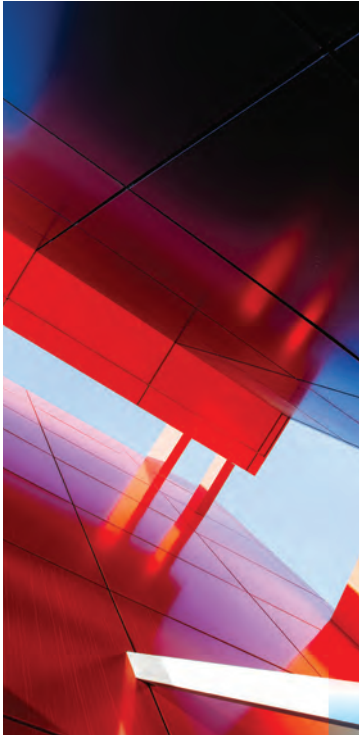


BRE Annual Review 2017-18



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The BRE Trust is the largest independent charity in the UK dedicated to improving the built environment for the benefit of all.

Created in 1997 following the privatisation of BRE, the Trust uses its donations to fund research and education to enhance the knowledge and skills of the industries who design, build and operate physical assets. This, in turn, supports the development and improvement of standards, qualifications, products and services in our industry, to bring about positive change in the global built environment.

Foreword



With the celebration of 20 years of the BRE Trust marking two decades of innovation and development, 2017-18 was a significant year. Keeping the momentum of this important milestone, this year saw the launch of the new BRE Trust Strategy 2017-2021.

Formulating the strategy was both challenging and enlightening. In defining future goals we evaluated and reflected on our achievements to date, particularly in increasing demonstrable societal impact. The intrinsic link between the focus and ultimate outcomes of our own programme, and the shape and growth of the commercial business of our BRE Group subsidiaries and their clients, was apparent and a critical ingredient of our ongoing success.

BRE Trust Strategy 2017-21 – the key elements

Our **vision** is to enrich the lives and businesses of citizens by supporting the delivery of sustainable buildings, infrastructure, communities and cities.

Our **mission** remains to enable transformational change in the built environment through research, demonstration and education as a global charitable Trust.

The strategy outlines our approach to being a digitally led, global leader in the built environment – ensuring that the BRE Trust remains relevant to the needs of the built environment, and extending its impact in the UK and internationally. Underpinning the delivery of our strategy will be the research, testing, validation, knowledge-creation and other services provided to the industry by the BRE Group subsidiary companies.

The Trust in turn, will focus on enhancing lifetime learning, extending international delivery, expanding global outreach as well as protecting our reputation and independence. It will ensure the outputs of its own research and education programme will create an environment in which the BRE Group, its academic and industry partners, and the wider built environment can flourish and build a better world together.

To actively drive this agenda forward we have appointed Dr Deborah Pullen MBE as the Executive Director of the BRE Trust, who has already been leading the delivery of the Trust Programme for the last three years. I would like to thank her and also my fellow Trustees for their efforts in the last year and continued support going forward.

Finally, I'd like to take this opportunity to remember Michael Dickson CBE, who died earlier in the year. Michael became a Trustee in 2013 and made such a positive contribution to our work, applying a wealth of experience from his illustrious career in our sector. In particular his continued encouragement of our sponsored students illustrated that his passion for extending the broader education provision for our future professionals both here and abroad was relentless and heartfelt. We will miss him.

James Wates CBE
BRE Trust Chairman

The BRE Trust Programme 2017-18

Overview



In 2017-18, the BRE Trust continued to leverage significant cash and in-kind support to expand the size and content of its projects through collaborations with over 70 partner organisations. 14 new projects were commissioned, with four completed in-year. These projects support both

specific research topics and validation and demonstration of innovation at full scale, with dementia being a particular focus in the last year or so.

Also, we have continued to strengthen our support for higher education in the built environment, with the reshaping of the programme from fixed sponsorships of University Centres of Excellence to more flexible strategic partnerships. In addition, we have extended our network to include existing academic partnerships associated with Constructing Excellence, the BRE Academy and the Innovation Park network, spanning both teaching and research activities.

The emphasis continues to be on the growth of world class capabilities and increased impact of outputs, as well as enhancing the learning experience and overseas exchange of knowledge for those engaged with the BRE Trust Programme. This will reinforce our collective activities and outputs and better align projects with our priorities.

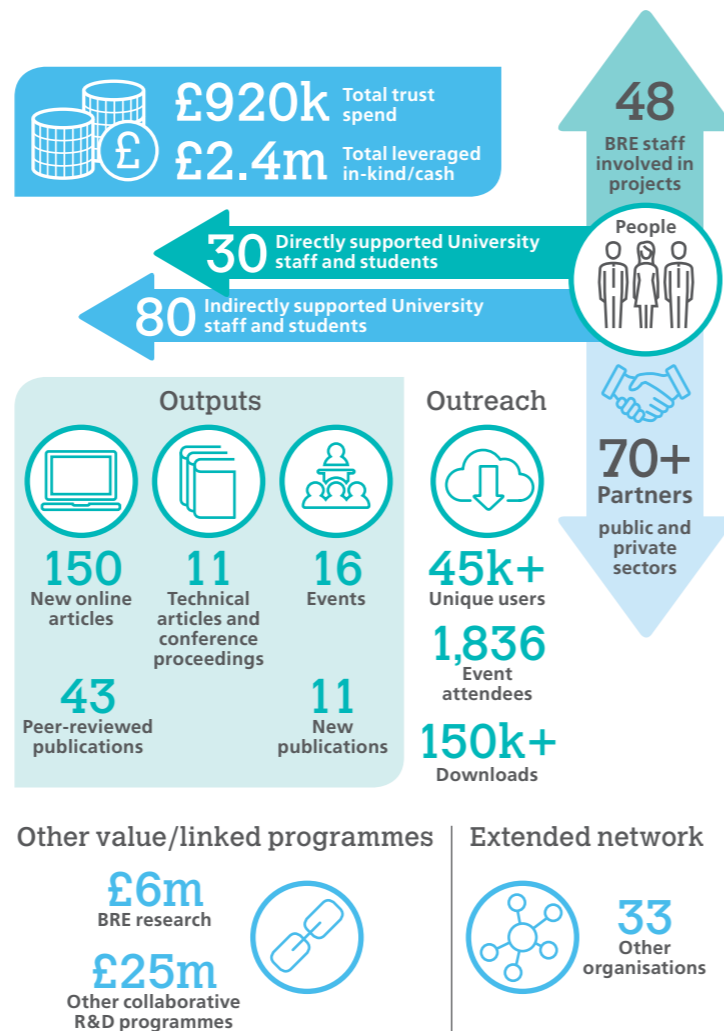
We have already increased our digital outputs and expanded dissemination via a number of online platforms, but as a part of the BRE Trust Strategy we are also actively adopting digital approaches in delivering our programmes. In addition, we are working with relevant distribution partners to extend the Trust's outreach and impact in the UK and Europe – and also further afield in China, India, the Middle East, America and other regions – in line with the increased global engagement of our sector.

Our strategy will underpin our assessment of the potential impact of current global trends and drivers on the built environment. These include climate change, which is exacerbating issues such as flooding and overheating, and a growing population that is putting pressure on the world's resources and ecology. Associated challenges include those involved with rapid urbanisation, such as the provision of good quality air, lighting and water, and an increasingly elderly population that needs support to live independently and cope with issues such as dementia.

The Trust is also addressing challenges within the construction industry such as skills shortages – we are developing a new skills programme to promote active learning and extending our university partnerships to also focus on enhancing teaching and learning. We are also addressing aspects of supply chain wellbeing, helping to expose the problems of labour exploitation and modern slavery, and developing standards and guidance to combat them.

Dr Deborah Pullen MBE
Executive Director BRE Trust

2017-18 Output Metrics at a glance



Since 1997 the Trust has funded more than £20m of research, produced over 300 new or updated publications and supported more than 300 post-graduates through our university partnerships. We have leveraged significant additional funding from both government and private-sector sources, resulting in a growing network of partners and collaborators of over 150 organisations.

Specific outputs

Projects completed

- Biophilic research and dissemination network, to complement the BRE Biophilic Office Refurbishment project (see page 16). This Trust supported project has developed an increased engagement with the supply chain associated with this innovative design approach.
- Healthy Planning Policy and Monitoring in Southwark and Lambeth. Complementing the long-term Healthy Cities Index project, this review of a local authority planning department and application of research findings informed stakeholders of the social determinants of health through planning policy and public health.
- Blockchain Feasibility and Opportunity Assessment. Technological advances are providing the greatest source of innovation in the built environment. This review determines the potential of one such technological advance, distributed ledger technology, outlining where and how this technology could impact our sector (see page 25).
- Multi-sensor detector capabilities and comparative performance with smoke detectors. The advantage of multi-sensor detectors over both ionisation and optical smoke detectors, particularly in relation to false alarms, has been largely anecdotal until this scientific analysis. Through experimental tests this research has provided robust evidence for multi-sensor alarms resistance to false alarms when compared to other alarms (see page 12).

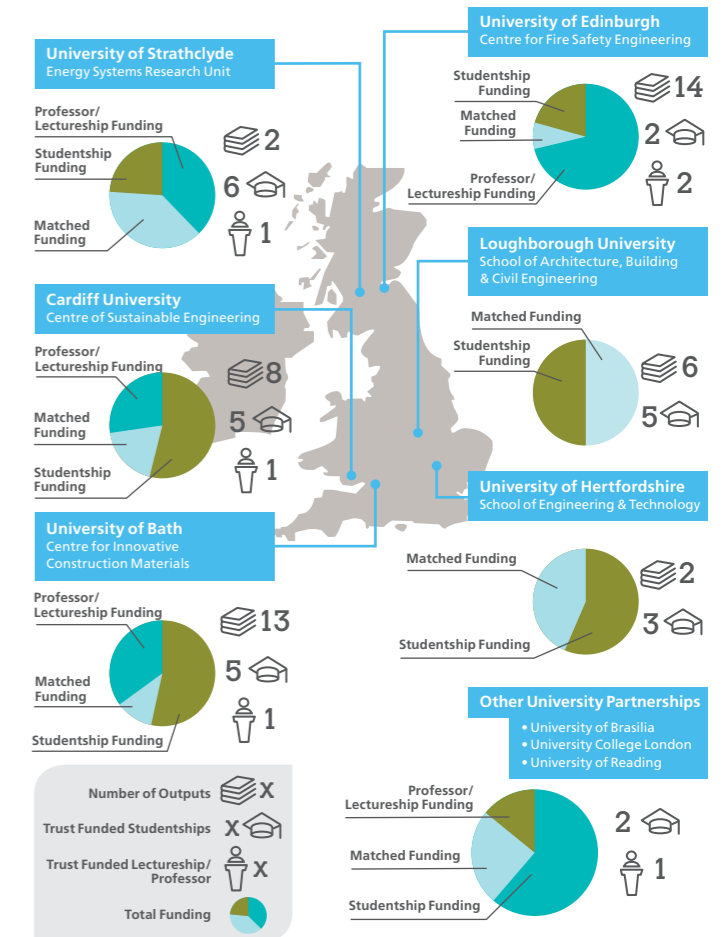
New projects started

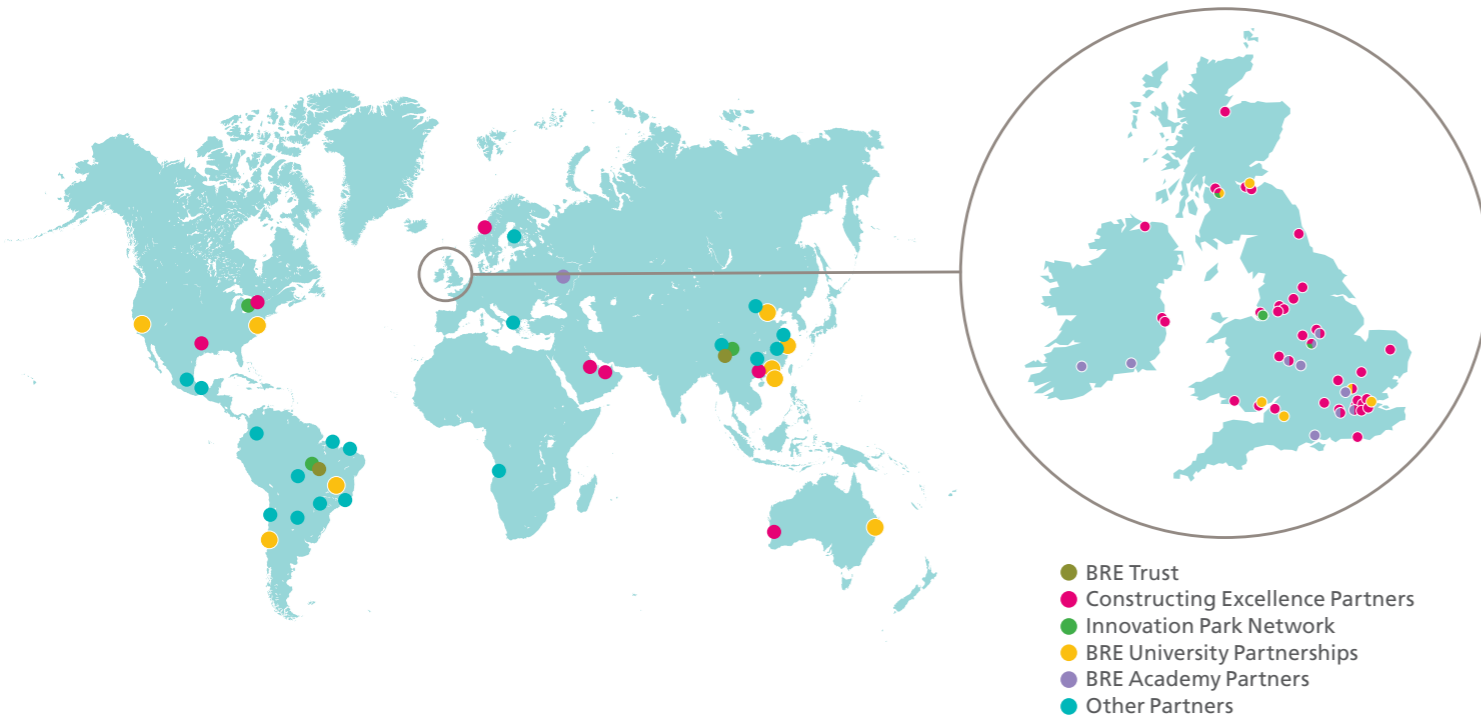
- Fire protection: digital technologies and personal wellbeing. £72.5k
- Life-long health effects of poor indoor air quality. £150k
- Home for Life. £150k
- Suppression of biomass fires. £45k
- Centre for Smart Homes. £117.5k
- Circadian lighting effects on health and wellbeing and solar shading. £80k
- Optimum replacement of detectors. £50k
- Lancaster grange: living legacy. £40k
- BIM case studies. £70k
- Disseminating knowledge through digital training. £60k
- Building resilience to natural disasters. Trust contribution £157k

University Partnerships Programme

The BRE Trust awards scholarships and bursaries to PhD students, and also provides financial support for the creation of new professor and lecturer roles that together form the 'BRE-Universities Partnership'. It also links with the wider universities network that BRE has via Constructing Excellence, BRE Academy, the Innovation Parks network and our international outreach.

University summary 2017/2018





BRE Trust Sponsored Studentships

The following six BRE Trust funded PhD research projects were completed in 2017/2018:

- Rosalie Calloway, Biodiversity in community developments, University of Reading
- Maria del Carmen Bocanegra-Yanez, Simulation-aided building design, University of Strathclyde
- Maddalena Iovene, Making the connection happen: A community regeneration framework for energy systems and low carbon solution, University of Strathclyde
- Yu Li, Modelling and developing 'smart' and 'environmentally friendly' engineering materials, Cardiff University
- Shaun Howell, Ontological representations for integrated smart cities modelling and data analytics, Cardiff University
- Lewis Sullivan, BREEAM Communities: Evaluating and further developing the new sustainability standard for masterplanning, UCL

During the year to 31 March 2018, the following three studentships were taken up and new awards made:

- Ioanna Vrachimi, Low cost approach for characterization of residential building stock for energy labelling, University of Strathclyde
- James Bradford, Next generation natural fibre reinforced geopolymers, University of Bath
- Ahamad Wadee, Optimising phase change material use for energy-efficient buildings, University of Bath

In a first for a BRE Trust supported studentship, this year has seen an international study exchange, facilitated through links with the Worshipful Company of Engineers (WCE). WCE's Sir Peter Gadsden, Britain-Australia Travel Award 2017 has allowed Aurimas Bukauskas, a Bath University PhD student supported by the BRE Trust, to spend six months studying at the University of Queensland, while Australian PhD student, Ian Pope, studied at Edinburgh University. Through such schemes we extend our global outreach and further increase the impact of our University Programme, both at the individual and university level.

Working with charity sector partners

An important part of the BRE Trust's strategy is to foster partnership with other charity organisations to help maximise positive impacts around the world. Examples of such partnerships include:

Emergency housing with the Catholic Relief Services

The increasing number and scale of natural disasters throughout the world prompted a collaborative project by BRE and the Catholic Relief Services (CRS), which was unveiled at BRE's Watford Innovation Park in November 2017. The 17.5m² Humanitarian Shelter demonstrates construction types and approaches that can be used to help communities when disaster strikes, providing 'transitional' shelters that are one of the first critical components of emergency relief.

"Recovery after extreme weather events may take many years, which often requires some kind of transitional shelter," says Jamie Richardson, of CRS. "This exhibition shows how organisations can collaborate to build safer, stronger shelters and better to meet the challenges of a changing climate and environment."

The exhibit demonstrates how emergency shelters need to be designed for resilience, rapid construction and deployment; but also crucially, to make use of local skills, labour and materials.



In Myanmar and Burkina Faso with Article 25

Article 25, the world's largest architectural non-profit organisation, is a charity dedicated to creating a world where all people have access to good quality homes, healthcare and education buildings.

Cycle Myanmar Expedition

In November 2017 BRE's Tim Wiseman (Scheme Manager of BREEAM Domestic Refurbishment) joined the Article 25 Cycle Myanmar Expedition, funded by the BRE Trust. Over nine days, cycling 550 km and visiting numerous healthcare institutions, the expedition helped to raise research funds and directly provided expertise on sustainable design. It also contributed to research and data gathering to inform a government report advising on improvements to healthcare infrastructure. The BRE Trust's support for this work included providing funding for a local student, Kyel Sin Linn from Technological University, Hmawbi, in Yangon, to take part in the mission, supporting translation and additional technical input to the review work.



BRE's Tim Wiseman on the Article 25 Cycle Myanmar Expedition.

New roof design in Burkina Faso

A new research project to assess the effectiveness of a new roof design, being used in a number of Article 25 delivered school buildings, has been defined. This will involve the BRE environmental testing group and The University of Bath, and a test site at the Gourcy School in Burkina Faso. The project will assess indoor temperature, humidity and air flow at various locations in the building, as well as monitoring equivalent external conditions over a period of time.

An initial feasibility study is underway. Following this, the consortium is keen to seek external funding to create a laboratory environmental test rig to simulate structural elements in a range of conditions. This will be used to assess the effectiveness of the design in different climatic conditions in developing countries. The project will extend our understanding of the ability of simple passive designs to support environmental comfort in extreme weather environments.



Demonstration of the Humanitarian Shelter at the BRE Innovation Park.

BRE Group strategic focus



We remain focussed on growing the BRE Group's business using outputs from the BRE Trust Programme and our own research, to deliver a range of products, services and support to improve the quality, safety, economic performance and sustainability of the built environment.

In doing this we deliver the wide-ranging services and support that enable key sectors in the built environment – product manufacturers, construction contractors and professionals, and developers, owners and operators of property – to build a better world together.

Over the past year our business has grown and we have engaged with new clients both in the UK and internationally. It is pleasing to see that our advice and expertise is being actively sought out by governments around the world as well as private sector clients.

To maximise the Group's impact the Group Board have agreed to focus on:

- High performance buildings and infrastructure
- Life safety and the protection of physical and digital assets
- Knowledge and skills
- Smart homes and buildings
- Health and wellbeing
- Construction process, supply chain and productivity
- Adaptation, resilience
- Management of existing asset

To maintain and enhance our leading position in these areas, we have introduced a Professional Assurance programme to ensure that we have appropriate and leading-edge skills, conduct the highest quality research and make the most effective use of the knowledge we generate. We have continued to upgrade our facilities – and have developed exciting plans for a new BRE Open Innovation Hub building at BRE Watford, which will strengthen our reputation as a national and international centre of built environment research.

The BRE Group has been carefully assessing the changes that Brexit, in whatever form, will bring. In the knowledge that our certification arm, BRE Global, will no longer be a Notified Body beyond the date of the UK's exit from the EU, we have established a new company – BRE Global Assurance (Ireland) Ltd – based in Dublin, to ensure that our clients will still be able to obtain the certification services as required by EU legislation. This advance planning will enable a smooth transition.

At the end of the business year we said farewell to Dr Peter Bonfield, who had served as Chief Executive for the past six years. Peter had a successful career with BRE spanning more than 25 years and we are grateful for his vision, energy and commitment to creating the BRE Group of today. We wish him well in his new role.

We are fortunate that Niall Trafford, who has been with BRE for the past nine years, has been able to immediately take on the role of acting Chief Executive to ensure a seamless handover without loss of momentum.

I am also grateful for the support of my non-executive board colleagues, Brigid Sutcliffe and Ashley Wheaton for their insights and support in guiding the business.

Chris Earnshaw OBE FREng
Chairman BRE Group

BRE Group business achievements



I am pleased to report that in 2017/18 the BRE Group of companies delivered increased revenues of £54.1m (2016/17 £46.7m), bringing a net profit of £2.1m. Digital revenues accounted for more than 25% of the total, and over 40% of these revenues now come from outside the UK – demonstrating that our focus on extending and

enhancing the global relevance of our products and services is succeeding.

Our short-term objectives are focused on growing and strengthening the Group's core assets, including its staff talent, digital product portfolio and technical facilities at BRE Watford. Our long-term objectives are to develop a truly international organisation, building on the global reach of our certification schemes which particularly address environmental, safety and security related societal challenges. We will also drive greater value from data and analytics flowing from digital platforms in an increasingly smart built environment.

A key enabler and conduit for us with our industry is the BRE Academy, which has continued to extend its international outreach, training over 2,000 students across 160 countries. We have launched our online learning platform – BRE.AC – in China, and new partnership agreements are in place in Malaysia, UAE, New Zealand and France.



Looking ahead, we welcome the UK Government's commitment to developing innovative technologies that will transform building design practices, increase productivity and secure the skilled workers of the future. A new joint-government industry deal will see an investment of £170m in the Transforming Construction programme to support developments in areas including affordable homes, building material technology, digital design and energy efficiency initiatives.

While developing our plans to play a full part in delivering this and other exciting initiatives, we never forget that underpinning BRE's continuing success are the skills and wellbeing of our colleagues, the strength of our industry and the delight of our customers, who are at the heart of everything we do.

These complementary elements of our work are reflected in this report, which is divided into two main sections. One covers our work in delivering a better built environment, and the other our drive for efficient construction processes, and the enhanced skills and wellbeing of the people in our industry.

Niall Trafford
Acting Chief Executive Officer BRE Group

Through the work of the BRE Group and its partners around the world, the BRE Trust strives to make buildings and the built environment better for all – better for those using homes, buildings, communities and infrastructure, better for the supply chains that create them, and better for the wider environment in which we all live.

The BRE Group 2017-18

A built environment for future generations



The most important elements of any structures we build, refurbish or maintain, are the people that use them – their safety, health, wellbeing and comfort. We don't just need more homes, buildings and infrastructure, we need high quality homes, and high performing buildings and communities that will fully meet the needs of people within them.

Delivering quality housing

With the UK Government's pledge to build 300,000 homes a year until the mid-2020s, a major review of building regulations, a growing construction industry skills gap and homeowners increasingly reporting defects, it is clear we need not just more homes, but more high quality, sustainable, affordable and fit-for-purpose homes.

In this section we outline a few examples to illustrate the vital contribution that BRE is making in this key sector.

The Home Quality Mark

Developed by BRE, the Home Quality Mark (HQM) helps house builders to demonstrate the high quality of their homes and to differentiate them in the marketplace, while giving householders the confidence that the new homes they are choosing to buy or rent are well designed and built, and cost effective to run.

With thousands of homes already registered to HQM, BRE this year focussed on developing the latest version of the scheme – HQM ONE – incorporating feedback on the HQM beta and extensive consultation which closed in April this year.

A key element of the changes to HQM ONE involves recognising new standards that will help to deliver high-quality homes. This will enhance the value of homes with HQM ONE certificates, as they will meet a set of minimum standards that all quality homes should meet, but are not covered by building regulations. The star rating system has also been refreshed, making it more consumer friendly.

We launched the HQM ONE technical manuals for new homes in England, Scotland and Wales on 10 August and the scheme went live on 24 August. For more information visit www.homequalitymark.com

Smart homes and buildings

BRE officially launched the Centre for Smart Homes and Buildings in January 2018. The centre is working with its members and partners – which include energy and technology giants such as EDF, Telefonica and BT, and small to medium enterprise companies such as Wondrwall – to help maximise the benefits of smart technology. It is a collaborative hub for industry, academia and the government, designed to facilitate research and knowledge exchange to improve the use of smart products and services in the built environment.

Smart home and building devices and systems have the potential to dramatically change the way we live and work, and their rapid evolution is driving advances in digital technology and data services. The scope of these changes presents both opportunities and challenges in the fields of energy, health and wellbeing, safety and security, connectivity and data privacy. The centre is a resource to provide clarity and support innovation in the construction industry – see www.cshb.com

The LENDERS Project

In July 2017 the final report of the BRE-conceived LENDERS Project, which links energy costs, affordability and mortgage borrowing, was launched by Claire Perry, Minister of State for Climate and Industry at Westminster Central Hall. In September 2017 the findings of the LENDERS project became official Government strategy through the UK 'Clean Growth Strategy', which specifically calls for the adoption of the LENDERS project results.

Households with lower fuel bills have more uncommitted household income, so better forecasting of fuel costs could allow home buyers to access bigger mortgages for low energy properties without paying more overall. To enable this, the project developed a more accurate method of estimating energy bills that can be readily incorporated into the mortgage process at the appropriate stage.

In June 2018, LENDERS project mechanism was adopted into the 'live' lending decision making for Help to Buy loans in Wales, granted by the Development Bank of Wales, as the Welsh Government's direct means of supporting the project's outcomes. "We have worked closely with BRE on the LENDERS project which modelled this work," said Housing and Regeneration Minister Rebecca Evans. BRE is now working with the Development Bank of Wales to understand the challenges and opportunities of this 'live' operation and report the findings to the industry to encourage further adoption.

Healthy housebuilding

The UK-GBC Healthy Housebuilding Briefing Paper, sponsored by BRE and Hoare Lea, was launched at a parliamentary reception on in April 2018. The Paper aims to demonstrate that the UK Government's target of 300,000 new homes a year can be cost-effectively delivered in a way that promotes occupant health and wellbeing. It includes a number of good practise case studies, that show that it a healthy home can be completed all over the UK.

Earlier this year, a national memorandum of understanding for Improving Health and Care through the home, was signed by organisations (including BRE), decision-makers and implementers from across the public and voluntary sector, to help embed better housing in actions to improve health, and health and social care services.

Living at home for longer

With a rapidly growing proportion of elderly people in our population, BRE has been working on projects to enable older people to live safely and comfortably at home for longer. These include projects on living with dementia, which can take an enormous toll on those with the disease and their families, and put an increasing strain on health services.

Developed jointly by BRE and Loughborough University, a new 'dementia-friendly' demonstration house on the Watford Innovation Park will help housebuilders, carers and relatives to better support those living with dementia.

There is clinical evidence that the dementia process can be slowed down if people stay in their own homes, whereas the condition is likely to accelerate if they are moved. The design of the demonstration house is geared to help those with dementia to remain at home for longer than is possible in a normal home, improving their quality of life and reducing the cost of care to the state and relatives.



A major Home Quality Mark milestone was reached with the certification of the first HQM approved residences, Lancaster Grange, in Bricket Wood, Hertfordshire. This seal of approval on the 100-unit development by Crest Nicholson, provides buyers with the added assurance that their new home is designed, built and will perform to a high environmental standard to meet owners' health and well-being expectations.

Sustainability of social housing in Brazil

Around 4 million homes have been built under Brazil's social housing programme, Minha Casa Minha Vida. This is a huge achievement, but there have also been concerns relating to the new developments' quality, sustainability and social cohesion.

Following from a series of workshops with industry, academia, financial institutions and government, sponsored by the BRE Trust, a work programme was developed by BRE in partnership with Caixa Econômica Federal and the Brazilian Ministry of Cities, funded by the United Nations Development Programme.

The project aimed to raise sustainability standards for further social housing developments, focussing on these outputs: a Sustainability Standard for Social Housing, a Balanced Scorecard assessment method for improving new developments' resilience, and a Post Occupancy Evaluation methodology to prioritise existing dwelling improvements.

After being launched at events across Brazil, and receiving very positive feedback, the next stage will be a series of pilot projects by housing developers keen to trial new thinking in social housing.

The project was awarded the 2018 British Expertise International Award for best International Collaborative Project, which celebrates outstanding international achievements by UK professional services sector companies.



The Smart Home Lab at BRE's Watford site, provides a collaborative demonstrator and test bed for smart home technologies.



"Many of the ideas put forward in the 'dementia-friendly' demonstration house are just good sense for us all to incorporate into our properties to adapt to the process of ageing," said Director of BRE Innovation Parks Dr David Kelly at the launch of the house.

Protecting people, property and places

Our work is focussed on helping to protect people and their property and businesses, by providing the independent research, assessment, testing and certification services.

Supporting industry following the Grenfell fire

On 14 June 2017 the Grenfell Tower in London was struck by tragedy, and our thoughts remain with the many people so lastingly impacted by the fire, along with the broader Grenfell community. We continue to do all we can to support the collective range of activities designed to ensure that nothing like this fire ever happens again.

Fire investigation – BRE Global's fire investigations team has been working for the Metropolitan Police on the Grenfell Tower fire investigation.

Building a safer future – Dame Judith Hackitt's report on building regulations and fire safety that was published in May 2018 highlighted the need to address many systematic cultural issues.

BRE welcomes Dame Judith Hackitt's report. We welcome the call for more rigorous powers to enforce building standards and regulations and are participating in many ways with the various initiatives within the broader construction and fire sectors to deliver an improved system for driving building safety. In particular, we fully support the urgent need to improve the competence of those working in the industry and are actively contributing to the various working groups in this area. In addition, there is significant industry effort, focus and collaboration in the development and delivery of a British Standard for the extended application of cladding fire test results to introduce much needed discipline and robustness into the process.

BS 8414 testing – The Hackitt report also highlighted the need for more fire testing capacity. Over the past year BRE has had unprecedented demand for the BS 8414 cladding system test which evaluates external fire spread. We currently have four test rigs in operation and are operating multiple shifts, even so, the demand remains very high with long lead times.

Setting the standards

An important aspect of our work with insurers involves identifying areas in which standards will enhance safety and security – and then developing those standards in collaboration with the industry sectors involved.

In 2017, we launched a new Loss Prevention Certification Board (LPCB) standard - LPS 2084 - for companies carrying out inspection, cleaning and maintenance of ductwork systems that may be contaminated with combustible deposits. Certified companies are regularly audited to check records and supporting documentation covering the contract itself, storage and handling of cleaning materials and their disposal, training and other issues.

Conducting new research

We carry out a wide range of independent research designed to enhance the safety and security of people, property and businesses, one such example completed in the last year is;

Reducing false fire alarms

The early detection of fire is necessary to give building occupants time to escape and to limit the damage to property. But achieving reliable early detection with minimal false alarms over a broad range of applications is a challenge. The detection of smoke-like phenomena commonly found in the service environment, such as steam, aerosols and airborne dust, contribute to the numbers of unwanted alarms.

After investigations into false fire alarms showed that they can be reduced with the greater use of multi-sensor detectors, tests have been conducted at BRE on thirty-five optical heat multi-sensor detectors – representing the full range available in the marketplace. This research has been supported by the Fire Industry Association, Fire Detector manufacturers and the BRE Trust.

In February 2018, the research report, confirming the ability of multi-sensor detectors to reduce the occurrences of false fire alarms, was published in two forms – a video summarising the project for the non-expert, and a detailed written report.

Addressing personal security concerns

Published in December 2017, the BRE National Security Survey revealed that personal security is an increasing worry across the UK, with two out of three respondents more concerned about crime today than they were five years ago. The top three issues causing most concern were cyber crime, terrorism and property crime.

"Although we are continuing to identify effective ways to protect our built environment from crime and terrorism, these efforts are not necessarily reflected in the general public's perceptions of their own personal security," says Gavin Jones, Director of SABRE. "Despite the likelihood of an individual being directly affected by a terrorist incident being extremely remote, recent events are having a disproportionate impact on people's lives; they appear to be influencing where people are willing to travel, where they stay and whether they attend a major event or concert. The public clearly need reassurance that the places they live, work and visit are safe and secure. It is in the interests of businesses that they find innovative solutions to this problem."



LPCB and the Red Book

LPCB has been working with government and industry for more than 100 years to set standards – now specified in more than 65 countries – that ensure the effectiveness of fire and security products and services. The leading force in fire and security approvals, LPCB publishes the Red Book which has more than 16,000 listings from 946 companies to help customers source products and services.

Responding to BREXIT

In the knowledge that BRE Global Ltd (the certification arm of BRE) would no longer be a Notified Body beyond the date of the UK's exit from the European Union, we have established a new company – BRE Global Ireland – which is based in Dublin.

We have also taken action to ensure that our clients will still be able to obtain the services required from us in respect of EU legislation. Our applications for accreditation with the Irish National Accreditation Board (INAB) to become a Notified Body and a Technical Assessment Body are under way and should be confirmed later this year. Once confirmed, we will begin the transition of current European Construction Products Regulation (CPR), Marine Equipment Directive (MED), Pressure Equipment Directive (PED) and Transportable Pressure Equipment Directive (TPED) certifications to BRE Global Ireland.

Meanwhile, anyone with an LPCB certificated product or service, can be assured that the associated certificates and delivery of the service will remain completely unaffected and will continue to be delivered by BRE Global in Watford.



Left to right – Dr Debbie Smith, MD of BRE Global; Ms. Heather Humphreys TD, Minister for Business, Enterprise and Innovation; Richard Hardy, Special Projects Director, BRE Group; Barry O'Dowd, Senior Vice President IDA Ireland

Developing fire safety and security guidance

New guidance and information documents developed by our fire and security experts in 2017/18 include:

Installing fire protection to structural steelwork – new guidance on correctly specifying and installing passive and reactive fire protection to structural steelwork. It highlights the importance of adequate testing, product quality, installation and maintenance, and the critical role of third-party certification schemes.

Installing fire doorsets and shutters – illustrates the importance of correctly installing fire doorsets and shutters to ensure occupant safety and protect property, identifying key issues for specifiers, manufacturers, contractors and approval authorities.

Façade security standards – guidance on available product performance standards and which of these best suits potential threats. It explains the differences between the standards for forced entry delay provided by façade and other building components (such as doors and windows).



Attack testing of security products

Participating in fire safety and security events

BRE has been strongly represented at fire safety and security events all over the world during 2017/18, from the BRE hosted Fire Research Conference at our Watford site, to exhibitions in Middle East, India, China and many other countries. For example:

Fire research showcase

At the 3rd BRE Fire Research Conference in June 2017 more than a hundred delegates saw leading BRE experts present the latest advances in fire safety and standards development. Topics ranged from spacecraft fire safety and innovations in fire suppression, to fire investigations and strategies for firefighting in basements. This annual event has quickly become an established fixture, with the 2018 Fire research Conference being held in September.

Attack testing steals the show at IFSEC 2017

At IFSEC 2017 – Europe's largest security event – we introduced a new feature, the LPCB Attack Zone in which physical security attack tests were carried out on a range of products by BRE security experts. With four LPCB security clients (CLD Fencing, Morgan Marine, Technocover and Gilgen Doors) providing equipment to be attack tested, this proved to be one of the event's highlights.

"The Attack Testing Zone was the star performer at IFSEC 2017," says Gerry Dunphy, Brand Director, IFSEC & Firex International, *"with visiting customers standing four deep around the area just to get a view"*. The Attack Test Zone was expanded for IFSEC 2018 in June 2018, again providing dramatic demonstrations of security solution capabilities.

BRE Pavilion at FIREX International

BRE hosted the LPCB Red Book Live Pavilion at FIREX International in June 2017. The Pavilion was a high-profile destination for visitors to speak with manufacturers and proved to be an effective platform for generating new business leads. The Pavilion returned to FIREX in June 2018 and BRE was able to negotiate exclusive exhibition stand packages for companies with LPCB certificated products.

High performing buildings – health and wellbeing

Many aspects of our testing, certification, advisory and research work fall in the area of health, and wellbeing, from life safety (see page 12) and structural integrity to high quality indoor environments for building occupants.

There is abundant research evidence for a direct link between building performance and the health and wellbeing of people. Along with the benefits this offers to individual building occupants, there are very clear business advantages for organisations that invest in the wellbeing of staff – such as being able to attract and retain employees – by providing efficient and healthy workplaces.

We work on a wide range of factors that determine the quality of indoor building environments, including the following examples in 2017/18.

Circadian lighting

BRE is undertaking field research on circadian lighting, which is tuneable lighting that can alter its colour and intensity.

Circadian lighting aims to improve people's alertness during the day or during working hours using bright light, but to switch to lower brightness, warmer coloured lighting when it is time to relax. Funded by the BRE Trust and CIBSE, the research project investigates when is the best time to have the high intensity, cool coloured lighting, and for how long, and when to turn it down and make it appear warmer.



Circadian lighting

The field study is being carried out in an open-plan office using 23 participants. Various conditions are being administered over a number of weeks in the winter period, including constant fluorescent lighting and variable LED lighting. Site measurements, lighting monitoring and computer modelling are combined with subjective and objective measures of occupant reaction, including questionnaires, regular pop-up questions and computer-based performance tests, and monitoring of light exposure and level of activity of participants using activity tracking watches.

The project aims to determine how the effects of circadian lighting on occupants' health and wellbeing are linked with circadian lighting control schedules in order to identify optimal control strategies for circadian lighting and to produce associated guidance so that health and wellbeing benefits are maximised.

Contaminated air – the INGRESS Tool

Each year around 3.7 million people in the UK are estimated to be within 250 metres of a large-scale urban fire or uncontained chemical release. Understanding and assessing risks to the affected population and providing evidence-based advice to emergency responders and the public is important. Public Health England commissioned BRE to undertake studies to develop the underpinning scientific evidence required for such advice.

Small-scale wind tunnel modelling was carried out in the BRE Environmental Wind Tunnel on the dispersion of contaminants from chemical and fire incidents in simulated urban areas and their subsequent impact on the environment, buildings and occupants. The study investigated the effect of building shape and size, the density of the urban area, source position and its buoyancy, and wind direction.

With the data generated we developed the INGRESS Tool to predict the likely concentration of contaminant downwind of the source at the building of interest and also the variation in contaminant concentration within the building. It provides guidance on the suitability of the building for shelter-in-place during a contaminant incident. The tool takes account of type of property affected, its airtightness, whether it is in a rural, suburban or urban area, and also the type of source.



Solar shading

With rising summertime temperatures, increased use of energy for cooling, and the ubiquity of personal screen-based tasks, solar gain and glare are major concerns in many buildings, including homes, hospitals and schools.

Recognising the increasing importance of solar shading as a design strategy, in 2017/18 we have comprehensively updated BRE's guidance documents on this topic. These include the flagship guidance publication for designers, 'Solar shading of buildings', and supporting publications on retrofitting solar shading and controlling the wide range of motorised systems now available.

The impact of nature

In July 2017 the Biophilic Office project was launched, a long-term research and demonstration programme of work by BRE and Oliver Heath Design, supported by a range of commercial partners. A ground-breaking office refurbishment project, it will provide quantified evidence on the benefits of biophilic design on health, well-being and productivity of office occupants. The BRE Trust is supporting a number of the projects' dissemination activities.

Biophilic design focuses the innate attraction of people to nature and natural processes. This three year project centres on a 650m² 1980s office building on the BRE campus in Watford, which will be refurbished according to biophilic design principles.

The fully operational Biophilic Office and its occupants are being monitored by BRE's lighting, indoor air quality, acoustic experts and social scientists. It incorporates design to maximise our link to nature by making use of plants, design diversity, circadian rhythm artificial lighting, colour and patterns.



High performing buildings – design and operation

Buildings, infrastructure and communities which are designed and operated to high standards of sustainability deliver resilient performance to their owners and occupiers.

BRE tools deliver a robust framework to design and operate buildings to optimum levels of performance.

BREEAM

BREEAM is the world's leading benchmark for the performance of sustainable buildings and infrastructure.

BREEAM continues to evolve in line with the market. Underpinned with equally evolving technical and scientific rigour it remains the 'go to' benchmark for many of the world's largest investors and occupiers.

BREEAM Awards

BREEAM celebrates the achievements of building development and management projects of every kind. These achievements were showcased at the Annual BREEAM Awards held in March this year in partnership with Ecobuild. The event also highlighted the journeys that project teams, committed to the highest levels of performance and sustainability, have taken to reach these high standards – the lessons learned and applied, and the improvements made over time.

Even more important are the lessons that can be passed on to others. By demonstrating the practicalities and benefits of sustainable solutions – particularly those that are widely replicable – BREEAM projects inspire others to aim higher with their own developments, so driving improvement throughout their sectors or regions, or even internationally.

Reflecting BREEAM's growing international influence and recognising the differences between regional markets, new awards were introduced this year for projects in four major regions of the world. BREEAM certificated buildings show that the benefits of sustainability are achievable in the particular conditions found in these regions, and demonstrate the technologies and skills that can help to create a better built environment for us all.

The latest updates

The BREEAM schemes are regularly reviewed and updated – with the close involvement of BREEAM stakeholders – to ensure that they continue to drive built environment sustainability using the latest scientific knowledge. For example, the BREEAM UK New Construction 2018 scheme update was completed this year and launched in March 2018, introducing a number of key changes including:

- Recognition of best practice in energy modelling at the stage design as well as part of the post-occupancy assessment
- Encouragement in the materials category for whole building lifecycle assessment, designed to help increase industry understanding and inform decision-making based on true impact of materials specified
- Inclusion of new criteria to promote the integration of holistic, best practice ecology approaches across the lifecycle of the building. These criteria are based on BREEAM's Strategic Ecology Framework, a pioneering methodology delivered through extensive consultation with industry experts, linking ecology with all aspects of development

Other important progress in the BREEAM family of schemes included the publication for consultation of the new Home Quality Mark (HQM) scheme, HQM ONE (see page 10), and the development of CEEQUAL (2018) (see page 19). For more news visit the BREEAM website (www.breeam.com).



Opened in October 2017 in the City of London, the new European HQ of global information and technology company Bloomberg, achieved a design-stage 'Outstanding' BREEAM rating. Its score of 98.5% is the highest ever achieved by a major office development in an urban setting.

Photography: James Newton

Strong partnerships

A key element in BREEAM's increasing international influence is our strong cooperation with other key players in this area. Among the partnerships forged and strengthened this year were:

GRESB – BRE and GRESB have teamed up to introduce new efficiencies for reporting Green Building Certifications to the GRESB Real Estate Assessment, by integrating a BREEAM Application Programming Interface (API) with the GRESB Portal for the 2018 reporting cycle. In addition, and for the second year, GRESB and BREEAM partnered to recognise responsible real estate investment, as part of the annual BREEAM Awards in March 2018.

Measurabl – The integration of BREEAM with real estate sustainability software Measurabl, to help improve the financial performance of commercial real estate, was announced in April, offering an easy way for facilities managers and building owners to save time and improve the accuracy of sustainability reporting and third-party certification.

BREEAM

 **2,274,575**
registered buildings

 **77** countries

 **565,600**
certificates

With the PM in China

It has been a particularly busy year for BRE in China, among the highlights of which was our participation in the bi-lateral trade visit to China in January 2018 by UK Prime Minister Theresa May. The key outcome of this event for us was an agreement between BRE China and one of the country's largest developers and owners of commercial real estate, the Jinmao Holdings Group.

As part of the agreement, signed at a ceremony attended by Liam Fox, the UK's Secretary of State for International Trade, Jinmao committed to applying BREEAM to a least 100 building projects over the next two years. Mr Yang Bing, General Manager of Jinmao Green Building Technology, said *"Using BREEAM International New Construction on Jinmao's multiple developments in Beijing, Shanghai, Nanjing, Guangzhou and Chongqing, will enable us to continue on our mission to transform the Chinese real estate market"*.

This exciting initiative reflects the growing success of Jinmao and other Chinese property companies, in developing superbly sustainable buildings that achieve high BREEAM ratings. Chinese developments were well represented, for example, at the 2018 BREEAM Awards.

Other areas of collaboration between BRE and Jinmao include an investigation of the market need for BRE's Responsible Sourcing Standard for Construction Products (BES 6001), which demonstrates the ethos of supply chain management and product stewardship and encompasses social, economic and environmental considerations.

BREEAM In-Use in China

This year we are further extending access to the BREEAM standard in China by introducing BREEAM In-Use. The drive for building sustainability in China has been focussed primarily on the new developments needed to meet the challenging housing demand, but there is now a move to include the management and value of existing buildings.

CEEQUAL

CEEQUAL, part of the BREEAM Family of certification schemes, is the evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and public realm projects. It was the first sustainability rating scheme for the infrastructure sector in the world and, with over 700 project registrations, it has become an internationally recognised sustainability standard for civil engineering works.

There have been over 40 new infrastructure projects registered with CEEQUAL in 2017/18 increasing the total construction value of projects registered with CEEQUAL to over £40bn. We are extending our international reach with more projects in Sweden, Norway and the Middle East, and have introduced CEEQUAL to Finland and Malaysia. Significant effort is going into the development of the new version of the scheme to bring CEEQUAL and BREEAM Infrastructure (pilot) together, making good use of the early work supported by the BRE Trust.

CEEQUAL certificates presented in 2017/18 include several Crossrail projects - the new railway for London and south-east England, the Port of Dover Western Docks Revival, the A82 Pulpit Rock scheme in Scotland and the Storåselva power plant – a new hydropower project in Norway.

The development of CEEQUAL (2018)

In February 2018 we announced that the CEEQUAL (2018) was open for the pre-registration of projects for sustainability assessment. Currently scheduled for launch in mid-2019, the new scheme will merge BREEAM Infrastructure (pilot) and CEEQUAL version 5.2 into a single assessment scheme.

The scheme will incorporate the development work supported by the BRE Trust in **BREEAM Infrastructure (pilot)** and learning from the eight pilot projects including the UK's HS2 high-speed railway, directly linking London and Birmingham. HS2 was the UK's first infrastructure project to be awarded a BREEAM Infrastructure (pilot) Scheme Certificate for its ambitious sustainability strategy on Phase 1.

CEEQUAL (2018) combines the best of BREEAM thinking with the experience and legacy of CEEQUAL, to provide a world class scheme to promote best practice in delivering better outcomes in infrastructure sustainability.

It will be a scheme that sets new standards in sustainability and is true to the aspirations of both BREEAM Infrastructure and CEEQUAL, and their users. Work to merge the two existing schemes will include extensive consultation with users, assessors and the wider infrastructure community. More information is available on the CEEQUAL website (www.ceequal.com).

CEEQUAL

19 countries with
CEEQUAL assessors



£40 billion the civil
engineering contractual value
of CEEQUAL projects to date

Energy

The efficient use of energy and the sourcing of energy from low or no carbon sources run as common threads through many of BRE's products and services, and informs way we operate our own facilities. BRE's extensive work in this area is illustrated here by just a few examples of our research and guidance projects.

Using solar energy in car parks

Renewable energy is of growing importance in making our built environment work. BRE is at the forefront of the solar energy research and guidance needed to help us all gain the benefits of this enormous resource.

There are, for example, more than 17,000 parking facilities in the UK, providing valuable opportunities for using free, renewable energy. The BRE National Solar Centre (NSC) and carport design and manufacturing company, FlexiSolar, have developed guidance on the best way to deliver multifunctional solar car parks that combines renewable energy generation with energy storage and EV charging points. *Multifunctional Solar Car Parks – a good practice guide for owners and developers*, was funded by Innovate UK and launched at Ecobuild in March 2018.

Battery energy storage

A guide re-published in September 2017, *Battery energy storage systems with grid-connected solar*, advises on battery energy storage systems for domestic or small commercial grid-connected solar photovoltaics (PV).

The guide provides information to enable customers to assess the benefits of energy storage systems, and systems designers and installers to effectively design, specify and install these systems.

Innovation Park house inspires zero energy village

"Essex eco-village given the green light" was reported in October 2017, when planning permission was granted for the erection of 94 residential dwellings on the edge of Newport in Essex.

The scheme, designed by Zed Factory (whose Principal is Bill Dunster OBE), will export surplus electricity generated by its solar arrays to the national grid, and the technology incorporated into the design is such that residents will have net zero energy demand. The eco-credentials, coupled with a range of other benefits helped secure planning permission.

The Zero Bills Home at BRE's Watford Innovation Park was the first show home for this new zero bills development. Designed to have no net annual energy bills the Zero Bills Home represents 10 years of innovation and supply chain development.



There are more than 17,000 parking facilities in the UK, providing valuable opportunities for using free, renewable energy.



BREEAM Communities case study

Rated Excellent under the BREEAM Communities scheme, the development of Garitage Park in Sofia, Bulgaria aims to create a modern community where everyone can find the right balance of work, family and self-care, as well as a sense of security, serenity and satisfaction. "With the help of BREEAM Communities, through Garitage Park we are introducing world-best practices in our market and furthermore setting an example for the future developments in our city," said Atanas Garov, Managing Partner at Sofia Park AD.

SAP at 25

This year BRE is celebrating 25 years of SAP – the National Calculation Methodology for energy rating of dwellings. SAP was originally developed by BRE's energy modelling team, which continues to update and manage the methodology on behalf of government. Devolved administrations have their own variants of SAP, adapted for their own conditions and energy efficiency policies. Together with its non-domestic equivalent, SBEM (developed by the same BRE team), SAP underpins key elements of energy efficiency policy applicable to buildings in the UK and elsewhere.

Tackling the energy performance gap

Studies of energy use in non-residential buildings have found that their actual energy performance is typically much poorer than the performance they were designed to deliver.

BRE is engaged in a research project, in partnership with building asset owners, to understand and explain the 200-450% gap in energy performance, between building design and the building in use. The findings will be used to provide investors, asset managers and valuers with guidance on the energy performance gap, and the tools and solutions required to reduce the gap.

The *Mind the Gap* project has access to 'real-life' building assets and their occupants, in order to gather the large sample of quality data needed to investigate the underpinning causes of the performance gap and then present practical solutions.

This project is in two stages, with the on-going first stage defining the methodology using trial buildings to determine the correct data to collect and the right questions to ask, and a proposed second stage rolling this out over a larger number of buildings.

The work done so far has highlighted the difficulty of data collection, with current collection and storage processes being ineffective due to the lack of management and a dedicated resource. The remaining data required for the first phase will therefore be collected or measured on site. The initial results have confirmed that the performance gap is real and in the range of 209 to 491% – similar to that observed by previous studies – with no relationship between the perceived operational status and that observed.

With an important part of this project being the dissemination of the findings, BRE's Dr. Andy Lewry (project leader) will be chairing expert panels on the performance gap in November 2018, at EMEX 2018 in London, and the University & Healthcare Estates & Innovation conference in Birmingham.

Building materials and products

BRE provides vital services to support industry partners with the development, testing, validation and demonstration of materials and products that deliver sustainable improvements to the built environment. Three very different examples are outlined here to illustrate the range of recent activities in this area.

Buildings as Materials Banks

BRE is among 15 organisations throughout Europe that have been brought together this year by the EU funded Building as Materials Banks (BAMB) project to gain the full use and value of building materials. Applying Reversible Building Design principles and the creation of Material Passports are key objectives to create the next generation of buildings (as material and product banks).

Each brick, board, piece of wood or glass in a building has a value but is often wasted rather than reused after building demolition or refurbishment. BAMB is providing the tools to enable a transition to circular building approaches, in which buildings, products and materials are kept in use for as long as possible (extracting the maximum value from them) and then recovered and regenerated at the end of their service lives.

BRE is leading development of a BIM enabled 'Circular Building Assessment' method and proof of concept software platform. The resulting prototype will be piloted in real life building situation over Autumn 2018 with further development into a commercial product subsequently planned. Full details of BAMB are at www.bamb2020.eu

Award winning demonstration of building flood resilience

The BRE Innovation Parks feature full-scale demonstration buildings which enable 'real-life' testing and demonstration of innovative designs, building materials and products that help to deliver sustainable homes and communities. These include the Flood Resilient Repair Home at the BRE Watford Innovation Park.

The term '*flood resilience*' combines resistance to flooding with resilience to (or recovery from) flooding – resistance is keeping floodwater out of a building, and resilience is taking measures to ensure a home or business can quickly recover if flood water does enter.

Initiatives such as the Flood Resilient Repair Home have put BRE at the forefront of mainstreaming flood resilience. Products and materials being tested and demonstrated in the home include water resistant insulation in the walls and under the floor, kitchen units and doors made from resin-bonded board, waterproof magnesium oxide wall boards instead of plasterboard and embedded pumps in the floor.

The Flood Resilient Repair Home project won the award in the Innovation Category at the 2018 Flood and Coast, Project Excellence Awards.

This year we also hosted the Flood Resilience Summit at the BRE Innovation Park in February, developed a certification scheme for flood resistance surveyors, and launched a new BRE Academy flood resilience surveyors training programme and a series of six webinars on aspects of flood resilience.

Construction products – Life cycle assessment tool enhanced

In June 2017 we upgraded BRE's LINA tool for assessing products in line with EN 15804, the European Standard for Environmental Product Declarations (EPD) for construction products. LINA 2.0 incorporated critical improvements to the user interface, updates to the calculation steps in the inner workings of the tool, and an expanded datamatrix covering a wider range of input and output flows.

Data from assessments in LINA can be submitted to the BRE Global EPD programme to obtain third-party verified EN 15804 compliant EPD. It was showcased in June 2017 at the EPD event *Declaring your Data* being held at St Gobain Multi-Comfort Visitor Centre, London.



There are great opportunities for improving the construction process – reducing waste and making savings on labour, time and effort to design – and for training a workforce in the modern construction approaches and technologies that will enhance productivity and deliver a fit-for-purpose built environment.

While driving process improvements with new tools, systems and training opportunities, such as those summarised below, we must never lose sight of the people in our industry, and of the fact that meaningful improvements cannot be made without ensuring the wellbeing of those working in the industry and throughout the supply chain.

Preventing exploitation

The construction industry has been identified as one of four UK sectors most susceptible to modern slavery. BRE has been working with partners to eliminate the scourge of modern slavery and labour exploitation from our industry. A few examples of this work are presented below.

Gangmasters protocol – a construction protocol from the Gangmasters and Labour Abuse Authority (GLAA), committing to supply chain transparency and endorsed by BRE, CIPS, CIOB and Marshalls, was launched at the GLAA national conference in October 2011. BRE has contributed to promoting the protocol, to which there are now more than 30 signatories.

Taking a lead – in October 2017 BRE produced, delivered (in partnership with Sustain Worldwide) and participated in the second *Modern Slavery and Ethical Labour in Construction Leadership Symposium*. CIOB Chief Executive Chris Blythe and other prominent industry figures discussed how leading organisations were driving best practice in ethical labour and human rights.

Following the first two acclaimed events, the 3rd annual symposium, *Eradicating Modern Slavery: How Good Governance Demonstrates Leadership and Mitigates Risk*, was held on 27 September 2018 at Royal Institute of British Architects (RIBA) in London.

'How-to' guidance on ethical sourcing – A 'White Paper' giving step-by-step guidance for businesses wanting to adopt ethical approaches to sourcing materials, products and people, was published by the APRES network (apres.bre.co.uk). The *Eight Pathways to Best Practice* was presented at the APRES conference in November 2017.

Delivered by BRE, APRES is a network of industry and academic partners – open to new members from all relevant organisations free of charge – committed to embedding responsible and ethical sourcing in the construction industry. The 2018 APRES Annual Conference is being held on 1 November at Pinsent Masons in London.

Ethical labour sourcing goes online – our Ethical Labour Sourcing Standard (BES 6002) helps businesses to better understand their corporate governance profile, including human rights responsibilities, and demonstrate ethical sourcing. One of the UK's leading building and civil engineering companies Sir Robert McAlpine, for example, became the first contractor to be verified under the Standard in November 2017.

An easy-to-use online version (www.elsonline.co.uk) was launched at a reception hosted by Baroness Young of Hornsey at The House of Lords on 17 April 2018.

The UK Top 100 influencers – launched in March 2018, The inaugural 2018 Annual Top100 Corporate Modern Slavery Influencers' Index, was developed and delivered by BRE and Sustain Worldwide. It recognises individuals from business, media and academia who are leaders in raising awareness to end modern slavery and labour exploitation, and those who advocate for robust ethical sourcing and human rights recognition and practices in UK direct business operations and global supply chains.

The unranked Top100 names on the list were revealed in May 2018 by Baroness Young of Hornsey, with the rankings of the Top100 Influencers announced at a recognition dinner at RIBA on 26 September.





Delivering a skilled workforce

The construction industry workforce must have the skills needed to apply the modern approaches and advanced technologies that will raise efficiency and performance across the construction and operation of our built environment, and deliver an internationally competitive industry.

With an impressive track record of success in delivering training excellence in the built environment, both in the UK and overseas, this year the BRE Academy has been further developing and expanding the reach of its training.

Reaching the next generation of construction professionals

Attracting more women and younger people into the construction sector is critical to the future of the industry. The BRE Academy has been working hard to expand the reach of its training beyond the middle-aged male sector that has previously dominated its courses. Eighteen months ago, the Academy's customers were 93% male and in the age category 45 to 54 – today they are 63% women in the age category 25 to 34.

Working with colleges and universities

The BRE Academy has been collaborating with colleagues and universities to develop expert technical training content that can be licensed for use in a range of construction-related higher education courses. Through this programme, some 18 academic partners across various technical disciplines now have gained access to cutting-edge technical knowledge with which to give future generations of construction professionals the knowledge and skills they will need to drive forward a modern and internationally competitive construction industry.

The Academy's BIM Approved Graduate (AG) course, for example, is a higher education programme launched in September 2017. It is designed to fill a recognised gap in the BIM training currently offered in higher education. Universities are able to licence the course and integrate it into their existing modules. The programme will train students to become BIM professionals and fast-track them to certification.

In September 2017, the Academy also delivered a joint BEng and MEng in Civil Engineering in collaboration with the University of Hertfordshire.

**G4C says
"Construction industry needs new image"**

G4C (Generation for Change), the young professional voice of the UK built environment industry, passionately believes that the construction industry needs a new image. It says that the current image has a negative impact on attracting talent and skills retention.

The G4C Conference in May 2018 was the first step in G4C setting out how it wants the industry to be perceived and how a reinvigorated industry can be attractive to the next generation. Addressing the theme of image directly, the conference was held in a ping-pong bar instead of the "typical grey-wash, antiseptic rooms" that usually play host to construction industry events. More than 50 future leaders attended, nearly half of which were women.

The conference report 'Bouncing back – a narrative for construction' (available at www.g4c.org.uk), reports on the tangible ideas put forward for developing the industry, and plans to work with industry partners to drive forward a multi-faceted, targeted plan to unite the industry and deliver change.

G4C is an integral part of Constructing Excellence (which merged with BRE in 2016), a platform for stimulating, debating and driving construction sector change. It has members from the entire supply chain – clients, industry and users – who share a vision for change through innovation and collaboration.

New online training courses

The BRE Academy's growing range of online courses is making training from leading experts available at any time and place – bre.ac. Courses on BREEAM, BIM and flood management were among those added during 2017/18:

Training for a career as a BREEAM assessor – a new, online version of training to develop building professionals' skills in BREEAM now provides a route to the BREEAM assessor qualification in the International New Construction scheme – and a career as a licensed BREEAM assessor.

Dealing with flood risks – a new course, *An Introduction to Flood Protection and Flood Prevention*, has been developed for anyone with responsibility for a building that is a flood risk. The course explains the term 'flood resilience', how to find out if you are at risk, and how you minimise the impact of flooding on your building in future.

BIM for site managers – this *BIM for Site Managers* course was developed by BRE Academy and the CITB to help site managers to work more efficiently and effectively with BIM. If well implemented, BIM delivers faster, more efficient construction, less mistakes and lower costs over the lifetime of a building.

Expanding training in China

Our BRE Academy has continued to roll out of a range of BREEAM training across China, as part of a programme of upskilling built environment professionals to help meet the Chinese Government's sustainable development targets.

Providing the BIM skills

To date the BRE Academy has trained and qualified more than 12,000 construction professionals in the use of Building Information Modelling (BIM).

At the BRE China Annual Conference in April 2018 BRE's CEO Niall Trafford announced the introduction of further training courses, including Building Information Modelling (BIM) courses – BIM having proved to be a valuable tool for reducing waste and costs in the design, construction and operation of buildings.

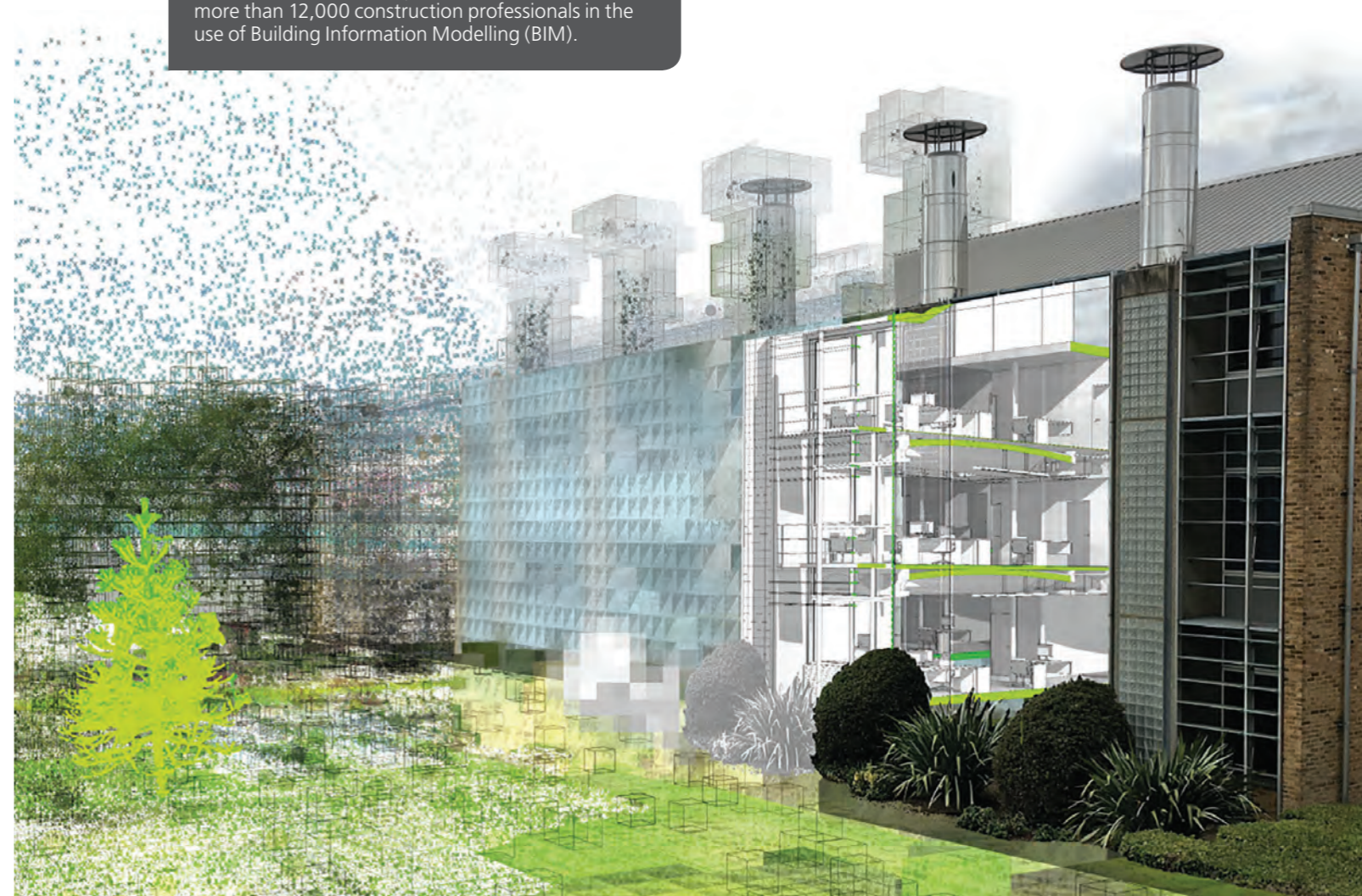
Published guidance from the BRE Bookshop

In addition to its extensive and growing training programme, the BRE Academy now manages the publication, by the BRE Bookshop (www.brebookshop.com), of a wide range of guidance publications written by leading experts in their fields.

Last year the BRE Bookshop website was significantly enhanced to give it a fresher, more modern look and to make it more consistent with the BRE Academy's bre.ac site. As part of the process of integrating the Bookshop into the Academy, the opportunity was taken to promote relevant BRE publications alongside Academy training courses.

Sales of publications in 2017/18 – including pdfs, printed documents and software – through the BRE Bookshop totalled 2,650, and downloads via the Construction Information Service reached just over 151,000. A selection of the wide range of topics covered by new publications produced this year include:

- Battery energy storage systems with grid-connected solar photovoltaics
- Façade security standards
- Flexible electrical networks for a low carbon future
- Going retro with solar shading
- Hydraulically treated soils in residential construction
- Installing fire doorsets and shutters
- Installing fire protection to structural steelwork



Embracing the digital revolution

BRE is taking a lead in driving the uptake of digital technologies in the construction industry – and in catching up with other sectors that are taking fuller advantage of digital opportunities. We are extending our current use of digital dissemination platforms, adopting digital approaches in research and education programmes, and extending the digital capabilities of our products.

Enhancing SmartSite features

We work to continuously improve and add to our construction process improvement tools. This year we updated the construction site performance improvement platform, SmartSite, with new features to support users in achieving and demonstrating better site health, safety, environmental and quality performance.

The SmartSite (www.bresmartsite.com) tools enable construction teams to measure, collate, report and continuously improve their business level performance to make their sites safer, healthier, more sustainable and ultimately improve productivity. SmartSite brings together the highly acclaimed online tools SmartWaste and YellowJacket, which have more than 20,000 global users, including Balfour Beatty, Brookfield, Crossrail, Heathrow, Kier, Lendlease, Mace, M&S and Whitbread.

Launch of BRE digital tools in China

At the second BRE China Annual Conference, on 18 April 2018 in Shanghai, BRE's SmartWaste and YellowJacket tools were launched to the Chinese market having been adapted to conditions in China with the help of a local software partner.

SmartWaste is a proven resource management tool that helps to reduce waste, and YellowJacket focuses on enhancing workplace health and safety. They will support China's drive for increased construction industry sustainability and efficiency, and workplace safety.

BIM – Building Information Modelling

With a team of leading experts in building information modelling, BRE has continued to take a lead in supporting the uptake of BIM with cutting edge products, services, guidance and training (see page 23), examples of which are listed below.

The BRE Templater provides a definitive data dictionary using web service technology for the delivery of structured data templates, and is key to the use of BIM to support not only design and construction but also a lifecycle approach.

The BIM DataBook Product Library was introduced at Digital Construction Week in November 2017. It was developed by BRE and partners to help make BIM work better for everyone by providing a much-needed process for managing information flow between manufacturers, architects and contractors during the design and build processes.

DataBook was then launched at Ecobuild in March 2018, to the approval of manufacturers and architects alike. It serves as a universal data store for all BIM data, underpinned by consistent data templates provided by the BRE Templater, to provide the supply chain with standardised and reliable BIM data.

Providing BIM adoption support. BRE offers individuals a pathway through training and education to demonstrate their BIM competences, leading to individual BIM certification. We also provide companies a process for adopting BIM Level 2 Business Systems Certification. BRE provides support from gap analysis with a pre-assessment service, through advisory, training and support, to achieve BIM certification.

New guidance, published in April 2018 and entitled *Beyond BIM: Knowledge management for a smarter built environment (EP106)*, presents a roadmap for the future of BIM, converging with modern technologies such as the Internet of Things, AI, and the semantic web.

There's no BIM like home – When our BRE colleague and BIM expert Dan Rossiter moved into his first house, he was amazed at how unstructured all the information about it was. To make sense of it he used BIM to produce an information model of his house. This experience is the basis of his blog – 'There's no BIM like home' (<https://bimblog.house>) which won the Smartest Blog Award at the 2018 BIM Awards.

Sharing our data and tools

A major innovation has involved opening our data and tools to allow others to create new applications and interface with our products, via Application Programming Interfaces (APIs). This initiative has followed an investigation of ways of sharing BRE generated data products and services, as part of the BRE Trust DataLabs project.

APIs are technologies for making some parts of a company's digital services and data available to other third-party developers, so that tools can be built upon and extra services can use those applications and data.

We have developed a set of API technologies that are now in use in a number of our tools, including BREEAM, SmartWaste and Green Book. The BREEAM API has allowed third-party applications and tools to create and manage BREEAM assessments for users. SmartWaste now offers access to clients via the SmartWaste API as an additional value-add on the product, and we use the GreenBook API with Measurabl, the sustainability data management software, to allow them to check the validity of BREEAM certificates.

Exploring benefits of blockchain technology

In March 2018 we published a new BRE research paper exploring the ways in which blockchain technology can benefit the built environment industries.

Distributed Ledger Technology (of which blockchain is one application) is a digital record of the economic transactions or changes in the ownership of an asset. The information is shared and continually updated on a network of computers simultaneously, whilst secured through cryptography. This means that while allowing digital information to be distributed, but not copied, a blockchain is both transparent and incorruptible.

The new report, *Blockchain – feasibility and opportunity assessment*, draws insights from two workshops run by the BRE Trust in partnership with Constructing Excellence and industry professionals. The issues it covers include:

- The potential for better 'track and trace' of products throughout their life cycles, to give a clear picture of where they came from, who supplied them and who installed them
- The evolution of distributed energy systems to support more localised energy creation and use
- Using blockchain technology to help tackle modern slavery and human trafficking by creating more transparency in construction supply chains
- Connected districts and cities with the Internet of Things – blockchain technology offers a distributed system of registers, all of which are connected through a secure validation mechanism

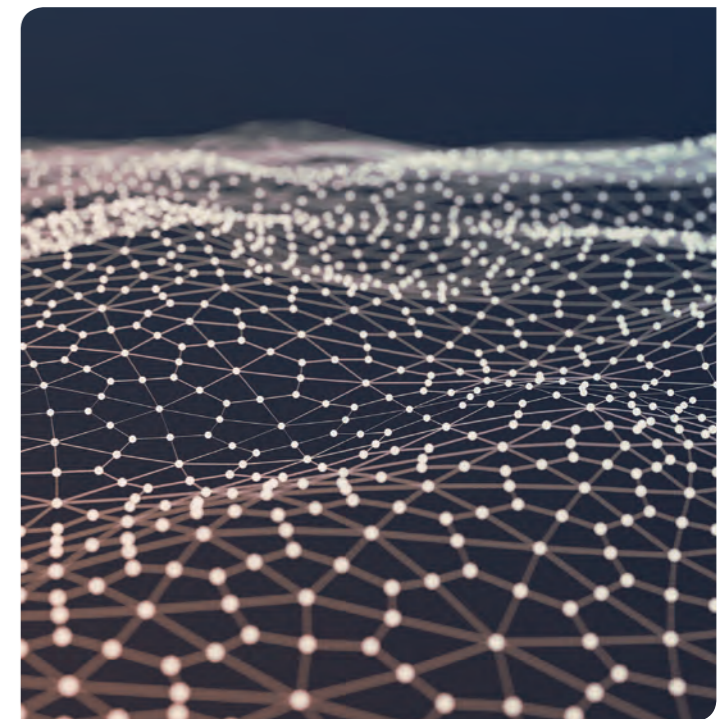
Going digital with offsite construction

BRE supports the continued development and uptake of smart construction techniques, such as offsite construction. We are working hard to help construction catch up with other industries in fully embracing the digital revolution, and the combination of offsite manufacturing and digital construction technologies offers exciting opportunities.

In February 2018, for example, we delivered (with Explore Offsite) the Explore Offsite Outlooks conference on the potential of digital construction and how best to implement it into offsite construction strategies. It brought together clients, contractors, project managers and offsite technology suppliers and digital experts, to discuss the latest developments in digital construction for the offsite sector.

Smart Homes and Buildings

Smart technologies can improve the performance of homes and buildings, and the experiences of people living and working in them. To promote the use of smart products and services in the built environment, in February 2018 we officially launched the Centre for Smart Homes and Buildings (www.cshb.com), a collaborative hub for industry, academia and government (see page 10).



About us

Underpinning everything we achieve is an extraordinary team of people and unique facilities.

Our people

Their health, safety and wellbeing

The health, safety and wellbeing of our colleagues, visitors, contractors and everyone involved in our work, is our top priority. All of our people undertake regular mandatory health and safety training on topics such as behavioural safety, fire safety, manual handling and risk assessment, along with specialised training appropriate to their work.

Their skills

The skill and expertise of our people – many nationally and internationally renowned – is our key resource. It is essential that we maintain and develop a skilled and motivated team with the appropriate training, Continuing Professional Development and support for Professional Registration with relevant institutions.

To facilitate this, and as part of our ongoing Professional Assurance initiative, we are rigorously monitoring our expertise and competencies to ensure that they fully meet the needs of our industry and our business, and to help our people realise their full potential and further enhance their abilities.

This has involved developing a staff Skills Matrix against which our existing skills can be compared with our skills' needs. These skills comprise two elements – 'competence', which involves issues such as professionally dealing with clients and behaving in a manner that is beyond reproach, and 'expertise', which is the knowledge and experience in a particular discipline.

The Skills Matrix has, for example, informed a programme to register BRE with Professional Engineering Institutions as a 'provider of accredited graduate training' leading to professional registration.



Your Say Your Way

In 2017 we invited colleagues to provide feedback on a range of topics which effect their employment with us, through participating in the Your Say Your Way (YSYW) survey. The results provided insights into how engaged employees are with the organisation, their views on BRE's health and wellbeing culture and the ways in which we communicate within the Group. This information has been used to prioritise people initiatives such as improving the annual personal development review process. We now have a better understanding of who our colleagues are, their strengths, career aspirations, the support they need for their development and, importantly, we are better able to recognise their contribution to achieving our ambitious business plan.

In 2018 the YSYW survey was repeated, this time with the inclusion of questions on how colleagues view the company's benefits and what they would like to see offered in the future. The results of this year's survey have been analysed by division and fed back to the teams, with action plans now in place to make improvements in relevant areas. The information gathered in relation to company benefits have informed a review of our reward and benefit schemes.

Diversity

Our people are recognised solely on the basis of their strengths, capabilities, performance and potential. We believe that the more the people at BRE reflect the diversity of the world around us, the more we will be able to build a better world together.

This year we published our first Gender Pay Gap Report, which was derived from the relevant pay data as of 5 April 2017. The results indicate the difference between the mean (average) and median (mid-point) hourly pay of all male and female employees, regardless of their role, expressed as a percentage of male employees' pay. Our mean gender pay gap is 24.8% and our median gender pay gap is 21.9%.

As part of our broader Equality, Diversity and Inclusion agenda, the gender pay gap continues to be a key focus for us, and good progress is being made on the actions that we have committed to undertaking to address the gap.

Recently the Rainbow Flag, widely recognised as a symbol of diversity and acceptance, has been flying over the Innovation Park. This is just one element of a range of planned diversity activities to help ensure that BRE is a place in which we can all belong. These include a 'Festival of Diversity and Belonging' – a week of activities showcasing, demystifying and galvanising action around key diversity and inclusivity themes. The staff will be canvassed for the themes by the BRE Women's Network.

BRE Women's Network

The Women's Network is a group of BRE women working to inspire and encourage diversity in our industry and to showcase the achievements and opportunities available in the construction sector. The network has organised annual events and awareness campaigns within the International Women's Day and Women in Engineering Day Lego Challenge, and partnered with the IET and the Women's Engineering Society on the 'Girl engineer' campaign.

Last year, the Women's Network hosted the 'BE:Global' event that brought Amanda Clack, Naomi Climer, Melanie De Wet, and Maya Naasani together to discuss gender bias, pay gap and more.

Staff Champions

BRE's Staff Champions is a group of colleagues representing all parts of the BRE Group, and dedicated to identifying all types of continuous improvement to make BRE an enjoyable, effective and fulfilling place to work.

Their monthly meetings provide a platform for colleagues' suggestions and feedback to help monitor staff engagement and general satisfaction. The Staff Champions engage in a very wide range of activities – supporting staff members in raising money for charity, organising staff clubs, running health and safety events, and arranging sports and social activities from the BRE Summer Sports Day to the Christmas Party.



The popular annual BRE Sports Day sees a range of energetic activities, such as football, tennis and a 5km run, along with non-sports events and refreshments for spectators.

bre INNOVATION PARK
WATFORD



Our community

Through support for local charities, volunteer schemes and open days, we encourage our people to engage with and support our local and wider communities – and our environment – as illustrated by the following examples from 2017/18.

Heritage Open Days

For the fifth consecutive year BRE took part in Heritage Open Days - England's largest festival of history and culture, bringing together over 2,500 organisations, 5,000 events and 40,000 volunteers. Every year in September, places across the country throw open their doors to celebrate their heritage, community and history. It's a chance for people to see hidden places and try out new experiences (for free).

Over 900 local, national and international visitors came to the Open Day on 9 September 2017, primarily to see our star historic attraction – the Mohne Dam prototype which was created for renowned 'bouncing bomb' engineer Barnes Wallace back in 1940. Test facilities like the new anechoic chamber, the structures lab and the timber library were also on show along with the prototype homes on the BRE Innovation Park including the Flood Resilient Repair House.

Schools programme

Our long-standing Schools Programme aims to inspire children and young people of all ages to take an interest, and develop their careers, in the built environment. Using the specialist buildings and laboratories located on our Watford site, we host half-day educational visits that support the delivery of the National Curriculum and the Construction and Built Environment Diploma. More than 525 schools and almost 17,000 pupils visited free-of-charge between 2008 and 2017.

The BRE Trust is now reviewing how best to further develop the Schools Programme. This includes examining the current national curriculum, gaining an understanding of how teachers and pupils engage best with learning, coordinating education objectives with emerging technologies, and opening a dialogue with other bodies with successful education programmes. The aim is to increase the Programme's impact among local education groups and further encourage children and young adults to consider careers in sustainability and engineering fields.

S Plan

The S Plan is the BRE Group's sustainability strategy, covering seven areas that affect our business and the wider environment in which we operate: energy (CO₂), procurement and supply chain, ecology, water, communications and engagement, transport, and waste.

In 2017 we achieved a 7% reduction in electricity and gas use at the Watford site, compared to our baseline energy use in 2010. We also raised £6,995 by reclaiming a number of items (roughly 345m³) arising from the clearance of the North Field site and the demolition of Building 12 – such as cabinets and other items that were given a second home. We maintained a 99.99% diversion of waste from landfill, with 52.8% recycled on site, 1.66% recycled off site, 45.4% sent to energy from waste plant and just 0.01% being sent to landfill.

Activities organised by our S Plan Champions this year have included events to inform and engage staff and suppliers in sustainability, tidy-up days to encourage efficient office practices and waste reduction, management of an allotment on the Watford site and the provision of re-usable coffee cups.



Our facilities

As the custodians of an extraordinary range of research and test facilities, we have continued to invest in and develop our sites to ensure that we can support clients in virtually all aspects of the built environment – such as:

Whole buildings – large-scale structural test facilities capable of accommodating a four-storey building.

Materials and components – performance testing facilities for steel, concrete, stone and other traditional and innovative construction materials and components.

Indoor environments – environmental test chambers for full scale mock-up testing of internal environments and HVAC systems, and sound transmission suites.

Wind conditions – two atmospheric boundary layer wind tunnels that simulate natural winds for a range of environments.

Renewable energy systems – unique facilities for renewable energy performance testing.

Fire – the largest Burn Hall in Europe and comprehensive fire testing facilities, including fire detection and suppression research and testing.

Redeveloping the Watford campus

BRE's Watford campus has been undergoing a major redevelopment programme of improvements to its facilities and infrastructure. We have been consolidating our operations into a smaller area of land to reduce operational costs and environmental impact, while improving current facilities to ensure that BRE remains a world-class organisation.

As part of this process, the planning permission gained for 100 new homes on the Watford site's North Field area, has this year been followed by construction of the Lancaster Grange housing estate by developers Crest Nicholson. These homes have recently been certificated under the new Home Quality Mark scheme (see page 10).

New test facilities

Having had to say goodbye to some of our older test facilities as part of the North Field redevelopment project, we have set about replacing the key ones, while taking the opportunity to upgrade them. The old anechoic chamber and acoustic transmission suite, for example, have been replaced by a smaller but more perfectly formed anechoic chamber – now primarily used for fire detection and electronics testing – and a new sound transmission suite.

The HVAC rig has been moved and is now bigger and better in order to be able to cope with the demands of testing for international markets. In addition, our old indoor air quality chamber has been recently replaced by a large and far more versatile 40m³ environmental chamber.



BRE Open Innovation Hub

The new BRE Open Innovation Hub will be a magnet for further inward investment as we continue to regenerate the BRE Watford Campus.

The BRE Open Innovation Hub

This year, £6m of grant funding has been secured through the Hertfordshire Local Enterprise Partnership to contribute to the construction of a new 3,100 m² facility on the BRE Campus.

The new building, called the BRE Open Innovation Hub, will provide flexible office and collaborative space for large organisations, SMEs and business start-ups. These new partners will come together to work in a sustainable, healthy and inspirational environment, to accelerate the development and commercialisation of new technologies, products and services for the construction sector.

The building will replace the existing Building 4 which has stood empty for some years. BRE is working with an award-winning design team led by Stirling Prize winning architects, AHMM, and targeting a BREEAM Outstanding rating. The new facility will be a great asset for BRE, fostering business innovation, growth and collaboration on our campus, creating opportunities for employment and new partnerships, while maintaining BRE's reputation as a centre of excellence for built environment research.

The new development will be a magnet for further inward investment as we continue to regenerate the BRE Watford Campus. A planning application has been submitted this summer with construction starting in spring 2019.

Annual accounts

| Income and Expenditure Account | 2018 £'000 | 2017 £'000 |
|---------------------------------------|-----------------------|-----------------------|
| Income from charitable activities | 54,075 | 46,707 |
| Interest receivable | 3 | 40 |
| Total | 54,078 | 46,747 |
| Expenditure on charitable activities | (51,780) | (45,054) |
| Net income before tax | 2,298 | 1,693 |

| Balance Sheet | 2018 £'000 | 2017 £'000 |
|--|-----------------------|-----------------------|
| Fixed assets | 24,677 | 24,242 |
| Debtors | 16,389 | 22,290 |
| Cash | 1,960 | 3,453 |
| Creditors: amounts falling due within one year | (10,813) | (15,500) |
| Net current assets | 7,536 | 10,243 |
| Provision for liabilities | (1,623) | (2,099) |
| Net assets excluding pension scheme liability | 30,590 | 32,386 |

| Cash Flow Statement | 2018 £'000 | 2017 £'000 |
|---------------------------------------|-----------------------|-----------------------|
| Net cash from operating activities | 1,007 | (6,041) |
| Net cash used by investing activities | (2,500) | 8,835 |
| Increase in cash in the year | (1,493) | 2,794 |
| Cash at the beginning of the year | 3,453 | 659 |
| Cash at the end of the year | 1,960 | 3,453 |

Structure and governance

BRE Trust (the "Trust") is a company limited by guarantee (Company number 03282856) and is registered as a charity in England and Wales (No 1092193) and in Scotland (No SCO39320). It is governed by its memorandum and articles of association.

Objects

As a charity all the Trust's activities must at all times conform with the statement of 'objects' given in the governing documents – the Memorandum and Articles of Association.

The Trust's objects are for the public benefit:

- To undertake, commission and support research in areas of science, engineering, information technology, management and economics associated with the built environment, including its processes and artefacts
- To advance knowledge, innovation, and communication, and to promote education and excellence, in all such matters, and to collect, collate and publish useful information, ideas, and data relating thereto
- To undertake, commission, facilitate and support carbon emission reduction projects and such other activities and services as are beneficial to the built environment and charitable in law

The aims of the Trust include maintenance of a strategic plan for funding world class research in the built environment; to play a leading role in the development and expansion of research and to disseminate and promote its application through its publications to stimulate high quality, innovation and excellence in pursuit of a sustainable built environment for public benefit.

Statement of Public Benefit

The Trustees confirm that they have referred to the general guidance on public benefit issued by the Charity Commission when reviewing on an annual basis the Trust's aims and objectives and in planning future activities and setting the grant making policies for the year. Any benefit received by researchers and research institutes is purely incidental to the objectives of the Trust's work.

Structure and Governance

The Trust is the owner of BRE Group Limited which in turn owns the subsidiary trading companies Building Research Establishment Limited, BRE Global Limited, Ceequal Limited, Constructing Excellence Limited and Constructing Excellence Learning Limited – all of which operate in the UK. BRE America Holdings Inc. and BRE Shenzhen Limited are subsidiary trading companies operating in the USA and China respectively. The commercial activities of the Trust are carried out through these subsidiary companies (see note 11 for further details). The majority taxable profits arising in the UK are gift-aided to the Trust to be used in furtherance of the Charity's objects and for no other purposes.

This ownership structure means that:

- BRE Trust has the flexibilities and freedoms as a charity to promote its objectives for the public good
- BRE Group companies can maintain their independence from sector or political interests. They can act for the benefit of the built environment, the construction industry and its clients, whilst being free to develop as businesses
- The corporate structure is clear and extensible with responsibilities and risks clearly defined

Trustees and Officers of the Charity

The governing body of the Trust is its Council of Trustees which comprises of up to 14 Trustees. The Directors of the company are its Trustees for the purposes of charity law. The Chairman is appointed by the Council of Trustees, with the current Chairman having been reappointed in May 2018.

The Trustees and Officers serving during the year and up to the date of this report were as follows:

James Wates CBE, Chairman
June Barnes

Julia Barrett (appointed 7 June 2018)

Francesca Berriman MBE

Nick Jennings CB

Peter Lobban OBE

Ashley Pocock

Sam Stacey

Phil Wilbraham (appointed 7 June 2018)

Gary Wingrove

Michael Dickson CBE (resigned 31 May 2018)

Liz Goodwin OBE (resigned 15 Nov 2017)

John Hooper (resigned 4 April 2018)

Sir Ken Knight CBE (resigned 3 June 2018)

Jose Torero Cullen (resigned 20 Oct 2017)

Governance

BRE Trust recognises that it must ensure that it continues to achieve its ambitions and aims through effective governance, the right leadership structures and skilled and capable trustees, promoting attitudes and a culture where everything works towards fulfilling its vision.

In July 2017 a new Charity Governance Code was published, drawing on the best practice and guidance of over 200 charities and their representatives, and this framework is now being used to assess current BRE Trust governance processes and identify areas for further enhancement or adoption.

Whilst the BRE Trust already has the required contracts and procedures in place to ensure it meets its legal requirements as a Charitable Company it also recognises the need to ensure very best practice in governance with its subsidiary companies.

The Trustees have delegated all other day to day management of its subsidiary activities to the Board of BRE Group Limited. However, like all organisations it is critical that regular review and benchmarking of performance and efficiency is carried out to provide evidence to back up all external claims and reports as well as identify ongoing improvement needs and opportunities.

BRE Group or other organisations working closely with the BRE Trust for specific programmes and processes are in place to also ensure that other organisations working with BRE Trust in the delivery of its activities also have appropriate procedures in place in line with the guidance that accompanies this regulation.

Standing Committees

At the beginning of the year The Trust had five standing committees reporting to it, namely the Research Committee, the Publications Committee, the Programmes Committee, the Audit Committee and the Remuneration Committee. The Programmes Committee is chaired by a Trustee, and the Audit Committee and Remuneration Committee are chaired by a non-executive director of BRE Group Board. Each committee formulates decisions for consideration and approval by the Council of Trustees.

BRE Programmes Committee

The programmes Committee as formally launched on 6th September 2017 having merged the previously separate Research and Publications Committees. This Committee met twice in 2017/18 (December 2017 and March 2018). The committee comprises Francesca Berriman (Chair), Ashley Pocock, Michael Dickson and Nick Jennings (joined December 2017).

Audit Committee

The Audit Committee comprises the BRE Group Board non-executive directors Brigid Sutcliffe (Chair) and Ashley Wheaton and representatives of the Trustees, June Barnes and Peter Lobban. Attending, by invitation, are the BRE Group Non-Executive Chairman, Chris Earnshaw, Chief Executive, Peter Bonfield, and the Chief Financial Officer, Jat Brainch (until January 2018) and Nick Farrimond (from February 2018).

The Audit Committee met five times during the year to review financial performance and monitor such matters as the Group's external financial reporting, audit activities, risk management and corporate governance. The Committee acts as Audit Committee for both the BRE Trust and the subsidiary companies.

Remuneration Committee

The BRE Group Remuneration Committee is responsible for determining the remuneration and conditions of the executive directors of the subsidiary companies. In determining appropriate levels of remuneration for the executive directors, the Remuneration Committee aims to provide packages that are competitive in the marketplace and will attract and retain high quality executives capable of achieving the subsidiary companies' objectives and ultimately those of the Trust. The Remuneration Committee retains the right to seek external benchmarking as required to ensure these aims are fulfilled.

Membership of the committee consisted of Chris Earnshaw (non-executive Chairman of BRE Group), Kristen Lord (Group Director – people), Ashley Wheaton and Brigid Sutcliffe. The Remuneration Committee met 5 times in 2017/18.

Risk Management

The Trust and the Group maintain detailed and comprehensive, group-wide systems for managing risk, operational and compliance issues across all activities. Systems are continuously evolving and currently include a code of conduct, compulsory training, mandatory procedures, a detailed high level risk analysis and response strategy, mandatory risk assessments, appropriate insurances and internal audit. The major risks faced by the Trust and the Group are reviewed on an annual basis by the Audit Committee, the BRE Group Board and the Council of Trustees. In addition, the Trust Research and Publication Committees (now via a single Programmes Committee since September 2017) also conduct an annual review of risks as part of their activities. The Trustees advise on improvements to risk procedures, which are incorporated into operations and reported on in the next annual report. The Trustees acknowledge their responsibility for the Group's system of internal control and for monitoring its effectiveness.

The Trustees accept that such a system can provide only reasonable and not absolute assurance against material misstatement and loss and that the system is designed to provide the Trustees with reasonable assurance that problems are identified on a timely basis and dealt with appropriately and that systems exist to mitigate those risks. The Trustees are content that the controls are effective and that risks faced by the Charity have been minimised.



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BRE Trust

The BRE Trust uses profits made by BRE Group to fund new research and education programmes, that will help it meet its goal of 'Building a better world together'.

The BRE Trust is a registered charity in England & Wales:
No. 1092193, and Scotland: No. SC039320.