

BRE Trust Programmes Quarterly Review July - September 2017

Prepared by the BRE Trust Secretariat



Executive Summary

This report summarises the progress of the BRE Trust Programmes and related activities in the quarter July – September 2017. This includes the full portfolio of research underway at BRE, which also includes the managed Trust programmes, the research partnerships and training programme.

BRE Programme Progress

Overall funding has increased by over £2m to £15,824,000 in the last quarter, primarily from increased overseas funding sources and direct commercial contract R&D. Alignment of knowledge needs to support ongoing product development with both relevant external funding calls will ensure a targeted programme for the future.

BRE Trust Programmes

The overall Trust programme is developing well, with £306k of Trust funding now committed to 11 projects, which is leveraging a further £529k of cash and £990k of in-kind support from partners. £113k of new funding was awarded in the last quarter for 6 new projects. The remaining £61k funding for this year is likely to be allocated in the next quarter, with a significant bid to support the production of a suite of CPD videos to kick off the skills programme.

Outreach and Dissemination

The number of IHS Press and BRE Bookshop direct sales was 1,053 in this quarter, a decrease of 17% compared to the last quarter (1283) the figure is also a decrease of 41% on the same quarter last year. The total number of downloads from CIS for the last quarter was 35,926, a slight decrease of 6% from the last quarter (38,121) It is also a 5% decrease on the same quarter last year.

Plans to develop the Schools Programme to extend reach and provide more content to our visitors has been investigated in this last quarter. Meetings have been held with the EDF's Digital Education and specific collaboration with the Armourers and Brasiers to support the development a pilot programme to enhance primary school science.

In September, BRE hosted an open day to celebrate 20 years since BRE came under ownership of the BRE Trust. 80 VIP guests were invited for lunch with guest

speaker Baroness Tanni Grey-Thompson who shared her experiences in the House of Lords and as a Paralympian. She urged her audience to deliver communities that promote fitness, health and wellbeing, something that ties into BRE's core strategy.

The Smart Cities Symposium held at BRE Watford was supported by the Office for the Chief Scientific Advisers (OCSA). Attendees were given tours of the Innovation Park at the BRE Smart Homes Lab, as well as presentations by CISCO and Ordnance Survey on the Manchester Cityverve project and from Martin Ganley on Smart Homes and Buildings work at BRE.

The University Partnership Programme

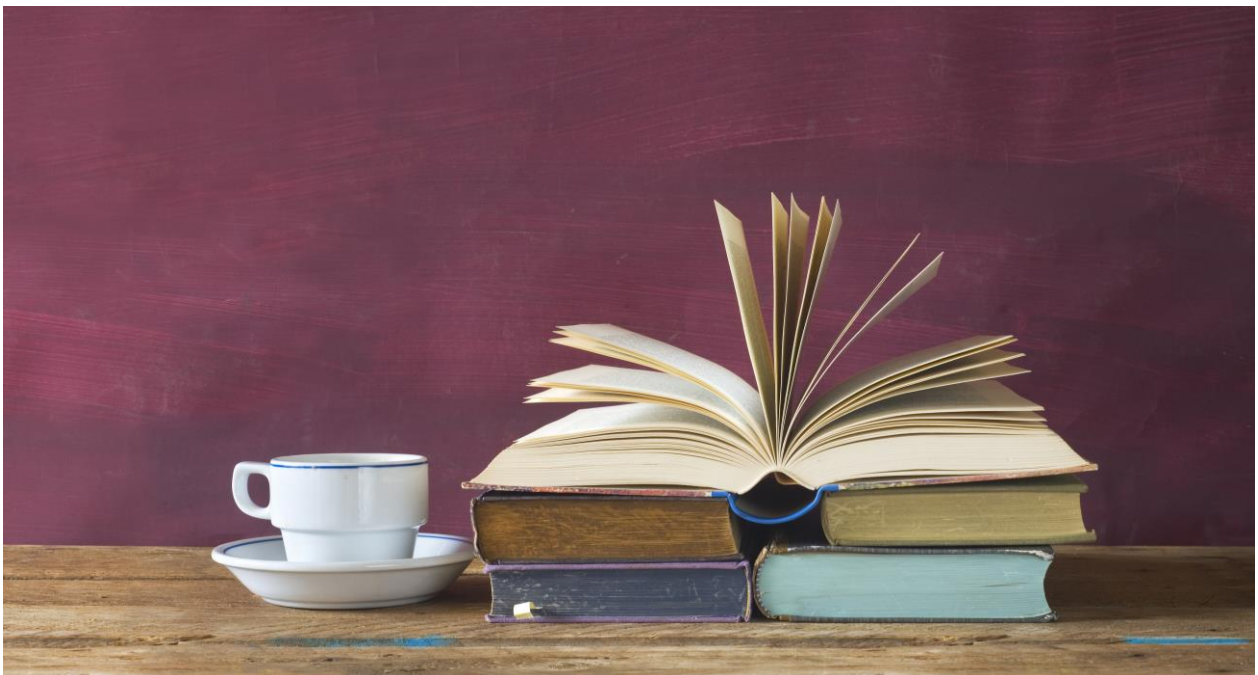
Our university partnerships are progressing well, with an increase in bidding to extend research activities and also dissemination of outputs through peer-reviewed papers and conference presentations. In general, more students are now engaging in these earlier in their studies, which not only increases their own development but also enhances dissemination of project outputs sooner. Our new professor at Edinburgh professor Grunde Jomass is already making a significant impact in actively seeking funding, with a joint bid with BRE submitted to the prosperity fund for £800k over the next 5 years to extend capabilities in the Fire and Safety engineering Centre.

They have also started work on the Grenfell Tower Response grant, and the collaboration with BRE on the use of the Burn Hall is essential for the project.

The University of Hertfordshire are currently recruiting a BRE Trust sponsored Chair, who will lead the new BEng in Civil Engineering that was launched this autumn. BRE are providing access to laboratories (concrete) and also delivering other key lectures as part of this course (BIM and structures). The relationships with UoH also focuses on the integration of digital systems in the built environment and will become more active in the delivery of the Connected Built Environment programme as it develops.

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Project Progress – People

The social interaction of citizens with the built environment, exploring health, productivity, safety and wellbeing. Considering the impact of demographic changes and cultural differences on future assets.

Current portfolio: Trust - £55k, Other Contribution - £1.2m

New Project – Home for Life

£150k total contribution

Over the last five years there has been significant advances in developing dementia friendly communities and cities, with pilot sites across the UK attempting to make towns and cities more accessible and understandable, enabling people with dementia to live more independently for longer. This is a broad concept which involves transport, housing, local amenities, shops and businesses and includes training and awareness raising. Recent research carried out by Dr Rob MacDonald (Liverpool John Moores University) and Bill Halsall (Halsall Lloyd Partnership) has focused not only on adaptations or design features for domestic buildings, but extends to the street, community and town level. Working closely with clients and healthcare professionals, this research has recently been published and provides thought provoking information on how we adapt our housing and communities to those suffering from Dementia. Looking broadly at the challenge of 'housing for an ageing' population it is apparent that there a range of stakeholders involved; from clinicians, to healthcare sector, housing providers, local authorities, design professionals, technology providers, carers, service users, and the NHS

It is also apparent that communication, leading to integrated solutions, is at best fragmented, and at worst non-existent.

This can lead to missed opportunities in the provision of adequate and safe housing for an ageing population.

It is recognised, however, that much of the research, design principles, and assistive technology, already exists in this area. What is missing is a well-planned and communicated approach to housing for an ageing population, as well as consistent and effective communication between stakeholders.

As part of the development of the 'Home for Life' demonstration on the Innovation Park, BRE will develop detailed online information, a detailed publication, and a programme of activities to identify the challenges and potential solutions on housing for an ageing population. This will include principles of design and adaptation within existing housing and extensive engagement with stakeholders. BRE will act as a facilitator to present principles of design and adaptation, and a coordinated and repeatable approach to identifying solutions which allow people to age well at home. This will create a 'bridge' between stakeholders and fill a gap not currently services by any organisation.



New Project – Biophilic Design

£1m total contribution

We spend 90% of our lives in buildings, however, studies have shown that in typical UK offices, 60% of staff do not have access to daylight and in Europe, 7% of staff do not even have access to windows. In an office based business, staff costs represent 90% of a company's costs (ref: WGBC report) and the importance of the build environment on staff is therefore potentially huge. Biophilic design is about bringing people closer to their connection with nature through better space design. Studies have shown that a human centred approach can improve many of the spaces we live and work in. This could, in turn, have numerous benefits on staff health and wellbeing and efficiency.

As part of our site redevelopment Building 18 has been selected for improvements. The team has been developing a commercial project based around the refurbishment of the first floor of this building and has secured funding to carry out research to understand more about:

- Practical and cost-effective interventions that office owners can implement to improve health and wellbeing of occupants
- How to quantify these interventions as part of the decision making process
- How and what products' qualities can be measured for their "health and wellbeing potential"

This project, referred to as the "BRE biophilic office refurbishment project", was launched on 5th July 2017 and is funded and supported by the commercial core partners: Ecophon, GVA, Akzo Nobel, Coelux, Royal Ahrend, Biotecture, Plessey, Ambius and Interface. Constructing Excellence, Innovation Gateway, CIAT, CIBSE, RICS, BSSA, LIA, CPA, SBID and eFig are some of the supporting trade associations and organisations. These establishments are dissemination partners to help raise its profile through press releases, focus group discussions, consultations and events. The aim of the BRE Trust funded part of the project is to develop a research network that will allow the BRE biophilic office refurbishment project to remain a market leader and to grow through the support of PhD students and research organisation collaborations.



New Project – Fire Protection

£72.5k total contribution

Domestic fire deaths have been steadily decreasing over the last 3 decades, however, an increase has been observed in England and Scotland over the last year, warranting a swift response to investigate and identify any underlying reasons or causes. Domestic fire death statistics have not been subject to scientific analysis for many years and information on relevant social, medical and architectural issues is largely anecdotal. There is a view that with more focused attention on high risk situations (often arising from the vulnerability of people, lifestyle factors and living conditions) there is still a significant amount that can be done, as the law of diminishing returns has not yet been reached.

By using a group of fire experts to analyse data gathered by Fire and Rescue Services (FRS) the causes of fire deaths and the circumstances surrounding the most serious fire related injuries will be reviewed.

The outputs from this project will be used to produce guidance that will illustrate the effect that using new technologies or services can have on the reduction of deaths and injury from fire in domestic dwellings. Leading this research puts BRE in a position to identify any potential new services or enhancements to existing services (e.g. LPS 1655) that may result. Proposing solutions may create a driver for the development of new products and position BRE to offer corresponding testing and certification service/s.



Completed Project – Healthy Planning Policy & Monitoring

There is an increasing interest from many stakeholders in the relationship between places and health. While there are many guidance documents focusing on this relationship, there is uncertainty regarding what design and policy measures work. This project - commissioned by the Planning Department at Southwark Council in conjunction with Lambeth Council, and part funded by Guy's and St. Thomas' Charity - focuses on the intensive social research in two regeneration locations in order to inform current best practice knowledge with local perceptions of health and place.

The resulting review and shortened report provide information on healthy built environments and health planning practice; giving focus to elements such as health services, social interaction, monitoring impact and innovative community engagement. Included were case studies of a number of regeneration programmes across the UK that included health as a factor for consideration or as a measure for impact, in addition to an overview of urban environmental health impacts and an outline of innovative means for including communities in the healthy planning process. Overall findings indicated a growing interest in using the planning system to improve health and wellbeing, as well as a need for more training and dissemination of best practice across planning policy and development management processes.

Through working with Lambeth and Southwark Council the project has also been able to emphasise the importance of collaboration

Completed Project – HCI Case Studies

In preparation for the launch of the BRE Healthy Cities Index (BRE HCI) website, a number of case studies have been written that showcase city planning initiatives from around the world. The case studies highlight policy initiatives relating to the ten BRE HCI environmental categories (air quality, resilience, safety and security, green infrastructure, noise pollution, housing and buildings, leisure and recreation, food access, transport, utilities and services) and in many cases demonstrate co-benefits in areas such as local economy, biodiversity and education. Some examples include; Congestion Charge Zone (London, UK), Public Lighting Strategy (Melbourne, Australia) and a river restoration project (Seoul, South Korea). The case studies aim to inspire city planning professionals who are committed to building healthy, thriving cities and communities. By representing a wide variety of cities and aim to be applicable across the world the studies provide information regards all possible influencing factors (economics, climate, rate of growth etc.) making them a resource that provides benefits to all.



Project Progress – Property

The delivery of assets which are built and operated efficiently and sustainably, increasing value to businesses who occupy them. Resource efficiency, renewable and efficient energy and adaptability to future changes of use and critical factors.

Current portfolio: Trust - £58.5k, Other Contribution - £196k

New Project – Suppression of Biomass Fires

£40k total contribution

Refuse derived fuel (RDF) is the organic matter derived from waste products and used to generate heat and/or electricity. These fuels are typically found stored in large outdoor piles or being handled in waste processing plants. Under some circumstances these fuels can spontaneously ignite or can be ignited by accident.

Fires involving such fuels once developed can take a long time (sometimes weeks) to get under control and the damage to the environment in terms of pollutant gases, surface water run-off and CO₂ emissions can be enormous.

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The Fire Industry Association have been leading some research in this area and have identified wetting agents (added to water) that increase the spreading and absorption of water on solid substrates which increase the effectiveness of water when attempting to extinguishing an RDF fire. Tests have been performed on a small scale, with the next stage of work looking to perform larger scale tests.

To date no research of this kind has been performed with wetting agents on RDF fires; this research will identify ways fire and rescue services can interact with such fires to put them out most effectively and quickly.



New Project – Centre for Smart Homes and Buildings

£134.5k total contribution

Emerging smart digital solutions present the opportunity for a step change in the way that we live, work and address key societal challenges. These smart solutions are enabled by advances in digital technology, our ability to make better use of data, and the creation of new and transformative data driven services and business models. The speed and scope of the changes present both opportunities and challenges that are complex and cross-sector, covering energy and comfort, health and wellbeing, safety and security, data and privacy, design, construction and installation.

Smart solutions need to be connected, trusted and truly smart, providing real benefits in ways that are more transformative, efficient and effective. These building blocks will help drive awareness, engagement and adoption of smart solutions. To ensure mass market roll-out we will also need to invest in skills, ensuring adequate training and education, and understand needs and behaviours.

This project focuses on the challenge of improved wireless coverage models in and out of homes, comparing measurements and modelling “Building Path Loss” (BPL), and in particular researching the optimum methodology to be used when faced with considerable variations in housing construction and materials across a housing stock of 26 million homes

. Phase 1 of the Connectivity Research under the Smart Homes and Buildings aims to validate the optimum measurement techniques and the performance of computer modelling against the measurements, comparing different techniques, accuracy and any limitations e.g. with frequency and computing power.

The dissemination of information will be through a number of routes including the following:

Awareness publications to a wide range of stakeholders regarding the challenges and impacts of predicting wireless coverage into homes. The publications will be disseminated through:

- Publications and presentations at events and workshops through the BRE Centre for Smart Homes and Buildings
- Publications and presentations at Constructing Excellence regional events
- External conferences on Smart Homes and Buildings such as Smart Homes World
- Presentation at UK Construction Week
- Partner websites e.g. Ofcom



New Project – Redevco Foundations: Digital Built Asset Recording Platform

£80k total contribution

Currently real estate asset information is created and stored in a number of different metrics and databases, making it difficult to extrapolate and report on performance and to assess how best to improve asset efficiencies. There is a need for an improved means of reporting and sharing key performance indicators that benefit all those with real estate assets, whether large or small, anywhere in the world. A project has been initiated between the BRE Trust and the Redevco Foundation to develop an interoperable reporting platform based on BREEAM In-Use output data. A centralised digital platform would allow for comparisons between different BREEAM In-Use assessments within both National Scheme Operator (NSO) and non-NSO territories. Users of this platform would be able to input, receive and export instantaneous data in the format they require, thus creating a common reporting framework and KPIs for the various user groups and building types that can then be used in CSR reporting, as well as improvement and action planning.

The broader industry will benefit from the production of benchmarks and data insights that inform the wider market of the current performance standard. This new reporting platform will drive the market towards the use of realistic actual performance metrics as opposed to theoretical modelled benchmarks.

On-going Project – Innovation Park Brazil

The Park for Innovation and Sustainability within the Built Environment (PISAC) is a centre for development, testing, demonstration and dissemination of sustainable and innovative technologies for the built environment. PISAC results from the partnership between public and private agents in Brazil and the UK including; BRE, University of Brasília and CBIC; so far 300+ organisations have been associated with the project.

The mission of PISAC is to develop sustainable, high performance technological innovations; meeting the current future demands of the Construction Industry Productive Chain (CPIC) and society. The project, implemented by Brasilia, is a reference centre that will work in a network as a catalyst for technical capacities. Consolidated in one place, focusing on development projects using cutting edge technology to address issues critical to the future of urban environments such as smart buildings, urban infrastructure, mobility and resilience, PISAC aims to integrate agents, resources, actions and knowledge through collaborative networks aimed at the decentralisation of technologies and innovation.

Development of an on-going research programme with the University of Brasília and other Brazilian academic partners will concrete the relationship between BRE and Brazil and expand outreach and dissemination of our products and services on an international level. The park presents a business opportunity platform for industry through the application of innovative and sustainable solutions in projects supported by our international collaboration network.



On-going Project – Blockchain Application

Through the unique position Constructing Excellence has in the industry, a series of workshops have been coordinated to focus on investigating the potential applications of distributed ledger (DLT) and blockchain (BC) technologies in the built environment, involving professionals from across the sector. Currently very few individuals or organisations have a great detail of knowledge about this new technology group; with it so far being applied to only a few large-scale construction/manufacturing/supply-chain case studies. The purpose of these workshops and the resulting report is to establish if, and how, DLTs could contribute to the built environment sector.

The first of these took place in late September, with the focus being on understanding the initial thoughts and concerns regarding how these technologies could be used. It is evident that the uses are far reaching, although the degree of need varies between application areas. Consensus was that BC and DLTs are an exciting, potentially industry changing, technology, particularly in areas that benefit from high levels of trust, security and accountability, such as resourcing and contracts. A common theme, however, was the need to be asking ‘how can distributed ledger technologies improve on the current?’, rather than ‘what do we need them for?’.

A second workshop taking place in the next quarter will have greater focus on specific areas of opportunity, including: smart contracts, responsible sourcing, and material passports.

On-going Project – Tackling Overheating in Urban Dwellings

Urbanisation, occupant behaviour, orientation, thermal mass, and building design all contribute to overheating; while climate change and urban heat islands are expected to exacerbate the associated risks in the UK. Following previous BRE work¹ investigating overheating in new-build homes and providing guidance, this new research furthers these studies through practical monitoring studies to help emphasise the causes of overheating and appropriate remedial actions.

This work has manifested itself in collaborative work with an anonymous property developer whereby several occupied flats in North London have been monitored for contributory factors to the overheating of dwellings. Monitoring has culminated in a peer-review journal paper in collaboration with Dr Rob McLeod, Loughborough University, and is being continued through a second, longer-term, piece of monitoring of a new block of flats in South London in collaboration with the Peabody Trust, expected to end in 2019.

The outcomes of monitoring have already and will continue to benefit manufacturers, planners, developers and occupants through the production of recommendations and guidance documents for all relevant stakeholders.

¹ Dengel A. and Swainson M., Overheating in new homes: A review of the evidence. NHBC Foundation Report NF46, November 2012.

Dengel A., Swainson M., Ormandy D. and Ezratty V., Guidance Document: Overheating in Dwellings. BRE Trust, May 2016.

Dengel A., Swainson M., Ormandy D. and Ezratty V., Assessment Protocol: Overheating in Dwellings. BRE Trust, May 2016.



Completed Project – The Action Programme for Responsible and Ethical Sourcing (APRES)

In the last quarter, there has been one Trust funded publication released; the APRES White Paper. The Action Programme for Responsible and Ethical Sourcing (APRES) was established in 2001 to tackle responsible and ethical sourcing of materials, product and people in property and construction markets across the world.

One of the key elements of guidance in this publication is the APRES Eight Pathways Model. Building on academic research, market intelligence and management systems and practices from some of the leaders in the field, the model provides a guide to better practice across a business's operation.

The eight elements of focus are, (1) Organisation strategy and policies, (2) Management systems, (3a) Assurance: compliance and auditing, (3b) Assurance: reporting, (4) Procurement and supply chain management practices, (5) Financial management, (6) HR, recruitment, staff training and development, (7) Communications, external relations and PR, and (8) Innovation, best practice, and continuous improvement.

The APRES White Paper aims to provide assistance to those wishing to embed responsible and ethical sourcing in their organisation through, (i) building on their understanding of the key issues, (ii) informing their thinking on professional approaches, and, (iii) presenting a new pathway model that covers strategy, operations and supply-chain issues (the APRES Eight Pathway Model).



Project Progress – Places

The robustness and resilience of communities and cities to natural and man-made external environmental influences. Climate effects, biodiversity and the interaction between buildings and their surroundings are a priority.

Current portfolio: Trust - £12k, Other contributions - £45k

New Project – Building Resilience to Natural Disasters

£57k total contribution

Community resilience, before and after the impact of a natural disaster, plays a key part in the successful recovery and stability of a disaster affected community and their associated environment. More and more the importance of community resilience is stronger as the frequency and severity of natural disasters grows. Data from the EM-DAT – International Disaster Database shows the significantly increasing number of reported natural disasters over the last century. The impact of these disasters also appears to be increasing in severity resulting in devastating destruction that affects hundreds of thousands of people in several ways, including: property damage, displacement, loss of livelihood and loss of loved ones. Damage to the natural and built environment was total in some areas.

While it may never be possible to stop natural disasters from occurring it is possible to reduce the time taken for affected communities to 'get back to normal'. Examining how it can be made to be more resilient and support other factors that contribute to community resilience such as capability building and skills, livelihoods, ecosystem services, health and hygiene, community ownership and sustainable management etc. is key to ensuring the successful recovery post disaster and reducing impacts of a disaster before it hits.

This work is largely a continuation from Building Resilience to Natural Disaster. The aim of this research is to create a knowledge/evidence base of practical resilience and sustainability based information which can be applied prior to or following a natural disaster to strengthen a communities' resilience to respond to and recover future disaster events.



Project Outputs – Humanitarian Demonstration Shelter

Following the last quarterly report where the opportunity for a collaboration with the Catholic Relief Services (CRS) to create a demonstrator for disaster relief was mentioned, a shelter has been created on the Innovation Park, Watford. This shelter acts as demonstration of the materials and techniques that can be used to create a quick, safe, and sufficiently long-lasting humanitarian shelter.

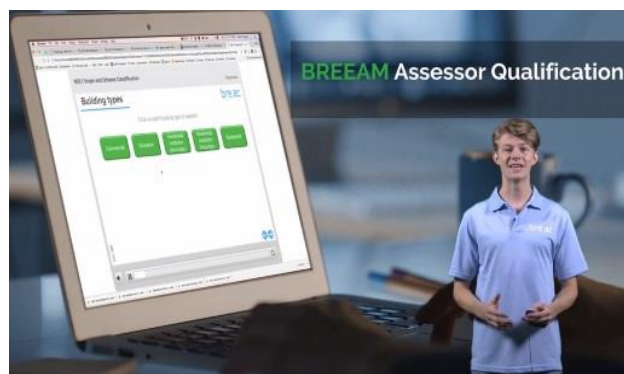
Through the collaborative partnership of CRS and BREs QSAND tool, this demonstrator acts as a source of knowledge for how considerations of local communities, materials and skills can address a number of issues following a disaster event while maintaining a sustainable approach throughout.

The shelter was built over a number of days at the end of September, with members of BRE staff helping to establish the roof.



Project Output – BREEAM International New Construction

The Academy has also developed an online version of the BREEAM International New Construction course. The training covers BREEAM by way of interactive content and technical modules, which gradually builds delegates' knowledge, understanding and confidence of the BREEAM International 2016 scheme. The course describes how to assess a project and provide a sustainability rating. On successful completing the course and examinations delegates are issued with notification that verifies their BREEAM International Assessor qualification.



The course can be found at: <https://bre.ac/course/breeam-international-new-construction/>, and a promo video can be viewed.

These training packages represent a further step change in the capability of the Academy's Digital team. The team not only uses desktop publishing software to create animations and edit images to deliver a coherent overall package, it uses 'green screen' to tailor the background and has filmed voice actors to make the courses more engaging.

Project Output – An Introduction to Flood Protection & Flood Prevention

This online course is designed for anyone that is responsible for the upkeep or management of a building that is at flood risk. It gives those completing the course an understanding of what is meant by the term "flood resilience"; information on where you can find out if you are at risk; and what you can do to minimise the impact of flooding on your building in the future. The course has been developed by BRE's Centre for Resilience in response to the Property Flood Resilience Action Plan as an output from the Resilience Thematic Programme and is of interest to local authorities, housing associations and other asset managers.

The course can be found at: <https://bre.ac/course/intro-flood-protection-flood-prevention/>, and a promo video can be viewed.

On-going Project – Other training activities

Other new training material in preparation includes the Flood Risk Assessor course which extends the introductory course and is aimed primarily at surveyors to enable them to undertake flood resilience surveys and enable them to become certified. We have signed an agreement with RICS as a key partner to link to their membership, and are in discussions with the Environment Agency, insurers and lenders to promote the course which we will launch early next year at a resilience event.

We continue to have considerable interest in our fire door inspection courses and have submitted numerous proposals and delivered an in-house course for the military services based in the Falklands. The Academy is working with academia to set the curriculum and qualification for a mandatory fire course in conjunction with IFE and other institutions. We are looking to broaden our whole fire training offering.

On-going Project – UK Centre for Moisture in Buildings

The UKCMB is an independent, not for profit organisation run by University College London, BRE, Heriot Watt University and the London School of Hygiene and Tropical Medicine. The primary aim of this centre is to develop a moisture-safe built environment in the UK, preventing damage to fabric, services and appearance from moisture effects and which have minimal moisture-related adverse impacts

on human health. Buildings should be moisture-beneficial, providing comfortable environments for occupants.

This project reviews global research on the effects of moisture in buildings upon occupant health. A gap analysis and critical assessment will also be performed to be followed with recommendations for essential research work. A 2 year knowledge transfer partnership has been formed between The Property Care Association and UCL Institute for Environmental Design and Engineering.

The purpose of this collaboration is to carry out a comprehensive study in to the problem of excess moisture in buildings. Using the expertise of the PCA and its members UCL will collect, analyse and develop the data. An increase in understanding the role moisture in building design and performance will be obtained and lead to new integrated processes of procurement, design, construction and use of buildings.

A guidance to homeowners will be produced on how to avoid moisture problems in existing homes. This guidance will be available in 2 formats; a short video that provides an introduction and explains with images what damp is, where the moisture in buildings comes from as well as introducing the notion of balance and how this can be achieved. The second format being an interactive web-based tool that will show how different measures or problems can push a building out of balance in a particular way and how the balance can be restored. A highly visual interface will collect information from the user and will provide summary advice for particular problems.



Outreach & Dissemination Activities

2017/18 outreach – Year to Date

Publications – 7 Titles Sales – 2,336 units Downloads – 74,047 Events – 5 New Articles - 82

Schools Programme

Plans to develop the Schools Programme to extend reach and provide more content to our visitors has been investigated in this last quarter. Meetings have been held with EDF's Digital Education Programme Manager to discuss their programme and how we may collaborate with them to broaden our content and engagement. Launched in 2008 and engaged with over 2.5 million children by 2010 we can learn a lot from the programme and if partnered with, could initially help extend our programme nationally for those who may not be able to come and visit the site, but could work online.

We have also been invited to work with the Armourers and Brasiers in their quest to broaden primary school science. The pilot scheme will work with Duncombe Primary School in London where the organiser of this scheme, BRE have offered assistance in creating a brief and business plan for the regeneration of an old IT room in to the space required for the science lab. This will involve working with the teachers to help them understand the requirements of the space and equipment and hopefully inspire them to put a real focus on science and help make teaching science more fun and interactive. The next steps are for the school representatives to visit BRE Watford to meet colleagues who are able to assist them and see the Innovation Park for some inspiration.

Events

BRE Open Day – Watford

On 8th September BRE hosted an open day to celebrate 20 years since BRE came under ownership of the BRE Trust. Seminars, tours and demonstrations were put on at the Watford site, designed to give a sense of our past and present. Seminars topics included: An overview – 20 years of the Trust and its positive impact, Principles in biophilic design, Cost of poor housing, Future Cities and the new Healthy Cities Index.

120 guests attended the tours throughout the day, showcasing BRE's facilities along with the official opening of the new Sound Transmission suite by IET President and BRE Chief Scientist, Jeremy Watson. 80 VIP guests were invited for lunch with guest speaker Baroness Tanni Grey-Thompson who shared her experiences in the House of Lords and as a Paralympian. She urged her audience to deliver communities that promote fitness, health and wellbeing, something that ties into BRE's core strategy.



IET Open Engineering Day

The IET Open Engineering Day is a national event held to inspire children to get into engineering. Consisting of many businesses opening their doors to showcase what they do. BRE shone the spotlight on engineering in the built environment with a great introduction from Julie Bregulla who shared what attracted her to engineering as a profession, including the influence of her father. Pete White gave a brilliant demonstration that involved a sheet of A4 paper and a litre and half of blackcurrant squash as part of his presentation on the 'science of shapes' which helped explain the engineering design of bridges.

The children had 40 minutes to build their own bridges with only paper, sticky tape and string and were eager to get involved. Awards were given for the following categories; best looking bridge, strongest bridge and the widest. A tour of the Innovation Park and the wind tunnel/structures lab were a highlight of the day, giving an insight in to some of the work we do here at BRE. All in all, positive feedback was well received from both the children and parents who left feeling inspired to build a better world.

BRE Innovation Parks Network Partners – March 2018

Our Network Partners will be invited to BRE Watford early next year to present their approaches, challenges and ambitions for shaping buildings, infrastructure, and communities via their Innovation Park activities. This will provide a truly international perspective on the challenges faced by the built environment and the role it plays in economic and societal development. The discussions will focus on identifying a short list of common themes on which the Innovation Parks Network can collaborate and develop future opportunities. BRE will prepare a report as a summary of discussions and findings from the Convention.

Smart Cities Symposium – BRE Watford

With support from BRE, the Office for the Chief Scientific Advisers (OCSA) hosted the Smart Cities Symposium at BRE Watford. Attendees were given tours of the Innovation Park at the BRE Smart Homes Lab, as well as presentations by CISCO and Ordnance Survey on the Manchester Cityverve project (<http://www.cityverve.org.uk/>), and from Martin Ganley on Smart Homes and Buildings work at BRE.

This was an opportunity to showcase the new BRE Smart Home Lab facility; a supporting feature of the BRE Centre for Smart Homes and Buildings. This retrofit of the Integer House contains some of the latest smart home technologies, allowing a range of research to be performed looking at energy and health outcomes, cyber security, connectivity and interoperability, among other issues. A number of companies are joining the Smart Home Lab project, including, nCube (<https://incubehome.co.uk/>) and O2 Home (<https://home.o2.co.uk/en-GB/>).

Digital Report

Accompanying this report are a series of videos documenting both directly Trust funded as well as Trust-related projects that are either just starting, or have come to a completion. The aim of this digital report is to showcase a new means of reporting on our programmes that is in line with our 'Digital by Design', while also providing an insight in to some projects that are indirectly linked to the BRE Trust, whether that be through previous research or demonstration projects, or through collaborations.

In this first series of digital reports, a broad topic area is covered, from using the Flood Resilient House to demonstrate a new flood resilience digital tool, to the beginning stages of an exciting new project with Redevco. The four videos can be found on the BRE Trust Website and include:

1. The Property Flood Resilience Tool
2. LENDERS
3. Serenity – the real estate asset management database
4. Homes for Life

Partnership Programme

University of Edinburgh

BRE Centre for BRE Fire Safety Engineering

No. of active PhD Studentships: 2

The group remains active in publishing and grant proposal writing, and the output and success is very good. Work was started on the Grenfell Tower Response grant, and the collaboration with BRE on the use of the Burn Hall is essential for the project. Work has also commenced on a proposal for the EPSRC second call for Prosperity Partnership, and the plan is for BRE to be the industrial lead on a bid on Fire Resilience with the University of Edinburgh as the academic partner institution.

The new academic year started, and the interest in Fire Safety Engineering courses is booming, with several of the courses having record attendance. Dr Law commenced teaching Structural Design for Fire 5. Dr Law has re-structured the class to include a project and has developed a series of original course notes to support the class. In addition, we welcomed both SAFE and IMFSE students. A new buddy system with PhD students linked to one or two MSc or MEng students has been initiated to include these students to the centre and with the hope that it will increase the recruitment for both programs, but also improve the internal recruitment for PhD studies.



Ben Ralph, 3rd Year, Coupled Hybrid Modelling for Fire Safety

Ben has published and presented his work at the 16th International Conference on automatic Fire Detection (AUBE) and Suppression, Detection and Signalling Research and Applications Conference (SUPDET) in Washington DC., and he has also a member of the creation and steering committee of the Fire & Smoke Modelling Forum UK (fsmf.uk). The forum aims to enable communication and knowledge transfer between practitioners, approval bodies, researchers working in fire and smoke modelling in the UK.

New funding secured within the last quarter:

- £21k – “Grenfell Tower Response: Urgent Research on External Cladding Fires” Carried out by the BRE Lecture Angus Law
- "Characterising component failure in composite structures exposed to fire." EPSRC iCASE studentship, with £33k from Arup
- EP/R023875/1; PI-Law; CIs Jomaas, Hadden and Bisby. Total grant value: £211,059

Activities planned for the next period are:

- Significant activity on the Grenfell Tower Response grant
- Inaugural Lecture by BRE Chair Grunde Jomaas (November 2)
- Deliver on existing EPSRC, Arup iCASE, International Paint, and RAEng funding.
- Submit proposals for Prosperity Partnership with BRE as the industrial lead
- Working on a larger grant with internal submission at School and College level at the University of Edinburgh before it can be submitted externally.

University of Brasilia

Integrated Sustainable Communities

No. of active projects: 3

The main outputs from 'Resilience' project covers three areas:

- The Android App tested and working with Coral Cities and Coral Campus integrated, it will be used in University of Brasilia; UFMG; IEG; UFMT and UNIVAG.
- Mapping of the governance of the electric energy sector in Brazil for energy efficiency. This work is part of the evaluation of a good governance of the energy sector for the energy efficiency.
- Research exercise – mapping of the governance of the water supply sector. This is an important exercise as it is allowing us to test the model analysis as well as widening our scope to other sectors.

'PISAC' project's location has been moved to the UnB main Campus. This a very important achievement and has strengthen the project in every possible way. Construction Process Procurement is waiting for the funds from FINEP which should be passed to FINATEC at time. The Prototype square should be complete by July 2018.

The SUSTENTA Network has hosted presentations of LACIS and CECIS (BRE/UnB) activities and projects at UFMT in Cuiabá. At this workshop it has been decided to structure a network of 17 Universities form the Central Part of Brazil



Fiona Gleed, 3rd Year, Flood Resilience: Improving Building Drying Times

Fiona's project is investigating reducing the indirect costs for flooded buildings by limiting the moisture uptake in the building fabric and reducing the drying time of the building after a flood event.

In the last quarter, Fiona has completed the 1st flood cycle with monitoring on-going pending second cycle, and an acid precursor has shown interesting results and an alkali precursor is being developed for comparison

The discovery also includes stub walls have been inundated for a flood cycle and monitored over a 6-week drying period; sol-gel coating has shown significant differences in water absorption, particular for mortar samples; variation of water absorption with hydrostatic pressure due to depth of exposure up to 1m has been excluded as a significant factor.

University of Bath

Centre for Innovative Construction Materials

No. of active PhD Studentships: 5

A period marked by the successful completion of two European projects, recruitment of a new member of staff (Shahabpoor) and departure of three long-standing centre staff members (Ibell, Orr and Chang). Recruitment of replacement staff continues

Project Completed This Period:

- ECO-SEE: Eco-innovative, Safe and Energy Efficient wall panels and materials for a healthier indoor environment. 1.9.2013-31.8.2017.
- EU FP7. Marie Curie ITN: Endure project (Tim Ibell, PI). 1.10.2013-30.9.2017.

Colleagues in CICM have been working on new research proposals, including:

- Leverhulme Trust. Doctoral training centre (Dynamics and buildings). Darby. Submitted.
- EPSRC. VOC Sorption properties of building materials. Maskell. £120k.
- EPSRC. Numerical modelling of energy piles. Pelecanos. £120k.
- Royal Society Challenge Grant. Food resilience for housing in Sri Lanka; Walker, Sharma and Maskell. (£100k). Submitted.

University of Hertfordshire

Integrated Systems

No. of active PhD Studentships: 2

The university are currently recruiting a Chair, who will lead the new BEng in Civil Engineering that was launched this autumn. BRE are providing access to laboratories (concrete) and also delivering other key lectures as part of this course (BIM and structures). The relationships with UoH also focuses on the integration of digital systems in the built environment and will become more active in the delivery of the Connected Built Environment programme as it develops.

University of Hertfordshire UH

Emilio Mistretta, Year 4, Device free indoor occupant localization system for smart buildings Utilising wireless signal interference to enable homes to intelligently Adapt to their occupants

This period has largely involved the writing up of my final thesis. Emilio also presented at SpliTech2017 international conference on Computer and Energy Science (Paper to be published in IEEE explore) Presented with a BrightSparks award in recognition of being one of a cohort of most talented young electronic engineers in the UK with the ceremony taking place at the houses of parliament London.

University of Loughborough

Resilience and Resource Efficiency

No. of active PhD Studentships: 5

An annual review was held at the University in the last quarter to review progress of the 4 current 5 PhD students, who are all in their final year. Also, potential research topics for future collaborations. As a consequence of this a proposal for a new studentship focused on energy efficient has been submitted for consideration to the Programmes Committee.



Loughborough University

Madeleine Edgeworth, Year 3, Measuring community resilience to natural hazards in low and middle-income countries

In the last quarter, Madeleine has developed assessment criteria to summarize the key components of a natural hazard resilience assessment tool. Madeleine is still in India at the moment to carry out her fieldwork. She interviewed the DRR and resilience expert Andhra Pradesh of RedR India in Pune and gained insight into challenges presented by natural hazards across India.

While in India, Madeleine visited VNIT University, Nagpur to discuss with Dr Sameer Deshkar and PhD student in socio-ecological community resilience to climate related hazards, Shruthi

University of Strathclyde

Integrated Systems

No. of active PhD Studentships: 4



Maria del Carmen Bocanegra-Yanez, Year 4, Detailed Simulation of the Indoor Environment as a Tool to Design Ventilation Systems in Low Energy Houses

In this period Maria has continued with her thesis writing up schedule, and has also has presented her work at the PLEA 2017 conference, the Building Simulation 2017 Conference and the Annex 68 expert meeting. Maria has published a paper 'Assessment of spatial and temporal distribution of thermal comfort and IAQ in low energy houses' to explain a more sustainable future begins with low energy buildings which must combine comfort and function using passive systems and new evolving technologies. Another recent publication from Maria is 'Modelling indoor environmental quality in low energy housing' assess the impact that pollutant sources and ventilation strategies have on thermal comfort levels and indoor air quality (IAQ) in low energy houses through a case study using the detailed thermal simulation program, ESP-r.

Secondments

Sian Hoare – Undergraduate studying for a BSc (Hons) in Geography and Natural Hazards

As part of a 10 month secondment from the University of Coventry, starting in September 2017, Sian has joined the QSAND team to help further the research and development of the tool with specific regard to the natural ecological systems and settlement. In addition to the technical work she will be helping with developing communications and stakeholder engagement and management.

Over the following months Sian will also assist the Centre 4 Resilience as they grow the www.floodguidance.co.uk website; an information service formed as part of the Property Flood Resilience Action Plan.

Na Tang – Studying for an MSc in Modern Building Design

Na Tang has joined the BIM team from the University of Bath on a 6 month placement. During her placement, she will be completing research to determine the requirements for implementing BIM data to match design criteria in relation to the creation of digital tools to support the design and operations stages of projects. This work will contribute to existing research streams and assist the production of digital tools, as based upon the data standard established with LEXiCON, which will aid BRE services and products such as BREEAM, Greenbook and Redbook.

Appendix A: Further Outreach and Dissemination Activities

Publications Releases

Further to the publications listed above, the titles *'Energy efficient refurbishment update of BR262 (352 460)'* and *'Building Elements: walls, windows and doors (revision)'*, both delayed due to the Grenfell fire, are now undergoing a further internal review as they contain fire safety elements. Publication of these is expected during the 3rd Quarter.

Sales & Downloads

The number of IHS Press and BRE Bookshop direct sales was 1,053 in this quarter, a decrease of 17% compared to the last quarter (1283) the figure is also a decrease of 41% on the same quarter last year. It is worth noting that there are 394 BRE Connect online subscribers that receive BRE's entire listing consisting of circa 1800 publications: the potential outreach that cannot be captured via the current method of data analysis could be as much as 177,300 publications being accessed in the last quarter.

The total number of downloads from CIS for the last quarter was 35,926, a slight decrease of 6% from the last quarter (38,121) It is also a 5% decrease on the same quarter last year.

Fire titles continue to dominate the Top 10 lists of downloads and bestsellers, more than likely relating to the Grenfell fire disaster earlier in the year; which BRE Global are continuing to do fire testing for. Other observations from the data received are:

- BR135, a digest presenting a new classification system for fire performance of cladding on multi-storey buildings
- DG365, the Soakaway Design digest aids designers to support planning and development applications.
- A series of 13 publications are available from 'The Expert Collections' these continue to provide a convenient format for CIS users with 5 collections appearing in the Top 10 downloads.
- Old perennials such as BR209: Site layout planning for daylight & sunlight, DG365 Soakaway design, BR211 Radon guidance, BR470 Working Platforms, SD1 concrete and BR453 Recognising wood rot & insect damage; continue to sell steadily.



BRE Bookshop Website

Staying consistent with last quarter there were nearly 35,000 hits on the BRE Bookshop website, although this is a drop of 32% on the same quarter last year. This may be, in part, due to the location of the BRE Bookshop on the new bregroup.com website. However, the BRE Bookshop re-launch is currently being tested and will sit within the BRE Academy section of the website. It's look and feel mimics bre.ac and is better integrated, e.g. publications related to specific courses are highlighted and linked.

At the same time, with support from IHS, we are close to completing a major archiving activity of older publications where some of the information within them does not fully reflect current codes and standards.

Designing Buildings Wiki

By the end of the 2nd quarter there were 5,683 articles on Designing Buildings Wiki of which 215 of these are from BRE. 27 new articles were published in the last quarter this has increased more than threefold covering aspects of fire, energy storage, concrete and dementia. During the 2nd quarter Designing Buildings Wiki was visited by 881,951 unique users, with 22% increase in the number of page views compared to the same quarter of 2016, 14% less than last quarter.

BRE Buzz

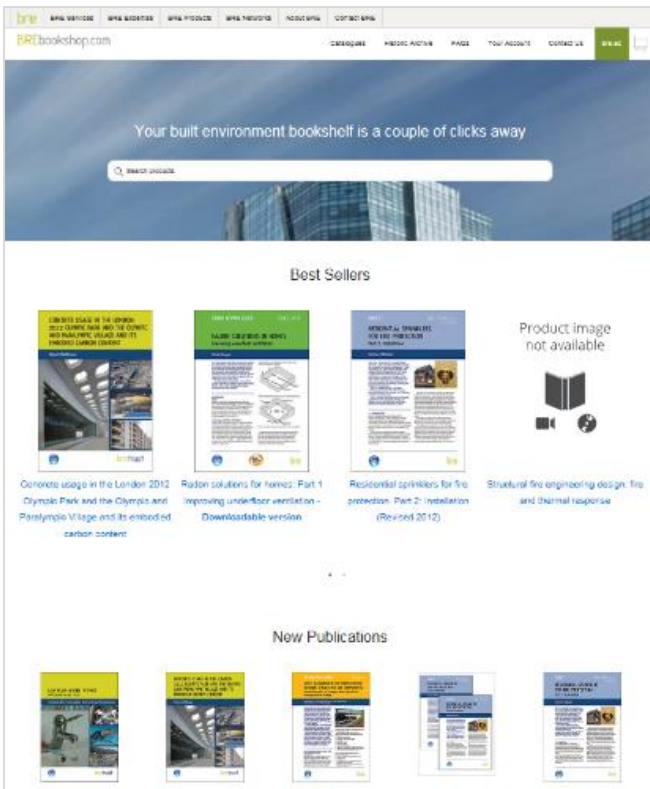
Using our online platform for news stories and blogs there were 25 articles in the last quarter, 3 of which being Trust related either with past or current funding. These articles alone attracted over 700 viewers, with over 14,000 site visits between July and September this is an 18% rise since last quarter, a 12% decrease on the same quarter last year. These articles covered topics such as:

Helen Pineo, Associate Director – Cities wrote a report on Healthy Planning and Regeneration. It covers her work with a London Borough council to raise the profile of health and wellbeing in the Council's planned activities, particularly for the regeneration of Old Kent Road.

Gavin Jones, Director of SABRE wrote a blog in response to the Chief Planning Officer for England's letter to planning authorities promoting the importance of planning in delivery a safe and secure built environment. BRE Global launched SABRE, a 3rd party security assessment and certification scheme which is used by developers, their project teams, police and planners to manage the integration of security in new developments. Funding from the BRE Trust helped to initiate this project and provide the vital research needed to launch this new scheme under BRE Global.

Twitter

Since its inception in April the @TheBRETrust account continues to extend outreach and communication for BRE Trust activities. With a consistent rise of followers and 'tweets' the profile of the BRE Trust is being raised internationally with the University students enthusiastically using the platform to promote their work in industry.



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BRE Trust

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