

### History and Vision

The R&D strategies of the IEA EBC Programme are derived from research drivers, national programmes within IEA countries, and the IEA Future Buildings Forum Think Tank Workshops (to be held again in October 2022). These R&D strategies aim to exploit technological opportunities to save energy in the buildings sector, and to remove technical obstacles to market penetration of new energy efficient technologies. The R&D strategies apply to domestic and non-domestic buildings and community systems. The vision of the EBC Programme is that for new buildings and communities sustainable solutions have been adopted by 2030 giving net zero carbon dioxide emissions, and a wide range of reliable technical solutions have been made available for the existing building stock<sup>1</sup>. Its mission is to accelerate the transformation of the built environment towards more energy efficient and sustainable buildings and communities, by the development of knowledge and technologies through international collaborative research and open innovation.

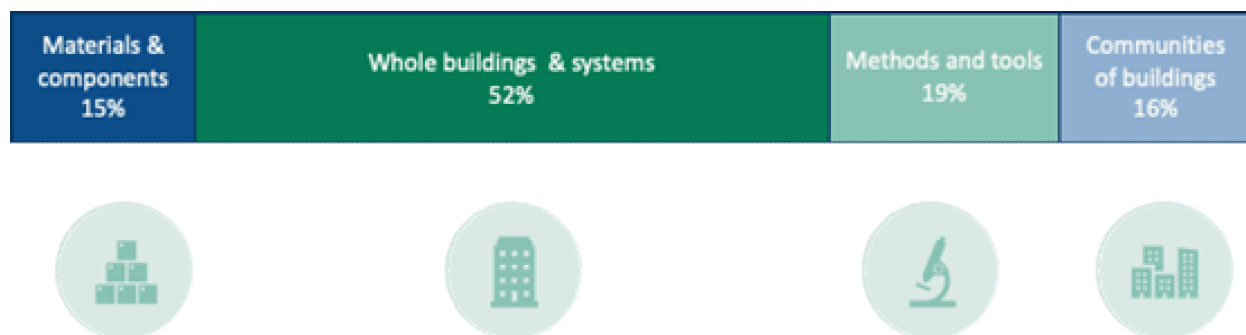


Figure 1 Historic EBC research focus

It is important to note that, despite being a Technology Collaboration Programme, only a small component of the research undertaken by EBC falls into a strict view of technology and the majority of the research is focused on buildings as systems and as part of communities.

Looking to the future the challenge facing the UK, and many other developed countries, is overwhelmingly the need to decarbonise the existing building stock. There is still a major role in this challenge for emissions reduction through reduction of energy demand as illustrated by a recent CREDS publication<sup>2</sup>. However there is increasingly a balance to be struck between energy demand reduction and decarbonisation of the energy supplied to buildings. A number of factors limit the extent and pace of energy demand reduction in buildings. These include the practical challenges of installation, upfront costs, lack of a trained workforce, and constraints specific to buildings that are 'hard to treat' (eg: listed buildings, conservation areas and unconventional building systems). There is a further consideration which is only just coming to the fore in which we may need to consider the carbon emissions associated with the supply and installation of deep retrofit measures against the embodied carbon in the deployment of grid-based renewable energy, such as that from offshore wind.

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<sup>1</sup> [EBC Strategic Plan 2019-2024](#)

[REDACTED]

### Timescales

In the context of collaboration within the EBC TCP it is important to understand that a the project lifetime of an annex is typically five years, involving a one year preparation phase, a three year operation phase and a one year reporting phase. Whilst it is sometimes possible to deliver interim findings, the main findings and reports are delivered at the end of the project. There are many topics that require this length of study and would benefit from the collaboration with international partners, especially where these partners have more or different experience in the specific research topic. For faster results Working Groups provide an effective mechanism to assemble and disseminate existing knowledge and conduct limited and rapid research.

### Upskilling to deliver new technologies

There may be further technological advances, thinner insulation materials for instance as studied in Annex 65<sup>3</sup>, and it will be important to develop research that supports new materials and components such as advanced glazing technologies. However, equally important will be the challenges faced in installing retrofit measures to deliver the expected performance without unintended consequences and further research building on experience of PAS 2035 could be valuable and may be of interest to other EBC members.

It is likely that progress with faster and larger volumes of low carbon retrofit will come through more strategic programmes, such as the SHDF<sup>4</sup>, which by their scale deliver system and cost efficiencies, whilst providing the certainty needed for investment in training the work force. Annexes 61 and 75 have touched on aspects of this but further work could be undertaken to support strategic programmes.

### Decarbonisation of heat

The key area of technical development will be in the decarbonisation of heat in which heat pumps will play a critical role and there is much need for research on the technology and its applications. This is where collaboration between the TCPs will be important. HPT has recently approved a new (HPT Annex 60) on Retrofit Heat Pump Systems in Large Non-domestic Buildings and EBC has agreed, in principle, to collaborate on this project. EBC will need to carefully consider what aspects of heat pumps, if any, it wishes to take a lead on given the interests of other TCPs in this topic. Collaboration will be crucial to avoid duplication. This applies equally to community energy systems where despite EBC Annexes such as 63, 64, 75 and 83 the DHC TCP would normally take the lead.

### Closing the performance gap

The cross-cutting area of research that should persist for some time to come is the further identification and understanding of the performance gap between our predictions and expectations of the energy and environmental performance of buildings and their performance in practice. Several annexes have developed tools to test in-use performance in domestic buildings (eg: Annexes 55, 71 and 81) but more work needs to be done and attention should also be paid to the long-standing issues in non-domestic buildings.<sup>5</sup>

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<sup>3</sup> [Annex 65 Long Term Performance of Super-Insulating Materials in Building Components and Systems](#)

<sup>4</sup> [Social Housing Decarbonisation Fund](#)

<sup>5</sup> [Assessing building performance in use 5: conclusions and implications, Bordass, Leaman & Ruyssevelt](#)

Research Experience

[REDACTED]

Research Project Proposals

Based on the observations on the research landscape presented in 1a above, I would propose two annexes which would address the first two objectives of the current EBC Strategic Plan. The first relates to the objective of “reinforcing the technical and economic basis for refurbishment of buildings, including financing, engagement of stakeholders and promotion of

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<sup>6</sup> [PROBE](#): Performance Review Of Buildings and their Engineering

co-benefits”. This would seek to examine and establish **best practice in low carbon retrofit** to ensure that projects are implemented using a fully coordinated management system that results in close to zero defects, avoids the risk of unintended consequences and achieves a result that has the potential to deliver the expected energy and emissions performance. This would include ensuring that systems are, as far as possible intuitive, and the process includes an effective handover procedure to fully inform the occupants about how to obtain the best energy and environmental performance. This annex could be built on the growing experience of applying PAS2035 in the UK and similar methods in other EBC member countries.

My second project proposal would relate to the EBC objective for the “improvement of planning, construction and management processes to reduce the performance gap between design stage assessments and real world operation”. There is still work to be done in this field and it should look at closing the gap from both ends; meaning it should review prediction methods and their applicability and value (eg: EPCs and SAP) as well as developing the means to demonstrate, test and potentially improve in-use performance using methods that involve the minimum of intervention and disruption to building occupants. Annex 71 undertook valuable groundwork in this field of research but with the UK development of the SMETER<sup>7</sup> system, which has been supported by BEIS, this work could go further in domestic buildings. There is also scope to develop comparable approaches for non-domestic buildings which could draw on the Australian NABERS Design for Performance method which has recently been adopted in the UK by the Better Buildings Partnership.

#### Chairing

[REDACTED]

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<sup>7</sup> [Smart meter enabled thermal efficiency ratings \(SMETER\) technologies project: technical evaluation](#)

[REDACTED]

# [REDACTED]

A significant barrier to garnering interest in participation in IEA annexes is the lack of dedicated UK funding for this purpose. [REDACTED]

[REDACTED] If successful in this proposal, I would want to work with BEIS to establish clearer mechanisms for funding participation in IEA annexes. This may become increasingly important and valuable in a post-Brexit (post-EU Horizon programme) Britain.

A few other factors also play into the challenge of developing an audience for engagement with EBC activities:

- Energy in buildings and communities is a very broad church and it is therefore difficult to target a specific audience.
- There is considerable overlap with other TCPs such as SHC, HPT, DHC, PVPS, etc. All of which appear to have more identifiable target audiences whose members typically also have interests in energy in buildings and communities more generally.
- Time for engagement in non-work activities is becoming increasingly precious and both individuals and companies are looking to expend what they have in ways that deliver tangible returns.

Learning lessons from the Covid affected 2020 National Team workshop there are 4 actions that I would seek to take in discussion and collaboration with BEIS:

1. Seek to collaborate with other TCPs on joint engagement activities to avoid duplication and develop integration on future annexes (as increasingly requested by the IEA)
2. Now that in-person events are back, investigate the possibilities to collaborate with mainstream conferences such as Future Build to provide a platform for engagement
3. Restart discussions with UKRI about future funding mechanisms to support involvement in EBC annexes. [REDACTED]
4. Discuss with the organisations listed above the potential for each of them to host at least one event a year which provided a platform for EBC to report and engage.

### 03 Knowledge transfer plan (1 page) 10%

The response to the question is strongly linked to the response to the previous question since engagement as part of a 'National Team' is likely to come first and foremost from an understanding of the work of the EBC annexes and the value they can deliver. Hence this response elaborates a knowledge transfer plan that is integral to the proposals put forward above.

However, before discussing a UK knowledge transfer plan it is important to recognise that the organisations involved each annex are usually best placed, to facilitate knowledge transfer of their findings in order to create impact. In the past this was often not considered until the end of the project. [REDACTED]

Furthermore, annexes often use international conferences to coincidentally facilitate annex meetings and participants will often submit papers and presentations related to the annex topic to justify their presence at these conferences. I would encourage UK partners to participate in this way and ensure that they are actively promoting their contributions to the international research.

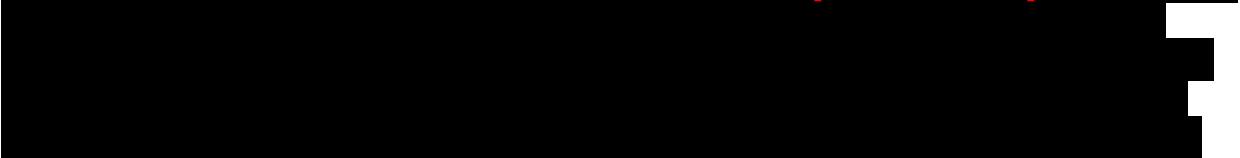
I would propose to use the mechanisms and channels identified in the previous section to disseminate and promote the results of all annexes, including those without UK participants, since these may still be of equal interest to UK audiences. Working with our in-house comms team I would seek to find additional routes to continue to build the distribution of the EBC Newsletter and Annual report to a wider UK audience than is currently signed up to receive them. In parallel with this I would redouble efforts to secure contributions to the newsletter and Annual Report from UK annex participants and I would seek to support them in the preparation of material to the extent that that would be possible and helpful.

The above activities fall under the heading of dissemination and whilst they serve as a form of knowledge transfer the likelihood of creating real impact is uncertain.

To develop a more strategic approach to knowledge transfer and be more certain about creating impact I would propose a new approach to be developed in collaboration with BEIS. With the support of the BEIS official delegate and help from other contacts I and colleagues maintain in BEIS and other departments such as DLUHC, DfE, NHS, I would seek feedback on the relevance of current and recently completed annexes to the development of UK energy and carbon policy and the underlying technical support framework. From this I would develop a knowledge transfer plan for those annexes or components of annexes that are considered to be most useful and relevant. The plan would identify specific units and individuals in government departments and agencies, professional and industry bodies, and other specific target audiences to which synthesised briefing notes could be delivered summarising key annex findings and their potential value. The aim would be to deliver these notes in concert with the official delegate and other relevant BEIS officials in anticipation that their import and impact would therefore be enhanced.

04 Service delivery (2pages) 20%

As an experienced delegate/alternate delegate I am very familiar with the operation of the EBC ExCo and the general duties and responsibilities of delegates. [REDACTED]



[REDACTED]



Plan for delivering the suggested tasks

*Attendance to ExCo Meetings (4 days/year):*

[REDACTED]



*Gathering information for an annual report (2days/year):*

This report would be compiled using the material available from the EBC annual report with additional material and interpretation to make it relevant to a UK audience.



*TCP administration, meeting minutes, invoicing (1 day/year):*

Subject to discussion about the exact BEIS requirements for these activities, notes will be provided from the ExCo meetings and other relevant meetings. Support will be provided to ensure timely submission of invoices.

*Coordinating a National Team and relevant adhoc meetings (3days/year):* Time will be allocated in relation to the plans for the National Team activities and the knowledge transfer plan as set out above. Time will be invested in the proposed discussions with the official delegate and others in BEIS to ensure that these activities are well targeted and effective.

*Producing a report of TCP activities for BEIS:*

A summary report of the activities of the TCP will be provided to BEIS at six month intervals following each ExCo meeting. The contents of this report to be agreed with the official delegate.

*Chairing TCP (liaising with secretariat, developing strategy, representing the TCP at external meetings (4days/year):*

[REDACTED]

*Developing a Programme of Work for new research project (5days/year):*

[REDACTED]

*Active participation in a sub-task led by another country (e.g. information gathering, fact sheet writing, data analysis) (4days/year):*

Possible activities in line with these requirements will be discussed and agreed with the official delegate for each year of the contract. These could for instance include secure more detailed insights into an annex in which the UK does not have an active participant if that annex can be shown to be of interest and value to the UK.

[REDACTED]

[REDACTED]

[REDACTED]