

# DELIVERING BUILDING PERFORMANCE TASK GROUP

## APPENDIX A (1)

A summary of the organisations, working groups and research relating to building performance is mapped across the key segments of the building sector. Some organisations such as CIBSE, RICS and BIFM are well known and focus on specific stakeholders in the building supply chain providing professionals with guidance and qualifications. Many other organisations provide helpful guidance through establishing research projects, partnerships or benchmarking. **This list is non-exhaustive and represents those organisations or initiatives mostly frequently cited during interviews and in the literature review.**

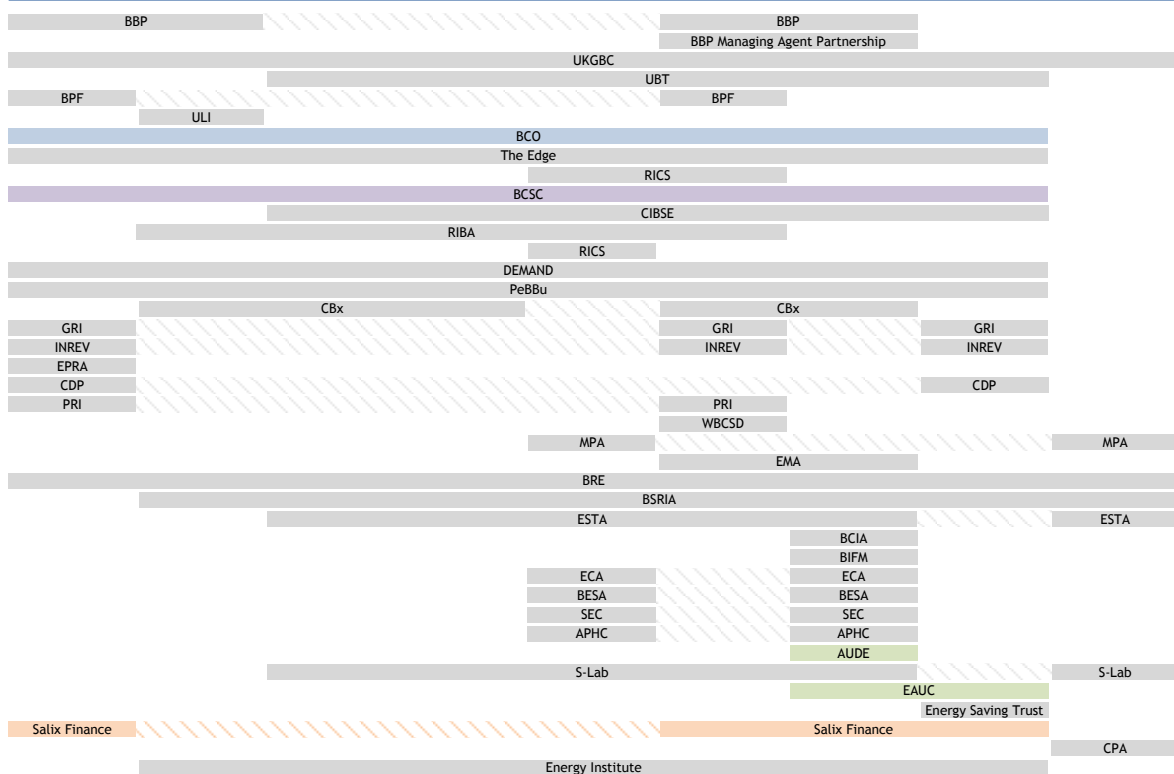
Many of the included tools and ratings are included on UK-GBC's online resource portal:



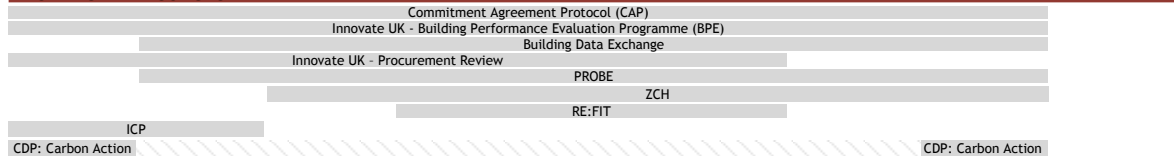
- Retail
- Office
- Healthcare
- Public
- Education
- Regulation



### ORGANISATIONS / WORKING GROUPS



### RESEARCH / PROJECTS



## ORGANISATIONS:

### **Association of Plumbing & Heating Contractors Ltd. (APHC)**

A membership organisation for plumbing and heating businesses providing professional support working closely with government, local authorities, training bodies and consumer organisations to ensure that best practice in the industry is promoted and that quality plumbing and heating contractors are fairly represented.

[http://www.aphc.co.uk/about\\_us.asp](http://www.aphc.co.uk/about_us.asp)

### **Association of University Directors of Estate (AUDE)**

AUDE promotes excellence in the strategic planning, management, operation and development of Higher Education estates and facilities. AUDE offers membership to publicly funded UK bodies whose primary remit is higher education teaching and/or research.

<http://www.aude.ac.uk/about/>

### **Better Buildings Partnership (BBP)**

A collaboration of the UK's leading commercial property owners working to improve sustainability performance of existing buildings, enabling market transformation through sustainability leadership, promoting innovation and knowledge sharing across the property industry through their members.

<http://www.betterbuildingspartnership.co.uk>

### **BBP's Managing Agents Partnership**

A collaboration of the UK's leading property managers committed to improve sustainable management of the commercial property sector. Provides a platform for managing agents to share practical information, knowledge and discuss how to best deliver clients' sustainability requirements.

<http://www.betterbuildingspartnership.co.uk/our-priorities/managing-agents-partnership>

### **British Council for Offices (BCO)**

Body that provides research, develops and communicates best practice in all aspects of the office sector. It provides a forum for discussion and debate.

<http://www.bco.org.uk/>

### **British Council of Shopping Centres (BCSC)**

Industry body, which, through its Low Carbon Working Group, responds to government consultations on energy efficiency and low carbon policies and regulations.

<https://www.bcsc.org.uk/>

### **British Institute of Facilities Management (BIFM)**

The professional body for facilities management (FM). Supporting and representing over 16,000 members around the world, both individual FM professionals and organisations, and thousands more through qualifications and training. They promote and embed professional standards in facilities management. Committed to advancing the facilities management profession we provide a suite of

membership, qualifications, training and networking services designed to support facilities management practitioners in performing to the best of their ability.

[www.bifm.org.uk/](http://www.bifm.org.uk/)

### **British Property Federation (BPF)**

The British Property Federation is the membership organisation for the UK real estate industry. They represent all those involved in real estate ownership and investment and work with Government and regulatory bodies to help the real estate industry grow and thrive, to the benefit of their members and the economy as a whole.

<http://www.bpf.org.uk/>

### **Building Controls Industry Association (BCIA)**

The BCIA represents the controls and building energy management systems industry, it lobbies and liaises with government, enables member companies to discuss shared interests and provides unique market trends and sales data. It aims to promote better understanding, application and use of building controls and promotes higher standards among membership through training and development of their diploma in building management systems for apprentices.

<http://bcia.co.uk/about-us/>

### **Building Engineering Services Association (BESA), previously known as HVCA**

The Building Engineering Services Association is a trade organisation for building engineering services contractors - representing the interests of firms active in the design, installation, commissioning, maintenance, control and management of engineering systems and services in buildings.

<https://www.thebesa.com/about/>

### **Building Research Establishment (BRE)**

Expert, impartial research, knowledge and advice for the built environment sector and beyond. BRE helps government, industry and business to meet the challenges of our built environment. The BRE also owns and operates the BREEAM and EcoHomes environmental rating schemes, and promotes the German Passivhaus ultra-low energy building standard in the UK.

<https://www.bre.co.uk/>

### **Building Services Research and Information Association (BSRIA)**

BSRIA is a UK-based testing, instrumentation, research and consultancy organisation, providing specialist services in construction and building services engineering. It is a not-for-profit, member-based association, with over 650 member companies; related services are delivered by a trading company, BSRIA Limited. Any profits made are invested in its research programme, producing best practice guidance.

<https://www.bsria.co.uk/>

### **Carbon Action Initiative**

Carbon Action is an investor-led initiative to accelerate company action on carbon reduction and energy efficiency activities which deliver a satisfactory return on investment.

<https://www.cdp.net/en-US/Programmes/Pages/Initiatives-CDP-Carbon-Action.aspx>

### **Carbon Disclosure Project (CDP)**

A voluntary reporting initiative which works with shareholders and corporations around the globe to disclose greenhouse gas emissions, energy use and the risks and opportunities relating to climate change. CDP works with 3000 of the largest corporations in the world to help them ensure that an effective carbon emissions / reductions strategy is made integral to their business.

<https://www.globalreporting.org/network/report-or-explain/campaign-forum-members/Pages/Carbon-Disclosure-Project.aspx>

### **CBx**

CBx facilitate cross-sector knowledge and data sharing events, collaborative research, bespoke advisory and training led by property professionals, to increase the capacity of those involved in energy efficiency and property management across the UK. CBx is for organisations and individuals involved in the design, engineering and development stage through to operational management of properties.

<http://www.cbxchange.org>

### **Chartered Institution of Building Services Engineers (CIBSE)**

A professional body that support the science, art and practice of building services engineering by providing members and the public with information and education services.

<http://www.cibse.org/>

### **Construction Products Association (CPA)**

The Association acts as a single voice to promote and campaign for construction product manufacturers and suppliers in the UK. The construction products industry is at the heart of the UK economy, providing essential materials for the built environment including our homes, schools, hospitals, factories, offices, roads, railways and other infrastructure.

<http://www.constructionproducts.org.uk/about-us/>

### **Dynamics of Energy, Mobility and Demand (DEMAND)**

The DEMAND centre is one of six funded by the Research councils UK to address end user demand reduction. It is a consortia of many universities, led by Lancaster University. The Centre started work in May 2013 and will continue until 2018.

<http://www.demand.ac.uk/>

### **The Edge**

A campaigning built-environment think tank. Their Edge Debate is a process of thinking about how the built environment could be better it involves the 'why', 'what', and 'where' questions. They publish reports, blogs and books in addition to debating.

<http://www.edgedebate.com/>

### **Electrical Contractors Association (ECA)**

The UK's leading trade association representing the interests of contractors who design, install, inspect, test and maintain electrical and electronic equipment and services.

<http://www.eca.co.uk/about-the-eca/>

### **Energy Institute**

The Energy Institute (EI) is the professional body for the energy industry, developing and sharing knowledge, skills and good practice towards a safe, secure and sustainable energy system. The EI provides learning and networking opportunities to support professional development, as well as professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

<https://www.energyinst.org/home>

### **Energy Managers Association (EMA)**

The EMA aims to improve the standing of the Energy Management profession and those working within it, establish best-practice in Energy Management and put Energy Management at the heart of British business. EMA presents itself as a knowledge base to government in issues around Energy Management. It is no secret that legislation cannot be changed overnight and the EMA works closely with DECC, DEFRA and BIS so that future policy works for practitioners rather than just on paper.

<http://www.theema.org.uk/>

### **Energy Saving Trust**

A householder focused energy efficiency organisation that deals directly with home occupiers, runs programmes for governments and provides consultancy to UK businesses and international companies, underpinned by their research.

<http://www.energysavingtrust.org.uk/about-us>

### **Energy Services and Technology Association (ESTA)**

ESTA members have the commitment and expertise to deliver high quality energy efficient systems and practices. By joining ESTA a company has signalled its genuine intention to assist building designers and managers to improve working environments and reduce operational costs. ESTA members are expected to uphold the highest professional standards and have the experience and expertise to deliver the best results.

### **Environmental Association for Universities and Colleges (EAUC)**

The EAUC is a strong alliance of universities and colleges, sector bodies and commercial organisations, working together both in the UK and internationally. The EAUC will lead, inspire and support Members and stakeholders with a shared vision, knowledge and the tools they need to embed sustainability and facilitate whole institution change through the involvement of everyone in the institution

[http://www.eauc.org.uk/what\\_we\\_do](http://www.eauc.org.uk/what_we_do)

### **European Association for Investors in Non-Listed Real Estate Vehicles (INREV) - Sustainability Guidelines**

The INREV Sustainability Reporting Guidelines have been revised to form a disclosure framework that delivers meaningful data to increase visibility and insight into a vehicle's Environmental, Social & Governance (ESG) efforts and also details their next course of action for improvements. They aim to provide a coherent framework for ESG reporting in line with annual financial reporting and present a clear picture from the vehicle's strategy through to environmental key performance indicators.

<https://www.inrev.org/>

### **European Public Real Estate Association (EPRA)**

Produces best practice guidance on reporting and accounting for European listed property companies and REITs. It has produced the EPRA Best Practices Recommendations on Sustainability Reporting which builds upon relevant mandatory reporting requirements and voluntary initiatives, in particular the GRI CRESS.

<http://www.epra.com/>

### **Global Reporting Initiative (GRI)**

GRI is a non-profit organization working in the public interest towards a vision of a sustainable global economy where organizations manage their economic, environmental, social and governance performance and impacts responsibly. GRI's activities are two-fold: firstly the provision of sustainability reporting guidelines and secondly, the development of engagement activities, products and partnerships to enhance the value of sustainability reporting for organizations.

<https://www.globalreporting.org/Pages/default.aspx>

### **Global Real Estate Sustainability Benchmark (GRESB)**

GRESB is an industry-driven organization committed to assessing the environmental and social governance performance of real estate assets globally, including real estate portfolios and infrastructure assets. More than 190 members, of which about 60 are pension funds and their fiduciaries, use the GRESB data in their investment management and engagement process, with a clear goal to optimize the risk/return profile of their investments.

<https://www.gresb.com/>

### **Investor Confidence Project (ICP)**

The Investor Confidence Project (ICP), a project of the Environmental Defense Fund, defines a clear road-map from retrofit opportunity to reliable Investor Ready Energy Efficiency™. With a suite of Commercial and Multifamily Energy Performance Protocols in place, ICP reduces transaction costs by assembling existing standards and practices into a consistent and transparent process that promotes efficient markets by increasing confidence in energy efficiency as a demand-side resource.

<http://www.eepformance.org/>

### **Performance Based Building Network (PeBBu)**

PeBBu is a thematic network funded under the European Commission's (EU) 5th framework' Competitive and Sustainable Growth. The programme commenced in October 2001 and runs until September 2005. The PeBBu Network facilitates in enhancing the existing performance based building research and activities by networking with the main European stakeholders and other international stakeholders. It produces synergistic results for dissemination and adaptation of performance based building and construction. Currently, more than 60 organisations worldwide are participating in the PeBBu Network.

<http://www.reading.ac.uk/PeBBu/>

## **Principles for Responsible Investment (PRI)**

The United Nations-supported Principles for Responsible Investment (PRI) Initiative is an international network of investors working together to put the six Principles for Responsible Investment into practice. Its goal is to understand the implications of sustainability for investors and support signatories to incorporate these issues into their investment decision making and ownership practices. The Principles are voluntary and aspirational. They offer a menu of possible actions for incorporating ESG issues into investment practices across asset classes.

<http://www.unpri.org/about-pri/about-pri/>

## **S-Lab**

S-Lab is a not for profit initiative that is primarily funded by the Higher Education Funding Council for England (HEFCE), with income from exhibitors and sponsors. Covers all aspects of laboratory design, management, operation and use. Its mission now is to support improvements in the efficiency and effectiveness of laboratories, and especially in universities and research institutes. S-Lab works closely with, and in some ways replicates, the US based International Institute for Sustainable Laboratories (I2SL) which is taking forward the DOE/EPA funded Labs 21 initiative.

<http://www.effectivelab.org.uk/about-s-lab.html>

## **Specialist Engineering Contractors' Group (SEC)**

SEC Group is a grouping of 6 Trade Associations comprising over 60,000 firms and a workforce of more than 300,000. It accounts for the largest single component (by value) of construction output. SEC Group is constantly in touch with developments in construction which may affect the workforce and makes new developments known through its website, through articles in the construction press and press releases.

<http://www.secgroup.org.uk/>

## **UK Green Building Council (UK-GBC)**

A charity and membership organisation, which campaigns for a sustainable built environment. UK-GBC has a diverse membership of more than 400 organisations spanning the entire built environment. The majority are from the private sector, but it also has public and third sector members. Affiliated to the World Green Building Council, a network of Green Building Councils in over 75 countries worldwide.

[www.ukgbc.org](http://www.ukgbc.org)

## **Urban Land Institute (ULI) - UK Sustainability Council**

A multidisciplinary real estate forum, ULI facilitates an open exchange of ideas, information, and experience among industry leaders and policy makers dedicated to creating better places. More than 37,000 individual members worldwide, representing the entire spectrum of land use and real estate development disciplines working in private enterprise and public service.

<http://uk.uli.org/>

## **The Usable Buildings Trust (UBT)**

An educational charity dedicated to improve building performance in use, delivering a free resource for anyone who wants to make buildings more suitable for the people who use them, less damaging to the natural environment and a better long-term investment. Promotes studies of building performance in use, publicises and disseminates findings in the wider public interest.

<http://www.usablebuildings.co.uk/>

### **World Business Council for Sustainable Development (WBCSD)**

The World Business Council for Sustainable Development (WBCSD) is a CEO-led organization of forward-thinking companies that galvanizes the global business community to create a sustainable future for business, society and the environment. Through its members, the Council applies its respected thought leadership and effective advocacy to generate constructive solutions and take shared action to drive business action on sustainability in the coming decade and beyond.

<http://www.wbcSD.org/home.aspx>

### **Zero Carbon Hub (ZCH)**

The Zero Carbon Hub closed for business on 31st March 2016. The information on its website remains accessible. Formerly a non-profit organisation that supported the mainstream delivery of low and zero carbon homes in England. The ZCH reviewed evidence for the significance of the performance gap in domestic buildings. It engaged with more than 160 industry experts seeking to understand the performance gap and provide solutions.

<http://www.zerocarbonhub.org/>

## **RESEARCH / PROJECTS**

### **Building Data Exchange**

An open access platform by Digital Catapult that contains data from Innovate UK's Building Performance Evaluation Programme, which analysed how well real buildings performed. Containing over 100 projects over a period of four years collated into reports.

<https://buildingdataexchange.org.uk/>

### **Building Performance Evaluation Programme (BPE) - Innovate UK**

Addresses the performance gap challenge in new buildings. The programme committed up to £8m to fund the costs of building performance evaluation studies on domestic and non-domestic buildings.

<https://connect.innovateuk.org/web/building-performance-evaluation>

### **Commitment Agreement Protocol (CAP project)**

Commitment Agreements are part of a strategy to enable in-use energy performance to be targeted, achieved and verified, to complement existing regulations and to help push skills and innovation within the construction and property sectors well beyond the regulatory minimum. A Commitment Agreement in Australia is a formal contract lodged with the NABERS Administrator, by which a developer commits to achieving a specific post-construction in-use energy rating (for which 18 months of operational data is required). In return, the developer may advertise the rating in advance of its measurement in use. In Australia, this provides commercial benefit because many upper-tier tenants seek good NABERS ratings. Second tier landlords are now also starting to see higher NABERS ratings as a desirable differentiator for their buildings. Good ratings also attract green bond investors, who seek robust, measureable outcomes for the duration of their investment, not performance gaps. This project is reviewing the feasibility of the adoption of CAP for the UK market and is about to enter an 18 month pilot phase. The project has cross-industry support including the following:



- Executive Board (funders): BBP, British Land, EDSL, Laing O'Rourke, L&G, Stanhope, TH Real Estate, NG Bailey, Impax, DECC (observers)
- Other supporters: BCO, BPF, DECC, UK-GBC, CIBSE
- BBP support: BBP staff, Main membership, Managing Agents Partnership
- UK core team: Verco, Arup, BSRIA, UBT
- Australian support: Energy Action (expertise), OEH (government officials)

<http://www.betterbuildingspartnership.co.uk/our-priorities/measuring-reporting/design-performance>

### **Post Occupancy Review of Building Engineering (PROBE)**

Series of studies that describe practical evaluation studies on a number of buildings. PROBE was a research project which ran from 1995-2002 under the Partners in Innovation scheme (jointly funded by the UK Government and The Builder Group, publishers of Building Services Journal - now the CIBSE Journal). It was carried out by Energy for Sustainable Development, William Bordass Associates, Building Use Studies and Target Energy Services.

<http://www.usablebuildings.co.uk/> ← PROBE

### **RE:FIT**

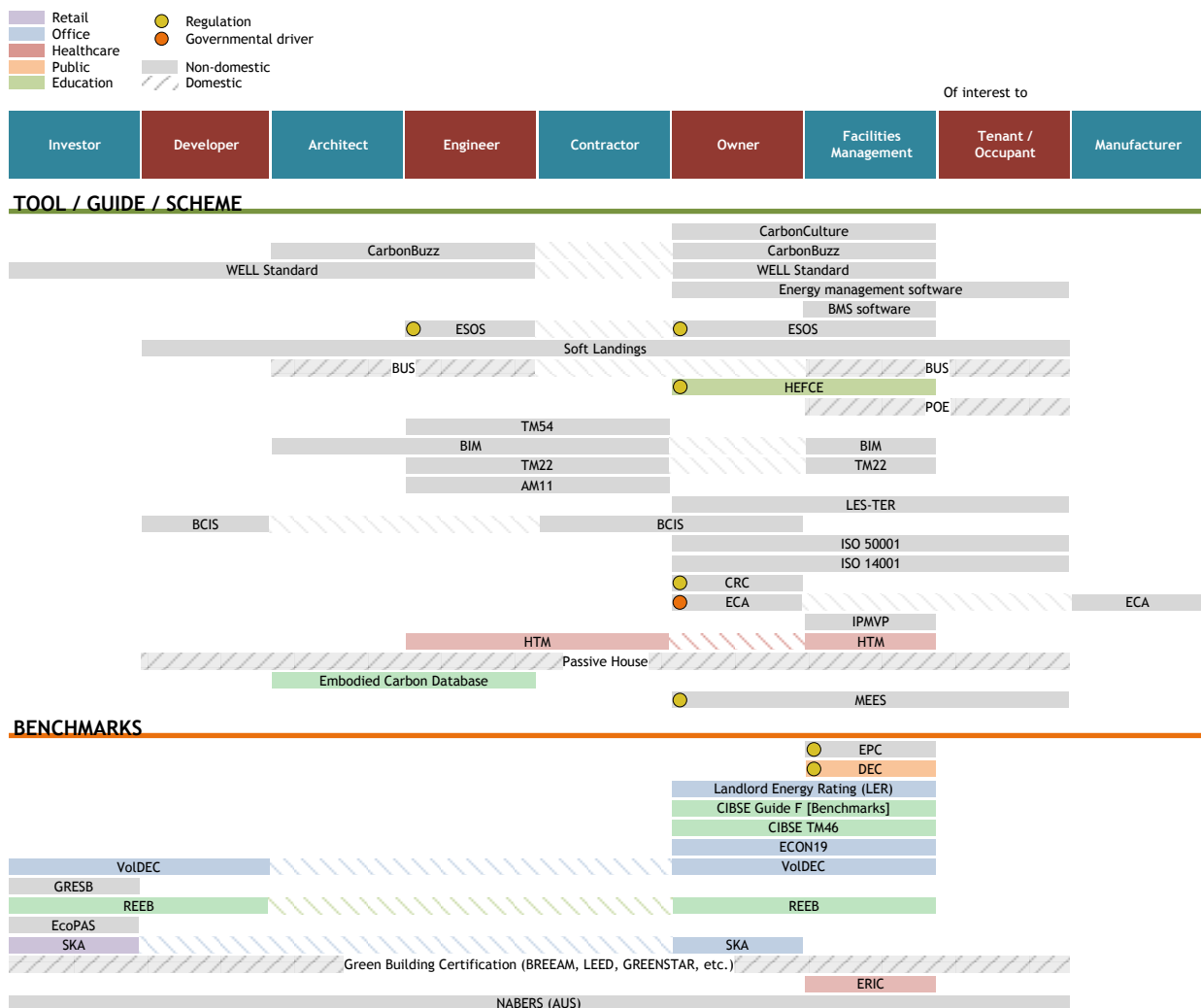
Re:fit is a procurement initiative for public bodies wishing to implement energy-efficiency and local energy-generation measures to their buildings or their estate and support services. These measures improve the energy performance of existing buildings. As a result, carbon emissions are reduced and substantial guaranteed annual cost savings are achieved.

<https://www.london.gov.uk/what-we-do/environment/energy/energy-buildings/refit>

# APPENDIX B (2)

A compilation of tools and resources identified that can assist in delivering performance of a building. Some tools such as Soft Landings, BIM and certification systems focus on performance throughout the building life cycle, whereas CIBSE guide TM54 focusses on improving design predictions, DECs provide the operational energy use of a building and ISO 50001 gives guidance on energy management for organisations. **As with Appendix A(1), this list is non-exhaustive and presents tools and resources mostly frequently cited during interviews and in the literature review.**

To further explore relevant tools, visit UK-GBC’s online resource portal Pinpoint: [www.ukgbc.org/pinpoint](http://www.ukgbc.org/pinpoint)



## TOOLS/GUIDES/SCHEMES

### **Building Cost Information Service (BCIS)**

The Building Cost Information Service, known as BCIS, is a leading provider of cost and price information for the UK construction industry. It is a part of the Royal Institution of Chartered Surveyors. BCIS carries out statistical analysis to be used as a basis for early project cost advice and Elemental Cost Planning.

<http://www.rics.org/uk/knowledge/bcis/>

### **Building Information Modelling (BIM)**

A process involving the generation and management of digital representations of physical and functional characteristics of spaces. It extends beyond two-dimensional drawings and covers more than just geometry. It enables virtual information to be transferred between different stakeholders in a building project, reducing information losses and providing more extensive information.

[https://en.wikipedia.org/wiki/Building\\_information\\_modeling](https://en.wikipedia.org/wiki/Building_information_modeling)

### **Building Use Survey (BUS)**

A survey that helps to capture good and less favourable building performance. The survey contains up to 45 questions and seeks views on aspects such as: thermal comfort, ventilation, lighting, noise, personal control, space, design and image. The BUS methodology is licensed only to trained and experienced partners. Results are compared to a benchmark from the BUS methodology database.

<http://www.busmethodology.org/>

### **CarbonCulture**

A community platform design to help people use resources more efficiently. They measure and report organisation's carbon and energy performance in real time, with the option to do this publicly. Currently they are developing tools to create savings.

<http://www.carbonculture.net/>

### **CarbonBuzz**

An online platform where practices can add the annual energy record for projects, these can be drawn from any project stage from design inception to operation. CarbonBuzz allows analysis of data entered for their buildings and publicly available data on other buildings for benchmarking. Data can be submitted anonymously.

<http://www.carbonbuzz.org/>

### **CIBSE Applications Manual 11: Building Performance Modelling**

This new AM11, Building performance modelling (BPM), has taken into consideration many of the real issues of simulating buildings and their systems whilst still focusing on compliance with building regulations and quality assurance issues. BPM covers the general concepts of energy and environmental modelling and in particular focuses on: quality assurance procedures, compliance with UK and some international building energy efficiency codes, thermal environment and energy, ventilation, lighting and plant modelling.

<http://www.cibse.org/knowledge/cibse-am/am11-building-performance-modelling-new-2015>

## **Carbon Reduction Commitment (CRC)**

The CRC Energy Efficiency Scheme (or CRC Scheme) is designed to incentivise energy efficiency and cut emissions in large energy users in the public and private sectors across the UK, together responsible for around 10% of the UK's greenhouse gas emissions. Participants include supermarkets, water companies, banks, local authorities and all central government departments.

<https://www.gov.uk/guidance/crc-energy-efficiency-scheme-qualification-and-registration>

## **CIBSE TM22**

This document provides a systematic framework for undertaking an energy survey, and reporting and benchmarking its results for an occupied building based on metered energy use. It provides an understanding of the building energy efficiency. Designers can use the tool with the client at briefing stage of a project to discuss a building's likely load profile, and use that information to set realistic (but also stretching) performance targets.

<http://www.cibse.org/knowledge/cibse-tm/tm22-energy-assessment-reporting-methodology>

## **CIBSE TM54**

CIBSE documentation that provides a methodology that engineers can use to undertake better-informed calculation of energy use in operation enabling them to respond to a project brief where an operational energy target has been set. It demonstrates that energy performance is dependent on how the building is run and maintained, as well as how it is designed and constructed.

<http://www.cibse.org/knowledge/cibse-tm/tm54-evaluating-operational-energy-performance-of>

## **Energy Savings Opportunity Scheme (ESOS)**

ESOS is a mandatory energy assessment scheme for organisations that meet the qualification criteria where the Environment Agency is the scheme administrator. Audits of the energy use by their buildings, industrial processes and transport must be carried out every 4 years to identify cost-effective energy saving measures.

<https://www.gov.uk/guidance/energy-savings-opportunity-scheme-esos>

## **Green Building Certification (BREEAM, LEED, GREENSTAR, etc.)**

Green building certificate programs assist participants to ascribe meaning to attributes of a building aimed at mitigating the impact of buildings on the natural environment through sustainable design. The certification is intended to outline and confirm that a building meets particular standards. Most programs certify buildings based on life-cycle parameters, including energy, waste and water. In addition they also require integrated design processes to make an environmentally responsible and resource-efficient building throughout its life cycle.

<http://www.breeam.com/>

## **GHG Reporting Regulations**

A requirement from the Climate Change Act 2008 for all UK quoted companies to report on their greenhouse gas emissions as part of their annual Directors' Report.

<https://www.gov.uk/guidance/measuring-and-reporting-environmental-impacts-guidance-for-businesses>

## **Health Technical Memoranda (HTM)**

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare. The focus of Health Technical Memorandum guidance remains on healthcare-specific elements of standards, policies and up-to-date established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle.

<https://www.gov.uk/government/collections/health-technical-memorandum-disinfection-and-sterilization>

## **Higher Education Funding Council for England (HEFCE) Carbon Management Plan**

HEFCE's capital funding provides financial incentives to educational institutions to support better carbon management. Institutional goals are measured over time against regular milestones. They have a carbon management plan for Higher Education establishments.

<http://www.hefce.ac.uk/pubs/year/2010/201002/>

## **The International Performance Measurement and Verification Protocol (IPMVP)**

The IPMVP® defines standard terms and suggests best practise for quantifying the results of energy efficiency investments and increase investment in energy and water efficiency, demand management and renewable energy projects. The purpose of the IPMVP® is to increase certainty, reliability, and level of savings; reduce transaction costs by providing an international, industry consensus approach and methodologies; reduce financing costs by providing a project with a Measurement and Verification Plan (M&V Plan) standardisation, thereby allowing project bundling and pooled project financing. It aims to provide a basis for demonstrating emission reduction and delivering enhanced environmental quality; also to provide a basis for negotiating the contractual terms to ensure that an energy efficiency project achieves or exceeds its goals of saving money and improving energy efficiency.

<http://evo-world.org/en/>

## **ISO 50001 Energy Management Standard**

Established in 2011, this voluntary standard gives organisations the requirements for energy management systems with guidance for use. It is intended to provide a recognized framework for integrating energy performance into management practices. It focuses on energy management by providing a framework that enables organizations to improve their understanding of their energy use and consumption—and subsequently to improve their energy performance.

<http://www.iso.org/iso/home/standards/management-standards/iso50001.htm>

## **ISO 14001 Environmental Management Standard**

The voluntary environmental management system standard, focuses on the environmental media the organization can affect. ISO 14001 includes energy topics, but does not prescribe detailed specifications for an energy management system. The ISO 14001 standard specifies the criteria for an environmental management system and provides a framework for organizations to assure that environmental impact is measured and improved. The other standards in the ISO 14000 family focus on specific environmental aspects such as life cycle analysis, communication and auditing.

<http://www.iso.org/iso/iso14000>

## **LES-TER**

LES-TER is an industry initiative led by the British Property Federation, with technical assistance from the Usable Buildings Trust and financial support from the Carbon Trust. It is a set of tools and a process designed to enable landlords and tenants to measure, understand and reduce their emissions from their ownership and occupancy of commercial buildings.

The landlord's energy statement (LES) is a tool that helps landlords understand their buildings' energy efficiency, compares the performance of common services against similar buildings with similar uses, identifies any areas for improvement and illustrates where year on year improvements have been made.

The tenant's energy review (TER) is a tool which allows tenants to assemble information on the energy and emissions attributable to the energy they purchase directly from suppliers. It also records 'stress' factors (such as high densities of occupation, long hours and intensive energy uses). It assists tenants in making energy reductions in the electricity uses they control through the production of an automated energy savings report, helping to identify potential savings opportunities.

<http://www.les-ter.org/>

## **National Australian Built Environment Rating System (NABERS)**

NABERS, is an initiative by the government of Australia to measure and compare the environmental performance of Australian buildings and tenancies. There are NABERS rating tools for commercial office buildings to measure greenhouse gas emissions, energy efficiency, water efficiency, waste efficiency and indoor environment quality. There are also energy/greenhouse and water rating tools for hotels, shopping centres and data centres.

NABERS offers a number of supporting tools to assist clients and their supply chain to debate, determine and delivery building performance.

<http://www.nabers.gov.au/public/WebPages/Home.aspx>

## **Passive House**

Passive House is both a building energy performance standard and a set of design and construction principles used to achieve that standard. The Passive House standard is the most stringent building energy standard in the world: buildings that meet the standard use 80 percent less energy than conventional equivalent buildings, and provide superior air quality and comfort.

The Passivhaus standard takes an approach to building design where the designer minimises the heating and cooling demand of a building while still meeting the thermal comfort required. Furthermore, its aim is to prevent recirculation of air mechanically and encourage supplying fresh air naturally where possible. The standard defines energy performance targets for certification, where heating and cooling demand need to be less than 15 kWh/m<sup>2</sup>.yr.

<http://www.passivhaus.org.uk/>

## **Post Occupancy Evaluation (POE)**

POE involves seeking feedback from occupants of the place being evaluated through a survey methodology including questionnaire, interview or focus group. This feedback may be supplemented by environmental monitoring of the temperature, noise, lighting, and indoor air quality. Energy consumption, waste and water are also commonly included. Finally quantitative

measures of the space and cost of a project are often considered in order to evaluate performance and give a better understanding of value.

[https://en.wikipedia.org/wiki/Post-occupancy\\_evaluation](https://en.wikipedia.org/wiki/Post-occupancy_evaluation)

### **Soft Landings**

Soft Landings is the BSRIA-led process designed to assist the construction industry and its clients deliver better buildings. Soft Landings provides a step-by-step process for clients and their project teams to follow in order to avoid these pitfalls and deliver a better-performing product. It aims to create virtuous circles for all. No matter whether your project is attempting to achieve exemplary environmental standards, or is a simple extension or retrofit of an existing building, the Soft Landings culture can be applied to ensure outcomes match the client's intentions.

<https://www.bsria.co.uk/services/design/soft-landings/>

### **WELL Building Standard**

The WELL Building Standard is focused exclusively on human health and wellness. It uses best practices in design and construction with evidence-based medical and scientific research - harnessing the built environment as a vehicle to support human health and wellbeing. It sets performance requirements in seven categories relevant to occupant health; Air, Water, Nourishment, Light, Fitness, Comfort and Mind. WELL is administered by the International WELL Building Institute (IWBI).

<https://www.wellcertified.com/>

## **BENCHMARKS**

The availability of performance data has grown drastically during the past decade, due to both the requirement of installing Automatic Meter Readings (AMR) meters and the improvement of technology. For new builds, such meters are likely connected to either the BMS or a dedicated AMR system, but for existing buildings such connections are often neglected as they are seen as unessential part of the building. Having a data collection system installed however is only the beginning, to make any sense of the data, software should be used to intelligibly visualise performance data. This in turn should be analysed by an appointed energy manager in order to take appropriate action, which is an integral part of the process.

Data is collected primarily for individual buildings or a portfolio of buildings in a private environment. In some cases organisations make their data publicly available as they wish to share their environmental track record in support of their values.

### **CIBSE Guide F - Energy Efficiency in Buildings [Benchmarks]**

Provides benchmarking for existing buildings divided by 'good' and 'typical' practice for different building types split to gas and electricity use and floor area. It also provides detailed end-use benchmarks per building type for cooling, heating, lighting, systems for example. Benchmark data date back to 1998.

<http://www.cibse.org/knowledge/cibse-guide/cibse-guide-f-energy-efficiency-in-buildings>

### **CIBSE TM46**

Provides guidance on energy uses that are excluded from DECs. These 'separable' energy uses are listed for each building type. TM46 describes the statutory building energy benchmarks prepared to complement the Operational Rating procedure. Benchmark data are based on CIBSE Guide F, but condensed and updated to take account of more recent additions to the data set.

<http://www.cibse.org/knowledge/cibse-tm/tm46-energy-benchmarks>

### **Display Energy Certificate (DEC)**

A DEC shows the actual energy usage of a building, the operational rating, which helps the public to see the energy efficiency of a building. It is based on the consumption as recorded by gas and electricity meters. DECs are only required for buildings with a useful floor area over 250m<sup>2</sup> (from 9<sup>th</sup> of July 2015, previously 500m<sup>2</sup>) occupied by a public authority.

<https://www.gov.uk/government/publications/display-energy-certificates-and-advisory-reports-for-public-buildings>

### **Energy Consumption Guide 19 (ECG 19)**

This guide describes four types of office buildings and their benchmarks in terms of energy consumption, energy cost and carbon dioxide emissions. It outlines technical and management measures to help reduce energy consumption and costs.

### **Eco-Portfolio Analysis Service (EcoPAS)**

Launched in 2012, EcoPAS is a benchmarking service that enables the user to understand the potential environmental risks in their investment portfolio. It focuses on environmental variables thought likely to impact asset and portfolio values, as well as performance, and demonstrates the extent to which the user is facing greater or lesser risks than competitors.

### **Embodied Carbon Database (WRAP and UK-GBC)**

Captures embodied carbon data for whole buildings and aims to provide free and publicly available resource for building professionals to benchmark their designs.

<http://ecdb.wrap.org.uk/>

### **Energy Performance Certificates (EPC)**

An EPC contains information about a property's energy use and typical energy costs and provides recommendations on how to reduce energy use and save money. It gives an energy efficiency rating from A (most efficient) to G (least efficient) and is valid for 10 years. The rating is calculated using software and involves an inspection of the property. EPC's are required before marketing the property for sale or rent. EPCs do not take into account how the occupier uses the building.

<https://www.gov.uk/buy-sell-your-home/energy-performance-certificates>

### **Estates Return Information Collection (ERIC)**

The ERIC (Estates Return Information Collection) is collected and published here by the HSCIC on behalf of the Department of Health. It is the main central data collection for estates and facilities services from the NHS containing information dating back to 1999/2000 and will be added to as future returns are completed. The data provided enables the analysis of Estates & Facilities information from NHS Trusts and PCTs in England which is a compulsory requirement that NHS Trusts submit an Estates Return. The data is as provided by reporting organisations and has not been amended. The accuracy and completeness is the responsibility of the reporting organisations.

<http://hefs.hscic.gov.uk/ERIC.asp>



## **Landlord's Energy Rating (LER)**

The BBP has developed the LER, a landlord energy rating which aims to differentiate energy efficient office space in the marketplace, creating the potential to feed through into market valuations.

<http://www.betterbuildingspartnership.co.uk/our-priorities/measuring-reporting/landlord-energy-rating>

## **NABERS**

This rating system has successfully transformed the energy efficiency of the Australian office building stock and has subsequently become mandatory in 2010 for commercial sale and lease transaction over 2000 m<sup>2</sup>. The rating is based on actual consumption whilst making corrections for operational factors such as hours of occupancy, climate, etc. Furthermore, office ratings are divided in three categories; base building, tenancy and whole building ratings.

NABERS, the National Australian Built Environment Rating System, is an initiative by the government of Australia to measure and compare the environmental performance of Australian buildings and tenancies. There are NABERS rating tools for commercial office buildings to measure greenhouse gas emissions, energy efficiency, water efficiency, waste efficiency and indoor environment quality. There are also energy/greenhouse and water rating tools for hotels, shopping centres and data centres.

NABERS Energy for offices is considered by many to have been successful, as over 72% of the Australian national office market has now been rated with either a base building or whole building rating. Factors behind the success of the tool are largely attributed to its ability to differentiate between the base building and tenants energy end uses and strong government support. Far fewer tenancy energy ratings have been conducted however and there has also been far less uptake of the other tools.

## **Real Estate Environmental Benchmark (REEB)**

Publicly available, asset specific, operational benchmark of environmental performance for commercial property. Based on real consumption of energy, water and waste which is updated annually. A joint initiative by the BBP and JLL.

<http://www.betterbuildingspartnership.co.uk/our-priorities/measuring-reporting/real-estate-environmental-benchmark>

## **SKArating**

A UK labelling system, led by the RICS, which is designed to rate and compare the environmental performance of fit-outs in office and retail buildings.

<http://www.rics.org/uk/knowledge/ska-rating-/>

## **Voluntary Display Energy Certificate (VolDEC)**

Voluntary operational energy performance rating scheme for non-domestic buildings. In contrast to the DEC it separates tenant energy use from that of the landlord and common parts of the building. This provides property owners and operators with cost-effective, user-friendly energy ratings for areas of a building that they control or manager, and are able to improve.

<https://voldec.com/>