maintained. Not within the UK culutre
We need more monitored data to decide whether MVHR is a good thing for asthma
Toxins and moisture are main focus. There is evidence of more cardiovascular problems in low energy housing
Asthma is high in UK linked to dust mites. UCL work showed levels could be up to 3500 times higher in MVHR homes
Purge ventilation is focused on IAQ and needs to be addressed with both mech and passive ventilation
Ventilation heat losses become more significant as air tightness increases. So MVHR increases in importance
Going to an airtightness of 1 is too far – nowhere to go
If we go too tight then might need to consider a linked requirement for maximum VOC emissions and IAQ
General issues
Very tight fabric and poor thermal detailing can increase mould growth
What ever the design target there will always be a range of tightness. Question is how to ventilate
Planning dept need to consider impact on single aspect flats etc
Heat recovery is used in Passiv Haus because it has significant space heat gains
04 Health and well being

Build Specification

A

B

C

D

High spec fabric leads to simplification of form and less design choice

You can have dormers. The way this is styled and marketed is key

Cokmplex form can be a style option, just detailed efficiently

Is a MVHR system really that coimplex?

Mech vent systems needs moding?

People do like good passive solar design in homes

General issues

**Biggest concern is MVHR inclusion and long term performance**

Build Specification

A

B

C

D

Concern the cost slope is steeper between B and C than shown

Suspicion that sweet spot is B

Concern the wall costs are jumping too soon as we are switching to expensive foams

Concern the window and door spec between B and C is not correct in the cost assumptions

**Extra cost modelling is required to investigate relationship with Carbon Compliance 70% solutions**

- Can be very simplistic due to time
- Gentoo study might be a good starting point
- Total cost to achieve 70% CC
- Use cSAP and look at
- First option to use SHW
- Then bring up to 70% with PV
- Alternate route is all biomass individual boiler
- Start by looking at a semi detached house

## Lifecycle costs

Concern as to what will happen if we use NPV & range of discount rates

What do we do with LZC payback costs?

Concern do we need to plot & think about payback period?

General issues

**Group concern at why Spec C windows are less expensive than Spec D when should be the same performance (0.8)?**

Concern the assumed cost difference of 10% between large and small builders is too small?

Build Specification

A

B

C

D

If we go closer to Passiv Haus then there will be less spikes in electric demand for DHW and space heating

**Some in group would like to see how adoption of Spec C & D would impact if they went all electric**

- Electrical heating choice might be a key influence by 2050
- Large scale shift to electric putting greater pressures on grid supply?

General issues

The assumed total number of builds might not be as shown

Is a MVHR system really that coimplex?

There is a little difference between A – D but what is it really?

This is just informative, not a key decision issue

Build Specification

A

B

C

D

Possibility if went to Passiv Haus less people likely to use biomass

Less energy demand is a good thing as there is limited biomass available

General issues

Energy in use is ~80% of total life time energy
Embodied energy is ~20% of total life time energy
Even in a 2005 B Regs house

Shift to Passiv Haus might increase the embodied energy to ~ 25 – 30% of total life time energy

Biggest issue is high performance foams and increased concrete in wider foundations. Very dependent on design selected

At the end of the workshop, each criterion on the matrix was revisited for further comment and adjustment, and those which had not been completed using the decision spectrum were re-evaluated. Participants were therefore given the opportunity to adjust or add comments and assess previous decisions, enhancing the final matrix's validity. It was agreed that concerns should not be recorded against certain criteria, not because the criteria were considered unimportant, but rather that the members felt that their concerns against the criteria did not vary in relation to the different levels of standard.

During the final summary each member was provided with the hierarchy matrix to fill out, which asked each individual to rank the decision criteria in order of importance. The results of these matrices were collated in order to inform which decision criteria hold more weight, and thus define their affect on the overall standard setting.

## Outcomes

The completed matrix (as illustrated below) indicated that the Task Group were more concerned by certain criteria at higher levels, principally:

- Building practices
- Health & wellbeing
- Lifetime costs

These subject areas became the focus for additional work activities by the ZCH for presentation at following Task Group Workshops