Green Finance Institute

Building Renovation Plans:

An information requirements framework

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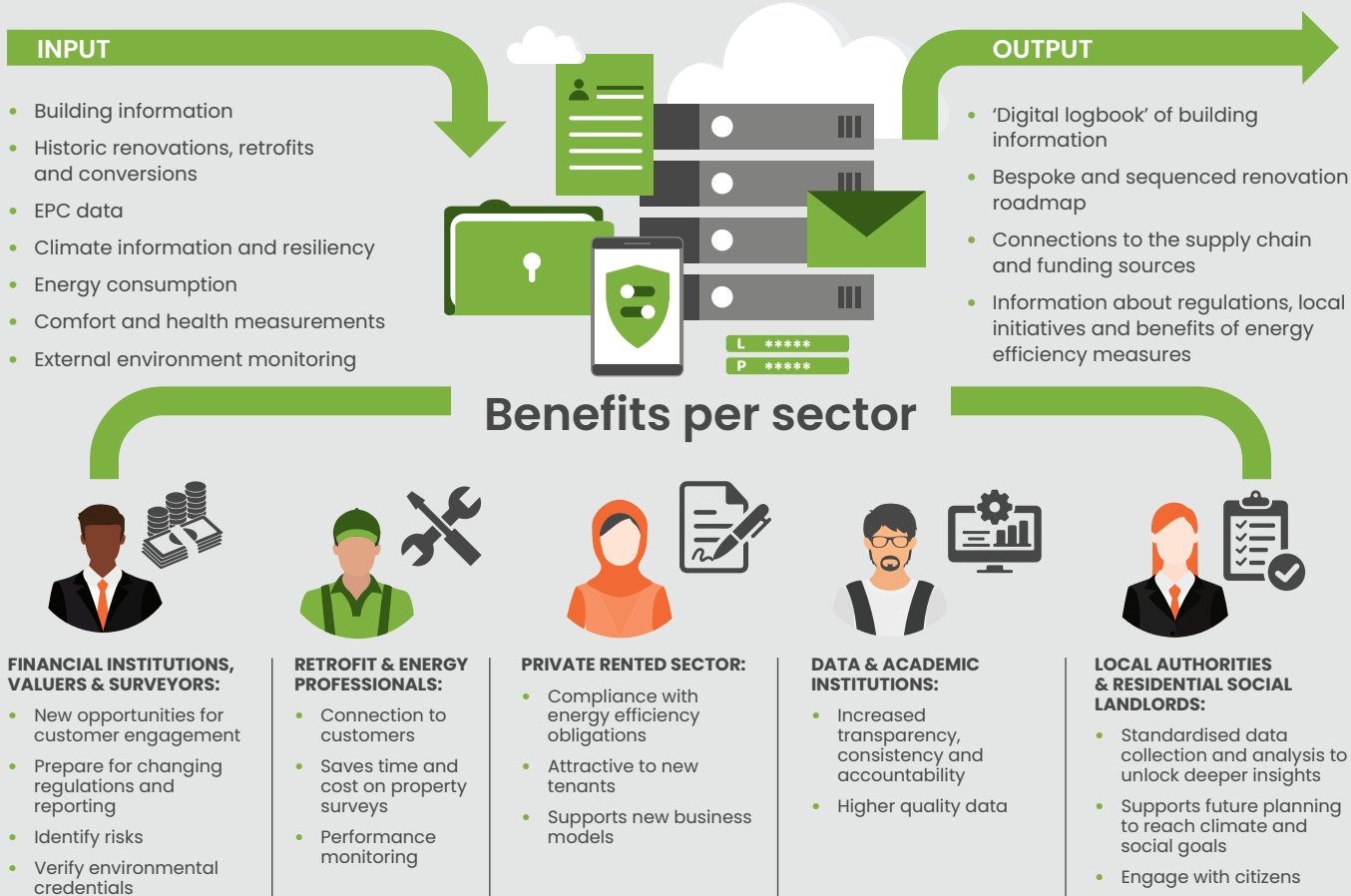An information requirements framework

Introduction

I. Introduction

This framework for UK Building Renovation Plans (BRPs), also known as Building Renovation Passports, has been developed by the Green Finance Institute's Coalition for the Energy Efficiency of Buildings (CEEB), with the support of numerous organisations and cross-sector industry experts. The framework outlines good practice considerations and recommendations for organisations developing BRP tools, as well as those that seek to support their introduction.

The framework builds upon market research undertaken by the CEEB to understand how to support widespread roll-out and engagement with BRPs, with the ambition to catalyse higher green retrofit rates by providing high-quality information and advice and by connecting property owners to supply chains and providers of finance.[1] While the focus of this framework is accelerating home decarbonisation, it is recognised that to maximise utility and engagement with BRPs, connections should be made with other areas of importance and interest for homeowners, including wider home improvements, or supporting the process of buying or selling a property. Although it is beyond the scope of this framework, research to better understand how to increase rates of utilisation will be key to unlock benefits across different sectors.

Building Renovation Plans – 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 logbook' 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

[1] https://www.greenfinanceinstitute.co.uk/green-finance-institute-puts-forward-recommendations-to-establish-uk-building-renovation-passports/

This document outlines the main features BRPs might contain to ensure their benefits can be realised, while accounting for practical considerations around the current status of data collection and data access. It seeks to support a transparent, consistent and coherent approach. The framework will be updated annually as new standards and best practices become available, as well as to reflect feedback from data users and innovations from BRP providers.

The framework is split into three main sections. The first describes the data inputs needed to make BRPs effective and reliable. The second section describes the outputs that BRPs should provide to users to ensure they are practical and provide trusted advice.

The final section covers data governance considerations that should apply to all BRP propositions, making recommendations to different stakeholders including the UK Government and industry. Finally, the framework contains an annex to provide further information regarding relevant standards and best practices for collecting, using and storing information, as well as other projects and initiatives of relevance.

I. Definitions

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There is different terminology used to describe similar products and tools that provide information about a home and measures that property owners can take to improve it. Different emerging definitions are outlined in the annex. Within this document, a Building Renovation Plan (BRP) is defined as a tool kit which contains:

1. A **status** of qualified information about the property's current and historic characteristics, performance, governance and relevant maintenance activity, with activity such as servicing and safety checks logged;

2. A **retrofit plan** of sequenced measures the property-owner can take to improve their home and significantly and measurably reduce its emissions towards net zero, in line with PAS 2035 standards or equivalent;

3. **Enabling links and connections** to supply chains, financial support, and sources of **information and trusted advice** to support the necessary changes.

A BRP therefore goes beyond an overview of the property's current characteristics and performance, and must be a practical, forward-looking tool which helps boost action and investment in the retrofit measures needed to support the UK's climate targets. To increase consumer uptake, it could also be linked to broader areas of interest for property owners and dwellers – for instance, logging activity within the property such as safety checks.

We recognise that at present, achieving all three elements of this definition may not be possible for every organisation. Tools which support certain elements can still offer a lot of value for households by improving the level of trusted, tailored information and advice currently available.

II. Inputs – Minimum Standard and Advanced

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The following data points should be integrated into a BRP where data is available or in the process of being collected. These data inputs will be used by a range of stakeholders (as identified through the CEEB's previous research)[2] including but not limited to property owners, local authorities, retrofit coordinators, financial institutions, energy companies, landlords and tenants. We note that not all data sets will be relevant to all stakeholders. For instance, while a local authority may require Unique Property Reference Numbers (UPRNs) to locate properties, this information may not be of interest for homeowners seeking to understand necessary steps to improve their homes. Balancing the interests and needs of different stakeholders has been considered when shortlisting different data inputs. In order to reduce time, efforts and costs, a rationalisation of the data collection process should be considered.

When reading the table below, 'minimum standard inputs' refer to those which are widely available for integration into BRPs, and providers should strive to include these wherever possible – recognising that there will be cases where even the most basic data sets will be challenging to collect and instances where information listed as part of the minimum standard will be assumed, unknown or unavailable. For the process to be inclusive for all homeowners, this should not prevent property-owners starting their journey towards creating a plan, but this minimum data should be acquired and integrated as soon as possible. Those data inputs classed as 'advanced' should be included within a BRP wherever possible but are not core for its minimal function. **For more information regarding data ownership, accessibility and update cycles, please see the annex.**

The table below seeks to capture all the different individual data inputs a BRP should contain, rather than prescribing a particular framework for grouping data. The following inputs have been grouped to reflect industry norms, such as TrustMark (which in turn builds on other standards), SAP and other industry conventions, but there is live discussion around how these datasets are best categorised.

INPUT	MINIMUM STANDARD	ADVANCED
Building information	• Unique Property Reference Numbers (UPRNs)[3] • Age and/ or era	• Topographic Identifier (TOID) • Planning permission (and building warrants in Scotland); certificates of lawful development and building regulation approvals • Conservation area; listed building status; identified radon area • Title number • MPRN/MPAN numbers • Area around the property (i.e. for installing equipment such as air source heat pumps)
Building type[4]	• Building typology (see annex for guidance) • Number and arrangement of floors • Floor plan • Floor area and building volume • Number of bedrooms • Number of bathrooms	• Layout of whole building for multi-unit properties (i.e. block of flats, terrace housing) • Presence of/suitability for EV charger • Roof area/usable roof area • 3D representation of building identifying massing, features, glazing areas, materials, surrounding features. • Typical extensions routes for building type (based on surrounding works) • Street parking

[2] https://www.greenfinanceinstitute.co.uk/green-finance-institute-puts-forward-recommendations-to-establish-uk-building-renovation-passports/
[3] Unique Street Reference Numbers (USRNs), Address, Latitude, longitude and azimuth all available through UPRN.
[4] N.B For flats, details of the individual property - rather than the entire building – are sufficient for the minimum standard.

INPUT	MINIMUM STANDARD	ADVANCED
Building ownership & governance We note data collection and storage must be aligned with GDPR and other relevant regulation.	• Tenure (Freehold/ leasehold/ commonhold) • Owner occupied or rented • Owner's details • Managing agent details (if applicable)	• Occupier details (if different to owner) • Obligations or restrictions on works and upkeep specified in the lease, title deeds, restrictive covenants or elsewhere • Restrictive covenants • Current and historic valuations • Copy of lease/title deeds or commonhold as appropriate
Building fabric[5]	• Construction type • Materials used • Energy Performance Certificate (EPC) rating and data contained with the Certificate, including Energy Efficiency Rating (EER) and Environmental Impact Rating (EIR) and Reduced data Standard Assessment Procedure (RdSAP) calculations • Recent (i.e. last 10 years) renovations and / or retrofits (installations, retrofits, conversions, extensions) including year, size, description etc. • Warrantees (i.e. for a heating system)	• Certification records • Defects and location (i.e. construction, structural, leaks, condensation, mould) • Materials records • Rapid testing solutions such as HTC SMeter, and PULSE air pressure tests (pre-retrofit survey) • Maintenance information (i.e. for heating installations) • Technical specifications (i.e. for heating installations) • Building features (i.e. bay windows / dormers / porches / converted lofts etc.)
Building services	• Energy supply and storage (i.e. mains electricity, fossil gas, heat network, oil, on-site generated solar thermal, etc) • Heating system • Ventilation provisions • Fire safety measures	• For multi-unit properties (i.e., block of flats), information on communal features and services • EV charging station (including communal access) • Maintenance records and information (i.e. commissioning and/ or servicing reports) • Access to private energy source (e.g. district heat) • Air conditioning system (if applicable) • Energy network constraints (i.e. capacity constraints, 3-phase supply limitations etc) • Local Energy network flexibility value streams (DNOs & Energy Management Aggregators) • Any existing and planned local energy schemes (district heat, Energy Service Companies, community energy schemes)

[5] Where known or available.

INPUT	MINIMUM STANDARD	ADVANCED
Energy consumption and household behaviour Some details of occupancy patterns are relevant for an effective retrofit strategy as they will give an indication of actual consumption. It should be borne in mind that the current occupants may have quite different behaviours to a future household. We note this information will not be available for new builds. We note that GDPR and other relevant regulations must be considered.		• Total annual electricity use kWh • Total annual fossil gas use kWh • Total annual kWh/m^2, per fuel • Total annual CO_2/m^2 • Total annual GBP on energy / m^2 • Tariff(s) • Smart meter data • Any other smart devices and credentials • Number / area of heated rooms • Metered energy savings • Real-time data on performance • Heat demand • Thermal imagery/3D scanning (relative material vs thermal performance, visual/visible texture mapping)
Information relating to climate resiliency	• Flooding risk • Coastal erosion • Subsidence risk	• Overheating risks (i.e. CIBSE TM59 assessments) • Measures taken to mitigate risks • Green space • Tree canopy cover
Circular economy considerations and enhanced climate information		• Environmental Product Declarations (EPD) for retrofit materials and systems • Construction details • Sustainable material use • Toxicity considerations • Capacity for deconstruction • Component change/reuse • Embodied carbon (likely derived from other inputs and sources) • Energy carbon intensity
Indoor monitoring systems to measure comfort		• Indoor air quality (humidity; particulate matter (i.e., PM10, PM2.5)) • CO_2 monitoring • Indoor room temperature • Daylight • Air change rates

III. Outputs and interface

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Below are five key outputs that should be included in a BRP interface, with recommendations to boost utility and engagement among households, supply chains, financial institutions and local authorities. We note that across these, interoperability will be key to ensure that multiple data sets can be aggregated and shared as appropriate, and that BRPs are portable across the market. Those five key inputs include:

1. Practical building status;
2. Retrofit plan;
3. Connections to qualified supply chains and other service providers,
4. Connections to funding sources and
5. Education and information regarding relevant central and local government regulations and initiatives.

Design to spur action from homeowners

While beyond the scope of this framework, it is important to consider how BRPs should be presented to different users – including terminology, format and customer experience – to ensure they are easy to understand, as well accessible and actionable. This requires understanding how homeowners think about their homes and are motivated to act. An emphasis on simple communications focused on high-impact outcomes should guide the approach of BRP providers in designing the interface. This includes considering which data inputs are 'back of house' for use by retrofit coordinators, local authorities etc., and which will be frequently accessed by householders.

1. Practical building status

The building status gives a summary of current and historic information about the home, showing its performance and characteristics in a 'logbook', based upon minimum standard data inputs overviewed in Section II (i.e. building status, building energy information and enhanced environmental and social factors). Providers may also look to integrate data inputs considered 'advanced', as well as any additional information about the building and its performance which might be included for commercial value (i.e. information of interest about the local area). This should be presented in a simple and user-friendly interface, covering key information about the property.

It is important that the information is interchangeable between providers. Building statuses or logbooks should be exportable into any retrofit assessment software as a standard data schema or in an extensible formation, such as XML or JSON.

More details on the data governance principles that should guide the minimum standards of interoperability, data access, ownership and confidence are set out in **section IV: Data governance, collection and accessibility.**

2. Retrofit Plan

A retrofit plan is an independent, tailored plan of improvements to get a property on track for net zero. It will outline the appropriate sequencing of steps, ensuring improvements have the greatest chance of delivering material impacts like lower bills, reduced emissions and higher amenity. The plan should identify interdependencies between works. Retrofit plans should ideally be exportable as open, structured and machine-readable data in an extensible format. A homeowner should be able to download their retrofit plan into their own choice of user software.

At a minimum, retrofit plans should conform to PAS 2035 standards or equivalent, which includes a property and risk assessment; evaluation of improvement options, informing the design and development of a medium-term retrofit plan; guidance on installation and commissioning; and handover, followed by monitoring and evaluation. Usually this will mean on-site assessment from a retrofit assessor, however there may be scope for elements of the process to be automated, and in certain cases coordination, assessment and installation roles may overlap. The new BS 40104: Assessment of dwellings for retrofit standard will aim to provide standardisation of the method of retrofit assessment described in PAS 2035.[6] This assessment is completed as part of the process that records evidence to the stakeholders in the process. The standard will provide requirements for the level of expertise needed for the role.

To develop standard data models and to conform with reporting requirements, retrofit plans should be built on certain standardised features and use a common database of measures. For example, TrustMark's Data Warehouse includes a lodgement data dictionary listing different retrofit measure categories and types, which can provide the basis for a minimum common database.[7] We note that any shared dictionary should be freely available to market participants, with a mechanism to ensure it can evolve based on market feedback. TrustMark is developing a PAS 2035 structured data definition for retrofit assessment and improvement option evaluation, which could provide a common foundation. Starting from shared standards, definitions and common data models, measures and features will ensure consistency.

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[6] https://standardsdevelopment.bsigroup.com/projects/9021-05901#/section
[7] https://www.trustmark.org.uk/ourservices/data-warehouse/1

An indicative table of standard features of a retrofit plan, produced through a combination of the data inputs listed above and on-site assessment, is outlined below.

FEATURE	STATUS	RECOMMENDED ACTIVITY	IMPACT ON BUILDING PERFORMANCE (i.e. on EPC, resilience, CO_2/m^2)
Summary report	Status report		
External fabric	Status report		
Airtightness	Status report		
Ventilation	Status report		
Heating and cooling	Status report		
Energy use *Recognising this is dependent on occupancy, and values need to be contextualised*	Status report, including bills and kWh use per week		
Renewables	Status report		
Fire safety	Status report		
Climate resiliency measures	Status report		

Under a PAS 2035 structure, a summary of these standard features would be considered in the retrofit assessment, and the improvement option evaluation and medium-term retrofit plan would set out the recommended activities, as well as the impact these would have on the building's performance.

Retrofit plans for properties that are part of a multi-unit building could also identify measures needed at a building level. In this case, the voluntary standard produced by CEN (the European Committee for Standardisation) *CWA 17382:2020 – Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities* – provides a source of common standards and measures.[8]

A BRP could also contain information about the estimated range of costs associated with making improvements, as well as the savings that might be accrued by different measures set out in the retrofit plan.

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[8] https://standardsdevelopment.bsigroup.com/projects/9021-05901#/section

3. Connections to qualified retrofit contractors and other service providers

BRPs should provide connections to allow homeowners to easily access trusted local and national businesses and stakeholders along the retrofit value chain who are qualified to carry out the works identified as necessary through the retrofit plan. The retrofit plan itself should be held in a format which allows specialist providers, with the correct permissions, to access information and upload data directly into it.

Businesses that are recommended in the BRP should be accredited by relevant standards (i.e. TrustMark, MCS) where appropriate – for example, TrustMark have indicated they would be able to provide an API to allow providers to signpost appropriate installers.

This information could be provided through links to the website of qualified, trusted businesses or by listing contact information such as company telephone numbers. Provision of these resources must be compliant with consumer protection laws (for example, Consumer Credit Act 1974) and General Data Protection Regulation (GDPR).[9]

4. Connections to funding sources

BRPs should enable homeowners to identify and understand available sources of public, private and blended funding to help to pay for the recommended retrofit and installation measures. This could include provision of information about government grants and subsidies, as well as private finance products on the market (e.g. green mortgages and other lending products).[10] Provision of these resources must be compliant with competition law, financial regulations, consumer protection laws and GDPR. We note that BRP providers should consider all relevant regulations.

The green mortgage market is developing quickly, with new products being launched regularly. As it matures, pricing and incentives will become more competitive, and so it is important this information is regularly updated.

Advice could be provided to property owners and dwellers about speaking to mortgage brokers and other financial professionals regarding green home retrofit offers.

5. Education and information regarding relevant central and local government regulations and initiatives

BRPs can educate and build awareness among homeowners by providing information about the benefits of green home retrofits and offering connections to supportive programmes and initiatives available, both nationally and locally. They can also provide information about regulations that may apply to property owners, such as changes to Minimum Energy Efficiency Standards (MEES) and planning permissions, and where appropriate, recommend actions to help achieve regulatory compliance.

BRPs can help raise awareness of local developments which might impact the household's decision-making in relation to retrofit measures, such as planned district heating or heat networks to which the property could connect. They could also provide information on local community energy projects.

BRPs can provide an education and awareness-raising opportunity to advise the public on measures they can take for low or no cost, such as using lower temperature set points, heating only the space they occupy, switching to green energy providers or providing a comparison of their energy use to benchmarks.

They could also contain information of particular interest for certain tenures, such as local authority selective licensing schemes that impact the private rented sector.

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[9] Providers should consider all relevant regulations.

[10] Providers might consider using the Green Home Finance Principles to identify products which can be verified as supporting green retrofit activities: https://www.greenfinanceinstitute.co.uk/ghfp/

VI. Data governance, collection, and accessibility

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This section contains recommendations for BRP providers, Government, industry and other stakeholders in order to promote good practices in data governance, collection and accessibility to underpin the market for BRPs, working to ensure coherence and consistency.

Companies developing BRP propositions can commit to the following principles and recommendations regarding data governance, collection and accessibility:

BRPs should be designed to ensure accessibility and utility for different users and stakeholders. For instance, the design of BRPs should consider alignment with Web Content Accessibility Guidelines (known as WCAG 2.1), internationally recognised recommendations for improving web accessibility. This is to ensure that the BRP can be accessible to everyone, including users with impairments to their vision, hearing, mobility and understanding.[11]

BRPs should be digital-first, simplifying access to data for property owners, registered social landlords and local authorities. Currently, a lot of data is likely to be in document form (i.e., a scan of a floor plan, title deed, etc) rather than being available in a structured data format. There should also be 'offline' options and formats for property owners and dwellers without access to the internet.

Consistent classification, field naming conventions, data collection and storage will enable a unified approach to the BRP market.

- Moving towards the digitalisation of data, BRPs need to be able to link different data sources and systems together. To do this, a common language for interoperability is needed, with a common set of taxonomies, definitions and data types. The data model should be generic enough to match the variety of different standards BRPs need to interact with. A common data structure will help investors and financial institutions who need to compare and aggregate thousands of homes into a single portfolio.
- BRPs should use a data structure which can be exported into a common data object that is interchangeable, with common terminology and data types used when communicating with homeowners.
- BRPs should build on existing, widely available standardised naming conventions - recognising that these best practices will evolve with time. Initiatives include:
  - ▶ The Industry Foundation Classes (IFC) data model is among the most well-established. The Active Building Centre (ABC) research programme, led by Swansea University and others, has developed standardised naming conventions for the Welsh government that ensure data is transferable through the IFC format, while also overcoming difficulties with time-series data sometimes encountered in the IFC format.
  - ▶ The Royal Institute of Chartered Surveyors (RICS) data standard provides a single schema for land, property and real estate data, and supports standards covering property measurement, valuation, due diligence, building surveying, and other areas relevant to BRPs. It includes objects in the schema to capture the provenance and assurance of data, as well as the rules around ownership and sharing.
  - ▶ Uniclass is a widely adopted classification system and is a required part of the UK BIM (Building Information Modelling) framework through the ISO 19650 series part 2 UK annex.

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[11] https://www.gov.uk/service-manual/helping-people-to-use-your-service/understanding-wcag#wcag-design-principles

Access and assurance

- **Validate and certify data inputs,** with transparency for every source. Any data ontology or standard needs to be able to trace data back to its origin.
  - ▸ Where data used in BRPs is unverified, it should be flagged as such.
  - ▸ A BRP needs to be based on a data model that not only captures metadata (data about the data) around the source, provenance, lineage etc, of each set of information but also allows the categorisation, 'ownership' and sharing permissions of each set of information to be defined, and thus governed. In addition to a governance structure, the underlying technology needs to support appropriate access controls, audit trails etc. to provide trust in the overall data handling.
- Ensure robust **data privacy conditions,** developing a Privacy Notice similar to the TrustMark data warehouse, clearly setting out rights over data. BRPs could adopt a privacy by design approach (e.g., aligning with the emerging ISO 31700). This should be consumer centred with the data owner (e.g. occupier and/or owner) having consent and transparency over what data is shared and the ability to have access and control over their data. Relevant standards include PAS 186: Smart cities code of practice for data products and services. This covers principles including: consent, purpose, proportionality, personal access and control, transparency, public safety and accountability.
- **Consider access rights to make data sets shareable with commercial and non-commercial third parties.** This should include permissions to support statistical analysis by central government and local authorities, analysis by other third parties, and sharing details with retrofit professionals working or planning work on properties. This requires gaining consent from the owner of the data (where data is privately held). Critical to this will be separating personal data from building data.
  - ▸ In all instances, this must ensure that the consumer is protected from mis-selling, or other bad practices relating to the use of data.
  - ▸ With the right governance mechanisms in place – including robust storage, privacy and sharing standards and anonymisation and aggregation – some elements of BRP data could be made accessible to commercial third-parties to stimulate the development of new products and services in the retrofit sector, and support local authorities to develop training programmes to support the scaling of local supply chains.
- **Validate the identity of parties requesting access to data.** Residents or homeowners should be the party with the ability to grant or revoke access, but in principle greater access to data should be allowed to parties with a confirmed relationship with the property (e.g. managing agent, freeholder, local authority, mortgage company).
- **For multi-unit buildings, provide appropriate data to individual households regarding the maintenance and retrofit of the whole building.** For example, in blocks of flats, a BRP might provide information and guidance regarding external wall insulations, connections to heat networks etc., which are of relevance to individual households within that building. This should ensure coherence with building owner obligations in the Building Safety Bills.[12]
- Working with the industry, BRP providers should take steps where possible to **avoid personal data being stored in static sources** such as PDFs, and should ensure that such data is only shared with appropriate parties with consent, and ensure compliance with GDPR. This may be difficult when planning applications and other important documents commonly contain personal data, therefore providers may consider including privacy notices and advice, with handover documents signed by the homeowner o provide necessary consent for sharing personal data with other stakeholders, and providing the opportunity to opt out.
- **Consumers should be able to move their data between BRP providers,** and not be 'locked in' to one system.

[12] This in future will require alignment with BS 8644-1. Digital management of fire safety information (see annex).
https://www.gov.uk/government/news/explained-the-draft-building-safety-bill&sa=D&source=editors&ust=1624012658414000&usg=AOvVaw21uFnGamLCGv14eNuhlW7K

The following recommendations apply to companies and organisations to enhance data availability and quality:

Businesses along the construction and retrofit supply chain and energy companies should work with industry and government to share and validate data (e.g. smart meter data) with providers of BRPs in a manner consistent with privacy regulations.

The Government and local authorities can play an important role in maximising the effectiveness and utility of BRPs by providing clarity, direction and resources to ensure uniformity in approaches. The market could evolve in different ways depending on early policy decisions. This might include a centrally regulated approach, a market-led approach, or a federated approach that allows for market diversification within an agreed framework of principles and standards. Each approach has pros and cons, including costs, assured quality for customers, and wider benefits for industry and society. The recommendations below align most closely with a federated approach – in recognition that the current market is evolving organically with minimum Government intervention – and outlines industry consensus about certain policy interventions that can ensure the integrity and consistency of market growth.

Recommendations to Government and local authorities include:

- **Clarify the division between personal and property data.** Clarification is required on which data inputs should be classed as 'building data' (belonging to and staying with the property as a 'digital asset') and personal data (belonging to and staying with the property dweller). Personal data must be removed from a BRP when a property changes ownership, whereas building data can be retained. Where the line between personal and property data is unclear, only the Government, and/or the Information Commissioner's Office, can ultimately adjudicate. There is a strong case for allowing selected authorised organisations to access property data, as it will be for the public good, and therefore might be considered in accordance with GDPR requirements.
- **Recognise and mandate a consistent framework for BRPs,** building upon this voluntary framework to ensure all BRPs established in the UK meet a minimum requirement. This will protect households by ensuring that everyone receives high-quality and trusted information, thereby supporting the integrity of the market. A coordinated approach between Government departments and affiliated bodies and agencies will be essential in this process, including the Department for Business, Energy and Industrial Strategy (BEIS), Department for Levelling Up, Housing and Communities (DLUHC), the Valuation Office Agency, the Geospatial Commission, Trading Standards, the Land Registry and Ordnance Survey.
- **Unify currently divergent approaches to data collection and storage.** Any future marketplace of BRPs should be based on unified data standard and data governance frameworks, enabling households to move between providers. A single accepted system will be key for maintaining the standards, integrity and interoperability of BRPs and similar tools.
- **Government should take steps to improve access to enabling data that is currently not available under an open license.** This can include providing baseline data from a national stock model. Many of the core datasets identified already exist in various silos held by central or local governments. The Energy Institute at University College London has a stock model (3DStock) that would enable the provision of a baseline BRP; this approach has been proven at scale (e.g. the London building stock model). Such an approach leverages the existing investment made by homeowners and government in EPCs, avoids repetition and duplication of inputs for BRPs, and focuses effort on high value data and the retrofit plan. A baseline BRP from a national stock model could help seed the industry and encourage the voluntary uptake of them by lowering the effort to complete them, and providing the data local authorities need to develop local area energy plans.

- **Recognise and mandate a robust governance process for data collection and storage,** to make sure that all BRPs being introduced in the UK comply with consumer protection laws, financial regulations and other relevant legislation. For the Private Rented Sector, the Government should determine, in consultation with relevant stakeholders, which data can be accessed by the tenant and the landlord respectively.
- **Consider how BRPs fit into current Government programmes to enhance property data,** including BEIS and DLUHC's EPC Action Plan and logbook process.
- **Ensure local authorities can gain access to data at an aggregated level,** helping to identify focus areas and characteristics, which in turn supports the development of policy and programme interventions, as well as supporting supply chains.
- **Establish a central register of logbooks, passports and related tools** so that a UPRN can be checked and the property-owner signposted to the appropriate organisation(s). This should be coordinated alongside existing efforts, including that of the Residential Logbook Association.

There are steps that Government and local authorities can take to support the widespread adoption of BRPs. These are considered below:

- **Require the use of BRPs for all properties.** Regulation on the use of BRPs will significantly support the pace and scale of their adoption. These could be gradually introduced, for instance requiring property owners to commission, or give proof of an existing BRP, in order to access government funding and subsidies. Requirements for BRPs could also be introduced at the point of sale of a property, or integrated into the planning permission process. If BRPs are integrated into the conveyancing process, they can help to improve and digitise existing data collection processes, and should avoid duplicating data collection. For low income and vulnerable households, support should be given to ensure they can afford and access BRPs.
- **Local authorities can help to normalise BRPs through area-based rollout programmes,** providing financial and non-financial support to encourage adoption across different tenures. Local authorities can also collaborate with BRP providers on the provision of data for planning applications, and notification of work conducted through Competent Persons Schemes and self-certification.
- **Consider how BRPs might supersede other data collection processes** to provide a single source of building information, by working with the surveying community, conveyancers etc.

Annex

I. Definitions

Terms often used to describe products and services that are similar to, or interchangeable with, a Building Renovation Plan include:

- Building Renovation Passport
- Retrofit Plan
- Retrofit Passport
- Retrofit Roadmap
- Retrofit Pathway
- Renovation Plan
- Renovation Model
- Renovation Road Map
- Whole Home/House Retrofit
- Whole Home Survey
- Whole Home Plan
- Medium Term Retrofit Plan (MRTP)
- Medium Term Improvement Plan (MRIP)
- Building Passport
- Optimised Retrofit Tool
- Digital property management solutions
- Digital Twin
- Retrotwin
- Property Logbook
- Digital Property Logbook
- Building Logbook
- Digital Building Logbook
- Net zero Pathway Plan / Tool

II. Data Inputs - ownership, accessibility and update status

The following table overviews the key attributes of different data inputs considered necessary or desirable in a Building Renovation Plan. This includes information regarding the owner of the data and its accessibility, as well as information on its update cycle. For the latter category:

- **Static data** refers to a fixed data set which remains the same after its been collected.
- **Dynamic data** refers to data that continually changes after it has been recorded in order to maintain its integrity. We note that for some properties, information may come from different sources.

For instance, in blocks of flats, some of the property information would come from the freeholder/property management company and some from the leaseholder.

Building Typologies

Building typology refers to the study and documentation of a set of buildings which have similarities in their type of function or form, classifying different building types and characteristics. For consistency, BRP providers can align with Standard Assessment Procedure (SAP) appendixes.[13]

DATA INPUT	OWNER	ACCESSIBILITY	UPDATE CYCLE
Type of Data	*Organisation, govt dept, property owner, land registry, property data*	*Open source, restricted access to specific user groups, subscription/ license, assessor/owner input*	*Static vs dynamic, live connection via API*
Building status			
Unique Property Reference Numbers (UPRN)	GeoPlace, on behalf of Local Government Association/ Ordnance Survey (OS)	Open Government Licence	Static
Unique Street Reference Numbers (USRN)	GeoPlace, on behalf of Local Government Association/ Ordnance Survey (OS)	Open Government Licence	Static
Topographic Identifier (TOID)	OS	Open Government Licence	Static
Address	Postcode Address File, via the Post Office	Royal Mail Postcode Address File, commercial license	Static

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[13] https://www.gov.uk/guidance/standard-assessment-procedure

DATA INPUT	OWNER	ACCESSIBILITY	UPDATE CYCLE
Latitude/Longitude	OS	Open source	Static
Title Number	HM Land Registry	Fee for access	Static
Planning permissions, including lawful development certificates	Local Planning Authority	Open source	Static (but needs periodic updating)
Conservation area	Local Planning Authority	Open Source	Static
Listed status	National Heritage List for England, Historic Environment Scotland, Cof Cymru - National Historic Assets of Wales, Planning Offices in Northern Ireland, some Local Planning Authorities	Open Source	Static
Building typology (using definitions in SAP appendix S)	Property owner	Contained in EPC	Static
Number and arrangement of floors	Property owner	Private	Static
Floor plan	Property owner	Private	Static
Floor area	Property owner	Private (but EPC data may make some aspects of age, area and other building characteristics freely available)	Static
Age	Property owner; some older properties listed on Land Registry	Mainly private	Static (but needs periodic updating)
Rooms	Property owner	Private	Static
On-street parking	Property owner (and local council, where appropriate)	Mainly private	Static
Roof area	Property owner	rivate	Static
Tenure	Property owner, HM Land Registry	Available at fee	Static (but needs periodic updating)
Owner/client personal details	Property owner / inhabitant	Private	Static (but needs periodic updating)

DATA INPUT	OWNER	ACCESSIBILITY	UPDATE CYCLE
Obligations for work and upkeep	Property owner / inhabitant	Private	Static (but needs periodic updating)
Restrictive covenants	Property owner, HM Land Registry	Open	Static
Current and historic valuations	Property owner, HM Land Registry	Open	Static (but needs periodic updating)
Construction type	Property owner	Contained in EPC	Static
Materials	Property owner	Private	Static
EPC rating	Property owner, Government, Energy Saving Trust (in Scotland)	Accessible through the Energy Performance of Buildings Register, or the Scottish Energy Performance Certificate Register in Scotland	Static (but needs periodic updating)
Recent renovations or retrofits	Recent renovations or retrofits	Private	Private Static (but needs periodic updating)
Certification records	Property owner/ inhabitants	Private	Static (but needs periodic updating)
Materials records	Property owner	Private	Static
RdSAP calculations	Property owner, Government, Energy Saving Trust (in Scotland)	Open	Static (but needs periodic updating)
Energy Efficiency Rating (EER)	Property owner, Government, Energy Saving Trust (in Scotland)	Open	Static (but needs periodic updating)
Environmental Impact Rating (EIR)	Property owner, Government, Energy Saving Trust (in Scotland)	Open	Static (but needs periodic updating)
Warrantees Maintenance information	Property owner/ inhabitants	Private	Static
Technical specifications	Property owner	Private	Static
Flooding risk	Environment Agency; FloodRe, some insurance companies, SEPA in Scotland	Some public	Static (but needs periodic updating)
Subsidence risk	Environment Agency; FloodRe, some insurance companies	Some public	Static (but needs periodic updating)

DATA INPUT	OWNER	ACCESSIBILITY	UPDATE CYCLE
Building energy information			
Heating, renewable energy and air conditioning system information	Property owner	Contained in EPC	Static
Ventilation provisions	Property owner	Private	Static
Fire safety measures	Property owner	Private	Static
EV charging station	Property owner	Private	Static
DNO	DNO	Private	Static
Energy network constraints	DNO/ energy companies/ networks	Private	Static (but needs periodic updating)
Local energy network flexibility value streams	DNO/ energy companies/ networks	Private	Static (but needs periodic updating)
Existing local energy schemes	Energy scheme providers	Public	Static (but needs periodic updating)
Total annual electricity use KwH	Property inhabitants, energy provider	Private (estimate in EPC)	Dynamic
Total annual fossil gas use kWh	Property inhabitant, energy provider	Private (estimate in EPC)	Dynamic
kWh per m² per fuel	Property inhabitant, energy provider	Private	Dynamic
CO_2 per m² per year	Property inhabitant	Private	Dynamic
Spending (GBP) on energy per m² per year	Property inhabitant, energy provider	Private	Dynamic
Number of heated rooms	Property inhabitant	Private	Static (but needs periodic updating)
Smart meter data	Property inhabitant, DCC, energy provider	Private (data available through DCC)	Dynamic
Metered energy savings	Property inhabitant	Private	Dynamic
Performance data (real-time)	Property inhabitant	Private	Dynamic

DATA INPUT	OWNER	ACCESSIBILITY	UPDATE CYCLE
Heat demand	Property inhabitant	Private	Dynamic
Thermal imagery data	Thermal mapping service providers (e.g. IRT Surveys)	Private	Live
Vulnerability to heat waves and flooding	Environment Agency may have some data	Open	Static (but needs periodic updating)
Measures taken to mitigate heat wave and flooding risk	Property owner	Private	Static
EPD for retrofit materials and systems	Property owner	Private	Static
Construction details	Property owner	Private	Static
Sustainable material use (i.e. presence of certificates inc FSC certified timber, Cradle 2 Cradle, recycled content validation, BES 6001)	Property owner	Private	Static
Toxicity considerations	Property owner	Private	Static
Capacity for deconstructions	Property owner	Private	Static
Component change/reuse	Property owner	Private	Static
Embodied carbon (can be sourced from EPD data)	Property owner	Private	Static
Operational carbon levels	Property inhabitant	Private	Static (needs periodic updating)
Energy carbon intensity	Property inhabitant	Private	Static
Indoor air quality	Property owner	Private	Static
Indoor room temperature	Property owner	Private	Static
Daylight	Property owner	Private	Static (but needs periodic updating)
Air change rates	Property owner	Private	Static
CO_2 monitoring	Property owner	Private	Dynamic

III.	**Best practices and industry standards for defining and collecting data**

This section contains a non-exhaustive directory of standards and initiatives to inform how organisations can promote best practices when considering data inputs for BRPs, through embedding and building upon existing conventions. This directory is relevant as of October 2021.

Building status

TrustMark

TrustMark is the Government Endorsed Quality Scheme covering work a consumer chooses to have carried out in or around their home. TrustMark was established in 2005 in conjunction with Government, industry bodies and consumer protection groups. In response to the industry-led, Government-commissioned Each Home Counts review, the TrustMark remit has expanded to include all Repair, Maintenance and Improvement (RMI), Energy Efficiency and Retrofit measures. TrustMark delivers consumer confidence through its network of Scheme Providers and their Registered Businesses. TrustMark Scheme Providers commit to meeting the Framework Operating Requirements, and ensuring their Registered Businesses maintain required standards of technical competence, customer service and trading practices. Energy efficiency measures funded through certain government initiatives – for example, the 2020-21 Green Homes Grant – have to be installed by TrustMark registered installers and lodged into the TrustMark Data Warehouse.

Minimum Energy Efficiency Standard (MEES)

The Domestic Minimum Energy Efficiency Standard (MEES) regulations set a minimum energy efficiency level for domestic private rented properties. The regulations apply to all domestic private rented properties that are let on specific types of tenancy agreement and legally required to have an Energy Performance Certificate (EPC).

Building Energy Consumption

Energy Performance Certificate (EPC)[14]

An EPC is required for properties when constructed, sold or let. The EPC provides details on the energy performance of the property and what can be done to improve it, containing:

- information about a property's energy use and typical energy costs;
- recommendations about how to reduce energy use and save money.

An EPC gives a property an energy efficiency rating from A (most efficient) to G (least efficient), alongside a numerical score out of 100, and is valid for 10 years. The SAP is the methodology used to generate an EPC, produced by an accredited assessor registered with a certification body.

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[14] https://find-energy-certificate.digital.communities.gov.uk/find-a-certificate/search-by-postcode?lang=en&property_type=domestic
https://www.gov.uk/guidance/standard-assessment-procedure

Smart meters

The rollout is being led by energy suppliers, who are responsible for installing smart metering equipment, consisting of a smart electricity meter, a smart gas meter, a communications hub and an in-home display at no upfront cost. Gas and electricity suppliers were required by their licence to take all reasonable steps to roll out smart meters to all of their domestic and small business customers by the end of 2020. Meters can collect data half-hourly, daily and annually, with the more frequent data collection providing a clearer idea of how the property is performing. Smart meters give consumers near real time information on energy use - expressed in pounds and pence - for them to be able to better manage their energy use, save money and reduce emissions. Smart meters will also bring an end to estimated billing, meaning consumers will only be billed for the energy they actually use, helping them budget better. Providers also enable their customers to share data with additional parties and to download their data.

Real time performance

Metered energy savings calculations can be as close to capturing real time performance as the underlying data allows. Energy savings in UK buildings can be 'measured' by creating an industry-standard protocol to calculate a counterfactual baseline – the estimated amount of energy that would have been used in a specific building had an energy efficiency retrofit not taken place. Actual energy use after the retrofit is then compared against this baseline in order to quantify – or 'meter' – the amount of energy use avoided. The Coalition for the Energy Efficiency of Buildings is collaborating with industry leaders to develop an open-source protocol for capturing metered energy savings.[15]

Enhanced environmental and social factors

AECB Lifetime Carbon Standard

The aim of the AECB Lifetime Carbon Standard is to encourage the use of simple operational and embodied carbon calculations as part of the design process in UK construction projects. In order to satisfy the criteria, two options exist for what should be assessed and reported. The first is operational carbon (related to heat and power) during the design phase; the other is embodied carbon (lifetime carbon, for no less than two alternative whole building construction options). PHribbon is the required software to certify to the AECB Lifetime Carbon Standard compliance and has been developed to allow operational and embodied carbon calculations to be carried out easily.

15 https://www.greenfinanceinstitute.co.uk/wp-content/uploads/2021/02/Towards-a-protocol-for-metered-energy-savings-in-UK-buildings.pdf

Temperature and Humidity

 Data points such as temperature and humidity can be easily collected using data loggers, available from various companies and used in property management by several local authorities across the UK. These tend to be a small appliance which collect both temperature and humidity data of the property and can be connected to via Wi-Fi, GSM or LAN cable. The importance of this data is that it can ascertain the comfort of the property while the Smart Meter data ascertains the amount of energy required to reach that level of comfort. A humidity sensor (or hygrometer) senses, measures and reports both the moisture and air temperature of its surroundings. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. If humidity in a property is too high or too low, not only can it make living conditions unpleasant, but it can also do lasting damage to the property. Humidity of a property provides an indication of how well ventilated the property is, and in combination with temperature and energy data can indicate of a property is being cooled by opening windows or if there is a failure of the energy efficiency measures installed in a property. By measuring humidity, and understanding any potential problems being caused by the creation of excess moisture and condensation, the property owner can prevent damage being caused to their physical property, fixtures and fittings, as well as the tenant's health. Measuring temperature can be particularly important in the built environment when considering the thermal comfort of occupants.

London Energy Transformation Initiative (LETI) Embodied Carbon Primer

LETI have published a supplementary guidance to the Climate Emergency Design Guide, that is aimed at supporting project teams to design buildings that deliver ambitious embodied carbon reductions.

RICS Whole Life Carbon Assessment for the Built Environment

The 1st edition of RICS' guidance on Life Carbon Assessment sets out specific mandatory principles supporting guidance for the interpretation and implementation of EN 15978 methodology (that assesses the environmental performance at the building-level). The objectives of the professional statement includes providing a consistent whole life carbon assessment implementation plan and reporting structure for built projects, and promoting the reliability of whole life carbon assessments by acting as a solid reference for the industry.

Code of Practice and guidance for property flood resilience

Codes of Practice (CoP) are under development on planning for property flood resilience, including CIRIA and BRE's Code of Practice and guidance for property flood resilience – RP1055. The standalone CoP for property flood resilience was launched in February 2020. The associated CoP guidance C790 for property flood resilience and complementary guides for households and businesses as well as local authority planners was published in January 2021[16].

Also of relevance is new standard BS 851188, which replaces the previous publicly-available specification for flood protection products and systems, PAS 1188.

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[16] https://www.ciria.org/ItemDetail?iProductCode=C790F&Category=FREEPUBS]

IV.	Best practices and industry standards to underpin data inputs, outputs and governance

This section contains a non-exhaustive directory of standards and initiatives to inform how organisations can promote best practices when considering data inputs for BRPs, embedding and building upon existing conventions. This directory is relevant as of October 2021.

AECB Retrofit Standard

The AECB Retrofit Standard combines a whole house 'fabric first approach' with ambitious energy efficiency measures. Individual self builders and larger-scale developers can positively contribute to a low-carbon future by adopting the AECB Retrofit Standard when improving their buildings. Compliance with the AECB Retrofit Standard requires the building to be modelled using a Passive House Planning Package (PHPP) verification sheet. The certification process can be done through an architect/engineer/other experienced consultant or contractor suitably experienced. Evidence needs to be uploaded to the AECB Low Energy Building Database.

BREEAM

BREEAM is a sustainability assessment method for master-planning projects, infrastructure and buildings. It provides third-party certification of an asset's environmental, social and economic sustainability performance, using standards developed by the Building Research Establishment (BRE). Within BREEAM there is a standard that can be used to assess the refurbishment and fit-out of most types and uses of existing buildings, including homes. In the UK, there are separate standalone technical standards for nondomestic and domestic projects. BREEAM Domestic Refurbishment is a performance-based assessment method and certification scheme for domestic buildings undergoing refurbishment. The primary aim of this scheme is to improve the environmental performance of existing dwellings in a robust and cost-effective manner.

BREEAM In-Use enables existing buildings, including homes, to benchmark, improve and certify their sustainability performance.

Passivhaus and EnerPHit Standards

Passivhaus is an international low-energy design standard. Passivhaus buildings achieve a 75% reduction in space heating requirements, compared to standard practice for UK new-build. Passivhaus certification is also possible for very low-energy retrofit projects. EnerPHit relaxes some criteria of the Passivhaus standard, where the existing architecture and conservation issues mean that meeting the Passivhaus standard is not feasible.

Publicly Available Specifications (PAS)

PAS are fast-track standards, specifications, codes of practice or guidelines developed by sponsoring organisations to meet an immediate market need. Sponsored by the UK Government, PAS 2035 (PAS 2035:2019: Retrofitting Dwellings for Improved Energy Efficiency – Specification and Guidance) is an overarching document in the retrofit standards framework, covering how to assess dwellings for retrofit, identify improvement options, design and specify energy efficiency measures and monitor retrofit projects. This is the specification for Retrofit Coordinators to follow when selecting materials, components and methods of installation. PAS 2030, which was redeveloped in conjunction with PAS 2035, continues to cover the installation, commissioning and handover of retrofit projects.

SuperHomes Rating Scheme

The Rating Scheme is a retrofit assessment methodology, funded by MSC Charitable Foundation and ran by the National Energy Foundation, that provides a comparable benchmark of exemplar retrofit performance The Rating Scheme includes an assessment of energy use, carbon emissions and health and comfort and is only awarded after the verification of outcomes through 12 months monitoring and evaluation. It is designed to encourage whole-house retrofit, is applicable to all housing tenures, and is able to recognise all types of retrofits that are carried out as a single operation or one that is carried out incrementally over time. The Rating Scheme has been designed to align with the provisions of PAS 2035 and PAS 2030 TrustMark.

BS 8644-1 Digital Management of fire safety information – Part 1

Code of practice for digital management of fire safety information. It covers the design, construction, handover, asset management and emergency response and makes recommendations for the management, presentation and exchange of fire safety information using digital information management processes.

Organisations Receiving Outputs

The recipients and outputs described below will vary depending on the nature of the BRP required and implemented (whether Whole Home Retrofit or self-administered Retrofit Plan) and based on the tenure of building (eg freehold, leasehold, rented, social/rental).

ORGANISATION	OUTPUT	FORMAT
Certification Body	• List and status of projects requiring certification • List of certificates issued • Issuing Company	• API (if digital)
Central Government	• Status of passport (eg Y/N) • EPC Rating of property and other relevant environmental data	• API from BRP • Summary report from providers (PDF)
Local authority	• Status of passport (eg Y/N) • List and status of projects requiring Building Control certification (as part of BRP) • EPC Rating of property and other relevant environmental data • Allowing access to data at an aggregated level would be useful for local/regional/national government, helping to identify focus area/characteristics/help to develop appropriate interventions, including to support the supply chain.	• API from BRP • Summary report from providers (PDF)
Estate or letting agencies	• Status of passport (e.g. Y/N) • Data on property as relevant for buying/ selling/ letting	• API from BRP • Summary report from providers (PDF)
Finance Provider	• Details of Project subject to finance (provider etc) • Status of project (eg underway) • Status of spend against the project	• API • End of project report (PDF)

ORGANISATION	OUTPUT	FORMAT
Finance Provider	• Details of Project subject to finance (provider etc) • Status of project (eg underway) • Status of spend against the project	• API • End of project report (PDF)
Retrofit Assessor/ Coordinator	• Progress against goals laid out in the BRP • Details of contractors used against each project step.	• API • End of project report (PDF)
Property Owner	• Full plan (PDF) or digital version in digital logbook/passport	• Log-in access/control of online logbook/ plan • Initial overview PDF • Incremental reports per sub-project
Property Occupier	• Summary plan and issues raised (as they pertain to an occupier).	• Log-in access/viewer access to online version • Initial overview PDF • Incremental reports per sub-project
Research organisations	• Aggregated/ anonymised data, as requested.	• API from BRP • Summary report from providers (PDF)

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