



Post Occupancy Evaluation

AN ESSENTIAL TOOL TO IMPROVE
THE BUILT ENVIRONMENT

Foreword	3
Executive summary	5
Recommendations	6
Introduction	6
Chapter 1 POE helps make buildings greener and healthier	8
Chapter 2 POE can reveal how a building is used compared to its designers' intentions	10
Chapter 3 POE reduces operational costs	11
Chapter 4 POE allows for continuous improvement	12
Chapter 5 POE can help reduce delays and overspends on future projects	13
Chapter 6 POE increases user satisfaction	14
It's time to take action	15
Building sustainably – what's the real cost?	17
Appendix	18

Foreword

We need to improve our built environment. It contributes to, and impacts upon, our world and our lives in so many ways that we must strive for significant improvements to make it better.

From the existential risk of climate emergency upon our planet, to health and well-being, the physical environment impacts on human behaviour. The knowledge of how our buildings perform functionally and environmentally must inform future design and delivery to ensure spaces truly meet the needs of those using them.

Governments, society and users want our industry to deliver consistency, quality and sustainability. We need to understand how each completed project is meeting the defined needs and performance and how improvements can be made for the future.

As Dame Judith Hackett noted in her report on the disaster at Grenfell Tower, nothing less than a culture change is required in the construction industry to address issues of quality, safety and sustainability.

The Royal Institute of British Architects (RIBA) believe that we would all benefit from an approach that made it easier to learn from both successful and more troubled projects via Post Occupancy Evaluation. To observers from other sectors, this sounds obvious. We need to embrace a culture of accountability and continuous improvement.

Those that live in and use our buildings, as well as the environment, deserve and urgently need us to make these changes.

Professor Alan M Jones
RIBA President





Executive summary

Post Occupancy Evaluation (POE) is the process of obtaining feedback on a building's performance in use after it has been built and occupied. POE collects information on building and energy use and user satisfaction.

This paper highlights the benefits of POE for new buildings using case study examples in the domestic and non-domestic sectors. It discusses the financial costs of POE and provides recommendations that Government, local authorities and the wider construction sector should action to ensure that new buildings are as energy efficient as intended, provide value for money and built environment continuously improves.

There are three broad levels of POE:

- Light touch POE: a simple but meaningful rapid evaluation undertaken post occupancy, before the building contract concludes.
- Diagnostic POE: feedback from a light touch POE may highlight the need for a more detailed review of a building.
- Detailed (forensic) POE: a comprehensive investigation, by independent evaluators, to identify and resolve any significant and persistent performance issues.

POE provides data to help understand how buildings are performing compared to their design intention. Without this data, the construction industry will unknowingly continue to make the same mistakes, wasting time and money.

POE also informs building users if their building is energy efficient and reveals if it is being used as intended. Addressing these issues can help reduce operational costs.

Despite these benefits, POE is still not embedded in all projects. Ensuring the widespread adoption of POE will require systemic

cultural changes in the construction sector. This should be led through a top-down approach from Government who should require POE as a condition when public money is spent. The National Audit Office should hold the Government to account, and highlight whether, or not, POE has been undertaken on any project that receives public funding.

This should be complemented by a bottom-up approach. Built environment professionals should highlight the benefits of POE to clients and include POE as standard when bidding for projects. POE should be taught at university so it is engrained from the outset of a built environment professionals' career, and the professional institutes should work together to promote POE and share information on overall findings and building performance.

The cost of POE is a very small percentage of overall building costs. Research shows as a proportion of a project's cost, undertaking POE adds an additional 0.1% – 0.25%.¹ In 2019, public sector construction output was £4 billion on new construction work on schools and colleges.² POE on this figure, at 0.1% to 0.25% of upfront costs, would be approximately £4 million to £10.1 million. This cost is tiny compared to the benefits of undertaking POE.

When POE is considered from the outset as part of a wider building strategy, the costs can be reduced. The cost of POE increases when the installed energy metering infrastructure is not at an adequate standard. This makes it difficult to ascertain where energy is being used throughout a building; in turn, adding time, and cost, to gathering and understanding this data.

As POE becomes standard the lessons learnt can help inform new projects, allowing for continuous improvement within the built environment. As buildings improve, the cost of POE depreciates.

0.1%–0.25%

Research shows as a proportion of a project's cost, undertaking POE adds an additional 0.1% – 0.25%

£4bn

In 2019, public sector construction output was £4bn on new construction work on schools and colleges

Recommendations

The RIBA recommends that:

| Government

- Endorse and promote that all buildings undertake POE.
- Require POE as a condition of procurement for building projects using public funding.
- Require POE as a condition of housebuilders receiving Help to Buy payments.
- Investigate how the Building Regulations could be amended to include POE.

| The National Audit Office (NAO)

- Publicly state that all new buildings that receive public funding should undertake POE to ensure that they are providing good value for money.
- Highlight in NAO reviews whether, or not, POE has been undertaken on any project that receives public funding.
- Scrutinise the data collected through POE to ensure buildings are meeting their design intentions.

| Local authorities

- Mandate the use of POE, and data sharing, on large scale housing schemes by making it a requirement through the planning system.
- Mandate the use of POE on all appropriate projects delivered by locally controlled or owned registered social landlords.
- Ensure that POE is delivered on local authority contracts where appropriate.

| Built environment sector

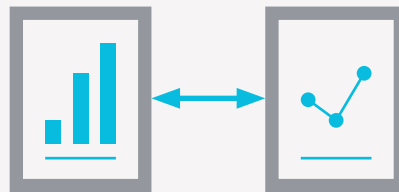
- Built environment professionals should highlight the benefits of POE to clients and include POE as standard when bidding for projects.
- Universities should include teaching detailed or forensic POEs in the curriculum to ensure that all built environment students understand the benefits and the methodology of POE.
- Built environment professionals should share data and information collected through POE.
- Professional institutes should work together to promote POE and share information on learnings and building performance.

| Clients

- Ensure that POE is included in your contractual obligations with the project team from the outset.



Ensure that POE is delivered on local authority contracts where appropriate



Built environment professionals should share data and information collected through POE

Introduction

If the construction sector is serious about reform and improvement, it needs to embrace POE

Post Occupancy Evaluation (POE) is the process of understanding how well a building meets the needs of clients and building occupants. By accurately measuring factors such as building use and occupancy, energy consumption, water usage, maintenance costs and user satisfaction, POE highlights if a building is meeting its design intention. This creates a process of continuous improvement in the construction industry.

If the construction industry is going to play its part in delivering the quality, safety and sustainability improvements that we need to see in coming years, POE will be an essential tool. The widespread adoption of POE will require systemic cultural changes in the sector. To ensure this is as effective as possible, the RIBA recommends both a top-down and bottom-up approach – Government, local authorities, the wider built environment and clients all have a role to play in achieving this.

POE can be part of the solution

The Royal Institute of British Architects (RIBA) has been promoting the use of POE since the early 1960s when the first RIBA Plan of Work was published. Today, POE remains the key tool to measuring that our buildings meet their design intentions, the needs of the client and that the built environment continuously improves.

POE makes buildings greener, cheaper and more productive

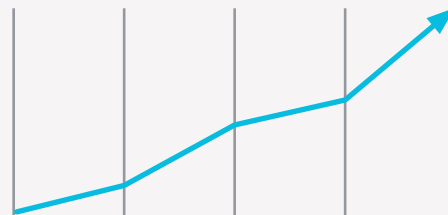
There are both qualitative and quantitative reasons to adopt POE. From lower energy bills to reductions in carbon emissions, a culture of continuous improvement can deliver huge returns on investment. POE does this in six ways:

1. Making buildings greener and healthier
2. Revealing how a building is used compared to its designers' intentions
3. Reducing operational costs
4. Allowing for continuous improvement
5. Reducing delays and overspends on future projects
6. Increasing user satisfaction

Most buildings will outlive their creators – to ensure that they are fit for future generations we need to be confident that we are doing all we can to build the best buildings possible.



By accurately measuring key factors POE highlights if a building is meeting its design intention



POE outputs can inform new projects, new processes, new systems and new designs, achieving better buildings



POE helps make buildings greener and healthier

Addressing energy efficiency in buildings is crucial to reaching net zero. Buildings are responsible for 40% of UK carbon emissions. POE confirms that the designed energy efficiency targets of a building have been achieved. If the requirements have not been met it highlights what actions need to be taken to meet the desired targets. In the current context of a climate emergency, it is vital that buildings are meeting their anticipated energy efficiency metrics. To ensure our built environment is sustainable, our buildings must be as energy efficient as possible and we must have a tool to measure improvement – POE is the solution.

In 2019, the Government declared a climate and biodiversity emergency and legislated to reach net-zero by 2050. The RIBA joined this call to action by declaring a climate emergency and launching the RIBA 2030 Climate Challenge. The 2030 Challenge calls on architects to meet net zero (or better) whole life carbon for new and retrofitted buildings by 2030. The Challenge sets staged targets for operational energy, embodied carbon and potable water usage for 2020, 2025 and 2030 for both domestic and non-domestic buildings.

Carbon emissions in the built environment are created throughout the whole building lifecycle, from strategy, to technical delivery, use and reuse. An especially intensive part of this cycle is heating buildings, which in the UK accounts for 19% of carbon emissions. It is important therefore, for the built environment to become more energy efficient. The UK has the least energy efficient housing stock in Europe, this contributes to approximately 3,000 deaths due to the cold³ and 2,000 deaths due to overheating per year.⁴

Even if a building's design has energy efficiency at its heart, the promised energy efficiency standards are not always met

A key issue here is the insufficient data and information on the energy efficiency of buildings compared to their intended design performance. This lack of data makes it difficult to understand where and how improvements on energy efficiency in a building can be made. Undertaking POE is a key to understanding whether a building's energy performance is in line with expectations at the design stage.

POE is the only way of accurately measuring if a building is as energy efficient as anticipated

There is significant evidence that buildings tend to over promise and underperform, particularly in relation to energy efficiency. POE verifies to both the building owner and user that it is as energy efficient as promised.

Buildings, of all sizes, are expensive – for example, as an individual, building a home may be one of the most expensive exercises ever undertaken; local authorities who are building social housing must ensure every pound spent provides value for money; and new landmark, multi-storey office blocks cost hundreds of millions of pounds. The construction industry is one of the few sectors where such a large sum of money is spent and there is no assurance that the building performs as intended.

“We'd rather spend £10 million on a building and hope it might work, than £100,000 before to show that it should, and £100,000 afterwards to make sure that it did”

Paul Morrell, UK Government Chief Construction Advisor (2009 – 2012)

In addition, most other industries have a much better culture of ensuring their product performs and meets customer requirements. For example, Rolls-Royce, through their TotalCare® maintenance package, offer their aerospace customers the choice to transfer the burden of engine maintenance and associated risks from the customer back to Rolls-Royce. TotalCare is charged on a fixed cost per flying hour, so Rolls-Royce are only rewarded when engines perform.⁵

Case study



Image © Tim Crocker



Image © Levitt Bernstein

Providing evidence that a building is working as intended

Architecture practice Levitt Bernstein undertook a POE together with the client Origin Housing on a housing scheme of 42 homes at Loudoun Road in the London Borough of Camden. The project brief had sustainability at its core and whilst not *Passivhaus* certified, the project team designed to these principles. Using a highly efficient building envelope including high levels of insulation and airtightness, the development achieved an average reduction across the site of 54% in CO₂ emissions compared to the relevant *Building Regulations*. The POE revealed that focusing on high fabric performance during design and construction could reduce the performance gap; and the building performed better than predicted at design stage. With the UK Government's focus on raising design quality along with energy efficiency targets, the data collected from Loudoun Road provides valuable insights into how this could be achieved.

Case study

Highlighting energy efficiency performance gaps

Assessing the performance of 188 homes across the UK, research by Innovate UK, revealed that despite all homes being "low energy" and 50 certified *Passivhaus*, many of the homes were losing heat at the windows and doors. The POE used a range of fabric thermal performance tests and infrared thermal imaging to highlight where the problems were occurring. The tests exposed that there was a need for improved detailing, specification and workmanship. This highlighted that whilst there is the intention of producing "low energy" homes this is not always how the home operates in reality. Without undertaking the study, the homeowners would not understand how much energy their home uses compared to the intention. The POE highlighted the issues to be rectified, and as a result the energy consumption of the buildings was reduced.



POE can reveal how a building is used compared to its designers' intentions

If a building is not used and operated as its designers intended, it can be less energy efficient than anticipated; POE can reveal how a building is used and helps rectify misuse.

POE can highlight items that need attention or fine tuning

The normal process of defect rectification does not necessarily pick up such issues because it is often focused on what is visible. POE equips the project team with the information they require to increase energy efficiency and maximise building performance prior to the conclusion of the building contract.

Case study

Understanding how energy saving products work in practice

Innovate UK conducted a POE on three low-carbon social housing developments in the South-East. The homes used Mechanical Ventilation with Heat Recovery (MVHR) system to help maintain heating and ventilation levels. MVHR systems can significantly reduce energy consumption at relatively low costs. The POE, which included interviews with occupants, revealed that poor installation and commissioning of the MVHR system had resulted in worsened performance in fresh air supply, indoor air quality and high energy consumption. This was made worse by poor understanding of the system among residents which had led to it being misused or disabled. The POEs resulted in recommendations of how to improve commissioning of ventilation systems, as well as highlighting the need for better training for residents along with more user-friendly and intuitive controls.





POE reduces operational costs

Whilst the increased energy efficiency of a building is a key benefit of undertaking POE, it is not the only benefit.

Using a building efficiently, for example, reducing the required heating, cooling and improving space management, can result in lower costs

Analysis shows that for a 30-year old office building, the relationship between construction, maintenance and operating costs is 1:5:200, respectively.⁶ The operational costs of a building have a substantial impact on the total cost of the building's life cycle.

POE is a tool to help keep costs low

Understanding how a building is operating and if it is meeting its energy efficiency requirements is key to ensuring operational costs remain as low as possible. Without POE a building user does not know where or how they could be saving money.

Case study

Reducing operational costs

AHMM undertook a retrofit on their own offices in Clerkenwell, with the aim to provide energy efficient and uplifting open-plan workspace, through the maximisation of natural light and ventilation, improved thermal performance and the use of renewable technologies. The POE involved a comparison of AHMM's previous offices, located in the same building prior to refurbishment, with the performance of their new studio space. Investment and operational costs were also reviewed alongside other human metrics such as absentee and staff turnover rates. The POE revealed that operating costs reduced significantly as a result of the refurbishment, seeing a 69% reduction in total energy use per desk space compared to the previous office.

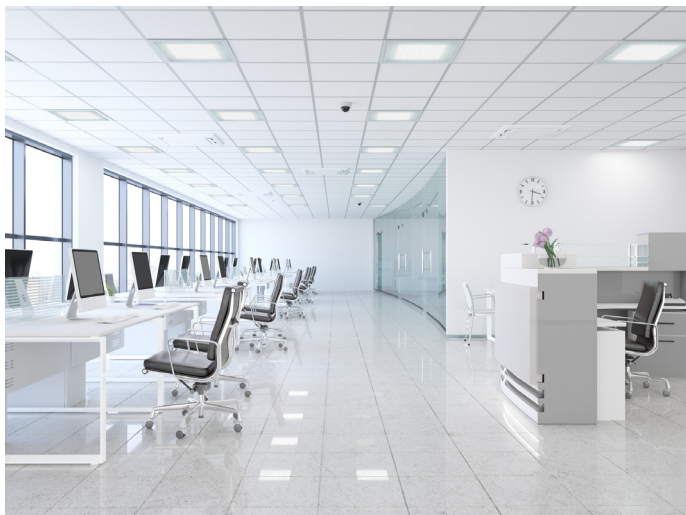


Image © iStockphoto



POE allows for continuous improvement, making future projects deliver better value

POEs provide information on how a building's design could be improved, which allows architects to modify and alter spaces that are not functioning as expected or in accordance with actual needs. In addition, the operational data gathered from POE can inform the design and construction of future projects. Reducing the need for adjustments once a building is occupied resulting in lower costs.

POE provides invaluable feedback and lessons learnt that all involved can take forward into their organisations and to their next projects. This 'closes the loop' that feeds back to the beginning of a project; by using POE outputs to inform new projects, new processes, new systems and new designs, you achieve better buildings. Without objective review, analysis and comparison between predicted and actual building performance, future improvements in building design, construction and operability may not occur.

The value of a building goes further than just financial cost

There is a need to focus on the value outcomes a project can deliver, not just the cost of construction. Continuous improvement can help reduce the cost of future projects and can help improve other value outcomes. The RIBA continues to support the Construction Leadership Council's drive to change procurement decision-making through the Procuring for Value approach. POE is the key tool to assess whether a project has delivered its proposed value, both in financial and social outcomes.

Case study

Continuous improvement of schools in the West Midlands

A ten-year programme of POE research undertaken by Architype on six successively built schools in the Wolverhampton area has led to improvements in the design, construction, and management of each successive school building. Wilkinson Primary uses almost 70% less energy to heat spaces and provide hot water compared to the first school built in the area. Refined building designs and construction processes have significantly reduced running costs and made the building far easier to run from an operational perspective. The improvements have benefitted school staff and pupils, who have rated the building as providing high levels of satisfaction and comfort at all times of the year.

Case study



Image © URBED

Providing insights on how to improve a building's performance

Urbanism, Environment and Design (URBED) are a research consultancy who have been developing tools and processes to assess master-planning projects against a sustainable investment policy. Understanding how developments work in-use is a crucial component of this work. One POE study revealed the impact of the use of halogen lighting and its contribution to overheating, leading to the installation of more efficient LED lamps. Common lessons have been learnt and these have influenced the design of future projects. For example, a much greater emphasis is now placed on a 'fabric first' approach to achieve energy targets and carbon emissions reductions. The development of learning through POE is fed into future projects to refine processes, designs and hand-over procedures which are of mutual benefit to clients, designers and building occupants.



POE can help reduce delays and overspends in construction projects

Conducting POE has the potential to de-risk projects over the long term as the feedback on the design and construction process and continuous improvements ensures that lessons are learnt from previous experience.

The information collected and the feedback loop is especially invaluable as the use of modern methods of construction (MMC) increases. MMC, a collective term for a wide range of non-traditional building systems, which includes modular construction, panelised systems, and sub-assemblies and components⁷, has been acknowledged by Government as key to unlocking a home building revolution in the UK⁸. MMC brings a greater level of standardisation, which if executed poorly can result in hundreds of buildings experiencing the same problem. POE is a tool that can help identify systemic issues that may occur in a project that utilises MMC and rectify these issues for future projects. This saves time and money in the long run by constructing buildings that do not require fixing in the future.

This is not only important when projects utilise MMC, but some projects, for example, schools, supermarkets and hospitals often use standardised designs. Learning from previous projects is imperative to ensure buildings continuously improve.

Whether an architect has previous experience of POE, and the lessons learnt from this process, may be asked by potential clients. These questions can carry a score during the bid process and if a firm is unable to show experience of conducting POE this could result in reduced chances of winning a project. POE is way of signifying that a building is working as intended and demonstrates to potential clients that an architect can design a building to meet the desired performance.





POE increases user satisfaction

POE provides actionable insight into whether the building meets the desired requirements for the people who inhabit it. Undertaking a POE can, therefore, determine whether the initial brief was achieved and can rectify any weaknesses. This ensures that the user's intentions are met and that they are satisfied with the project. This can also strengthen the relationship with client as they can provide feedback on operational improvements.

Case study



Architect: Hawkins Brown Photography: © Tim Crocker

Understanding needs increases satisfaction

A series of POEs were carried out on the New Art Exchange, a cultural centre in Nottingham to understand how the building was performing from the perspective of its users. The POEs helped to identify actions needed to resolve issues raised – such as the need for more user-friendly instruction manuals and a longer handover period to resolve building services and management issues. The gallery staff had not been informed that heavy duty plasterboards had been installed specifically to accommodate heavy exhibits – through the POE process the full capacity of the gallery can now be used. Issues with overheating in summer were also resolved through educating staff on the best use of windows to ensure sufficient ventilation, in particular for night-time cooling. The resulting changes have led to better space management and increased user satisfaction.

Case study



Image © Jack Hobhouse

Helping people to understand their homes

Between 2018 and 2020, a POE was undertaken by the architecture practice, Architype, in collaboration with a council, large contractor and the wider design team. The POE and environmental monitoring evaluated the largest *Passivhaus* residential schemes in the UK. The development was phased, to allow lessons learnt from earlier phases to be utilised in latter stages of the project. This was particularly beneficial for ensuring user satisfaction. For example, in the first phase of the development there were comments on the lack of visible radiators. The perception of wanting to see radiators was noted, and for the second phase the heating demand was split between more radiators to give the perception of a more traditional heating system.



It's time to take action

You can't improve quality if you don't monitor it

POE is still not common practice in the built environment. Only 19% of practices in the UK offer clients a POE service.⁹ However, RIBA research shows that only 3% of practices always measure actual or anticipated operational energy through POE, and 50% never do.¹⁰

The RIBA believes that the Government has a vital role to play in ensuring that undertaking POE becomes the norm. In the UK, the Government accounts for 25% of the construction sector.¹¹ Put it simply, by not pushing for reform, the Government is failing to make the best use of its money.

An effective POE strategy will bring huge benefits to Government

Government should require POE wherever public money is being spent.

A few Government departments are embracing POEs, mainly driven by the Government Soft Landings policy – a mechanism for ensuring a smooth transition from briefing, through design and construction phases to the operational phase of a built asset.

However, the implementation has not been widespread. The Ministry of Housing, Communities and Local Government, for example, does not require POE on housing projects that receive public funding. This must change and Government should require any building which receives public funding to conduct POE. From housebuilders who receive Help to Buy support to commercial and industrial developers seeking public sector clients, the Government can and should demand more from those it supports.

To promote the use of POE in privately funded projects, the RIBA recommends that the Government investigate how the Building Regulations could be amended to include POE.

RIBA recommendations for Government:

- Endorse and promote that all buildings undertake POE.
- Require POE as a condition of procurement for building projects using public funding.
- Require POE as a condition of housebuilders receiving Help to Buy payments.
- Investigate how the Building Regulations could be amended to include POE.

The National Audit Office must rethink how it scrutinises construction projects

The National Audit Office (NAO) scrutinises public spending on behalf of Parliament and undertakes value for money studies and investigations. These recommendations and reports help Government use public money wisely and improve lives. It is therefore disappointing that the NAO have so far failed to push POE more aggressively.

The NAO has made a number of recommendations that recognise the benefits of POE and has recommended it in the past. In 2017, *'Capital funding for schools'*, recommended that the Department for Education should evaluate the quality of the buildings to assess cost effectiveness, identify good practice, and analyse the data to understand how buildings can be improved.¹² The 2007 report *'Building for the future: Sustainable construction and refurbishment on the government estate'* highlighted the lack of POE undertaken in the Government estate. The report recommended that improving the sustainability of these buildings through the use of POE to assess whether the projects had delivered the desired level of performance.¹³ *'Getting Value for Money from Construction Projects through Design: How Auditors Can Help'*, published in 2004, also highlights the benefits of POE.¹⁴

However, these references are few and far between given the broad scope and political weight of the NAO's work. To drive the POE agenda forward, the NAO should publicly state that all new buildings that receive public funding should undertake POE to ensure that they are providing good value for money.

The NAO should also highlight in their reviews of Government spending whether, or not, POE has been undertaken on any project that receives public funding. The data collected through POE should be scrutinised by the NAO to ensure publicly funded buildings are meeting the required design intentions for energy efficiency and user satisfaction.

RIBA recommendations for the NAO:

- Publicly state that all new buildings that receive public funding should undertake POE to ensure that they are providing good value for money.
- Highlight in NAO reviews whether, or not, POE has been undertaken on any project that receives public funding.
- Scrutinise the data collected through POE to ensure buildings are meeting their design intentions.

Local authorities should use POE as a tool to get value for money and to develop local skills

To further embed POE in the built environment, undertaking POE and sharing the data gathered should become a requirement through the planning system. Embedding POE in the planning system means it becomes a standard cost in a project, rather than seen as an additional extra fee at the end of a project.

Some local authorities, such as the London Borough of Tower Hamlets, are already looking to introduce POE requirements for all housing developments that meet certain requirements (size, density). Under current proposals, developers can either conduct the POEs themselves or provide funding for the council to undertake it on their behalf.

More local authorities should follow suit and POE should be carried out as a condition of receiving planning permission. For those who do adopt POE, it offers the potential to develop the skills of local staff.

Disclosing the information and data gathered through POE helps to provide evidence about good practice, lessons learnt and helps to continuously improve our buildings.

Collecting this information is useful for local authorities who have declared a climate emergency as it will provide data on the energy efficiency of their building stock. This is already the case in some areas, with the new London Plan, calling for greenhouse gas emissions to “be seen”. This means monitoring, verifying and reporting on energy performance.

RIBA recommendations for local authorities:

- Mandate the use of POE, and data sharing, on large scale housing schemes by making it a requirement through the planning system.
- Mandate the use of POE on all appropriate projects delivered by locally controlled or owned registered social landlords.
- Ensure that POE is delivered on local authority contracts where appropriate.

The built environment sector must push its clients to ask for more

It has been suggested that clients do not see the potential benefits of POE and how the insight gained could be used in the future.¹⁵ The RIBA believes that built environment professionals have a responsibility to highlight the swathe of benefits that POE brings to a client.

In addition, architects, and other built environment professionals should offer POE as a standard element in their professional services contracts. This provides the opportunity to revisit a project post-completion. Currently, the way many current contracts are structured, this is not possible. For architects, conducting POE on a project provides the opportunity to gain feedback on the design process, allows for continuous feedback and increases user satisfaction, which can result in a strengthened relationship with a client and return work.

Training on how to carry out POE should be more widely available

To ensure that POE becomes the norm going forward, teaching the next generation of built environment students the benefits and how to undertake POE is essential. Including how to perform a detailed or forensic POE in the curriculum for built environment students at university provides an opportunity to learn how to perform a POE under the supervision of a professional. This provides a safe environment to learn, which is preferable to on the job training. The RIBA recommends teaching detailed or forensic POE to students; understanding the highest level of POE enables students to “work backwards” and “do less”, allowing them to adapt the POE to the needs of a project.

The data and information collected through POE must be shared

One of the key benefits of POE is that the data collected can be learnt from to inform future designs and buildings can be improved. Sharing data also highlights the benefits of POE to the wider sector, demonstrating what can be learnt through undertaking POE. This data sharing should be facilitated through the professional institutes; and the professional institutes should continue to work together to promote POE and share information on learnings and buildings performance.

RIBA recommendations for the built environment sector:

- Built environment professionals should highlight the benefits of POE to clients and include POE as standard when bidding for projects.
- Universities should include teaching detailed or forensic POEs in the curriculum to ensure that all built environment students understand the benefits and the methodology of POE.
- Built environment professionals should share data and information collected through POE.
- Professional institutes should work together to promote POE and share information on learnings and buildings performance.

Clients must demand greater collaboration

Clients should ensure that POE is included in the contractual obligations of the project team from the outset. Embedding POE in contractual obligations increases the designer and constructor involvement before and after occupation. Collaborating with all parties at the early stage of a project creates a more effective building and reduces fine-tuning at the end of a project, saving time and money.¹⁶

RIBA recommendations for clients:

- Ensure that POE is included in your contractual obligations with the project team from the outset.



Building sustainably – what's the real cost?

The lack of a standardised POE leads to the perception that POE is complicated and carries significant additional costs. However, the cost of POE, compared to the cost of the whole project is minimal.

POE is a very small proportion of overall building costs

Research shows as a proportion of a project's cost, POE costs an additional 0.1% – 0.25%.¹⁷ In 2019, public sector construction output was £4 billion on new construction work on schools and colleges.¹⁸ POE on this figure, at 0.1% to 0.25% of upfront costs, would be approximately £4 million to £10.1 million. This is a negligible cost to ensure we are building energy efficient and well-designed schools and colleges.

The costs of POE are tiny compared to the benefits

Not undertaking POE means that there is a lack of understanding of how the building works in practice and ignores problems that have arisen. This creates operational gaps which can cost the client exorbitantly. This also costs the construction industry through the requirement for site visits to understand issues plus remediation works. These problems can also result in the loss of future work as clients may be unhappy and not wish to employ the design and construction team again.

The knowledge, feedback and intelligence gathered by the architect and client for future projects during POE is invaluable. The feedback provides an opportunity to learn from mistakes, improve the predicted energy usage of a building and create better designs and better buildings.

The return on investment for elements of POE is easily measurable

The financial benefits of energy savings and carbon reductions can often far exceed the initial investment required. For example, a private sector company saved £222,000 after investing £74,000 in metering and reporting for its offices.¹⁹

Considering POE from the outset helps reduce costs

The cost of POE increases when the energy metering infrastructure is not at an adequate standard. This makes it difficult to ascertain where energy is being used throughout a building; in turn, adding time (and cost) to gathering and understanding this data. Therefore, when POE is part of a wider building strategy and considered from the outset, the cost of POE is reduced.

POE is an investment in a better future

As POE becomes standard within the built environment, the lessons learnt feed into new projects. Each new project becomes better than the last and eventually POE becomes a verification exercise. As this occurs, the cost depreciates.

Appendix

| What is Post Occupancy Evaluation?

Post Occupancy Evaluation (POE) is the process of obtaining feedback on a building's performance in use after it has been built and occupied. By accurately measuring factors such as building use, energy consumption, water usage, maintenance costs and user satisfaction, POE allows for a process of continuous improvement in the construction industry.

The RIBA Plan for Use describes three wide-ranging levels of POE:

- Light touch POE: a simple but meaningful rapid evaluation undertaken post occupancy, before the building contract concludes. This level may not fully reflect the true building performance as it may not include full seasonal information. However, it can provide some initial useful insights for the client and offer some feedback for future projects.
- Diagnostic POE: feedback from a light touch POE may highlight the need for a more detailed review of a building. This type of POE usually occurs in the second year of occupation and verifies the performance of a building and reviews any issues discovered.
- Detailed (forensic) POE: a comprehensive investigation, by independent evaluators, to identify and resolve any significant and persistent performance issues. A detailed (forensic) POE can occur at any time, but ideally be completed by the end of the third year of occupation.

A positive to some, but a criticism to others, is the flexibility of POE. It is widely accepted that there is no definitive standard or agreed definition of what a "standard" POE should look like. A POE can include some or all the following: interviews with occupants, feedback questionnaires, use of monitoring equipment, such as temperature, humidity, light and sound; collecting metered data and walk around observations.

However, this flexibility means that the POE can be shaped to the needs of a building and its users. A good quality POE provides a means for assessing whether a project brief had been met, obtain feedback from building occupants, and scope how efficiently a new or refurbished building operates.

POEs enable those that design and commission a building to understand how it is being used in practice. They are powerful tools for demonstrating if a building management system is delivering best value for money and for identifying areas for improvement.

| What is not classified as POE?

It is also important to highlight what does not constitute POE. There is a significant difference between a POE and gathering the information for a Display Energy Certificate (DEC). All publicly owned buildings are required to obtain a DEC, which highlights the actual energy usage of a building. Whilst DEC's do provide some advice on what measures can be taken to improve the energy efficiency, this is only high-level. POE provides greater insight into a whole building's performance which includes airtightness testing or interviews with building users to help provide a thorough picture of the building's performance.

Endnotes

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Acknowledgements

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