

# BS40101

## consultation event:

### 12<sup>th</sup> July 2021



## Event output

4<sup>th</sup> August 2021

### Introduction

The British Standard for [British Standard BS 40101 - Building performance evaluation of occupied and operational buildings](#), is **now available for public consultation** and open until 28th August. We invited people from across the sector to meet with us online to talk about the documentation and discuss it with various members of our industry. This event was held on 12th July at 3pm.

The documentation for BS40101 is available at the following online review portal using the link: <http://standardsdevelopment.bsigroup.com/projects/2020-03334>

### Please note

All contents of this event represent the views of the presenter and do not represent the views of BSI.

### Responses to BS40101 across the sector

We asked a panel from across the industry to answer the following questions about the building performance evaluation and the proposed British Standard for BPE of occupied and operational buildings:

- i) Why is BPE important to you? Personally / company / sector?
- ii) What is THE most important part of the BPE document?
- iii) What needs to be improved / clarified /developed or what are your concerns?

Our panel members were from across the built environment industry

1. Elanor Warwick, Clarion Homes
2. Luke Smith, Build Test Solutions
3. Julie Godefroy, CIBSE
4. Chris Morgan, John Gilbert Architects
5. Doug Drewniak, Willmott Dixon
6. Dr Kerry Mashford OBE, Ecology Building Society
7. Dave Kieft, EFT
8. Prof Fionn Stevenson, BPN, The University of Sheffield

We have picked out the most common and most emphasized points here from the panels' comments:

- i. BS40101 is very comprehensive - what about small-scale interventions and alternative routes through the standard?

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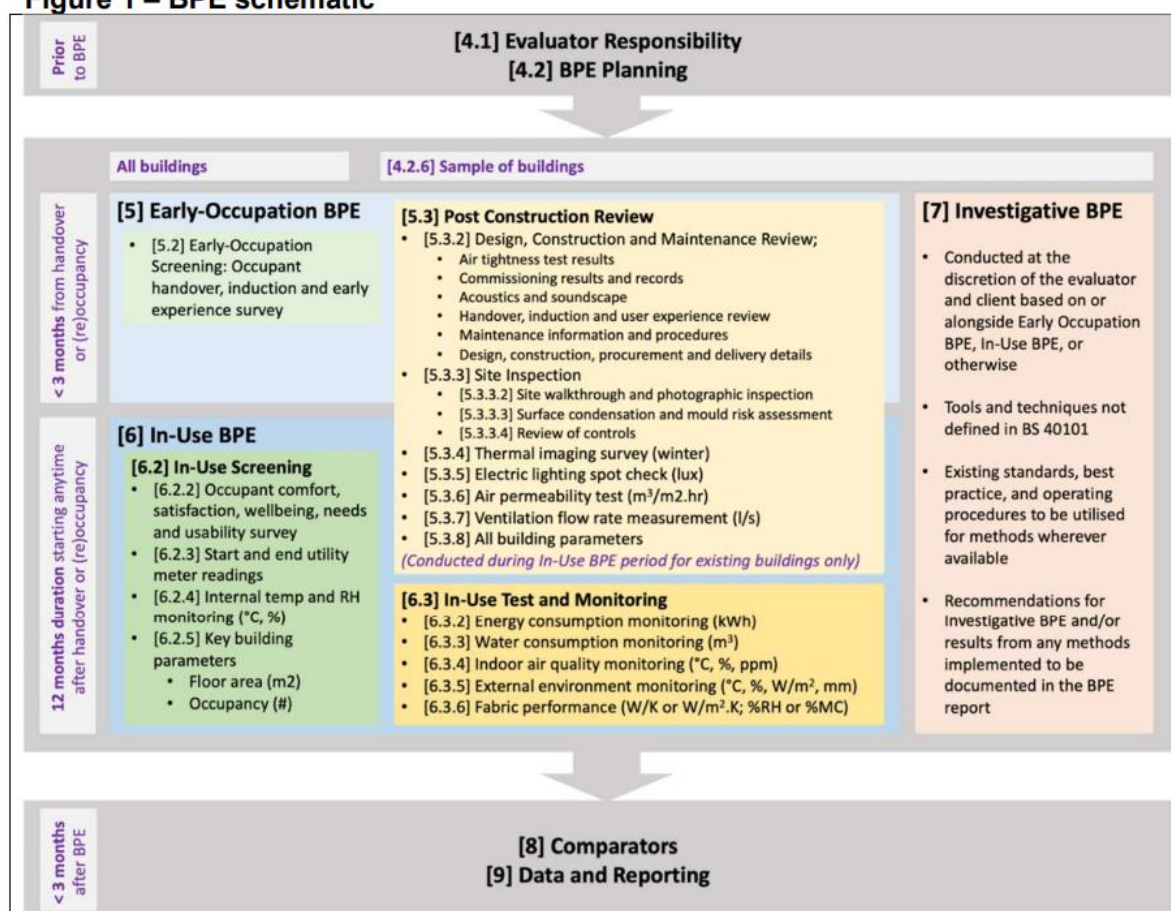
- ii. Using comparators (i.e. comparing measured performance to design intent) is useful - we're promoting BPE, not any particular building standards.
- iii. BS40101 needs to allow scope for new approaches/ innovations - don't be too prescriptive about HOW it's done, focus more on WHAT's being measured.
- iv. On the other hand, there does need to be some standardisation to support industry (e.g. UKGBC net zero verification scheme suggestion) and Government (e.g. for changes to Building Regs). Note: BS40101 will be only part of the package/ eco-system required to deliver widespread adoption of BPE.
- v. The Finance sector is being required to report on the CO<sub>2</sub> impact of the buildings that they lend on through ESG requirements.
- vi. There needs to be a gathering together of trained, experienced evaluators.
- vii. There should be work on a common ontology for data collection.
- viii. Interpretation of the data is important, not just how to gather it.

## BS40101 Approach

Zack Gill is co-author of BS40101 and member of the drafting panel. He talked us through the strategic approach to BPE in-use as set out in the standard. This is laid out in Figure 1 of the documentation. [Find this online here](#) and navigate to section **4.2.2 Selecting the correct BPE study type**.

Consultation documentation version reproduced here:

**Figure 1 – BPE schematic**



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Figure 1: BPE Schematic is a one-page summary of the whole document, signposting relevant sections. It sets out a schedule, time progressing downwards, and a sampling regime horizontally.

To begin, before the project starts, establish who the evaluator is. They may be inside or outside of the design team; they may represent the occupants team. Next, plan the evaluation programme, informing parties that need to know about it, including insurers, occupants, clients.

Moving down the diagram in Figure 1, we see what elements of the evaluation should be carried out on all buildings (left hand column), starting with the *Early-Occupation BPE*, intended to identify some problems very early, such as commissioning errors, and help avoid bad habits forming. Resolution of these problems enables quick wins.

The proposed occupant survey is provided in an annexe to the main document and provides a consistent measure across all buildings in a scheme.

In-use BPE Screening is carried out on all buildings for 12 months in order to demonstrate the performance through a whole year.

The *Post-Construction Review* is intended for a sample of buildings (specified in Table 1 on the documentation in section **4.2.6 Sampling rate**). Many elements are listed and all must be undertaken for the sample.

*In-Use Test and Monitoring* is more detailed testing on a sample of buildings, ongoing for 12 months.

CO<sub>2</sub> monitoring is not currently obligatory for all buildings as it was considered insufficiently well established or straightforward. It is advised for a sample.

Fabric performance measurement is recommended for high-risk buildings, e.g., historic buildings. We need to grow resources to make measurement of the fabric performance consistently and rapidly.

*Investigative BPE* includes further steps the evaluator identifies as being useful to carry out based on the earlier studies and then agreed with the client. BS 40101 does not specify every method for investigative BPE but does outline a framework and how reporting would be done.

Comparators are important. This would be the design intent but also formal guidance, such as that published by CIBSE, or, in the case of a retrofit, data collected and analysed prior to the works.

To enable comparison between projects and across lengthy periods of time, and to allow consistent analysis, a formalised data ontology is included in BS40101.

Reporting is also a formalised process.

George suggested the following points to consider in responding to the consultation:

- Is the three-level approach correct?
- Does Figure 1 represent well what needs to be done?
- Is the schedule set out too prescriptive?
- Is there too much to do without initial screening?
- Who might carry out meta-analysis of findings and providing learning for the industry as a whole?

## Sampling rates

The following table sets out the sampling rates. It is also available in the documentation: **4.2.6 Sampling rate**

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**NOTE 2** When calculating the total sampling rate required, the sampling ratios in Table 1 are cumulative such that the sample size for any cohort is made up as follows: 25% of the first nine properties, plus 20% of the next 10 properties, plus 15% of the next 30 properties etc. according to the percentages set out in the table.

**Table 1 – Sampling requirements in cohort studies**

Number of buildings in development (domestic and non-domestic)	% Properties for sampling (rounded up)	Example	
		Number of buildings/units or comparable rooms	Number of buildings/units or comparable rooms sampled
Buildings/units in cohort (Domestic and non-domestic) or comparable rooms in building (non-domestic)	% Buildings/units for sampling or % comparable rooms for Sampling (both rounded up)		
1 – 9	25%	1	1
10 – 19	20%	10	3
20 – 49	15%	20	5
50 – 99	5%	50	10
≥100	2%	100	13

**NOTE** This table applies to buildings with rooms of similar use (e.g. a hotel), but for other types of buildings the evaluator needs to justify an approach that ensures a representative evaluation strategy is applied for different room uses.

**NOTE 3** Figure 2 shows the relationship between the calculated sampling rate and the number of buildings (or rooms) in the development.

We felt that sampling rates may need to vary depending on building type and project type. To discuss the following questions, we split into breakout rooms.

- i. Are the sampling percentages correct?
- ii. Is it reasonable to expect industry to adopt these levels of testing?
- iii. Will the requirements be different for different sectors e.g small-scale vs large-scale, new build vs retrofit, commercial vs residential?

Breakout rooms were organized as follows:

New build homes, facilitated by Prof Fionn Stevenson, BPN

Retrofit homes, facilitated by David Adams, BPN

New non-domestic, facilitated by David Kingstone, Buro Happold

Retrofit non-domestic, facilitated by Dr Zack Gill, SOAPworks

## Key points on sampling from the breakout rooms

### New build homes

- i. The proposed sampling rates are good but as technologies improve and methods become easier, these could go up in the near future.  
Care should be taken where there are variations in the build form and type.  
Demographics should be taken into account in the sampling regime.  
Compare to how airtightness testing is distributed currently.
- ii.

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Airtightness testing everywhere could be used as a baseline.

Alternative Coheating tests are becoming easier to carry out and helps understand/ isolate the behaviour part of the performance.

- iii. Airtightness test for 100% for small and large projects. Then 5% sample for review.

### **Retrofit homes**

Where is low cost, indicative testing? Following BS40101 as it is may be overpowering for the novice, for those carrying out no testing at all currently. This may be to do with the emphasis in the document – there is suitable content in there for light-touch testing, it just needs bringing out.

The approach to testing should be graduated from light-touch testing to more in-depth later, once capacity has increased. Without light-touch included in the Standard, there is a danger that it won't be used at all.

### **New non-domestic**

Sampling levels proposed are not relevant to non-domestic buildings.

Including both domestic and non-domestic in one Standard may be too tricky.

Compare to the ASHRAE standard – the client-based approach is good.

### **Retrofit non-domestic**

Again, there was uncertainty that the sampling rates are applicable to non-domestic buildings.

Sampling rates could be based on rooms instead.

A decision tree accompanying a screening process would be helpful.

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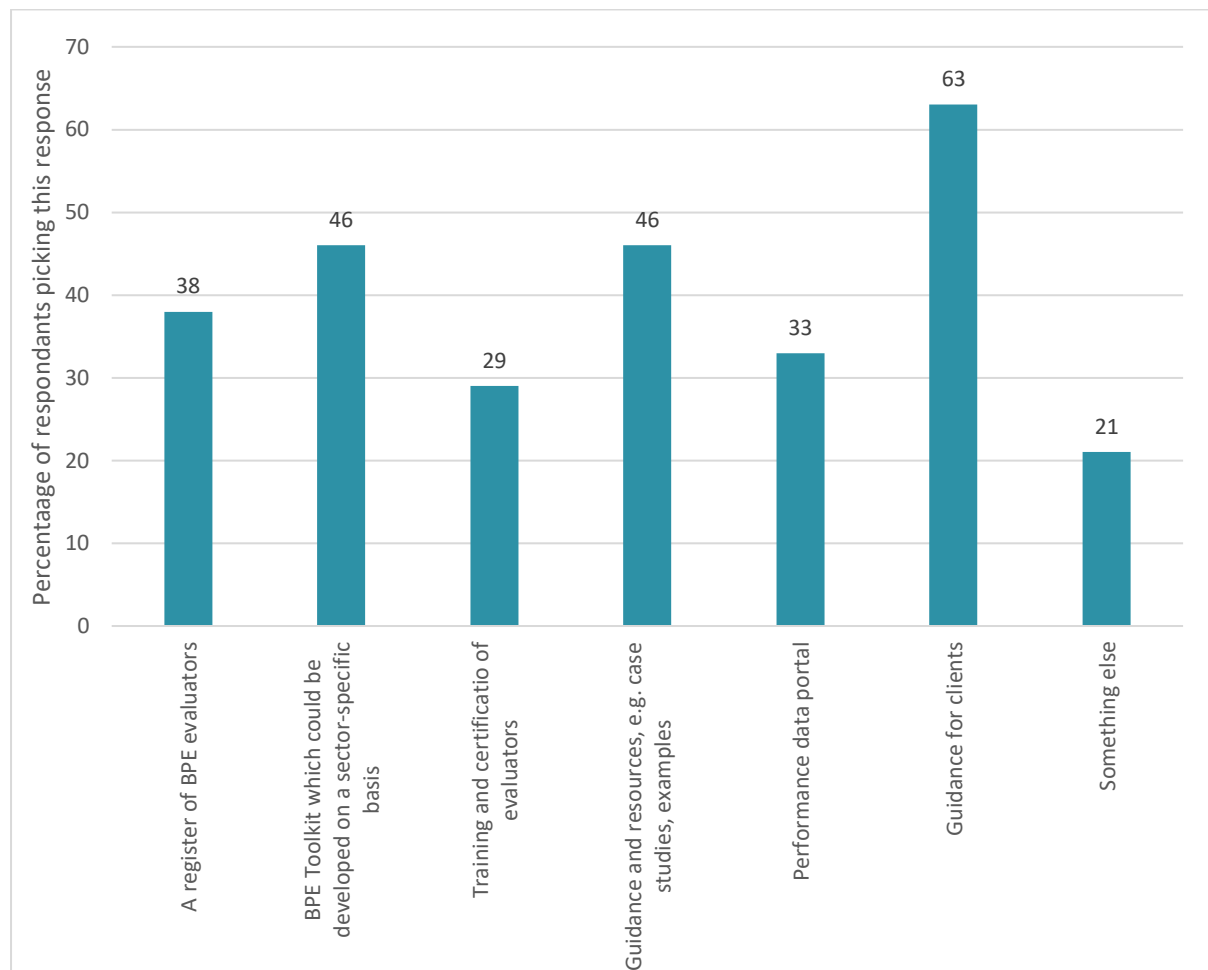
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## What will support BS40101?

We want to know what the BPN can do to make sure the British Standard will be used once it is in place. We recognize the need for supporting documents, education, infrastructure and policy, as well as working with other organisations to deliver these.

With this in mind, we carried out an audience poll:

**With the BS40101 in place, what does the industry need to embed BPE?** (responders permitted to choose multiple responses)



Comments in the chat included

- Move to performance-based targets being mandated by policy / gov. Regulation.
- The standard needs to be grounded in a strong procurement process like Soft Landings to really work well.
- The standard needs to focus on the customer and help them to take control of the building – needs a BPE champion to make sure it happens.
- Business case to be the carrot to client, as well as regulations to be the stick.
- A light-touch version of the British Standard to be more accessible to those not already in a BPE culture and those less familiar with the practice- a more graduated approach is needed to the standard moving from indicative towards a deeper dive designed to gain granularity on the issues raised.

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- Difficult to merge non-domestic and domestic BPE into one standard – may need separate sections.
- Data protection and privacy needs more consideration – who stores the data, who does the meta analysis?

## BPN response

There seems a clear need to inform clients and to help them understand what BPE is and what it can deliver. At the BPN, we are working on presenting a suite of business case studies that will demonstrate with real world examples that various merits of BPE. Further guidance on procuring BPE in all its form could sit alongside this. At the same time, it seems clear that BS40101 needs to develop a more nuanced approach, with different progressive levels of carrying out BPE and alternative pathways, depending on issues raised, client needs and circumstances found.

## BPN's key points

We have drawn out the most important points made during the event and drawn conclusions. These will inform our own response to the consultation on BS40101

1. Layered approach – initial light touch in-use screening, followed by more investigative methods as required by areas identified.
2. The methods for the light touch in-use screening would include: regulated kWh/m<sup>2</sup>/pa from smartmeters (absolute energy use figures also for net area ), CO<sub>2</sub> emissions/m<sup>2</sup>/pa (absolute figures would be useful to), external temperature from weather station, measured space heating and hot water where possible, CO<sub>2</sub> levels measured in main bedroom as an Indoor Air Quality proxy (as per Scottish Building regs since 2015) and
3. 4. 10% sample only for homes - indicative, not exhaustive
4. 5. A BUS type questionnaire is essential for the BS40101 to provide a 'why' to the 'what' of measurement.
5. Sampling should be indicative not exhaustive – a 10% sample could suffice for large developments. However a robust statistical approach could follow Neuman's formula as currently proposed for GLA and LDDC POE policy.
6. Decision trees are needed to provide a route through the standard, following the initial screening process.
7. Comparators were welcomed
8. Residential/ non-dom – separate sections in the BS (including sampling)
9. Extend into QA process – draw on Soft Landings, learn from Passivhaus
10. Data collection/ analysis – need to think about ontology (should this be within the BS or not?)

## Consultation process

The consultation process is run by BSI. It closes on 28<sup>th</sup> August 2021. We encourage you to make your own response.

The documentation is available online. You must register with their system to view it and to submit your response. The registration process is simple and takes little time.

The consultation for BS40101 can be accessed here:

<https://standardsdevelopment.bsigroup.com/projects/2020-03334#>

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You can navigate to and respond to specific sections of the document easily using the online system.

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