Green Finance Institute

# Building Renovation Passports: Creating the pathway to zero carbon homes

A report by the Green Finance Institute's Coalition for the Energy Efficiency of Buildings

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## Summary report: Building Renovation Passport recommendations



## Technical Report: Findings from the Coalition for the Energy Efficiency of Buildings' research into developing a standardised framework for Building Renovation Passports in the UK

# Summary report: Building Renovation Passport Recommendations

## I. Introduction

Building Renovation Passports can play a crucial role in overcoming current barriers to action and investment in green home retrofits

# I. Introduction

UK buildings are responsible for approximately 23% of the country's greenhouse gas emissions.[1] Although progress has been made towards decarbonising our built environment, the current pace of action is insufficient to meet the UK's climate targets.[2] A huge boost in energy efficiency measures and zero carbon heating systems is necessary. Overcoming the current shortfall in action and investment requires addressing key barriers, including low levels of awareness among homeowners and occupiers; a lack of information about appropriate retrofit measures and the financial options available to pay for them; poor and inaccurate data; and little connectivity between homeowners, tenants and potential service providers throughout the retrofit supply chain.

**Building Renovation Passports** (BRPs) can help meet this challenge, providing the information and guidance to enable property owners to improve their properties and reduce emissions. BRP initiatives are being rolled out in a growing number of countries[3] and can be designed to support all housing tenures. BRPs typically contain **a digital logbook** of renovations at a property-level, with historical and contemporary information about the property, its construction and operational performance; and **a long-term renovation roadmap** that identifies future retrofits and installations to decarbonise the property, along with links to contractors, other service providers and finance options.

The **Coalition for the Energy Efficiency of Buildings** (CEEB) was established by the Green Finance Institute in December 2019, with support from E3G, with the remit to develop the market for financing a net-zero carbon and climate-resilient built environment. The CEEB identified BRPs as a critical enabler of capital flows[4] and assembled a working group to establish a standardised approach for introducing BRPs suitable for the UK market.

The CEEB conducted surveys and hosted workshops with over 50 organisations, spanning five sectors:

- Retrofit and energy professionals
- Local authorities and registered social landlords
- Private rented sector
- Financial institutions, valuers and surveyors
- Data and academic institutions.

The purpose of this research was to create a 'greenprint' for BRPs in the UK, considering what data inputs and outputs would be required, who currently owns that data and how it can be accessed. Roles and responsibilities in the development and deployment of BRPs were also considered, including which parties would update the information and which parties would pay for them. Lastly, the benefits and opportunities associated with the widespread adoption of BRPs were explored, together with the levers that could accelerate adoption of, and engagement with, BRPs in the UK.

Key recommendations are outlined in this summary report and the full findings are presented in the technical report. After a consultation period, the results will be used to produce and publish an initial standardised framework to support the introduction of BRPs in the UK. The framework will identify the main features required of a BRP to deliver the benefits associated with their widespread adoption, while taking on board the practical realities around data collection and accessibility, as well as measures which will help support their widespread adoption and engagement. The technical report contains further recommendations for government, industry, financial institutions and landlords to promote and benefit from BRPs.

For a table of all the acronyms used in this report, please see Appendix 2.

[1] CCC (2020) **The Sixth Carbon Budget**
[2] BEIS (2019) Updated energy and emissions projections: 2018 and CCC (2015) **The Fifth Carbon Budget: the next steps towards a low-carbon economy.**
[3] For example, see https://ibroad-project.eu/, BPIE (2016) **Building Renovation Passports: Customised roadmaps towards deep renovation and better homes.**
[4] Green Finance Institute (2020) **Financing energy efficient buildings: the path to retrofit at scale.**

# Building Renovation Passports – A dynamic system to help property owners on their retrofit journey

## INPUT

- Building information
- Historic renovations, retrofits and conversions
- EPC data
- Climate information and resiliency
- Energy consumption
- Comfort and health measurements
- External environment monitoring


## OUTPUT

- 'Digital log book' of building information
- Bespoke and sequenced renovation roadmap
- Connections to the supply chain and funding sources
- Information about regulations, local initiatives and benefits of energy efficiency measures

## Benefits per sector

**FINANCIAL INSTITUTIONS, VALUERS & SURVEYORS:**

- New opportunities for customer engagement
- Prepare for changing regulations and reporting
- Identify risks
- Verify environmental credentials

**RETROFIT & ENERGY PROFESSIONALS:**

- Connection to customers
- Saves time and cost on property surveys
- Performance monitoring

**PRIVATE RENTED SECTOR:**

- Compliance with energy efficiency obligations
- Attractive to new tenants
- Supports new business models

**DATA & ACADEMIC INSTITUTIONS:**

- Increased transparency, consistency and accountability
- Higher quality data

**LOCAL AUTHORITIES & RESIDENTIAL SOCIAL LANDLORDS:**

- Standardised data collection and analysis to unlock deeper insights
- Supports future planning to reach climate and social goals
- Engage with citizens



**Figure 1:** Infographic showcasing the recommended data inputs and outputs of a Building Renovation Passport and the benefits such a tool could bring to different sectors.

# II. Report recommendations

i. Key recommendations for data to be included in Building Renovation Passports

ii. Key recommendations on data collection, ownership and accessibility

iii. Key recommendations on roles and responsibilities

iv. Sector-by-sector benefits and opportunities

# II. Report recommendations

This section outlines the key recommendations for a standardised framework for introducing BRPs into the UK market. The recommendations include: the data inputs that should be included; the data outputs that should be created, and how they might be displayed; the stakeholders who own the data to be included and how this should be collected and accessed; and finally, the benefits and opportunities for different sectors, and potential levers to catalyse widespread adoption and engagement.

## i. Key recommendations for data to be included in Building Renovation Passports

### Data input recommendations

There was cross-sectoral consensus about the core data inputs that should be included in a standardised BRP framework and the inputs that might be considered secondary, yet still highly desirable. These core and secondary inputs are shown in Table 1. Existing datasets will need to be amalgamated by the BRP platform, and this should be a prime consideration for any organisations seeking to deliver a BRP proposition. Another crucial factor will be differentiating between data inputs which are personal and belong with the household, and which datasets relate to the property and should remain available as the house changes ownership. For further information, please see Section 1 of the technical report.

**Key:** ✓ **Core** ✓ **Secondary consideration**

| Data Input | Indicative examples | |
|---|---|---|
| **Building information** | Unique Property Reference Numbers (UPRNs), Unique Street Reference Numbers (USRNs), age, construction, soil type, drainage, floor plans, heating system, floor type, planning permission, etc. | ✓ |
| **Building ownership and governance** | Freehold/leasehold arrangements, title deeds, lease terms relating to repairs and improvements, restrictive covenants, planning permissions, clarity between personal and property data sets, etc. | ✓ |
| **Energy consumption and user behaviour** | Smart meter data, metered energy savings, real-time data on performance, etc. | ✓ |
| **Energy Performance Certificate (EPC)** | EPC band, Energy Efficiency Rating (EER) band, Environmental Impact Rating (EIR) band, Standard Assessment Procedure (SAP) score, etc. | ✓ |
| **Enhanced climate information** | Embodied carbon, operational carbon levels, etc. | ✓ |
| **External environment monitoring** | Weather, outdoor temperature, etc. | ✓ |

| Key: ✓ Core ✓ Secondary consideration | | |
|---|---|---|
| **Data Input** | **Indicative examples** | |
| **Indoor monitoring systems to measure comfort** | Renewable energy sources, water, humidity, indoor temperature, CO2, levels, etc. | ✓ |
| **Information on recent renovations, retrofits, conversions and property improvements** | Installations, retrofits, conversions, extensions, warrantees, maintenance information, technical specifications, etc. | ✓ |
| **Information relating to climate resiliency** | Vulnerability to heat waves and flooding, renovations taken to mitigate risks, etc. | ✓ |
| **Circular economy considerations** | Sustainable materials, construction details, toxicity considerations, etc. | ✓ |
| **Information on property value** | Current and historic property valuations. | ✓ |
| **Information relating to fuel poverty** | As defined by government, with devolved nations each holding their own data. | ✓ |
| **Overview of electric appliances** | Available via energy consumption data. | ✓ |
| **Thermal imagery/ 3D scanning** | Heat loss. | ✓ |

**Table 1:** Recommendations on the data inputs for a Building Renovation Passport.

## Data output recommendations

The core outputs to be included in the BRP are shown in Table 2. These should include a property logbook and renovation pathway to achieve a net-zero carbon home, presented in a simple, user-friendly interface. The passport should connect users to contractors, suppliers and finance options (public and private) , and comply with financial and data regulations. For further information, please see Section 1 of the technical report.

| Output | Aim | Interface and display | Considerations |
|---|---|---|---|
| **A practical logbook providing an overview of information about the home (current and historic)** | Improves awareness on the performance and characteristics of the home, encouraging informed retrofit action by the owner and providing a useful overview for retrofit coordinators, financial institutions, etc. | • Simple and user-friendly interface.<br>• A dashboard covering key data about the property.<br>• Social and environmental considerations (e.g. energy efficiency performance, comfort considerations, resilience to floods, etc). | Moves beyond EPCs to integrate real-time data, taking a holistic approach to building sustainability. |
| **A renovation roadmap with an independent, tailored plan of improvements to achieve net-zero over the lifespan of the property** | Ensures that improvements have the greatest chance of delivering a material impact (e.g. lower bills, higher amenity, lower carbon), with appropriate sequencing of steps. | • Sets out the sequential actions necessary to improve the individual home and achieve net-zero carbon.<br>• If part of a multi-unit property (i.e. a block of flats), can also identify measures needed at a building level (i.e. external wall insulation).<br>• Can link to relevant local initiatives (e.g. plans to install a district heating network). | Encourages 'whole house' retrofits where possible and 'fabric first' considerations, maximising the performance of components that make up the fabric of the building. |
| **Connections to qualified retrofit contractors and other service providers** | Allows homeowners to easily access trusted stakeholders along the retrofit value chain. | • Accessible via an online platform.<br>• Links customers to local qualified businesses that can install recommended measures (e.g. TrustMark or MCS accredited businesses in the area). | Compliance with consumer protection laws and General Data Protection Regulation (GDPR). |
| **Connections to funding sources** | Enables homeowners to access suitable sources of public, private and blended funding. | • Accessible via an online platform.<br>• Information about government grants and private finance options.<br>• Potential connections with the National Infrastructure Bank. | Compliance with competition law and financial regulations. |
| **Information about relevant government, local authority regulations and initiatives** | Educates and builds awareness among homeowners, with connections to initiatives and funding options in their region. | • Accessible via an online platform.<br>• May include changes to Minimum Energy Efficiency Standards (MEES) and planning permissions.<br>• Information about the benefits of energy efficiency and zero-carbon heating measures. | Can recommend actions to help achieve regulatory compliance. |

**Table 2:** Recommendations on the data outputs for a Building Renovation Passport.

## ii. Key recommendations on data collection, ownership and accessibility

Survey and workshop participants were asked about the individuals and organisations that currently collect and own the data inputs recommended for inclusion within a Building Renovation Passport, as well as how this information could be accessed and integrated. The key recommendations on accessing, using and storing this data are shown in Table 3. For more information, please see Section 1 of the technical report.

| Data access, use and storage | Further detail |
|---|---|
| **Establish a consistent framework for Building Renovation Passports** | • Unify the current mosaic of approaches to data collection and storage.<br>• Host all information in a single digital deposit, or alternatively develop an open standard and governance framework for data storage.<br>• A marketplace of BRPs based on unified data standards and governance frameworks could be created, with households able to move between providers. |
| **Build upon existing datasets as a baseline** | • Integrate existing data sources to establish a baseline, in order to save time during physical home surveys and reduce the cost of producing BRPs.<br>• Include Unique Property Reference Numbers, EPCs and SAP scores, smart meter data, thermal imagery, and other existing data sources where available.<br>• Improve the quality and consistency of certain data sources (e.g. EPCs) via collaboration with government and other stakeholders. |
| **Integrate open source data and privately-owned datasets** | • Overcome barriers to data access via:<br>  • Engagement between industry and government, with innovative new collaborations (e.g. with energy companies)<br>  • Gaining consent from households, while meeting GDPR regulations<br>  • Aggregating and anonymising data to share with relevant third-parties. |
| **Create a robust governance process for data collection and storage** | • Must consider consumer protection laws, financial regulations, and other relevant legislation.<br>• Clarity between which data inputs are personal and belong with the household, and which datasets relate to the property and should remain available as the house changes ownership. |
| **Host the Building Renovation Passports on a digital platform** | • Simplify access to data for property owners, registered social landlords and Local Authorities.<br>• Robust governance around online data storage and sharing.<br>• Potentially allow the commercial sector to access some of the information, in order to stimulate development of new products and services. |
| **Utilise Building Renovation Passports as an educational tool** | • Engage and educate property owners by providing additional information and advice, including:<br>  • National and regional regulations, relevant policies and updated standards<br>  • The benefits of decarbonisation measures (social, environmental and economic)<br>  • Available funding and grants<br>  • Information relating to property and appliance maintenance. |

**Table 3:** Recommendations on the access, use and storage of the required data for Building Renovation Passports.

## iii. Key recommendations about roles and responsibilities

Survey participants were asked who should be responsible for producing and maintaining BPRs. They were also asked about the implications for employment and training, who should monitor and enforce standards, and who should pay for the BRP. For more information, please see Section 2 of the technical report.

| Role | Responsibility | Further details |
|---|---|---|
| **Production and maintenance** | • Trained and qualified retrofit professionals and assessors.<br>• Other retrofit coordinators, builders and contractors, and potentially property owners and holders of data on energy consumption.<br>• Data companies and digital services, and providers of BRP platforms. | • Produce and maintain the BRPs.<br>• Provide additional inputs on an ongoing basis.<br>• Oversee the quality of inputs. |
| **Employment and training** | • Professional bodies offering training and certification.<br>• Retrofit companies along supply chain.<br>• Additional training may be needed for property valuers and mortgage lenders, if BPRs are integrated into these sectors.<br>• Government and local authorities may support skills programmes. | • Training throughout the supply chain may be required to produce and maintain BRPs to a high standard.<br>• There may be opportunities to embed BRP maintenance into PAS standards.<br>• It may be necessary to develop additional training courses or curriculums to upskill assessors. |
| **Management, monitoring and enforcement of standards** | • A relevant industry body (e.g. RICS).<br>• Potential role for government and local authorities to support and provide capacity. | • An industry-recognised certification scheme is needed to avoid poor practices.<br>• Third-party validation, cross checking, spot checks and industry standards (e.g. PAS 2035, TrustMark regime) could support monitoring and enforcement. |
| **Funding the BRP** | • Government was identified as potential "seed funder" of BRPs, especially if BRPs become mandatory.<br>• Homeowners were viewed as the long-term funders, with ongoing support for low income households. | • Government could subsidise the initial cost of development in order to drive widespread adoption by the housing market.<br>• The 'able to pay' market could become self-sustaining over time, with additional help available for lower income households. |

**Table 4:** Recommendations for the roles and responsibilities associated with Building Renovation Passports.

## iv. Sector-by-sector benefits and opportunities

An understanding of how BRPs can benefit different stakeholders is important to ensure that adoption is maximised across the UK. Key stakeholders include residents and homeowners, all five sectors engaged in this study, and the UK government. Table 5 considers the opportunities BRPs present for each sector and the levers that will drive adoption. For more information, please see Section 3 of the technical report.

| Sector | Opportunities | Leverage points |
|---|---|---|
| **Financial institutions, valuers and surveyors**  | • Consistent and granular information to make well-informed financial decisions about individual properties.<br>• Identifying and mitigating risks at an asset and portfolio level.<br>• Supporting disclosure and reporting requirements on mortgage portfolios.<br>• Certifying greenness of products, such as mortgages.<br>• New opportunities for customer engagement, with advice tailored to the needs of individual properties.<br>• Identifying renovation trends. | • Integrate BRPs into the lending process (e.g. embed into mortgage applications).<br>• Use BRPs to better inform customer conversations.<br>• Support new reporting requirements from the government, Bank of England, and other industry-led initiatives. |
| **Retrofit and energy professionals**  | • Connections to customers via the BRP platform can create commercial opportunities.<br>• BRPs provide baseline information that promotes a connected approach to renovations, saving time and informing future works.<br>• Data that can shape new and enhanced services and products.<br>• Monitoring the performance and effectiveness of works. | • Integrate BPRs into existing standards and requirements associated with retrofits (i.e. PAS standards).<br>• Connect into government grants and funding.<br>• Regulate data related to construction. |
| **Private rented sector**   | • Monitoring and supporting compliance with landlord energy efficiency obligations, identifying necessary works and available funding support.<br>• Facilitating conversations on green home retrofits.<br>• Attracting tenants, showcasing where houses meet modern, comfortable low carbon standards with low energy bills.<br>• Supporting new business models, such as 'green rental agreements'. | • Encourage property improvements through incentives and tax breaks to private landlords.<br>• Update tenancy agreements and leases to reflect data access requirements.<br>• Letting agents have responsibility for maintaining BRPs. |

| Sector | Opportunities | Leverage points |
|---|---|---|
| **Local authorities & residential social landlords**  | • A standardised approach to gain deeper insight on retrofits at local and national levels.<br>• Measuring, monitoring and meeting climate and social targets, including on fuel poverty.<br>• Support with fundraising and reporting with accurate, up-to-date data.<br>• Engaging with citizens on local initiatives and sources of funding.<br>• Supporting programme design and future planning for local housing stock improvements. | • Area-based roll out of BRPs, with support from local and central government.<br>• Integrate BRP data into reporting requirements.<br>• Integrate BRPs into the planning permission process.<br>• Aggregate local demand for BRPs to offer them at a lower price. |
| **Estate agents and valuers**  | • Understand the correlation between property values and zero carbon measures.<br>• Linking zero carbon measures into the valuation process, enabling dynamic pricing.<br>• Improving customer engagement and advice on how to achieve a fast, high value property sale. | • Integrate BPRs into existing standards and requirements associated with retrofits (i.e. PAS standards).<br>• Connect into government grants and funding.<br>• Regulate data related to construction. |
| **National government**   | • Enabling higher volumes of retrofit projects, thus helping achieve the UK's climate, energy efficiency and fuel poverty targets.<br>• Monitoring and analysis to inform policymaking and spending allocations.<br>• Promoting green jobs and skills along the retrofit supply chain.<br>• Supporting the economic recovery from the Covid-19 pandemic. | • Mandate BRPs for all buildings, starting with new builds.<br>• Improve and move beyond EPCs, embedding BRPs into the policy pipeline.<br>• Integrate BRPs into funding for local authorities and households.<br>• Provide financial incentives to support the adoption of BRPs.<br>• Introduce a register for private rented landlords. |

**Table 5:** How different key sectors can benefit from, and play a role in encouraging, widespread adoption of Building Renovation Passports.

# III. Conclusion

Building Renovation Passports can play an important role in mapping the road to decarbonise the UK's built environment, enabling the financial innovation needed to fund the scale of retrofits required, and guiding the UK in the race to zero emissions.

Providing clear, accessible and affordable information that is bespoke to individual buildings can also deliver benefits along the retrofit supply chain. BRPs can help homeowners make informed decisions, find funding and connect with suppliers and service providers, making retrofits simpler. Retrofit professionals can make energy efficiency improvements that complement existing technologies, materials and construction of a property. Lenders can better assess risks to their portfolios and provide tailored products to customers, while accessing the data needed to develop new products and services. Local authorities can build a better understanding of local housing stock, enabling them to implement effective retrofit programmes at a local level.

The Coalition for the Energy Efficiency of Buildings has presented the key recommendations that emerged from a series of workshops and surveys into the development of a standardised framework for Building Renovation Passports in the UK. The full data supporting these findings is contained in the following technical report.
The CEEB encourages feedback on the key recommendations contained in this summary report and technical report. **Please send your comments and proposals to passports@gfi.green**. Following consultation, the CEEB will publish an initial standardised framework for Building Renovation Passports in the UK.

# Technical Report:

## Findings from the Coalition for the Energy Efficiency of Buildings' research into developing a standardised framework for Building Renovation Passports in the UK

# 1. Core components of a Building Renovation Passport

The CEEB organised workshops and conducted surveys to identify the core components required in a Building Renovation Passport (BRP), in order to develop a standardised framework to support the introduction of BRPs into the UK market. It sought feedback on the data inputs to prioritise and the most crucial environmental and social factors to consider, while also identifying data ownership, collection and accessibility issues that need to be addressed. The research also sought information on what the outputs of a BRP should be, how the information should be used and displayed, and whether users could be connected to service providers and funding opportunities.

A standardised framework for BRPs in the UK aims to embed consistency into a rapidly evolving landscape. The main recommendations presented in this technical report received cross-sectoral support, although there were differences of opinion amongst the survey and workshop participant.

## 1.1. Data inputs

The key recommendations on data inputs to be included in a BRP are shown in figures 2 and 3 respectively, the most important inputs being:

- Building information
- Recent renovations, retrofits and conversions
- EPC band and SAP score
- User behaviour and energy consumption
- Monitoring systems that provide insights on how and when households are using energy, such as smart meter data
- Resilience to climate shocks

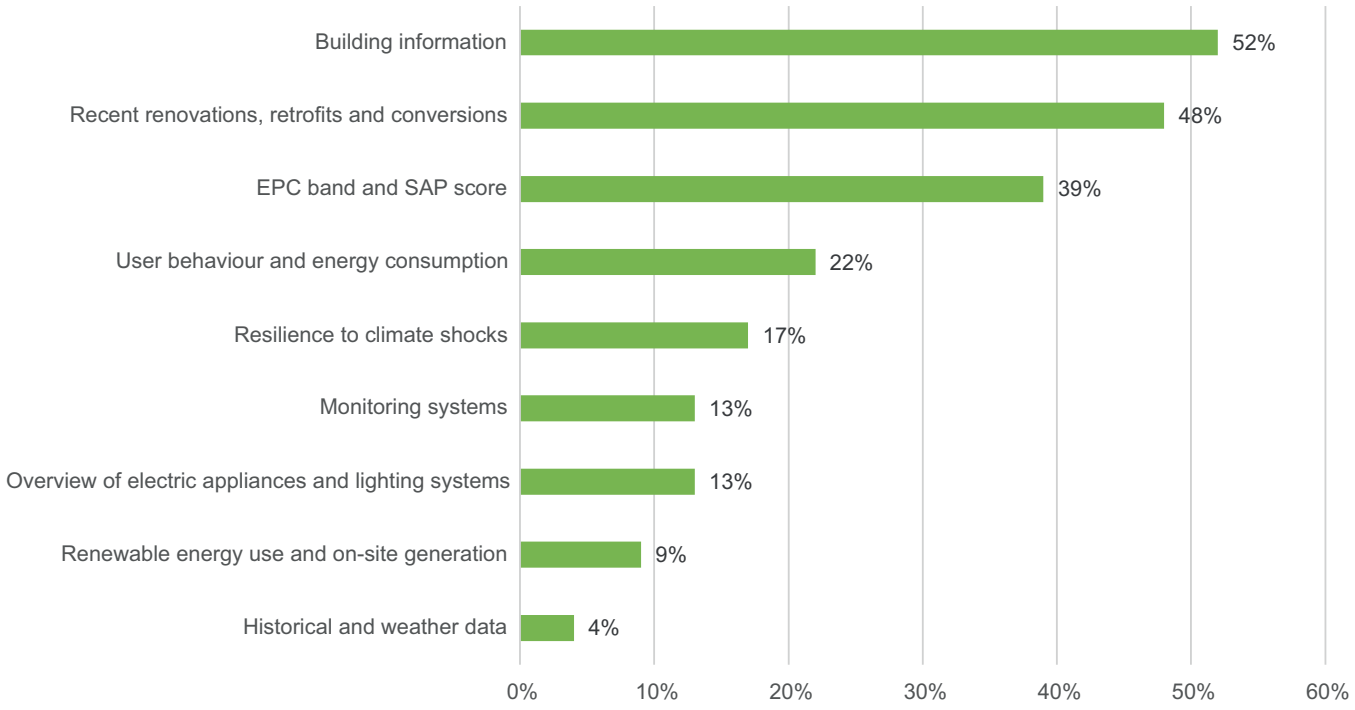


**Figure 2:** What data inputs and sources should be incorporated into the BRP framework?

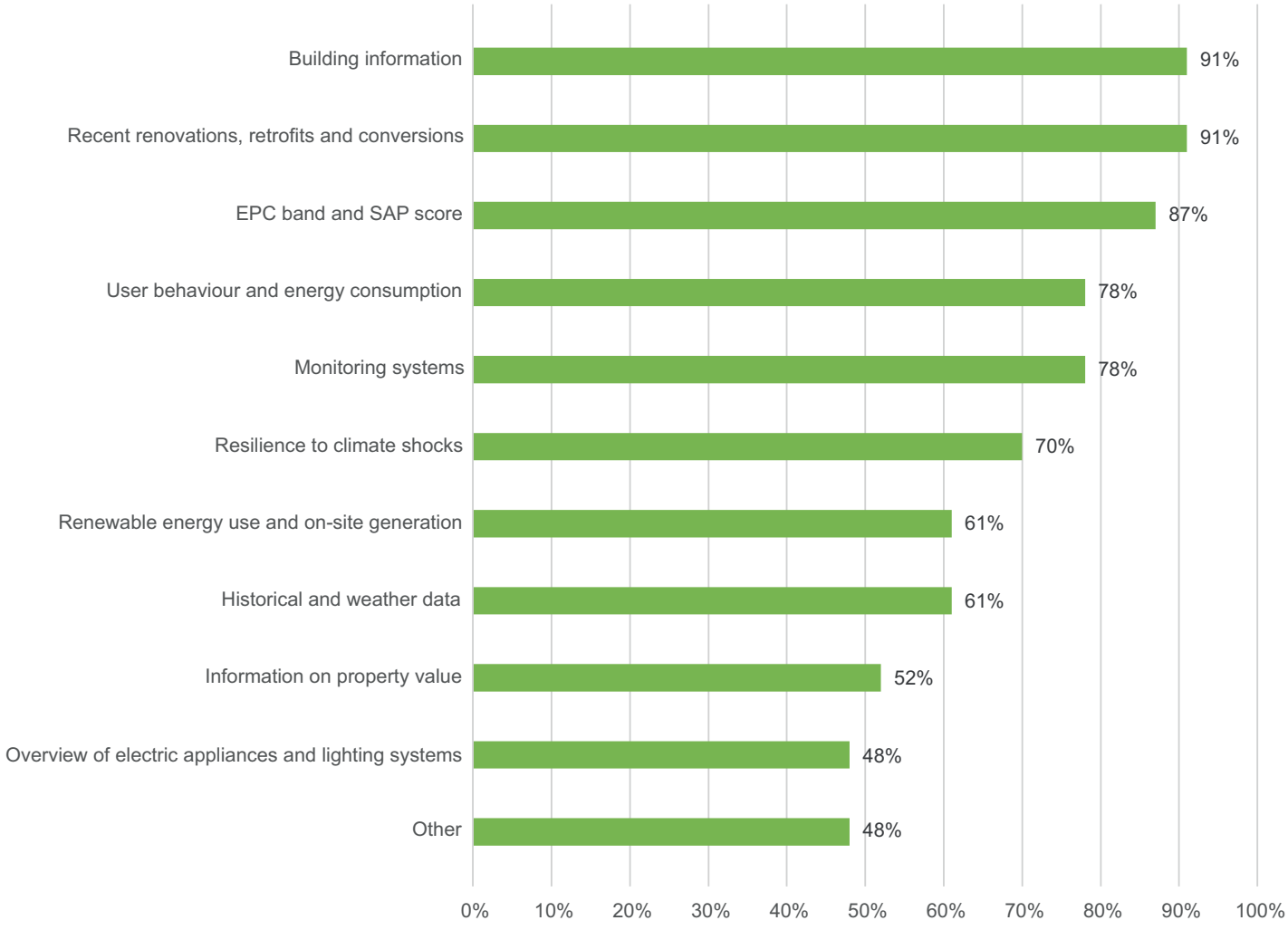


**Figure 3:** Considering the options in Figure 2, what are the top three priority data inputs that should be incorporated into the BRP framework?

**'Other' responses fell into the following four categories:**

**Energy consumption:**
- Current heating system installed in the property
- Energy network data (gas, electricity network, etc.)
- Energy Use Intensity (EUI) - kWh/m2 year and/or derived from energy consumption
- Existing baseline energy consumption and compliance data
- Real-time energy performance measures

**Detailed information about the property:**
- Baseline construction detail
- Drainage information
- Floor plans (including plan for the whole building if the property is a flat)
- If any rent-a-roof or other leasing arrangements exist
- In-home survey
- Ownership arrangements for the building – e.g. for flats with freeholders/leaseholders – and the terms of the lease relating to repairs and improvements
- Planning information

**Enhanced carbon data:**
- Embodied carbon levels
- Operational carbon levels
- Thermal imaging of property, calculations that show heat loss data before and after refurbishment work to be completed by an accredited assessor

**Enhanced social and environmental data:**
- Future weather predictions, especially if these could impact the property in relation to solar gain
- Internal comfort levels – such as indoor temperature, air change rates
- Toxicity of materials

BRPs should include a logbook of historical work to a building so that future retrofit contractors have knowledge of previous interventions and the materials used. Information on embodied carbon and use of sustainable materials should also be included, where available, to encourage more sustainable and thermally efficient building designs.

An overview of electric appliances and lighting systems was considered important by some participants, helping to determine different uses of energy and building upon the body of research that aims to do this through an analysis of detailed patterns of energy demand.

Information about consumer preferences could also be included, in particular the temperature required to heat homes to a comfortable level.

**EPCs and SAPs – a starting point towards measured, real-time performance**

Throughout the surveys and workshops, participants offered constructive criticism on Energy Performance Certificates (EPCs) and the Standard Assessment Procedure (SAP). While the systems are well known, nationally adopted and widely utilised, participants generally agreed **there is a need for significant improvement** if they are to properly assist the decarbonisation of UK homes. The perception that EPCs are not reliable could undermine BRPs, especially if the latter are substantively based upon the former.

The limitations of current EPCs have created **a trust gap between consumers and providers**, according to participants, which may undermine demand for energy efficiency improvements. The 10-year lifetime of an EPC means that a property can come into new ownership several times without new retrofit measures being recognised. SAP ratings can have a perverse impact on decarbonisation, as the current calculation includes the installation of home solar panels, but not batteries and storage. EPCs were considered a poor source of forward-looking information on individual homes, in particular for the most energy efficient homes.

The 2018 English Housing Survey found that **28% of people did not see an EPC when moving** into their new home and **76% of people that had seen an EPC were not influenced by them**.[5] These findings highlight the importance of designing BRPs to be engaging and interactive, so that homeowners are motivated to take greater interest in the energy efficiency of their properties, and the benefits these can offer.

[5] MHCLG (2019a) **English Housing Survey: Energy Report, 2017-2018**

EPCs could be improved by **incorporating real-time information on energy performance and savings.** Currently, live data on energy performance is limited and challenging to access. Recent signals from government indicate a change towards this approach, with the Social Housing Decarbonisation Fund announcing it will investigate in-use energy performance.[6] The EPC Action Plan published by the Department of Business, Energy and Industrial Strategy (BEIS) and Ministry of Housing, Communities and Local Government (MHCLG) sets out a series of actions to enhance EPCs and outlines the roadmap towards improved calculations, including in-use performance.[7] In addition, the CEEB is developing a standardised methodology for calculating metered energy savings in the UK.[8]

Building Renovation Passports need to be **fit for the future and provide a pathway beyond EPCs**. BRPs need to measure both outputs and outcomes, capturing the relevant performance data on retrofits to ensure that high standards are achieved, providing high-quality and trusted information to support households make the steps needed to get to zero emissions buildings.

## 1.2. Environmental and social considerations

The most important environmental and social considerations that should be included in a BRP are shown in Figure 4.

The main environmental considerations to be included in a BRP include:

- Energy efficiency
- Renewable energy
- Zero carbon heating
- Resilience to climate shocks
- Comfort and health improvements

Aesthetic, comfort, well-being and lifestyle improvements are likely to interest homeowners, therefore could be included in a BRP to bolster engagement levels. The inclusion of property valuations was strongly supported by retrofit and energy professionals, financial institutions, valuers and surveyors.

BRPs can help social landlords and local governments ensure that properties meet government-mandated fuel poverty requirements, which could be supported by refreshed government guidance and fuel poverty definitions. They can also support private landlords ensure they are meeting new Minimum Energy Efficiency Standards (MEES).

[6] Heath, L. (2020, December 09) **Government allocates £50m Social Housing Decarbonisation Fund. Inside Housing.**
[7] MHCLG, BEIS (2020) **Energy Performance Certificates For Buildings: Action Plan.**
[8] Green Finance Institute (2021) **Green Finance Institute: Coalition for the Energy Efficiency of Buildings Towards a protocol for metered energy savings in UK buildings.**

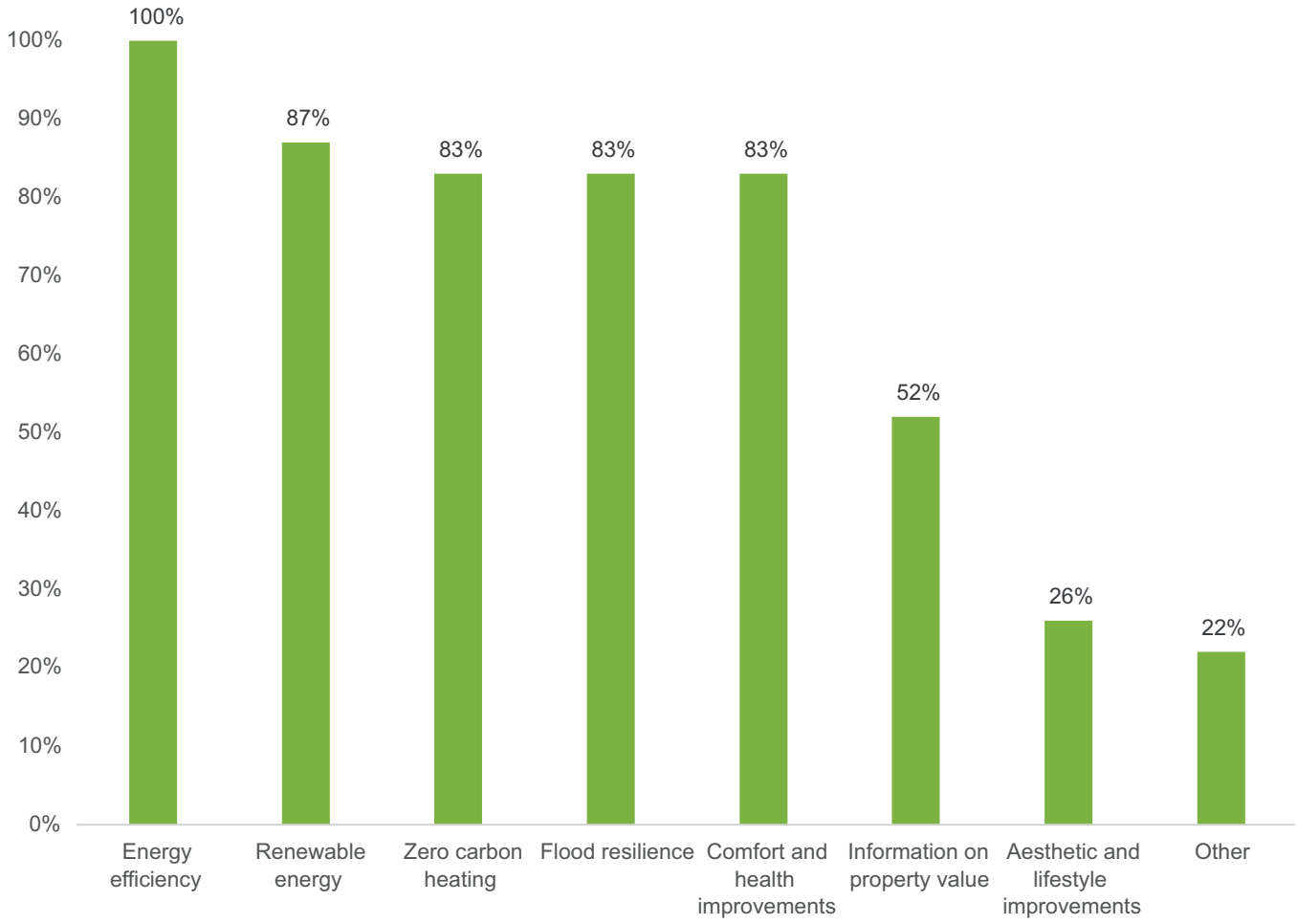


**Figure 4:** What environmental and social considerations should be included in a BRP?

**'Other' responses included:**

- Embodied carbon and sustainable materials
- General information about heating
- Lifestyle improvements should be considered as a trigger for energy efficiency measures, rather than as an essential input in their own right
- Maintenance requirements
- Potential for renewable technology and related funding options

## Key recommendations for data to be included in the Building Renovation Passports

The key recommendations for the core and secondary data inputs to a BRP are shown in Table 1, based on the findings in sections 1.1 and 1.2.

# 1.3. Data collection, ownership and accessibility

Survey and workshop participants were asked to identify which individuals and organisations currently collect and own the possible data inputs to a BRP, and with whom that data can be shared.

Several sources were identified including: government departments, local authorities, households and utility and energy companies were among those most cited. Datasets are often privately owned and variously located, typically without consistency between different sources. GDPR and privacy concerns were raised as potentially significant issues when accessing data, as were data abuse and manipulation.

A number of organisations have documented the performance gap between the design and actual performance of a building.[9] BRPs represent a potentially useful tool to identify performance gaps by increasing data consistency and transparency, improving the quality of data collected, and enabling scrutiny and evaluation.

**Data collection and baselines**

The key considerations on collecting and establishing a baseline for the data inputs are shown in Table 6. The data inputs can also be categorised into the following: asset data (including pathways for refurbishment plans), user preferences and user data. While some of these are open source, others must be kept private, especially GDPR-sensitive datasets.

To deliver a BRP, a methodology and governance framework to access and analyse the necessary datasets will be required. Some data inputs may be subject to aggregation and/or anonymised prior to sharing with different stakeholders, with access carefully controlled through the overall governance model.

| | |
|---|---|
| **Process for collecting data in BRPs** | • Integration of disparate existing data sources, collecting and storing data in a standardised format, with a data integration method to draw information together.<br>• Method for collecting new data at the point when home improvements occur, covering technical risks in a timely manner.<br>• An in-home assessment may be required to formulate the forward-looking retrofit plan.<br>• Robust governance process to ensure quality and data control.<br>• Transparency on data, making it open to scrutiny, can encourage better quality inputs. |
| **Level of detail required** | • UPRNs are essential to link data and outputs to the individual property.<br>• Include historic renovations and general property information.<br>• Capture differences between individual and multi-household buildings.<br>• Provide richer information than EPCs, which are currently insufficient to develop a long-term, bespoke retrofit plan.<br>• Address the gap between predicted and operational performance, considering the role of real-time metered energy savings.<br>• 3D scanning could be used in conjunction with thermal imagery to provide granular detail on asset performance. |

**Table 6:** Key insights regarding data inputs and collation collated during the data and academic institutions workshop.

[9] https://www.bregroup.com/buzz/building-performance-bridging-the-gap-between-design-and-operation/

Existing data sources should be integrated through an online platform and will be a critical factor for the success of BRPs. Data integration can verify the provenance of data inputs, while integration with more general building logbooks – several of which are currently under development and production – can ensure that BRPs are practical for homeowners.

The BRP should be designed as a live and dynamic digital document, capturing inputs as they change over time, with enough historical data to establish a baseline for the property's performance. Several possible data inputs to inform this baseline are outlined in Table 7.

Several options were proposed for the storage of BRP data. Some participants suggested that all data should be stored in a single location, such as the TrustMark Data Warehouse; this would address concerns that competition between BRP providers could result in inconsistencies and confusion amongst consumers. Lessons might be drawn from the history of EPCs, where attempts to introduce a competitive system struggled to deliver quality outcomes. Other participants believed there would be scope for a marketplace of BRP offerings, if a consistent approach to data collection and storage were established. If several market participants were to offer BRPs, the nature of this marketplace and the physical data architecture will need careful consideration.

| Data Inputs | Description |
|---|---|
| **Unique Property Reference Numbers (UPRNs) and Unique Street Reference Numbers (USRNs)** | • UPRN: a building of any kind at each UK postal address has its own 12-digit identifier throughout its lifecycle, from planning through to demolition.<br>• USRN: an 8-digit unique identifier for every street across the UK.<br>• In July 2020, both became open to access under the Open Government Licence with the aim of better connecting geospatial data.[10] |
| **Data from building performance measurement tools** | • Several organisations are developing technologies and software solutions to measure building performance (including energy assessors, building surveyors, the construction industry, utility suppliers, etc). |
| **EPC and SAP** | • An EPC gives a property an energy efficiency rating (EER) from A to G (most to least efficient) and an environmental impact rating (EIR). The rating is valid for 10 years.<br>• The Standard Assessment Procedure (SAP) is the methodology underpinning the EPC and is used to assess and compare the energy and environmental performance of dwellings. SAP ratings span from 0 to 100.<br>• While the EPC and SAP have been widely criticised, they are generally recognised as a useful starting point upon which to build. |
| **Home Analytics Scotland datasets** | • Collected on behalf of BEIS to provide sub-national energy statistics.<br>• Matches gas and electricity consumption data with information on energy efficiency measures installed in homes drawn from the Homes Energy Efficiency Database.<br>• Includes data about property attributes and household characteristics, obtained from a range of sources. |

[10] MHCLG (2020) Blog: Unique property identifiers to be opened under Open Government License

| Data Inputs | Description |
|---|---|
| **Simplified Building Energy Models (SBEMs) – the underlying model for SAP and EPCs** | • Government-approved methodology used to calculate the energy required to heat, cool, ventilate and light a non-residential building over a 12-month period under normal circumstances. Accompanied by a basic user interface termed an iSBEM.<br>• Calculates the amount of $CO_2$ a building emits and assigns that property a numerical rating. A lower rating corresponds with a more energy efficient building.<br>• Relevant to homes where iSBEM is used to calculate the energy use of communal areas in apartment blocks and mixed-use buildings. |
| **Smart meter data** | • Smart meters collect real-time data on energy consumption.<br>• Major programme to roll-out smart meters across the UK is ongoing. |
| **Thermal imagery and 3D Scanning** | • Produces a number of building-related datasets exist, including coastal erosion data, height data and footprint data. |

**Table 7:** Potential data inputs to inform a baseline information on a building in a Building Renovation Passport.

**Variations in data collection across the country**

At a national level, data collection methods for information on building retrofits currently lack consistency. BRPs present an opportunity to introduce a more uniform approach to data collection.

In England, local authorities can experience the following challenges:

- Real-time monitoring in local authority funded retrofit programmes is rare, with EPCs being more commonly used – although some authorities are exploring sophisticated monitoring systems.
- Short-term programmes often struggle to collect data over the long-term, due to insufficient lead times and funding uncertainty.
- Where funding is limited, monitoring and verification are often the first budget item to be cut.
- Changing definitions and measurements, such as for fuel poverty, can impact consistent data collection.

In Scotland, local authorities, registered social landlords and housing associations are required to submit an Annual Return on the Charter (ARC) that assesses their performance against standards set by the Scottish Housing Regulator. While guidelines on management and reporting exist, data is not necessarily collected at a granular level, and information on carbon performance is limited. Private landlords seeking funding from the Scottish government for installation grants also supply information as managing agents, which vary widely and are often in flux – with the potential for information to be lost when suppliers change.

A standardised framework for BRPs could help to establish a consistent and transparent approach to collecting data, helping to build confidence in the market. Table 8 summarises the key recommendations on data collection, access and datasets for a BRP.

[11] https://www.housingregulator.gov.scot/landlord-performance/statistical-information

| Data sources | Who owns/holds it? | | | | | | Collection and accessibility |
|---|---|---|---|---|---|---|---|
| | Resident, homeowner or freeholder | Construction and retrofit organisations | Utility companies | MHCLG, BEIS or local gov. | HM Land Registry | Other | |
| Building information | ✓ | ✓ | | ✓ | ✓ | Housing associations; architects; Building As Materials Banks (BAMB) electronic materials passport | BAMB not yet for residential properties. Land Registry fee for access. |
| Building ownership and governance arrangements | ✓ | | | | ✓ | | Rental agreements and leases, mainly for flats. Land Registry fee for access. |
| Climate resiliency | ✓ | | | ✓ | | Environment Agency holds data on flooding; FloodRe, some insurance companies. | Data may be limited. |
| Data on renewables | ✓ | | ✓ | | | Feed-in-Tariffs (FIT) and Renewable Heat Incentive (RHI) schemes; Microgeneration Certification Schemes (MCS) | FIT = administered by Ofgem; RHI = held by government |
| Data on social housing | | | | ✓ | | Registered social landlords, housing associations. | Privately held |
| Energy consumption and user behaviour | ✓ | | ✓ | ✓ | | Smart meter providers. Some specialist service providers (e.g. Sero Homes) | Limited current collection. Privately held. GDPR considerations are a must. Social and larger landlords may hold this data. |
| Enhanced climate information (e.g. embodied carbon) | ✓ | | ✓ | | | Specialist service providers. | Limited current collection. |
| EPC data | ✓ | | | ✓ | | In Scotland: Energy Saving Trust; TrustMark | Open access. Questions on quality and accuracy. |
| External environment monitoring | | | | ✓ | | Local weather stations; Met office | Open access. |
| Historic renovations, retrofits and conversions | ✓ | ✓ | ✓ | ✓ | | Housing associations; TrustMark | |
| Indoor monitoring systems to measure comfort | ✓ | | ✓ | | | Some specialist providers. | Limited current collection. |
| Information monitoring the performance of properties | ✓ | | ✓ | ✓ | | Private specialist service providers (e.g. Sero Homes, Retrofit Works) | |
| Information on property value | ✓ | | | | | Estate agents, valuation and surveying professionals, other financial insitutions. | |
| Information relating to fuel poverty | ✓ | | | ✓ | | Definitions of fuel poverty and targets set by government. | Devolved nations each hold their own data. |
| Land ownership/soil information | | | | | ✓ | | Land Registry fee for access. |
| Overview of electric appliances | ✓ | | ✓ | | | | |
| Planning (i.e. conservation area boundaries, climate change maps) | | | | ✓ | | | Open access. |
| National Energy Efficiency Data-Framework (NEED) | | | | ✓ | | | Includes data about property attributes and household characteristics, obtained from a range of sources. |
| Simplified Building Energy Model (SBEMs) | | ✓ | | ✓ | | Construction and energy assessors | |
| Smart meter data | ✓ | | ✓ | ✓ | | In Scotland: Consumer Access Device data collectors, e.g. Hildebrand | With residents' permission – accessible through Smart Data and Communications Company, with digital infrastructure needed to analyse the raw data. |
| Sustainable and circular design (materials and technologies) | | ✓ | | | | Property developers; planning authorities | Limited information routinely collected. |
| Thermal imagery/ 3D scanning | | | | | | Thermal mapping service providers (e.g. IRT Surveys) | |
| UPRNs and USRNs | ✓ | | | ✓ | | | Open access as of July 2020. |
| Water consumption, drainage | ✓ | | | | | Water companies | Privately held. |
| Works undertaken through Energy Company Obligation (ECO)/by a TrustMark registered business. | | ✓ | | | | TrustMark; PAS 2035 | Details on warranties/ protections; details on companies installing measures. |

**Key:** ✓ **This data is not widely collected** ✓ **This data is already being collected.**

**Table 8:** Summary of data owners and collection methods for Building Renovation Passport required datasets.

### Data access and governance

A significant proportion of data inputs are open source, for instance building regulations, planning permissions, gas safety certificates and other sources available in buy-and-sell transactions. Many data sources can be linked to the property asset, rather than the individual homeowner or resident, and therefore can be inherited by asset owners and held in the public domain, where appropriate.

Regulations control access to certain datasets, such as energy consumption and smart meter data. Access to the necessary datasets could be achieved by collaboration between the public and private sectors – for instance via the Smart Meter Installation Code of Practice (SMICoP) - and will require consent from householders, with new forms of collaboration with energy companies and other service providers.[12]

### Accessing data in the private-rented sector

There are specific challenges when accessing data in the private-rented sector, which represents over one-fifth of UK housing.[13] There are technical and ethical questions about who should own and access the data – whether the landlord should have access to personal data about tenants and whether tenants should have access to historical information about building maintenance. For flats, similar issues apply to the freeholder-leaseholder relationship.

Personal data on building occupants is protected. Non-personal and appliance information will require a robust governance process for access to be permitted. As such, BRP data should be held securely, in compliance with GDPR and other relevant standards. A governance board should control access to relevant data sources, with a code of practice developed to govern the use of data. Similar structures exist in the UK, such as the Secure Energy Code (SEC)[14] used to access the DCC network. Access to anonymised or aggregated data could be provided to third parties on request or payment, subject to appropriate governance and regulatory oversight.

### Ownership arrangements and access

Consideration should be given to the data accessible to residents, property owners and managing agents. While ownership arrangements in residential buildings can be more complex, the BRP could be organised around three tiers of property owner and resident data access:

- Freeholder – data made available to the owner of the property (usually in a block of flats[15]) or their agent.
- Homeowner – data made available to the owner of the property, who may be a landlord or their agent.
- Resident – data made available to the residents of the home.

A freehold owner-occupier single family home will have access to all three tiers of data. For social housing apartments, the registered social landlord is typically the freeholder and the homeowner, so will have access to both tiers of data.

Around 20% of English homes are flats, while Scotland has nearly double this proportion.[16] In blocks of flats the freeholder of the building, or their managing agent, is also a relevant stakeholder and therefore a potential user of the BRP. The freeholder owns the walls, roof, floor, often windows, and depending on the lease, may have to approve works inside flats. In Scotland, there are no freeholders. Instead, the community of flat owners in a building co-own its communal parts[17] and is often managed by a managing agent.[18]

Retrofits in flats are likely to be most efficient and cost-effective when the entire building is upgraded. Although each housing unit should have a BRP, consideration should be given to how data is shared between flat owners in the same building; this should help owners work together with their freeholder to plan a retrofit programme. A new European standard, Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities could provide a useful framework.[19]

[12] https://www.smicop.co.uk/

[13] Office for National Statistics (2018) **UK private rented sector.**

[14] https://smartenergycodecompany.co.uk/

[15] Though some single-family homes are sold on leasehold basis, and so have a separate freeholder.

[16] Data derived from: MHLCG (2018) **English Housing Survey: Energy Report (2017-18);** and Scottish Government (2018) **Scottish condition survey 2017: key findings.**

[17] This is a simplification: the balance between individual and communal ownership in Scottish blocks of flats is legally complex. In practice, day-to-day management will usually be taken forward by a factor (managing agents) on behalf of the flat owners.

[18] A similar situation arises in England where the freehold to a block of flats is jointly owned by its leaseholders.

[19] CEN (2020) **Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities.**

### Key recommendations for data collection, ownership and accessibility

**Recommendations**

- **A consistent framework:** The BRP should unify the current mosaic of approaches to data collection and storage. All information could be held in one digital deposit, or an open standard and governance framework for BRPs could be established: creating a marketplace with homeowners able to choose and move between providers.
- **Some existing datasets can be used as a baseline** including UPRNs, EPCs and SAP scores and smart meter data.
- **Open source data and privately-owned datasets should be integrated:** engagement between industry and government, consent from households, and compliance with GDPR and other regulations will be key to accessibility and integration.
- **A robust governance framework** will be required for data collection and storage, considering consumer protection laws and other relevant legislation.
- **BRPs can be hosted on a digital platform** that could share information with third parties: rich information may catalyse the development of technical and financial products that supports higher levels of retrofit activity, if administered in a manner that protects homeowners' data rights.

## 1.4. Data outputs, interface and display

The user interface for a BRP must be simple to understand and connect customers to retrofit contractors, other service providers and suitable funding options. The interface should provide a comprehensive pathway to decarbonise a home and recommend an optimal sequence of renovations, while also encouraging whole house retrofits where possible. This will ensure the appropriate actions are taken at the right time by the homeowner – for example, identifying whether more insulation is required prior to installing a heat pump.

Successful BRP models in other countries have combined a concise opening page that outlines the key results, supported by a more detailed report with technical information.[20] Another successful method to promote engagement and widescale adoption is for BRPs to cover issues that property owners care about. For example, information on the appearance, value and maintenance of the property. BRPs could also provide decision-useful information at key trigger points, such as major renovations when the owner may consider additional investment into energy efficiency or resilience measures.

Other information that BRPs could provide on the interface may include: relevant regulations (i.e. MEES), changes to planning permission, access to district heating networks in the local area , and the availability of grants or other financial incentives from local and national government.

[20] For a comparison between the following BRPs: Denmark (BetterHome), Flanders (Woningpas and EPC+), France (Passeport Efficacité Énergétique) and Germany (Individueller Sanierungsfahrplan), see: http://ibroad-project.eu/news/the-concept-of-the-individual-building-renovation-roadmap/

[21] Green Finance Institute (2020) **Financing zero carbon heat: turning up the dial on investment**

BRPs should link property owners to different service providers, including financial institutions offering green finance solutions, qualified retrofit contractors and other services and advice. A review of financial and competition regulations will be essential where data is used to sell products to consumers. BRPs could also facilitate business-to-business connectivity, for instance by linking multiple contractors on more complex retrofit projects.

A summary of the key outputs from a Building Renovation Passport are shown in Table 2.

## Key recommendations for data outputs, interface and display

**Recommendations**

- **The BRP interface should be simple and user-friendly,** providing a logbook with information on the property, and a forward-looking roadmap of green home improvements. The roadmap should be an independent plan for the lifespan of the property, ensuring that home improvements are structured to deliver the optimal reduction in carbon emissions, energy bills and other environmental and social factors.
- **The BRP should contain links to retrofit supply chains and funding options** in a manner that complies with financial and competition regulations. This connects users to trusted and qualified local service providers, and boosts awareness of the public and private financial options available.
- **BRPs can provide additional information and advice to engage and educate homeowners** on regulations and policies, the benefits of decarbonisation measures, funding and grants options, and information relating to property and appliance maintenance.

# 2. Roles and responsibilities

## 2.1. Production and maintenance

Qualified retrofit professionals and building surveyors - including energy efficiency assessors, professional standards and surveyor bodies (such as the Royal Institute of Chartered Surveyors), architects, those in the construction and retrofit industry, and energy sector engineers – were identified as the most suitable candidates to produce and maintain a BRP, with companies with expertise on data and digital solutions essential for integrating and hosting and storing data and platforms.

Regulated professionals would offer the greatest confidence to homeowners and lenders, especially if performance is independently assessed - similar to BREEAM and Passive House Institute.

It was suggested that homeowners could have some responsibility for updating information and validating the accuracy of data inputs. This may be helpful when buying or selling a property, in particular if sellers are required to provide an up to date BRP to homebuyers in the future.

Letting agents could hold and maintain BRP data for private rented properties under their management. This approach also allows information on communal spaces and utility usage to be recorded in blocks of flats, where each unit would have an individual BRP.

If a local council or central government scheme is assessing the improvements required for the housing stock in a certain area, a multi-property assessment could be used to reduce the time, cost and resource required to complete the BRPs.

## 2.2. Employment and training

To ensure the accuracy of data inputs and build confidence in BRPs, the qualified professionals who are responsible for producing and updating BRPs will require an adequate level of training.

Relevant training could be integrated into the PAS 2035 standard, or a new assessor curriculum may be required. A comprehensive training programme may have cost implications when compared to the one week of training currently required in the UK. Nonetheless, ensuring high-quality will be essential to underpin the confidence and integrity of the market.

[22] https://www.breeam.com/
[23] https://passivhaustrust.org.uk/certification.php

**Alternative curriculums**

The Energy Systems Catapult has prepared a draft curriculum for Home Energy Advisors covering advice, assessment and the evaluation of projects[24]. Other curriculums include the Association for Environment Conscious Building (AECB) CarbonLite Retrofit Training Course[25], Retrofit Coordinator training[26], or Passivhaus training to issue EnerPHit certificates[27]. RICS-certified assessors and architects may not require additional training.

BRPs may be used during property sales or building warrant applications, therefore estate agents and building control staff could be trained on interrogating and applying the information available on a property.

Additional benefits to employment may be delivered by a widescale roll-out of BRPs. Aggregated BRP data could help SMEs and service providers identify trends and manage their pipeline of work. BRP data could illuminate skills and trade shortages in certain areas, and identify organisations or individuals that may benefit from enhanced training. The data could also expose regional trends and inform training interventions by local and central governments.

## 2.3. Management, monitoring and enforcement of standards

A number of measures could be used to monitor and enforce standards in relation to BRPs:

- Leverage existing certification schemes to avoid poor quality installations and practices, learning and applying lessons from historic issues with EPCs, the Green Deal and Green Homes Grant Scheme.
- Use industry standards, such as PAS 2035 and the TrustMark regime.
- Third-party validation and spot checks can help to monitor quality and standards.
- Digital certificates could validate the source of data recorded, while an electronic hosting, auditing and policing platform can mitigate risks.
- Insurance schemes may cover liabilities when organisations cease to operate, or if a homeowner is unable to maintain their BRP.

A regulator or industry body could be mandated to oversee and enforce the quality and use of data in BRPs. Trading standards departments and local authorities could be responsible for regional oversight; however, they would need to be sufficiently resourced to ensure high levels of success.

A chain of custody for each piece of data would be needed to ensure a clear route of redress if any information or procedures were incorrect. Consumer Protection Regulations guidance could be used to identify the appropriate redress and enforcement procedures.

Financial promotions associated with BRPs must be based on clear, accurate data and comply with FCA regulations. This highlights the importance of precise data collection and analysis. For unsecured lending, sections 56 and 75 of the Consumer Credit Act – which details the lender's liability if a consumer makes a claim against a supplier – will require careful consideration by the finance sector.

[24] https://es.catapult.org.uk/capabilities/modelling/
[25] https://www.aecb.net/the-aecb-carbonlite-retrofit-online-training-course/
[26] https://www.retrofitacademy.org/
[27] https://europhit.eu/certification-retrofit-plans

## 2.4. Liability

In the event of inaccurate information being entered into a BRP, the organisation or individual responsible for inputting or updating the information will be liable. A sophisticated monitoring process would help to identify errors at the earliest opportunity.

## 2.5. Funding

Workshop and survey participants suggested that the UK government could contribute towards funding the initial roll-out of BRPs, with responsibility eventually passing to property owners. The price point for homeowners may need to be adjusted based on the ability to pay and tenure. Other sectors that could be responsible for funding BRPs include insurance companies and new build developers, as shown in Figure 5.

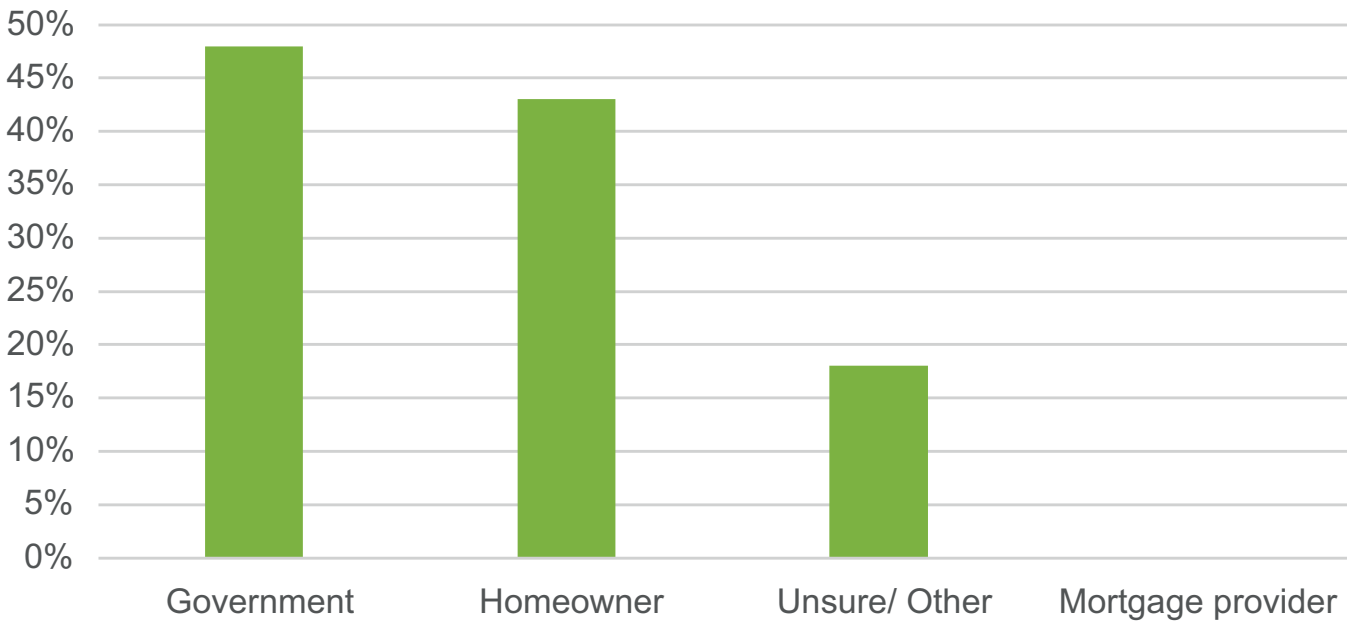


**Figure 5:** Who should be responsible for funding a BRP?

**'Unsure/Other' responses included:**

- Developer for new builds. Government to provide basic information on set up of system for existing stock. Homeowner responsibility to keep updated.
- Dependent upon conditions of property, type of ownership, degree of retrofit required, etc.

The production cost of a BRP is dominated by information-collection, quality control, administration, and maintenance of the digital platform. The price point for BRPs will need to balance the quality of data and analysis against customer expectations of a 'reasonable cost' – for instance, EPCs are viewed as affordable for many people, however quality issues are directly attributed to the relatively low-cost. Using existing datasets and collection methods could reduce the cost and time required to produce and maintain BRPs. A requirement for homeowners to provide non-public information, such as information about past renovations or energy bills, would also decrease the production costs.

An analogous tool in the automotive sector is MOTs, where consumers generally accept that expense irrespective of the value of the vehicle. Consumers may accept a comparable price for a similar document on a far more valuable asset – their property. Further consumer research is needed to understand the average price point that customers will accept for a BRP.

**International examples of Building Renovation Passports[28]**

Programmes and incentives to establish BRPs in Europe include:

- In Germany, a subsidy is available for the Individueller Sanierungsfahrplan passport, run by the Federal Office for Economic Affairs and Export Control. A grant subsidises up to 60% of an onsite audit to a maximum of €800 for single and two-family buildings, or €1100 or more for dwellings with three or more families.
- In France, an onsite assessment visit is currently free of charge. Different options are being considered for the future, including introducing a maximum fee of €400 or recovering costs via financing programmes. If a fee is introduced, there will be exceptions for low-income households. Analysis of existing schemes and initiatives shows that building owners are rarely willing to pay the full cost of a BRP. A survey by the French Shift Project indicates that building owners are on average willing to pay around €105. The survey showed that most stakeholders thought €200-€500 was a reasonable cost for a single-family house, followed by €50-€200 (22%) and €500-€1000 (19%).

## Key recommendations for roles and responsibilities

**Recommendations**

- **Production and maintenance:** Trained and skilled retrofit professionals and assessors should produce and maintain BRPs, with digital and data companies integrating this information and hosting the platform – with additional inputs from other retrofit professionals, coordinators, builders and contractors, and potentially property owners and holders of data on energy consumption.
- **Employment and training:** Training across the supply chain will be required to develop and maintain BRPs to a high standard. Opportunities exist to embed BRP maintenance into PAS standards, or to develop additional training courses for assessors.
- **Management, monitoring and enforcement of standards:** There should be an industry backed certification scheme to avoid poor practices. Third-party validation, cross checking, spot checks and industry standards can help to monitor quality. An industry body could regulate this process and oversee the redress procedure.
- **Liability:** Organisations that are responsible for supplying and/or maintaining data will be responsible for redressing errors or inaccurate information.
- **Funding:** Government could subsidise the initial development and roll-out of BRPs, in order to encourage uptake by consumers. Homeowners were identified as the long-term funders of BRPs. The 'able to pay' market could become self-sustaining over time.

[28] European Commission's Directorate General for Energy (2019) **Analysis of the relevance, feasibility and possible scope of measures at EU level.**

# 3. Sector opportunities and levers

# 3. Sector opportunities and levers

To maximise the adoption of Building Renovation Passports, it is important to consider how different sectors can use this tool, and the levers available to encourage widespread adoption. This includes residents and homeowners, but also stakeholders along the value chain, including retrofit and energy professionals, local authorities and residential social landlords, the private rented sector, financial institutions, valuers and property surveyors, and the UK government. This section considers the opportunities that BRPs present for each sector and the actions required to stimulate adoption.

## 3.1. Residents and homeowners

The key measures to increase awareness and adoption of BRPs with consumers are shown in Table 9. The application of behavioural change science, such as the COM-B process,[29] could help to identify the interventions required from different actors along the value chain. To encourage consumers to adopt BRPs, they could be positioned as a 'golden source' of information about a property to potential homebuyers.

| Category | Suggested measures |
|---|---|
| **House-buying process** | • BRPs could become mandatory at the point of sale, rent or lease of a property.<br>• Lenders could require homebuyers to provide a BRP as part of their mortgage application.<br>• Consumers could access lower interest rates or borrow more to decarbonise their property based on recommendations in the BRP.<br>• BRP data could help lenders identify risks and mitigation actions, such as providing additional finance to improve the energy efficiency of mortgaged homes. |
| **Major and minor renovations** | • Major or minor renovations, from replacing a window or boiler to extensions, are potential trigger points that could prompt further engagement and action, based on advice contained within the BRP.<br>• Installers and manufacturers could be asked to log information in the BRP or engage with property owners about additional energy efficiency measures that are recommended by the BRP. |
| **Insurance** | • BRPs could become mandatory for issuing insurance policies, including for flood resilience and fire risks.<br>• BRPs could be required when the householder makes an insurance claim for repairs (e.g. after a flood). |

[29] For example Mitchie, et al (2011) The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Science.

| Category | Suggested measures |
|---|---|
| **Ensuring high quality retrofits** | • BRPs can be used to show and certify quality assurance (i.e. PAS 2035 standard, use of MSC or TrustMark accredited businesses, etc).<br>• BRPs could become mandatory to gain planning permission for extensions or other renovation projects. |
| **Awareness raising and education** | • The government could launch a public information campaign, amplified by other relevant bodies such as local authorities and consumer interest organisations. |
| **Accessibility** | • Host BRPs on a user-friendly digital platform, with a mobile app version.<br>• Ensure that BRP information is decision-useful, specific and relevant - rather than a tick-box exercise, as seen with the discontinued Home Information Pack in the UK. |
| **Legislation** | • The government could mandate the use of BRPs for buildings, similar to the legal requirement for MOTs. |

**Table 9:** Measures to increase awareness and utilisation of BRPs

## 3.2. Energy and retrofit professionals

While some retrofit professionals may prefer to conduct their own assessment of a property rather than relying on the BRP, access to the property information contained in BRPs may reduce the time and cost of retrofits and surveys. BRPs can also help to measure and monitor the outcomes of retrofit projects, in particular with performance-based contractors.

Aggregated and anonymised data could inform retrofit and energy professionals about consumer trends and preferences, potentially supporting the development of new or tailored services. Existing service providers including Energiesprong[30], EnerPHit[31] and Sero Homes[32] already capture building performance data that could feed into a BRP and support this goal.

An integrated approach to BRPs, where customers are connected to service providers in the retrofit supply chain, would help to streamline the retrofit journey for property owners. If BRPs were positioned as a 'one stop shop'[33] for information on energy efficiency improvements, this would boost knowledge levels amongst consumers and help to stimulate higher levels of retrofitting.

[30] https://www.energiesprong.uk/
[31] https://europhit.eu/content/enerphit
[32] https://www.serohomes.com/
[33] EnergyCities (2019) **The one-stop-shop concept: How to make energy retrofits much easier for homeowners?**

**Case study: TrustMark[34]**

TrustMark is the government-endorsed quality scheme that covers work a consumer chooses to have carried out in or around their home. Information about work undertaken by TrustMark accredited businesses is held in the TrustMark Data Warehouse. Any work undertaken through the Energy Company Obligation (ECO) scheme or the Green Homes Grant voucher scheme must be undertaken by TrustMark accredited businesses.

TrustMark connects customers with accredited businesses in their local area and also supports some financial institutions with the verification of green lending for home retrofits. The TrustMark Data Warehouse may be a potential platform to store BRP data.

| Opportunities | Leverage points |
|---|---|
| **Connections to the consumer:** BRPs can link consumers to retrofit coordinators and service providers, creating commercial opportunities to help scale supply chains. | **Standards and requirements:** Integrate the BRP into existing standards, such as PAS 2035, as well as reporting requirements and processes. |
| **Baseline information that promotes a co-ordinated approach:** BRPs provide retrofit coordinators and service providers with baseline information about a property, alongside a logbook of previous renovations and improvements, which can reduce the time needed to assess a property. BRPs can also inform future works, such as signalling if previous renovations will impact on the delivery of other renovations needed to achieve net-zero. | **Connections to government grants and funding:** Work associated with ECO and other government grants could be logged in a BRP. |
| **Programme development and enhancements:** Aggregated and anonymised data could help retrofit coordinators and service providers design programmes, identify prevalent trends and improve services and skills. | **Regulation of construction related data:** Improve the quality of data inputs to a BRP through improved standards for collection of information about the construction of a property. |
| **Performance monitoring:** BRPs could support performance monitoring and allow retrofit coordinators and service providers to measure the effectiveness of renovations. | |

[34] https://www.trustmark.org.uk/

## 3.3. Private rented sector

BRPs can provide a clear trajectory for landlords to achieve mandated minimum energy efficiency standards (MEES) and act as a tool to demonstrate compliance. As new 'green rental agreements' are developed, they could explicitly refer to BRPs and the information they contain, and tenancy agreements could also refer to BRPs.

As awareness grows about the impact of home energy use on the climate, BRPs may become a tool to support greater disclosure by landlords and attract tenants. For instance, BRPs can demonstrate when a property is well maintained and performs to high environmental standards, with lower energy bills.

| Opportunities | Leverage points |
|---|---|
| **Compliance with energy efficiency standards:** BRPs could help landlords and tenants achieve and monitor compliance with MEES, providing a roadmap of retrofit measures required to meet increasingly stringent policy requirements. | **Providing incentives:** To overcome the landlord-tenant split incentive, tax breaks and other incentives (e.g. enhanced capital allowances) could encourage and reward landlords who decarbonise their properties, with information logged in BRPs. |
| **Facilitating conversations:** BRPs could help facilitate engagement and co-operation on green home retrofits. | **Tenancy agreements and leases:** Green rental agreements may require tenants and landlords to collect and monitor data from a private-rented property, in accordance with consumer protection standards and GDPR. |
| **Attract tenants:** Given the ever-growing interest to mitigate climate change, BRPs could showcase positive sustainability credentials and help to attract tenants. They can also provide information on whether a home is well-maintained and benefits for low running costs. | **Roles and responsibilities:** Letting agents could maintain BRPs as part of their remit to manage the property. |
| **Supporting new business models:** BRPs could enable green rental agreements and 'warm rent' models (i.e. include heating and utilities) by monitoring performance and identifying future energy efficiency measures needed. | |

## 3.4. Local authorities and registered social landlords

BRPs have the potential to unlock multiple benefits for local authorities and registered social landlords – from supporting funding bids, to climate reporting and citizen engagement.

Many local authorities highlighted the need for a consistent approach to collecting and storing data, and BRPs can help to create this consistency and set a benchmark for uniformity.

Consideration is required on how BRPs capture unit-level and building-level data. A unit-level BRP offers information specific to an individual property, and can foster greater engagement with individual households. A building-level BRP may be more practical for local authorities to identify the necessary improvements for multi-household buildings, such as blocks of flats or rows of terraced houses. Different types of BRPs could be created to address the single-household and multi-household building scenarios. This would require a data model that captures data at both unit and block levels, with governance mechanisms supporting access to relevant data.

| Opportunities | Leverage points |
|---|---|
| **Standardised data collection:** BRPs offer an opportunity to standardise data collection and analysis, enabling coherent insights at a local and national level. Local authorities also benefit from a better perspective on the built environment in their jurisdiction. | **Capacity and funding:** Adequate resources and funding would be required by local authorities and other public sector actors to access the full benefits of BRPs. |
| **Meeting, measuring and monitoring climate and social targets:** BRPs can help local authorities measure their progress towards climate, health and fuel poverty targets. BRPs also provide decision-useful information to improve properties to meet relevant standards. | **Clearer definitions and standards:** Improving the yardsticks used to measure progress towards government targets – such as EPCs – will help enhance the utility of BRPs. |
| **Fundraising and reporting:** The data in BRPs could support bids for regional and central government funding to decarbonise buildings, potentially streamlining the application process and reducing the data collection burden. BRPs may also help to track spending on renovations, monitor performance over time, and help to evidence value for money. | **Reporting:** New and existing reporting requirements for local authorities and registered social landlords could be integrated into BRPs to make monitoring and reporting more streamlined. |
| **Engaging with citizens:** BRPs provide an opportunity to engage and educate citizens about the climate emergency, the contribution of homes to carbon emissions, and practical actions to minimise the impact. This could generate more demand for retrofit measures among private and social households. BRPs could also raise awareness of public funding and grants available to households, as well as regulatory changes that may require action. They could also support community-led projects that aim to aggregate local demand (e.g. installing measures on several properties in the same street). | **Planning permission process:** BRPs could be required in planning applications for new builds, property extensions or renovations. BRPs could also be used to validate that new developments meet the relevant building standards, in particular Part L which sets the minimum standard for energy performance and carbon emissions.[35] |
| **Programme design and future planning:** Anonymised and aggregated data could help local authorities identify trends and redesign programmes to optimally support the retrofit market. The forward-looking renovation pathways may help local authorities and social landlords to plan and budget for necessary decarbonisation projects. | **Aggregating local demand:** Local authorities could aggregate demand for BRPs by commissioning assessments across a specific region, tapping into economies of scale to lower the price for individual households. |

[35] MHCLG (2019b) **The Future Homes Standard: 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings: Impact Assessment.**

## 3.5. Financial institutions, estate agents and valuers

In the UK market, few financial institutions are currently collecting, monitoring or reporting on the energy efficiency performance or other climate-related risks associated with the built environment. Nor are these considerations commonplace among estate agents and property valuers. However, an increased focus by institutions and regulators on monitoring and managing climate risks, combined with policy changes on the horizon, means that interest in energy efficient and resilient homes is rapidly growing.

BRPs can be a valuable tool to support financial institutions with the rising number of reporting requirements, from the Bank of England's Climate Stress Tests[36] and BEIS's proposed disclosures on the EPC performance of mortgage portfolios, to the carbon accounting methodology under development by the Partnership for Carbon Accounting Financials UK (PCAF UK).[37]

BRPs could be linked into the valuation process, working with organisations such as Landmark, EDM Group and CoreLogic to simplify data collection during a property sale. Embedding BRPs into mortgage applications could also improve data collection – this rich information may then support the development of new and improved financial products to support home retrofit projects. In addition, mortgage lenders could use the BRP renovation pathways to identify opportunities to further support their customers.

| Opportunities | Leverage points |
|---|---|
| **Consistent and granular insights:** A standardised framework for BRPs can help bring disparate data sources together and make them as interoperable as possible. BRPs offer a richer and more reliable source of data compared to EPCs. | **Integrating passports into lending processes:** BRPs could be embedded into the mortgage application process, in particular the Automated Valuation Models (AVMs), to ensure that lenders are able to collect and utilise rich data on their mortgage portfolio. |
| **Identifying risks:** Widespread adoption of BRPs could help lenders identify and manage risks at an asset and portfolio level. For example, lenders could assess their exposure to stranded assets, should the government bring in minimum energy efficiency standards (MEES) across all tenures (currently seen in the private-rented sector only) and engage with customers accordingly. | **Using passports to inform customer conversations:** Lenders could tailor their conversations with customers based on information in a BRP. Banks could also leverage their relationship with customers to encourage BRP adoption. |
| **New opportunities and customer engagement:** A BRP platform should link customers to appropriate funding options in a manner that complies with financial regulations. BRPs could be used to engage customers on opportunities to improve their property, allowing more informed conversations between banks and consumers. Aggregated data on retrofit trends could help financial institutions design new products and services that meet customer needs. | **Preparing for changing regulation and reporting:** Future policy and regulation are likely to require financial institutions to monitor and disclose the energy efficiency performance of their mortgage portfolios, with targets to ensure a minimum average energy efficiency performance. BRPs could simplify this process, while enhancing transparency and consistency across the market. |

[36] https://www.bankofengland.co.uk/climate-change
[37] https://carbonaccountingfinancials.com/

| Opportunities | Leverage points |
|---|---|
| **Certifying greenness:** BRPs could be used to verify the environmental credentials of underlying assets on bank balance sheets. For example, institutions offering green mortgages or retrofit loans could use the BRP to verify the positive environmental outcomes from the financed project, providing deeper insights than those currently offered by EPCs. | |

## Opportunities for estate agents and valuers

| Opportunities | Leverage points |
|---|---|
| **Improving property values:** When BRP outputs are expected to negatively impact the value of a property, potentially by exposing a low energy performance, the valuer and estate agent can work with customers to identify and support retrofit measures to mitigate this risk. | **Updating documents and regulation:** Amendments to the RICS Red Book could provide a stronger case for capturing energy efficiency data and linking the data to BRPs. Consumer Protection Regulations could reference BRPs to help encourage their uptake among estate and letting agencies. |
| **Linking retrofit measures to valuations:** BRPs could allow dynamic property valuations based upon relevant sustainability metrics. | **Customer incentives:** BRPs could be provided as a non-financial incentive to home sellers and purchasers. |
| **Improving customer engagement and advice:** Estate agents can use BRP outputs to advise customers about the potential impact of energy efficiency on the speed and price of a property sale. | **Plugging BRPs into the valuation process:** Valuation information can be embedded into BRPs to support more streamlined data collection. |

## 3.6. National government

National government could benefit across several areas if BRPs were adopted on a widescale. Government can also play a pivotal role in accelerating the uptake of BRPs across the UK.

| Opportunities | Leverage points |
|---|---|
| **Achieving national climate targets:** BRPs provide information and links to the retrofit supply chain, which could boost national demand for domestic retrofits, helping the UK achieve its climate targets. | **Mandating BRPs:** Once a standardised framework for BRPs is established, policymakers could explore the opportunity to introduce mandatory requirements for BRPs on all properties. Initial requirements could focus on specific market segments, such as new builds via the Future Homes Standard. |
| **Monitoring and evaluation:** National and local governments could use BRPs to monitor the impact of policies and identify measures that provide the greatest value for money. | **Improving and moving beyond EPCs:** The UK government's EPC Action Plan[38] outlines a pathway to improve data collection and methodologies underpinning EPCs and SAP scores. Incorporating BRPs into this pathway could significantly enhance the data available on UK homes. |
| **Supporting jobs and skills:** BRPs could support job creation along the retrofit and construction supply chain by increasing demand for high-quality home retrofits. | **Integrating BRPs into funding options:** As BRPs become increasingly mainstream, they could be used to support applications for public funding by local authorities, social housing providers and individual households. |
| | **Register for private rented landlords:** Currently, England does not have a central register of private rented landlords. If introduced, BRPs could offer tailored information to the sector and facilitate MEES enforcement. |
| | **Incentives:** Financial and fiscal incentives could pump prime the BRP and wider retrofit markets. For instance, an EPC-linked Stamp Duty Land Tax rate or rebate could drive demand for retrofits and BRPs. |

[38] MHCLG, BEIS (2020) **Energy Performance Certificates For Buildings: Action Plan.**

# 4. Conclusion

# 4. Conclusion

Building Renovation Passports can play an important role in delivering decision-useful information to actors along the retrofit value chain, mapping the journey to a net-zero built environment, and helping to accelerate the pace of financial innovation that is needed to fund retrofits at scale.

Providing clear, accessible and affordable information that is bespoke to individual buildings can also deliver benefits along the retrofit supply chain. BRPs can help homeowners make informed decisions, find funding and connect with suppliers and service providers, making retrofits simpler. Retrofit professionals can make energy efficiency improvements that complement existing technologies, materials and construction of a property. Lenders can more accurately assess risks to their portfolios and provide tailored products to customers, while also accessing the data needed to develop new products and services. Local authorities can build a better understanding of the local housing stock, enabling them to implement effective retrofit programmes at a local level.

The Coalition for the Energy Efficiency of Buildings has presented the key recommendations and findings that emerged from a series of workshops and surveys about how to develop a standardised framework to support the introduction of Building Renovation Passports in the UK. This technical report has offered a detailed picture of the results and recommendations from this research.

The CEEB encourages feedback on the key recommendations in the summary and technical reports. **Please send your comments and proposals to passports@gfi.green.** Following consultation, the CEEB will develop and publish an initial standardised framework for Building Renovation Passports in the UK.

# 5. Appendix 1: Acknowledgements

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# 6. Appendix 2: Acronyms Table

| | |
|---|---|
| AVMs | Automated Valuation Models |
| BAMB[40] | Buildings As Materials Banks |
| BEIS | Department for Business, Energy and Industrial Strategy |
| BRP | Building Renovation Passport |
| CEEB | Coalition for the Energy Efficiency of Buildings |
| $CO_2$ | Carbon Dioxide |
| DCC | Data and Communications Company |
| ECO | Energy Company Obligation |
| EER band | Energy Efficiency Rating |
| EIR band | Environmental Impact Rating |
| EPC | Energy Performance Certificate |
| EST | Energy Savings Trust |
| EUI | Energy Unity Intensity |
| FIT Scheme | Feed-in-Tariffs |
| GDPR | General Data Protection Regulation |
| MCS | Microgeneration Certification Scheme |
| MEES | Minimum Energy Efficiency Standards |
| MES | Metered Energy Savings |
| MHCLG | Ministry of Housing, Communities and Local Government |
| RHI | Renewable Heat Incentive |
| RICS | Royal Institute of Chartered Surveyors |
| SAP | Standard Assessment Procedure |
| SBEMs | Simplified Building Energy Model |
| UCL | University College London |
| UPRN | Unique Property Reference Number |
| USRNs | Unique Street Reference Number |

[40] https://www.bamb2020.eu/topics/materials-passports/

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