

Resource Hub

Building Performance Evaluation:

what, why and the benefits that it brings

Delivered by



Funded by



Image: Project Virido – Credit: Pollard Thomas Edwards

BPE Training Modules – Introduction

- BPN has produced 5 training modules on domestic Building Performance Evaluation (BPE), funded by Ecology Building Society.
- These form part of a BPE Resource Hub hosted by BPN and sponsored by Rockwool.
- The aim is to help you understand what BPE is, what the benefits are, and how to run a successful BPE project.

Module 1	Module 2	Module 3	Module 4	Module 5
BPE: What, why & the benefits it brings	Planning a BPE: where to start & common techniques	Undertaking dwelling BPE	Data interpretation, reporting & taking action	The performance golden thread: BPE & robust QA

Module 1: An Introduction to Building Performance Evaluation (BPE)

Module 1

BPE: What, why & the benefits it brings

- What is BPE and why is it needed?
- What are the common BPE techniques?
- Are there differences between BPE for different housing projects?
- What are the benefits and outcomes of BPE?

Why is BPE needed & what is it?

Many existing, new and retro-fitted buildings exhibit large gaps between design aspirations/predictions and in-use performance.

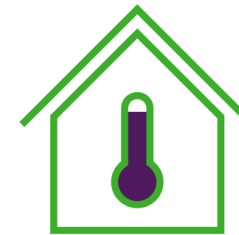
The difference between the levels of efficiency, comfort and usability that modern buildings are designed to attain and what they actually attain is known commonly as a '**performance gap**'.

Performance gaps can be introduced at any stage of a building project and can cover a range of performance factors.

BPE is an established ongoing review and learning process that can help you promptly identify and pre-empt or resolve problems when performance falls short of expectations.

The Performance Challenge

In the UK new homes can currently result in **energy bills that are twice as high as expected**, and **emit two to three times more carbon dioxide** than predicted from their design.



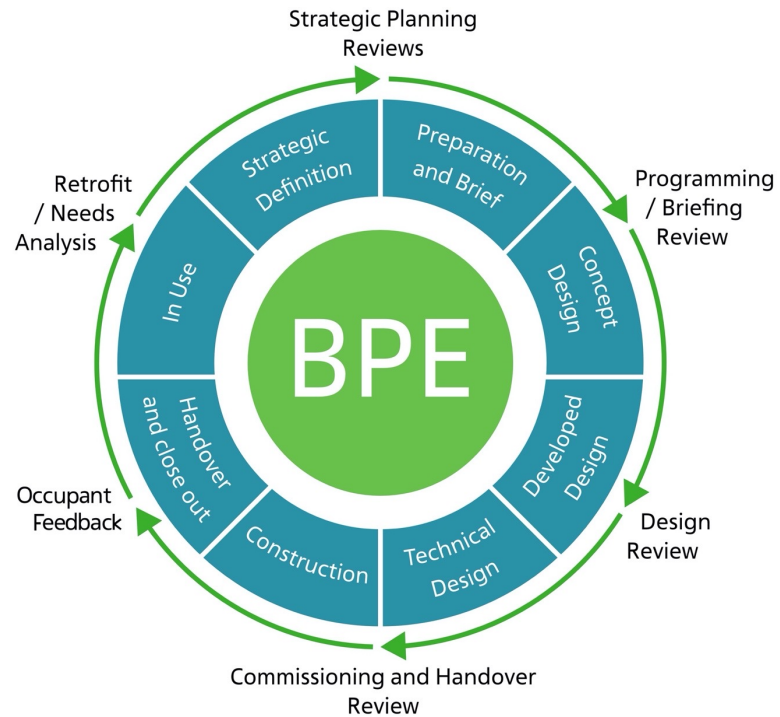
- ◆ Modelling of new homes of various kinds and typologies across the UK showed all were at risk of overheating.

- ◆ Poor ventilation: Government testing found only **3 out of 80 homes** met requirements for ventilation.



- ◆ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835240/Research_into_overheating_in_new_homes_-_phase_1.pdf
- ◆ <https://www.gov.uk/government/publications/ventilation-and-indoor-air-quality-in-new-homes>

When does it happen?



- BPE happens throughout all project stages.
- It is central to a process of continual improvement in the development of buildings.
- It needs to start at RIBA Stages 0-1 (Strategic Definition and Preparation and Briefing) and continue through to RIBA Stage 7 (In-Use), with findings informing subsequent projects.

What are common BPE techniques?

Common BPE techniques to review design/construction include:

- Design review – e.g. review of key building parameters, performance targets, design strategies and drawings etc.
- Procurement review
- Construction review – e.g. building walk-throughs, additional on-site checks
- Commissioning review
- Handover and induction review
- Fabric tests/surveys – e.g. air permeability tests, thermal imaging, whole fabric heat loss

BPE will inform contractors, direct remedial action and motivate ongoing learning

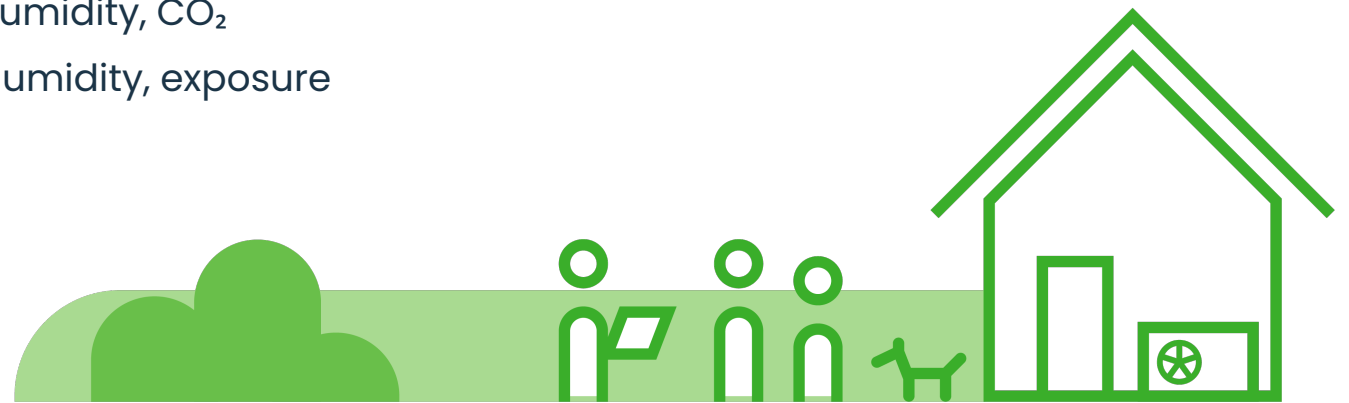


What are common BPE techniques?

Common BPE techniques applied in-use include:

- Occupant feedback:
 - On comfort, satisfaction, wellbeing, needs, usability, etc
 - May be gathered via surveys, questionnaires, interviews
- Monitoring and review:
 - Energy use and generation
 - Water use
 - Internal conditions – e.g. temperature, humidity, CO₂
 - External conditions – e.g. temperature, humidity, exposure

BPE will enable a better understanding of the building, inform recommissioning and help occupants understand services and controls



Levels of in-use BPE

- It is important to consider practical limitations on BPE and how much data is required to achieve your objectives.
- According to the British Standard, there are four levels of BPE: three for initial evaluations, one for in-depth.

Preliminary Evaluation

- Based mainly on occupant feedback
- Also some construction review observations, coarse energy data, and monitoring of external conditions
- Can flag major obvious issues
- Should be achievable on nearly every home
- May be a first step only

Light BPE

- Adds in more data including on construction review, water use, and monitoring of internal conditions
- Can flag major obvious issues and partially verify performance
- Can be used to screen properties and guide targeted study
- Can help establish baseline performance prior to retrofit

Standard BPE

- Requires more granular data across larger number of parameters and more homes (if >1 home is being evaluated)
- Takes into account cross-impact of performance factors
- Provides more robust verification and insight into performance

- Investigative BPE including many optional evaluation activities and is used to gain better understanding, possibly on one particular aspect of performance. It may follow results from the initial evaluations.

Source: BS 40101:2022 (British Standard for BPE for occupied and operational buildings)

Variations on BPE

New homes vs retrofit

- BPE will cover broadly the same technical and performance aspects for new build or retrofit
- However focus in retrofit BPE is likely to be on whether the home has been *improved* as a result of the works
- Additional feedback is typically sought on the process of the retrofit and its results from the occupant's perspective
- Evaluators may be able to compare pre- and post-retrofit data

Tenure differences

- BPE will cover broadly the same technical and performance aspects for any tenure
- However the process for social housing may be assisted by social landlords coordinating data access
- Social housing landlords may have particular objectives e.g. occupant welfare and affordability
- Tenants of private rented homes may have less opportunity to engage and landlord relationship should be considered

What are the benefits of BPE?

BPE will help you flag serious failures in performance, to guide prompt remedial action and to keep occupants happy with their homes.

When implemented well and across different stages of the project process, it will lead to more efficient, better performing homes overall.

The homes will have lower running and maintenance costs, better environmental impacts, and improved levels of comfort. BPE can also help to futureproof homes.

In doing the above, it helps manage reputational risks and can increase confidence of stakeholders (e.g. occupants, buyers, investors) in the performance and quality of homes.

Importantly, it can be part of a continuous improvement process, allowing improvements to your practices and more informed decisions about your projects in the future.

The Benefits of BPE

-  Process and product improvement,
-  Reduced risk and hidden liabilities,
-  Reduced defects,
-  Reduced maintenance,
-  Lower running costs for residents,
-  Improved indoor environment including air quality, and hence lower health risks, such as asthma,
-  Futureproofing for climate adaptation and resource scarcity,
-  Improved customer satisfaction,
-  Better reputation, repeat business and increased profitability,
-  Sector-wide learning.

Source: Stevenson, F. (2019) Housing Fit for Purpose: Performance, Feedback and Learning, London, RIBA Publishing

What have we covered?

- BPE Training Modules - Introduction
- Why is BPE needed & what is it?
- When does it happen?
- What are common BPE techniques?
- Levels of in-use BPE
- Variations on BPE
- What are the benefits of BPE?





Find more on all of this at the BPN
Resource Hub:

building-performance.network/

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Resource Hub