



**A Strategic Evaluation of the Knowledge Partnership**

**Between Leicester City Council and De Montfort University**

**Supporting the Leicester Building Schools for the Future Programme**

**Dr Fred Paterson**

**[fred@accelerate-the-shift.org](mailto:fred@accelerate-the-shift.org)**

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## 1. Executive summary

The Knowledge Partnership was a collaboration between De Montfort University and Leicester City Council between 2009 and 2016. It aimed to embed knowledge of low carbon building design into the design, construction, refurbishment and operation of schools administered under Leicester City Council's Children's Capital Projects. This resulted in Leicester becoming one of the first local authorities to set out a dedicated carbon reduction and sustainability contract for its schools' building programme.

The Knowledge Partnership also successfully responded to significant issues with the first phase of schools built under the Building Schools for the Future (BSF) programme in Leicester, which were performing well below their sustainability design expectations. Even with some highly unfavourable conditions, the Knowledge Partnership ensured that 'in-use' building performance of the supported schools match (and in certain cases even exceed) their sustainability design expectations.

The Knowledge Partnership achieved this by leading on the design, delivery and operational support relating to energy management and carbon reduction in these schools, and by engaging with politicians, design and construction teams and staff and students in the schools. The Knowledge Partnership team ensured that buildings were designed to high energy efficiency standards, and that schools were equipped to manage their new buildings efficiently into the future. This was accomplished by creating tools, guidance manuals and resources that have empowered users to become intelligent clients and building users. Remarkably, this has been delivered through a single (one full-time equivalent) Associate based at the City Council, working in collaboration with staff from Leicester City Council and De Montfort University's Institute of Energy and Sustainable Development.

Even though they are 11% larger in area, the new schools built under the Knowledge Partnership have delivered a 30% reduction in energy consumption over their first full year of operation,<sup>1</sup> whereas the earlier projects produced 60% more carbon emissions than the buildings they replaced. The evaluation concludes that:

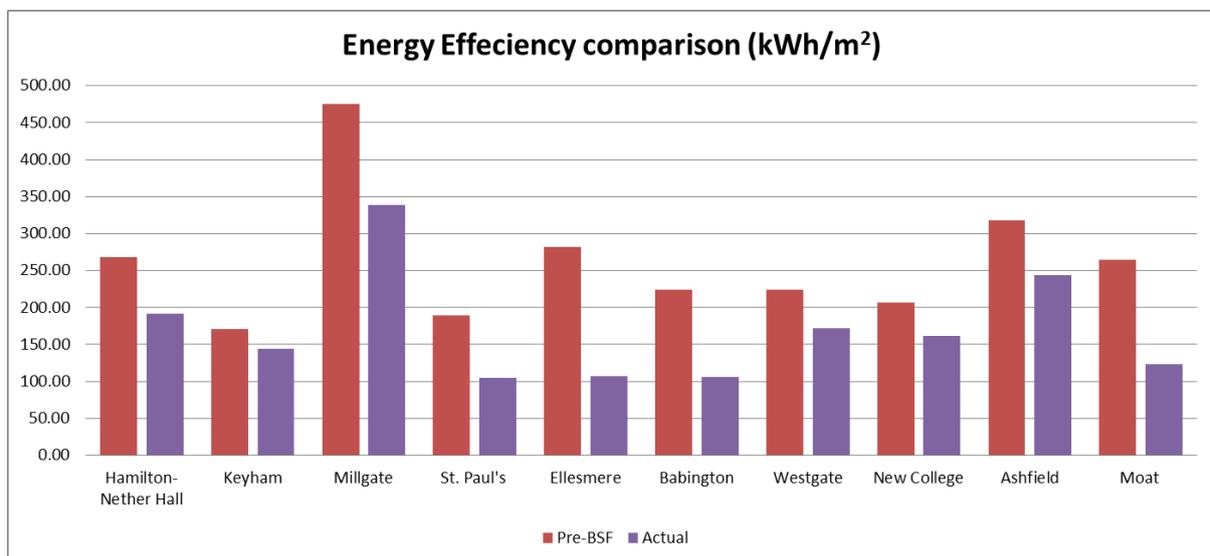
- The Knowledge Partnership has been **cost effective** and **highly successful in meeting its objectives**. It has created a variety of benefits that include significant immediate and potentially long-term cost savings.
- The Knowledge Partnership developed a **'whole systems' design** approach that gave emphasis to end user outcomes over narrower attention to project outputs. This has been a particularly powerful approach, and could be used when commissioning any new public building to ensure performance more closely matches design expectations. However, more work is needed to embed this approach across the local authority.
- More broadly, knowledge partnerships offer a **repeatable and cost-effective approach** that could support a range of whole city initiatives – allowing a leaner Leicester City Council to access the extensive specialist expertise of De Montfort University and other City stakeholders.
- The evaluation concludes that whilst knowledge partnerships of this nature can be achieved with a very lean team, a strong collaborative culture, common purpose, adaptability and an appropriate authorising environment are crucial to its success. This involves recruiting team members with determination, enthusiasm, the right expertise and an outcomes orientation.

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<sup>1</sup> Based on results from 11 of the 17 Phase 2b-6 schools supported by the Knowledge Partnership for which sufficient data was available. This is described in full in Section 7.1.

Leicester City was the UK’s first Environmental City, and retains a strong commitment to carbon reduction and environmental transition through the Mayor’s Delivery Plan, the Greener Leicester initiative and its sustainability strategy for schools. Four major factors, however, have worked against the environmental ambitions of the Leicester BSF programme: political changes and austerity measures from 2010 constrained the programme budget and compressed project timelines. This, in turn, fostered a compliance mind set amongst contractors that was compounded by a high turnover of BSF directors and the loss of staff in key City Council teams.

Nevertheless, the evaluation offers compelling evidence that the Knowledge Partnership (KP) added significant value to the BSF programme and was highly successful in meeting its own objectives. The success of the KP approach is reflected in the significant improvement in energy performance between the first phase of BSF schools and the 17 schools that enjoyed the involvement of the KP. The figure below shows the improvement in energy efficiency for 11 of the 17 schools supported by the KP.<sup>2</sup> Even with an 11% increase in estate area, the data suggests that across these 11 BSF schools, an overall 30% reduction in energy consumption has been delivered under the KP.



The evaluation concludes that the sustainability performance of these buildings has been achieved in unpromising circumstances because the two KP organisations have worked together with a common purpose to make a difference to the design and performance of these public buildings. The success is also down to the sustained commitment and adaptability of the KP team. This includes the KP Company Supervisor who displayed resolve and guile to establish, and then retain, the single (one full-time equivalent) post that supported the focus on sustainable design and user outcomes – and who acted as a bridge to the expertise of the Institute of Energy and Sustainable Development (IESD). It is also clear from the many comments of evaluation respondents that the expertise, determination and ‘dogged attention’ to detail of the KP Associate was a major factor in the success of the partnership. Finally, this project would not have been nearly as successful without De Montfort University’s (DMU) commitment to delivering exemplar buildings and positive outcomes for the City – pursued at some expense to their own ambition to create research papers and other

<sup>2</sup> The figure is based on actual energy consumption in the first full year of occupation for 11 of the 17 BSF schools where full data was made available. Note that Hamilton Community College and Nether Hall School are co-located and are thus treated as a single project for the purpose of this study.

academic work. A number of related papers are listed in the References section at the end of this report.

The *'whole systems' approach to design*, with its end user outcome focus, has been a particularly powerful approach. The benefits of taking a strong outcomes focus is evidenced by the extremely positive response of school staff to the KP handover support – such as the Building User Guides and energy monitoring training. Certainly, more could be done to share this approach with the remaining BSF schools. However, this would require additional capacity from Leicester City Council (LCC) to shift the 'failure demand' around building snags to 'value demand' for KP-style support. The evaluation also makes the case that, ultimately, making savings on the project budget by diminishing end user engagement in design, planning and handover stages was a false economy.

It is also worth emphasising that only 2 of the 17 schools have had dedicated sustainability funding. This means that the efficiencies described above have been almost wholly delivered in the absence of any 'ring-fenced' funding for carbon/energy reduction. It is also clear that the benefits achieved were at significantly less cost than through a standard consultancy approach. This evaluation shows that KP offers a cost-effective way to access specialist expertise from DMU and provide leadership (of the type described above) of complex, high stakes projects of this nature. As such, it offers great potential and opportunity for other City-wide initiatives.

It has, however, not been all plain sailing for the KP. Some of the significant sustainability building 'snags' could have been avoided if earlier advice provided by the KP to LCC senior managers had been acted on – most notably, in relation to bio-fuel systems, solar panels and overheating issues. Indeed, the KP has been a courageous ambassador for the LCC strategic ambition to reduce emissions in the face of weak contracting of building sustainability requirements and variable commitment at BSF director level to these aims. Undoubtedly, more could have been achieved if the 'authorising environment' for the work of the KP had been stronger.

The evaluation has highlighted technical capacity and leadership capability issues within the local authority which may need to be addressed if LCC is to become an intelligent commissioner of services, within an even leaner corporate structure, in the future – most notably in the areas of commissioning and strategic partnership development, as the following quote illustrates:

*"[The KP] has worked. I don't think without [it] you would have got the buildings that you have got. [In] order for the council to be secure in what they were getting they needed that person in place or that organisation in place to protect them, because quite frankly they are naive, quite frankly they need that protection."* (Operations Director, Galliford Try, construction company)

Hindsight is a fine thing, and we should be mindful of the difficult prevailing circumstances that were beyond the control of the stakeholders of this complex project. However, there are clearly some important lessons to be learned here. For example, better attention to the 'cultural fit' of the organisations that were collaborating to deliver the building programme, tighter contracting and clearer sustainability goals from the outset would undoubtedly have provided significantly more fertile ground for the KP to operate within (these issues are explored more fully in Section 10).

Although these latter points lie beyond the contracted remit of this evaluation, the impact on the work of the KP has been significant, and so reference is made to them in the strategic recommendations – which are themselves offered as a catalyst to further meaningful reflection on the lessons learned, and as a final conclusion to this evaluation.

## 2. The Knowledge Partnership team

The Knowledge Partnership (KP) was a collaborative project between De Montfort University (DMU) and Leicester City Council (LCC) (2009-16) that aimed to embed knowledge of low carbon building design through the design, refurbishment and operation of schools under LCC's Children's Capital Projects. The KP team worked with 17 of the 22 Leicester Building Schools for the Future (BSF) schools to drive innovation, embed research knowledge and promote collaboration and growth.

The KP was originally funded as a Knowledge Transfer Partnership (KTP). This provided funding for a single full-time equivalent post, the KP Associate. This role was filled by one individual throughout the partnership. Two other posts supported this role – the Academic Supervisor role based at DMU and the Company Supervisor role based in LCC. The incumbents in these roles shifted over the duration of the project, but key individuals are listed below. DMU provided two additional roles to oversee the work of the KP.

**Amrita Dasgupta** (KP Associate), Strategy Lead Sustainability, Children's Capital, Leicester City Council, [www.linkedin.com/in/amrita-dasgupta-729a4712](http://www.linkedin.com/in/amrita-dasgupta-729a4712)

**Dr Paul Cropper** (Academic Supervisor), Senior Research Fellow, School of Engineering and Sustainable Development, De Montfort University, [www.dmu.ac.uk/about-dmu/academic-staff/technology/paul-cropper/paul-cropper.aspx](http://www.dmu.ac.uk/about-dmu/academic-staff/technology/paul-cropper/paul-cropper.aspx)

**Chetna Patel-Liburd** (Company Supervisor), Head of Service Strategy, Learning Quality and Performance, Leicester City Council

**Professor Paul Fleming** (Academic Lead), Director of Sustainable Development, School of Engineering and Sustainable Development, De Montfort University, [www.dmu.ac.uk/about-dmu/academic-staff/technology/paul-fleming/paul-fleming.aspx](http://www.dmu.ac.uk/about-dmu/academic-staff/technology/paul-fleming/paul-fleming.aspx)

**Claire Edwards** (KP Adviser), Knowledge Exchange and Innovation Officer, Research, Business and Innovation, De Montfort University, [www.dmu.ac.uk/about-dmu/academic-staff/rbi/claire-edwards/claire-edwards.aspx](http://www.dmu.ac.uk/about-dmu/academic-staff/rbi/claire-edwards/claire-edwards.aspx)

### Acknowledgements

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### 3. Context

The first five Building Schools for the Future (BSF) schools built prior to the Knowledge Partnership involvement all perform well below sustainability design expectations.

The Knowledge Partnership began its work in a context of deepening austerity measures, BSF budget constraints, Leicester City Council staff cuts, a shift in political commitment to the building programme, and the removal of national carbon targets. The conditions were clearly not at all hospitable.

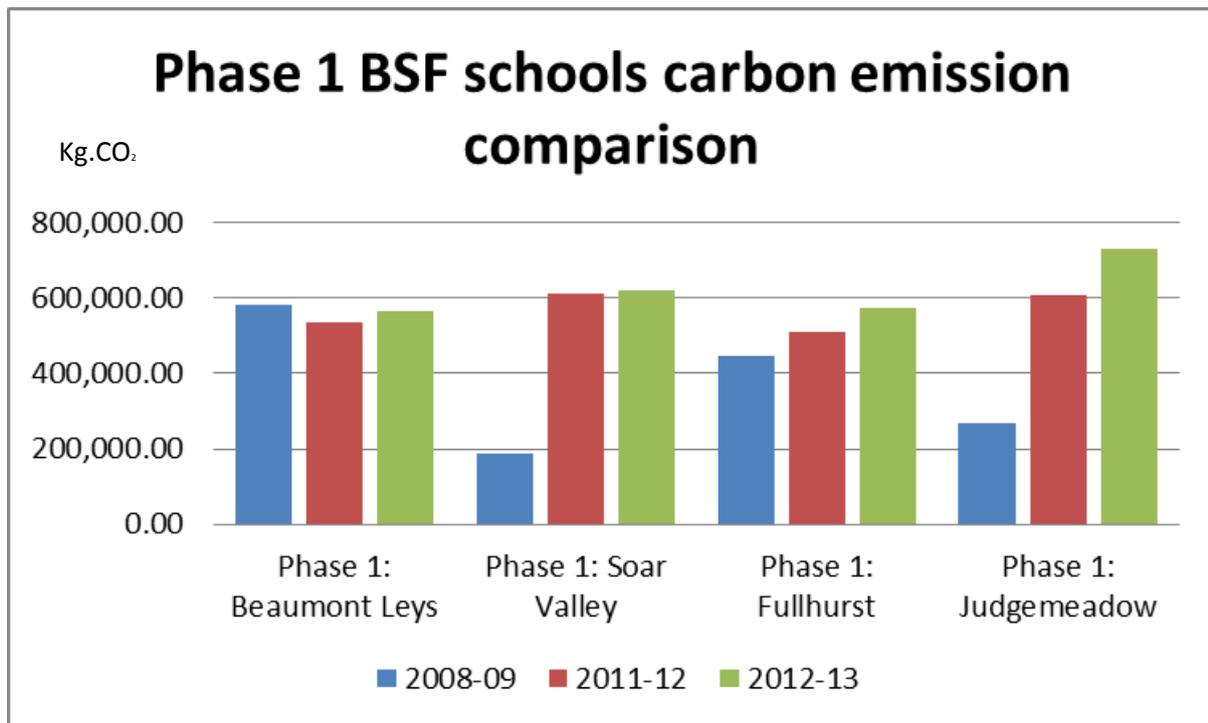
Leicester City Council (LCC) has made a commitment to reduce carbon emissions from schools by 50% by 2025, through a combination of measures including building upgrades, improving energy management and education for sustainable development. A significant proportion of this target was to be delivered through the rebuilding of schools under the BSF programme and Primary Capital Programme (PCP). However, in 2010, with the shift in national political aspirations, the PCP was shut down and the BSF programme subjected to significant funding cuts.

Before the Knowledge Partnership (KP) commenced in 2009, Leicester had completed four schools under its BSF programme, with a fifth school already underway. The assumption for the first four schools was that carbon reduction would be delivered through BREEAM<sup>3</sup> and the BE16 planning condition (which at the time required between 10-11% of energy demand to be met through renewable technology). For the fifth school, BREEAM was dropped, but additional 'exemplar sustainable school' funding was secured alongside the BSF funding to achieve a 50% reduction over the building regulatory requirements. However, even though De Montfort University (DMU) (in collaboration with school staff and governors) had pushed for higher standards, it became apparent in the first years of operational use that these schools were consuming up to four times more energy than expected, due to a range of issues with energy management and costs.

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<sup>3</sup> BREEAM is the world's leading sustainability assessment method for master planning projects, infrastructure and buildings. It addresses a number of lifecycle stages such as new construction, refurbishment and in-use. Globally there are more than 541,700 BREEAM-certified developments, and almost 2,238,300 buildings registered for assessment since it was first launched in 1990 (see [www.breeam.com/](http://www.breeam.com/)). Leicester's progress towards the BE16 planning condition can be found at [www.leicester.gov.uk/media/17957/interim-environmental-statement-13-14.pdf](http://www.leicester.gov.uk/media/17957/interim-environmental-statement-13-14.pdf)

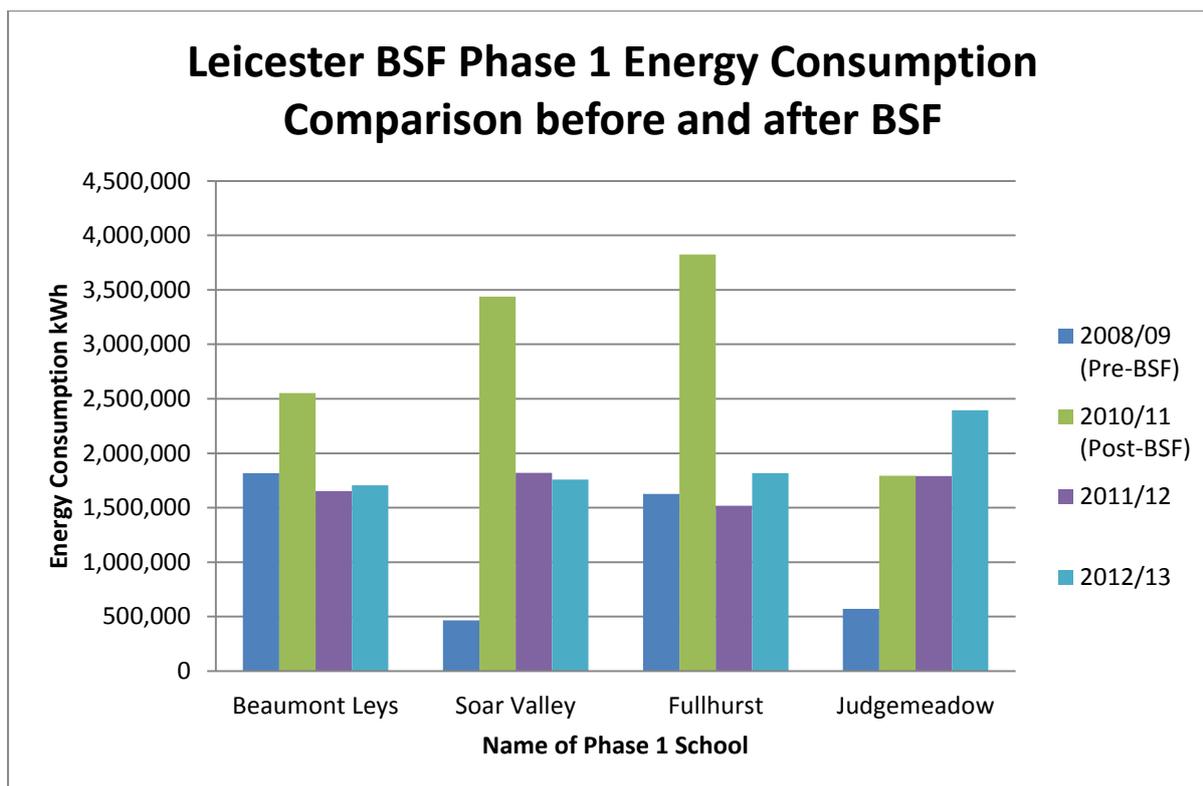
### 3.1. Phase 1 schools perform less well on emissions than the buildings they replaced



The first four building projects were framed as ‘sample’ projects that aimed to demonstrate the Contractor’s offer, approach and delivery in advance of the full contract being awarded for all 22 secondary and SEN (special educational needs) schools in the City.

*“As a governor at Judgemeanow, the new school is beyond comparison to the old building. It’s light airy and the kids learn better. There are issues with heating control and over-heating but they don’t compare.” (Governor, Judgemeanow Community College)*

Whilst bringing our attention squarely to the (poor) sustainability performance of these buildings, it is important to remember that there are many positive outcomes (they have great ICT facilities, and provide excellent learning spaces). However, even after two years of operation (when most handover snags should have worked through), carbon emissions for the first five schools built **were 60% higher** than pre-BSF performance.



Whilst the new BSF schools are bigger buildings with increased energy demands from IT, heating, ventilation and air conditioning (HVAC) than the buildings they replaced, the fact that they produce more emissions and use more energy than the old schools flies in the face of LCC’s aims to drastically reduce emissions across the City.

Given the ‘unfavourable’ economic and political conditions (see Section 8) that resulted in significant budget constraints and compressed timelines, this level of building performance is perhaps unsurprising, given that there were no specific contractual obligations to deliver sustainability outcomes – lower carbon, higher energy efficiency etc. – other than the stipulation that buildings would be built to their respective BREEAM standards. This situation was compounded by the contractual obligations of the school’s Facilities Management (FM) service providers that offer little incentive to reduce carbon emissions or energy use, and no obligation to provide technical ‘in-use’ information to DMU or LCC for monitoring purposes or in support of remedial action.

Although DMU had worked with the schools and LCC since the BSF programme was established in Leicester, the KP became involved after these first five buildings were completed.

### 3.2. The role of the Knowledge Partnership

The aim of the KP was to support the low carbon design aspect of Leicester’s BSF programme between 2009 and 2016. Originally, with funding of £340 million, BSF was LCC’s largest ever single investment in public buildings, and LCC wanted the outcomes of this investment to reflect the City’s ambitious environmental strategy.

The KP consisted of two connected projects. Between September 2009 and October 2012 it was funded as a Knowledge Transfer Partnership (KTP), and then continued as a Knowledge Exchange Partnership (KEP) from October 2012 until it closed in March 2016. Funding was secured in two

separate phases over six years for a single (one full-time equivalent) KP Associate post whose role was to support the ambitions of low carbon design for LCC's BSF programme and to connect with the expertise of DMU's Institute of Energy and Sustainable Development (IESD). The Associate was supported by an Academic Supervisor based at IESD and the Company Supervisor (also her line manager at LCC). Although the funding sources differed, both projects followed the same format<sup>4</sup> and pursued the same aims, to 'embed knowledge of low carbon building design through the design and refurbishment of educational buildings.'

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<sup>4</sup> The KP refers to the work of both projects over the entire period. Where attention needs to be focused on one or other of the sub-projects, they will be named specifically, that is, KTP or KEP.

## 4. Evaluation method

The focus of this evaluation is on knowledge exchange and the strengths, weaknesses and impact of the Knowledge Partnership between Leicester City Council and De Montfort University.

The strategic aspect of the evaluation considers whether project partners have seen a transformative effect in the way they carry out their business, including their products, policy, processes and services; the skills, knowledge and understanding of their workforce – and ultimately, whether the Knowledge Partnership has made an **enduring difference** to how people collaborate.

Section 5 explores the aims and objectives of the Knowledge Partnership. Section 6 evaluates the project outcomes, whilst Section 7 outlines the inputs provided by the Knowledge Partnership and reviews the immediate outputs of the Knowledge Partnership with respect to its objectives.

This evaluation set out to conduct an independent peer review of the Knowledge Partnership (KP) between Leicester City Council (LCC) and De Montfort University (DMU), to identify its strengths, weaknesses and impact. This review is a strategic evaluation in that it aims to assess whether the strategy implemented through the KP allowed the two commissioning organisations to fulfil their intended objectives. The review, therefore, explores the following topics:

### Justification for the partnership

- Evaluate the justification and objectives of the partnership against the aspirations of the local authority.
- Were the original objectives the right ones?

### Delivery strategy

- Were the objectives of the partnership clear and quantifiable?
- Was the delivery coherent and appropriate for all stakeholders?

### Investment decisions

- Was a knowledge partnership adequate to achieve the local authority's sustainability aspirations?
- Was it value for money?

### Readiness

- Was the local authority ready to have knowledge embedded?
- Did the Knowledge Partnership embed knowledge beyond the local authority?

### Benefits realisation

- Who has benefited from this project?
- What have been the benefits for the individuals and organisations involved?
- What has been the impact of the Knowledge Partnership?

Ultimately, the ambition is that this review will provide a specific insight for both stakeholder organisations that will help improve the practice and delivery of similar projects in the future. As such, the key audiences for the final report are the Council Executive and Directors, senior DMU staff responsible for the KTP/KEP programmes, school beneficiaries of the programme and the KP team itself. It is also anticipated that there will be more general lessons learned that can be shared with a wider audience in public service and academia who share an interest in the sustainable building and knowledge exchange agenda.

The evaluator addressed these aims by:

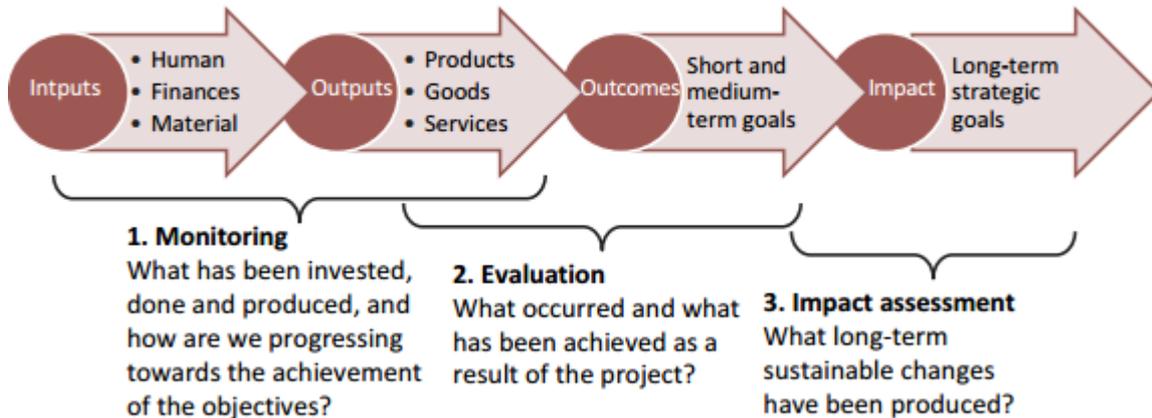
- undertaking a critical review of the initial aims of the KP projects in light of unfolding circumstances
- reviewing the existing data and evidence relating to the progress of the KTP/KEP projects
- conducting an additional nine in-depth semi-structured interviews with key stakeholders
- undertaking a robust analysis of both primary and secondary data with reference to the original project aims and organisational strategy using qualitative analysis software.

#### **4.1. Scope of the evaluation**

It is worth emphasising that this study is not an evaluation of the BSF programme. The focus for this evaluation is squarely on the knowledge exchange projects set up to support the sustainable design aspects of the BSF programme. However, given that the aims of the KP are entwined with the aims of the BSF programme to create energy efficient and sustainable buildings, inevitably this evaluation pays close attention to the (partial) data that relates to these common aims.

As the figure below illustrates, most evaluation studies are interested in the inputs, outputs and outcomes of the intervention in focus. This evaluation is no different, and provides evidence and conclusions relating to all three of these elements. However, given our aim to provide a strategic evaluation, this evaluation also draws on the available evidence to provide analysis and recommendations that relate the issue of knowledge exchange to longer-term, strategic considerations for the two commissioning organisations. These conclusions are necessarily tentative because the evidence of medium-term outcomes is still emerging and the local political landscape still shifting. They are offered in the spirit of mutual learning and as a catalyst for future reflection and action.

*Process for monitoring and evaluation:*



Source: ILOEVAL Unit (2005)

#### 4.2. What is knowledge exchange? An analytical framework

As noted above, the focus for the evaluation is on the knowledge exchange aims of the KP as distinct from the BSF programme more broadly. The definition of ‘knowledge exchange’ below is adapted from the work of the Arts and Humanities Research Council (AHRC, [www.ahrc.ac.uk](http://www.ahrc.ac.uk)). It describes knowledge exchange as:

... the **processes by which new knowledge is co-produced through interactions between academic and non-academic individuals and communities** that includes, but is not restricted to, innovation through applying existing knowledge to new contexts.

It assumes added value to all partners through co-design and co-production of outputs beyond the usual academic publications, websites or even exhibitions. Through involvement in a knowledge exchange project, project partners should see a transformative effect in the way they carry out their business, whether to products, policy, processes or services, or to skills, knowledge or understanding. It needs to **make an enduring difference** to how people collaborate.

The evaluation used the following analytical frame (adapted from Frappaolo, 2006, p.18) to guide its analysis. Frappaolo suggests that the way knowledge is leveraged within and across organisations can be seen in relation to this simple two-by-two framework:

	<b>Internal</b>	<b>External</b>
<b>Awareness</b>	Is the organisation collectively aware of its strengths and weaknesses across structural silos and functional boundaries? Are experiences openly communicated? Is the focus on competencies and talents, rather than products?	Does the organisation remove filters between customers/markets and its capacity to innovate and form partnerships?
<b>Responsiveness</b>	Is the organisation able to organise skills based on an unfiltered assessment of its resources and external market demand and opportunities?	Does the organisation meet customers on their terms – even when they cannot articulate these or a clear return is not present? Is the focus on customer service and knowledge seen as added value to the customer?

## 5. What did the Knowledge Partnership aim to achieve?

Whilst the emphasis shifted over the six-year duration of the Knowledge Partnership, it consistently aimed to:

- **embed knowledge of low carbon building design through the design and refurbishment of educational buildings.**

However, by 2013, the emphasis had shifted from a singular focus on affecting building design towards:

- understanding and overcoming the contractual limitations of Building Schools for the Future (BSF)
- placing a stronger emphasis on operational and handover support for schools
- analysing building performance across the BSF schools stock and project evaluation.

The original Knowledge Transfer Partnership (KTP) bid stated that:

By working with DMU's [De Montfort University] Institute of Energy and Sustainable Development (IESD), the council will have access to cutting edge research and technical expertise in order to engage designers and other stakeholders in the BSF and PCP [Primary Capital Programme] programmes. In aiming to meet the carbon neutral schools target by 2013, three years ahead of the national target, LCC [Leicester City Council] aims to lead the way and therefore disseminate their gained knowledge to other councils. It is anticipated that this knowledge will also be cascaded through the Strategic Partnership Board to other council departments including housing, other public buildings and commercial properties.

However, as the political and economic landscape shifted, so did the objectives of the KP. Latterly, the stated Knowledge Exchange Partnership (KEP) objectives became to:

- support the BSF team on technical design issues raised by Leicester Miller Education Company (LMEC) proposals through Project Stage 1 to handover
- transfer knowledge of low carbon design to BSF and other LCC teams
- understand and overcome the contractual limitations of BSF
- support the local authority in reviewing its design and building standards to inform and improve low carbon building programmes in the future
- transfer knowledge to key members of the local authority, and the national and international community interested in low carbon school and building design
- to support schools in understanding their new buildings to maximise the efficient use of the buildings (including overheating issues)
- investigate anticipated overheating issues and identify intervention or coping strategies
- provide support and transfer knowledge of low carbon/energy solutions and operations to schools

- evaluate BSF building performance against design targets for carbon reduction
- data analysis of BSF design targets vs delivered targets vs operational performance
- gauge internal and external views of success.

These objectives represent a shift away from the original KTP objectives – away from building design capacity within LCC towards a more outcomes-focused approach. The detailed analysis described in Section 6.4 suggests that the KP has been highly successful in achieving most of these objectives. Indeed, as stated elsewhere, DMU have compromised their own objective to produce academic papers to support the larger goal of delivering exemplar buildings for the City in significantly challenging circumstances. More could certainly have been done to systematically gauge internal and external views of the success of the KP and BSF more broadly – for example, by undertaking a full survey of stakeholders once all the buildings are in full operational use. However, there were significant barriers to achieving this within the KP project timescales and the long tail of the building handover process.

As early as February 2011 – with deepening austerity measures, BSF budget constraints, LCC staff cuts, a shift in political commitment to the building programme and the removal of national carbon targets – the KP began taking a lead role in streamlining the local authority requirements and design process by taking a more strategic approach than previously.

However, as the KP Company Supervisor acknowledged, the stated aims of the KP did not specify where knowledge should be embedded. This became an important point of learning for the KP, as, over time, the focus shifted from embedding knowledge within LCC technical teams to working much more closely with the end user staff in schools. With austerity measures resulting in deepening staff cuts and ensuing gaps in human and technical capacity, the KP found itself in the position of either upskilling individuals in certain aspects of low carbon design only to see them leave the local authority soon after, or finding that there was no one in place to upskill in the first place, and being forced into undertaking roles that were beyond their remit, simply to get things done within the unrelenting pressure of unfeasibly tight deadlines. For example, the Associate found herself involved in contract negotiations with the Contractor that would normally have been undertaken by suitably qualified commercial staff. These gaps expose the point made by several respondents, that if LCC is to become an intelligent commissioner of services within a leaner corporate structure in the future, it desperately needs to either ensure it has staff with the right technical skills to fulfil this new remit or become much more ‘outcomes-focused’, where LCC are much more explicit about the strategy involved, and clearer about the business change required in contractual agreements. We return to this point in Section 9.

By 2013 this state of affairs led the KP team to tighten the KP’s focus even further towards:

- understanding and overcoming the contractual limitations of BSF
- placing a stronger emphasis on operational and handover support for schools
- analysing building performance across the BSF schools stock and project evaluation.

One of the key tasks for the KP was persuading the BSF Board and then the Contractor to include outcome objectives in the contractual obligations. As a response to the reduced budget for the build projects, and following more than 18 months of negotiation, LCC and the Contractor eventually agreed clear sustainability design targets as part of the contractual agreements, on condition that the costly (£50,000 per project) requirement to follow BREEAM was removed.

In later sections we explore how this shift in emphasis over time towards outcomes placed the KP at odds with the output focus of the Contractor, other LCC teams and BSF directors. Even though it sometimes felt that LCC and the KP were ‘at war’ with the Contractor, and that everyone was battling ‘through a storm’, senior staff on the Contractor’s side still recognised the valuable contribution the KP made in balancing public service drivers with commercial constraints to support the stakeholder team to deliver the best possible buildings in difficult fiscal and political circumstances.

*“[The KP] has worked. I don’t think without [it] you would have got the buildings that you have got. [In] order for the Council to be secure in what they were getting they needed that person in place or that organisation in place to protect them, because quite frankly they are naive, quite frankly they need that protection.”* (Operations Director, Galliford Try, construction company)

This quote reflects a broader view of senior staff on the Contractor’s side, who felt Council staff had a poor commercial understanding of the design expectations and how a contractor may respond to them. Ultimately, however, the evaluation concludes that the ‘whole systems’ design approach championed by the KP could potentially be used on all new public buildings commissioned in the City to ensure their performance matches design expectations. It is also demonstrated below that knowledge partnership offers a cost-effective approach to accessing the extensive specialist expertise of DMU (or other City stakeholders) that could support other whole City initiatives, even within a significantly leaner Council structure.

### **5.1. Did the Knowledge Partnership fulfil its own objectives?**

A detailed analysis of the KP objectives concludes that **the KP has been highly successful in achieving its own objectives**, with the minor caveats that:

- greater attention could have been paid to producing academic outputs in order to share insights beyond the partners
- earlier attention could have been paid to the diminishing internal capacity of LCC teams.

An overview analysis of KP objectives as described in the KEP application and facilitator reports, and validated through interview, focus group data and LCC documentary evidence, is provided below.

## Evaluation of objectives

Objectives	Process/approach	Tangible outputs/outcomes	Mitigating circumstances/issues
<p><b>Support BSF team on technical design issues raised by LMEC proposals through Project Stage 1 to handover. Transfer knowledge of low carbon design to BSF and other LCC teams. Understand and overcome the contractual limitations of BSF.</b></p>	<p>Review of Contractor's proposals from concept design (Stage 1) to handover of buildings for 17 of the 22 Leicester BSF schools. This included a technical review of architectural and M&amp;E (Mechanical and Electrical) designs.</p> <p>Continuous engagement with the design team, project and programme management teams and site teams to identify risk, provide advice on mitigating solutions and transfer knowledge on low carbon designs. Review of Phase 1 energy consumption benchmarks and energy costs.</p> <p>Supporting the Facilities Management (FM) team on energy contracts. Consultations with Finance and FM on energy costs.</p> <p>The KP Associate conducted six training workshops for senior managers, schools and project teams.</p> <p>Knowledge was also transferred on a one-to-one basis with project teams, and through risk evaluation and advisory reports and meetings held with senior managers. The influence of the KP extended from councillors and strategic directors to the site teams.</p> <p>To overcome the contractual limitations the KP had to ensure that the building's energy performance would align with predicted performance. Rather than purely relying on the contract, the KP Associate provided thorough evaluation and 'dogged attention to detail' to identify and overcome design issues that would impact operational energy performance. This also involved an element of lobbying within LCC to raise awareness of risks and the impact of proposals on energy and carbon performance.</p> <p>The KP Associate also stepped in to fulfil various other roles.</p>	<p>Technical advice on one project prevented £250,000 variation (capital cost) from going through. The Contractor's design was technically flawed and would have increased revenue implications for the school.</p> <p>Bio-fuel report plus knowledge shared via meetings with schools on future energy costs.</p> <p>Workshops.</p> <p>Thirty per cent reduction in operational energy use in school buildings.</p> <p>Schools have embedded features that allow energy efficient management and low carbon energy generation.</p>	<p>Staffing cuts due to austerity measures means shared tacit knowledge has left LCC.</p> <p>BSF team completely disbanded by March 2016.</p> <p>Professional expertise developed in Contractor's staff as well as LCC staff, which has been put to commercial benefit.</p>
<p><b>Support the local authority in reviewing its design and building standards to inform and improve low carbon building programmes in the future.</b></p>	<p>Review of Phase 1 and 2 BSF projects with regard to local authority design policies and authorities' requirements for sustainability.</p> <p>Interviews with LMEC General Manager and 'Lessons learned' workshop with Galliford Try design team.</p>	<p>The 'Lessons learned' workshop identified key points of relevance to the local authority renewable technology planning policy (BE16).</p> <p>The success of the BSF Sustainability Authorities' Requirement (AR) has resulted in the LCC adopting a similar approach for other school building programmes and non-domestic projects.</p>	
<p><b>Transfer knowledge to key members of the local authority, the national and international community interested in low carbon school and building design.</b></p>	<p>Dissemination via regular meetings (LMEC etc.), consultation with other LCC teams plus seminars, workshops and conferences within academic, BSF and low carbon design communities.</p>	<p>Associate monthly report to the local authority Reducing Carbon Priority Board.</p> <p>Development of the BSF sustainability website.</p> <p>CIBSE technical memorandum on school design.</p> <p>Case studies created.</p> <p>MSc guest lectures on bio-diesel and sustainable building design at DMU.</p> <p>Projects developed for the MSc in Energy and Sustainable Building Design.</p> <p>Presentation at East Midlands Low Carbon Conference.</p>	<p>The demands of LCC sustainability lead role meant the KP Associate had less time to produce academic outputs than desired.</p>

<p><b>To support schools in understanding their new buildings to maximise the efficient use of the buildings (including overheating issues).</b>  <b>Investigate anticipated overheating issues and identify intervention or coping strategies.</b>  <b>Provide support and transfer knowledge of low carbon/energy solutions and operations to schools.</b></p>	<p>The Company Supervisor encouraged shift of emphasis to operational and handover support for schools cf. technical support of LCC and Contractor staff.  Exemplar approach to creation of Building User Guides developed.  Graduate interns used to support Building User Guide development. Associate walk-round with five schools.  Energy monitoring and management training workshop conducted for all BSF Phases 3-6 schools.  Schools supported by KP to develop sustainability section in their Strategy for Change (SFC) and Education Design Brief (EDB) documents.  School business managers, site managers and other staff invited to support meetings.</p>	<p>Highly regarded Building User Guides and DYNAMATlite guide and training.  KEP has worked with LCC Eco Schools Officer to embed knowledge of low energy solutions.  Most local authority-owned buildings and all schools in the city are linked to DYNAMATlite. Real-time whole systems monitoring could be achieved through an energy management initiative. Trials with DMU Smart Spaces have already started with more schools added March 2016.</p>	<p>Some designed educational eco-features did not make it to the build, e.g. energy displays/transparent drainpipes.  User guides have been developed for only 5 of the 17 Phase 3-6 schools.  The close of the KP project and lack of Associate capacity prevented further work on this.  The KP Associate supported the delivery of a STEM workshop on energy efficient buildings and in coordination with the Arts Strategy  Lead the KP is delivering an arts and sustainability project at one school. But the KP team recognise that more could be done to address the potential educational benefits of the new buildings.</p>
<p><b>Evaluate BSF building performance against design targets for carbon reduction.</b>  <b>Data analysis of BSF design targets vs delivered targets vs operational performance.</b>  <b>Gauge internal and external views of success.</b></p>	<p>University College London (UCL) benchmarking analysis commissioned.  Monitoring and formative evaluation of carbon reduction at project and programme level.  KP analysis of operational energy use data.</p>	<p>UCL benchmarking study.  Funding secured to install Databird energy monitoring in all Phase 3-6 schools.  KP delivered analysis of the 11 schools providing appropriately robust data, January 2016.</p>	<p>More post-handover user views could be gathered to get detailed picture of outcomes.  Michael Roberts' PhD (2014) provides a methodology for this.</p>

Sources: KEP application and facilitators report, LMC09, validated through interview and focus group data as well as LCC documentary evidence.

As this report shows in Sections 7 and 8, the KP has been highly successful in fulfilling its own objectives. The KP Associate was highly regarded by the full range of contributing stakeholders, and the support and guidance provided has been deemed useful by all respondents. The Associate has, evidently, brought a great deal of insight, energy and focus to the task that has undoubtedly supported a great deal of ‘knowledge exchange’, and in her parallel role as LCC Sustainability Lead, she has ensured that the emissions outcomes and energy efficiency of the new BSF schools are much better than if the Design and Build (D&B) had been left to LCC teams and the Contractor alone.

The objectives for DMU remain a ‘work in progress’, with DMU partners feeling that the Associate’s work had been dominated by the pragmatic demands of seeing the project through, within compressed timescales, and the understandable interests and demands of LCC. In one sense this highlights the common purpose and collaborative relationship between the two organisations – one in which DMU stepped back from its own interests in creating academic outputs to support the higher needs of LCC to deliver sustainable buildings in very challenging circumstances.

By its own standards the KP has been a real success. However, in a review of this nature, we also seek lessons to be learned and recommendations for the future, so it is important to reflect on whether the stated objectives of the KP were the right ones in the first place.

## 5.2. Were the Knowledge Partnership objectives the right ones?

In evaluating the objectives of the KP we need to bear in mind that the political and fiscal context was particularly challenging; that this evaluation has the benefit of hindsight, and seeks to draw lessons for the future.

In analysing the project documentation, one thing that becomes immediately apparent (in retrospect!) is the omission of a specific definition of ‘knowledge exchange’ itself. This might seem somewhat arcane given the detailed nature of the KTP and KEP project applications and subsequent documentation, but bears some consideration. The Arts and Humanities Research Council (AHRC) (see [www.ahrc.ac.uk](http://www.ahrc.ac.uk)) definition of knowledge exchange used in this evaluation (see Section 4) assumes added value to all partners through co-design and co-production of outputs that also results in a transformative effect in the way they carry out their business, and **makes an enduring difference** to how people collaborate.

It is immediately apparent that ‘making an enduring difference’ to how people collaborate is highly problematic in circumstances where organisational teams are in flux, with a high turnover of technical staff and senior leadership, where the Contractor’s staff shift constantly, and within a culture of low trust between the client team and the contracted delivery organisation. Given this backdrop, it is a testament to the endeavours of the KP team that so much was achieved. Nevertheless, it raises some issues about the focus of knowledge exchange if the aim is future transformation of business practice within LCC (and, to a lesser extent, DMU).

To evaluate the effectiveness of the KP objectives we draw on Carl Frappaolo’s knowledge chain framework (2006). As noted in Section 4, Frappaolo suggests that the way knowledge is leveraged within and across organisations can be seen in relation to the following simple two-by-two framework:

	<b>Internal</b>	<b>External</b>
<b>Awareness</b>	Is the organisation collectively aware of its strengths and weaknesses across structural silos and functional boundaries? Are experiences openly communicated? Is the focus on competencies and talents, rather than products?	Does the organisation remove filters between customers/markets and its capacity to innovate and form partnerships?
<b>Responsiveness</b>	Is the organisation able to organise skills based on an unfiltered assessment of its resources and external market demand and opportunities?	Does the organisation meet customers on their terms – even when they cannot articulate these or a clear return is not present? Is the focus on customer service and knowledge seen as added value to the customer?

In the transition from KTP to KEP projects, we can detect the influence of the KP Company Supervisor through the shift in emphasis of objectives towards ‘addressing contractual limitations’, in relation to LCC team activities and ‘operational handover’ to schools. This reflects a greater attention to both internal and external responsiveness. A counter point to this, though, is the recognition that even though schools were involved and supported in developing their individual Strategies for Change (SFC) and Education Design Briefs (EDBs), more could have been done along the pathway of concept, design, plan, build, deliver and support to understand the presenting needs and interests of the ultimate users, staff and students in the schools (external awareness). But there were clear capacity constraints. As the KP Company Supervisor noted, “we would have needed four associates to do this job properly.”

Similarly, more could have been done in the early stages of the KTP to capture and communicate ‘external awareness’ of exemplar existing low carbon buildings of the appropriate scale and function, and to communicate the range of possibilities to key stakeholders. Constructing a compelling vision of what ‘schools of the (near) future’ might ‘look like’ may have brought greater alignment between the goals and ambition of the Contractor, Council teams and schools. Finally, much more could have been done to raise ‘internal awareness’ of the capacity and capabilities required of local authority staff and teams to support delivery of this major £340 million rebuilding project. For example, identifying gaps in commercial technical contracting and legal expertise or establishing the earlier involvement of the Energy team may have prevented some of the later challenges.

Clearly, these points lie beyond the original ‘design focus’ of the KTP. The point being emphasised here is simply that if the aim of ‘knowledge exchange’ is to transform practice, its focus needs to move beyond the technical to embrace the human resources and organisational needs and interests of stakeholders in order to secure effective knowledge exchange in the service of sustainable, IT-rich and effective learning spaces. In this respect, the articulation of the ‘whole systems’ approach to low carbon design is a helpful step forward in that it describes a process that can be shared and debated by others interested in developing low carbon public buildings.

## 6. What approach did the Knowledge Partners take?

The Knowledge Partnership was rooted in a clear common purpose.

The team developed a 'whole systems' approach that involved establishing a strong strategic vision, setting clear requirements, supporting design and delivery and providing effective post-handover support for end users of the building.

This section reviews the overarching approach to knowledge exchange, outlines the Knowledge Partnership's (KP) 'whole systems' approach and what this added to the design, planning, project management and delivery of the final 17 new school buildings.

### 6.1. Partnership with common purpose

The delivery of carbon reductions across a city, local authority, programme or project requires a diverse set of skills and insight that pull together a variety of different strands of expertise and interests. Commonly this requires the involvement of numerous individuals and teams. However, in the prevailing conditions, lack of human capacity and funding severely limited the resourcing of the carbon reduction aspect of the Building Schools for the Future (BSF) programme. The KP undoubtedly helped overcome this skills and resource gap.

KPs are alliances between individuals or organisations that share a purpose or goal, and whose members contribute knowledge, experience and resources, and collaborate towards innovation or developmental work. These partnerships thrive when there is a strategic fit, and when members embrace the collaborative process. A starting point for any KP should therefore be a clearly defined challenge or purpose that partners commit to address together. This shared goal is also what sets KPs apart from simple consultancy frameworks.

In the case of KPs between commercial and academic organisations, the commercial organisations are often the receivers of skills and knowledge from the academic organisation that has a broader remit given its research and teaching focus as compared to buying services from a commercial company. The commercial organisation itself becomes a test-bed for the development of research and knowledge to establish how theory can translate into practice, its strengths, limitations and the opportunities it creates. Such a partnership thus becomes a foundation for change and innovation that steps beyond the limitations of funding and resources. However, as we have already seen, the stakeholders of Leicester Miller Education Company (LMEC) did not work as a partnership, and some of the opportunities offered by such a partnership were not grasped.

On the other hand, the strength of the partnership between De Montfort University (DMU) and Leicester City Council (LCC) through the KP has allowed the Council to draw from the extensive specialist expertise within DMU, understand the parameters that influence success in the construction programme, and integrate these into a 'whole systems' approach to sustainable design. The integrated methodology that was developed and adopted has ensured a holistic and robust approach to delivering energy and carbon reductions in buildings. This approach was underpinned by a shared vision between the two organisations for a greener Leicester, with both DMU and LCC

being signatories to the City-wide carbon action plan that recognises their individual roles in championing carbon reduction.

## 6.2. A 'whole systems' approach to delivering low carbon schools

The KP took a strategic approach to ensuring the sustainability outcomes of the BSF programme. Any strategy has four fundamental elements:

- Where are we going?
- Where are we now?
- How will we get from A to B?
- How will we know we have arrived?

The KP became involved some way into the building programme, so was only able to influence the full design process for the last 15 of the 22 BSF schools. The first part of the strategy involved rationalising the 50% carbon aspiration by analysing the energy performance, available funding and proposed plan of works for the schools. The methodology involved creating a predictive model for calculating carbon performance based on allocated funding, planned works and assumptions around design decisions.

After one-and-a-half years of iterations, campaigning, consultation, negotiations and necessary approvals, a target of reducing carbon emissions by 28% against 2009-10 baseline data was agreed for the 15 schools still to be built. The various partners acknowledged that although the baseline data was not perfect, this would not be easily remedied, and so the historic data on energy use was accepted as the imperfect starting point to review progress towards the carbon reduction targets.

The KP, however, recognised the importance of accessing data on energy use from schools in order to monitor ongoing progress and to provide a feedback loop to the system in future – as the various analyses and charts in this report testify. Whilst the various governance arrangements in schools mean that capturing a complete picture of energy use across the secondary schools estate remains problematic, the KP has striven to capture the broadest dataset possible in order to build a clear and ongoing picture of energy efficiency in the BSF buildings.

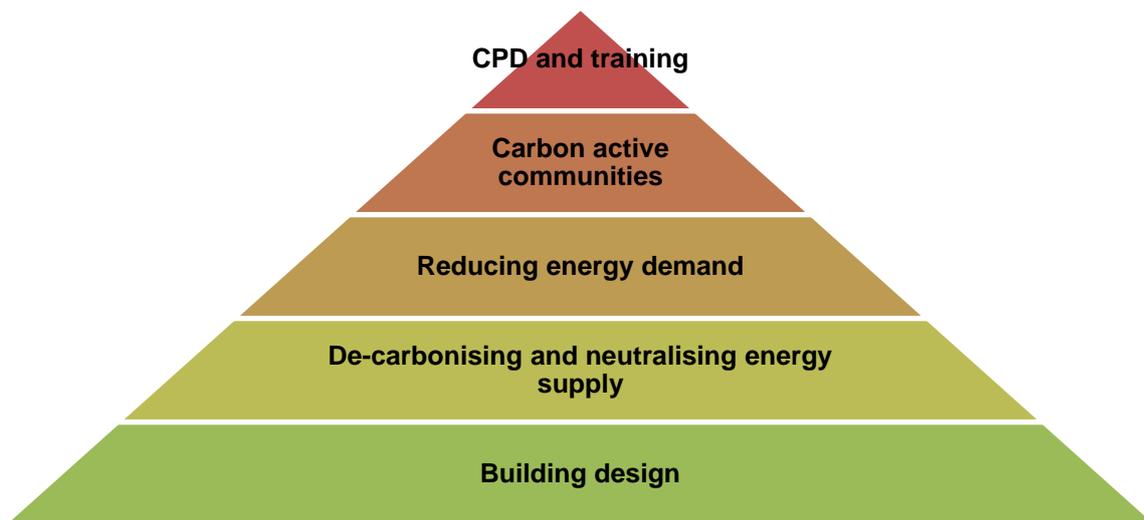
The KP's 'whole systems' model for delivering low carbon schools involved four key elements of activity:

1. **Establishing a strong strategic vision:** Ensuring that there were clear outcomes for the school building programme that responded to the sustainability vision for Leicester City.
2. **Setting clear requirements:** Binding the vision to output specifications through the design briefs and contract to provide clear targets, milestones, checkpoints and benchmarks that would demonstrate success against the Design and Build (D&B) contracts and the BSF framework.
3. **Supporting design and delivery:** Providing design advice and technical due diligence to ensure compliance to all sustainability requirements.
4. **Post-handover support:** Supporting end users in understanding and managing the energy use of their buildings, and embedding sustainability into the educational curriculum.

These four elements are discussed in detail below.

### 6.2.1. Establishing a strong strategic vision

The sustainability vision for the Leicester BSF is set out in the Strategies for Change (SFC) document. The SFC provides information on the five thematic priorities (see Appendix 2 for further details) that form the fundamentals of the sustainability vision for Leicester BSF. These five priorities cover the five key aspects of engaging schools in a holistic energy and carbon reduction plan through a building programme such as BSF. The five thematic priorities are:



- i. **Building design:** Ensuring energy and carbon reduction through an efficient building design.
- ii. **De-carbonising and neutralising energy supply:** Ensuring the residual energy demand is met through a renewable energy source.
- iii. **Reducing energy demand:** Ensuring good practice with energy management by end users (school staff and students), allowing operational energy performance (actual) to align with design intention (predicted).
- iv. **Carbon aware and active communities:** Ensuring Leicester BSF schools are actively engaged in raising awareness about climate change and carbon reduction. Further, ensuring that schools are actively pursuing incremental carbon reductions through action planning, staff and student engagement and curriculum.
- v. **CPD (continuing professional development) and training:** Supporting schools to improve understanding of new buildings, energy management and embedding sustainability within the curriculum.

### 6.2.2. Setting clear requirements

This strategic vision was linked to output specifications through the Education Design Briefs (EDBs) and clear targets, milestones, checkpoints and benchmarks that would demonstrate success against the D&B contracts and the BSF framework. Below we describe in detail how the EDBs, contract and Sustainability Design Tracker facilitated this process.

## **Education Design Briefs**

The BSF SFC set the foundation for the School-specific Strategy for Change (SSFC) and the EDBs. EDBs are a core part of the D&B contract, and translate the schools' aspirations into a design and construction brief. It was thus essential to embed the low carbon vision into the EDBs. Key priorities and aspirations for each school with respect to sustainable building performance and curriculum were identified and structured against the five thematic priorities. This also allowed for consistency between the overall City, programme and individual school vision and construction brief.

## **Contract**

The Leicester BSF sustainability contract, known as the 'Leicester BSF Phases 3-6 Sustainability Authorities' Requirements' (Sustainability ARs), provides the legal mechanism for delivering the 28% carbon target and the SFC aspirations. It allowed the KP to bind the carbon reduction vision into the BSF programme. The Sustainability ARs integrate with the D&B contract and provide programme and project level carbon targets, key milestones for demonstrating compliance within the BSF programme stages, and a clear description of process and information necessary for the Contractor to demonstrate success.

At this stage, the KP Associate was also involved in gathering lessons learned from national and Leicester school design projects. These were embedded into the Leicester BSF programme through the Sustainability ARs. While it was understood that the contract might not completely eradicate issues, it would, however, contribute to reducing the gap between actual and predicted building performance. The Sustainability ARs output specifications include a more accurate method of predictive modelling for operational energy performance, additional requirements for overcoming overheating and improving indoor air quality (IAQ), additional daylighting requirements as well as requirements for achieving energy efficiency in refurbished as well as new buildings.

The contract was accompanied by a tool called the Sustainability Design Tracker that, along with a carbon tracker, was used through the delivery process to monitor key building design decisions that might impact on the energy efficiency and carbon performance of the buildings.

## **Sustainability Design Tracker**

The D&B contract is based on output specifications that allows LCC (as client) to set out its fundamental requirements and aspirations but not to be prescriptive in how these are achieved. For example, the client provides a carbon or a renewable energy target but does not prescribe the solution to delivering it or the choice of the technology. The design risk of achieving the target rests with the contractor. However, this also means that operational success cannot be established until the very end, when any shortcomings can result in uncomfortable legal negotiations/battles.

The success of an energy efficient building relies on good design practices being embedded into design decisions starting from building orientation, spatial design, design and specification of Mechanical and Electrical (M&E) services, controls, heating zones etc. Under a D&B contract there is little scope for steering such requirements at a contractual level. This can only be achieved by engaging closely with the design team. However, with 15 schemes developing simultaneously, the KP did not have the human capacity to engage and influence all designs equally. Further, the design process is iterative and involved negotiations with the design and delivery team, adding a further layer of pressure on the KP team.

A framework or tool was needed to better communicate and manage design decisions that would have a direct impact on the sustainability aspirations of the building programme. The Sustainability Design Tracker was developed to perform this function.

The Sustainability Design Tracker is a comprehensive list of recommended good practice for the design of low carbon buildings. It has two sections: the first part focuses on building energy efficiency design, and the second focuses on softer non-energy-related sustainability issues. The tracker was embedded into the design evaluation process where every design team was required to comment against each of the good practice measures, providing information on compliance and clarification/justification in the event that it couldn't be achieved. An updated tracker was submitted at key stages within the process to monitor the design development. Whilst it was not expected that each of the measures would be achieved, it was important that design teams endeavoured to meet them or identify the critical barriers preventing them from doing so.

The Sustainability Design Tracker thus set clear expectations about the issues and approaches to focus on, and whilst it was not intended to be a design management tool, it assisted in overcoming human resource limitations, and provided a level of minimum quality management to all designs. As we see in Section 7.2, these interventions resulted in significantly improved building energy performance prediction.

### **6.2.3. Supporting design and delivery**

At various stages, the building programme involved different designers and sub-contractors. For instance, within the BSF programme, the M&E designers changed at concept, detail design and installation design stages. Typically, more than one company will be used as the design phase progresses. As staff change, every team or individual brings their own understanding, priority and method of delivery. In such a situation aspects of design are value-engineered, and original fundamentals can be lost as requirements are reinterpreted and (sometimes) even misinterpreted. Designs are also subject to the complex dynamics of a compliance-based approach where every supplier takes a low-risk approach conducive to their employment contract, sometimes prioritising a popular solution over an innovative/better solution. For example, a contractor may choose to introduce cooling rather than rely on thermal mass and night ventilation to overcome overheating.

A successful low carbon design relies on the integration of various cross-cutting themes and technical strands. 'Lessons learned' from national BSF schools clearly show that specifications for various technical strands can contradict each other. An example of this is the conflicting requirements between ventilation performance and acoustic requirements. 'Lessons learned' also show that a lack of communication between various designers (especially architects and engineers) can result in solutions that conflict with each other. While individual technical designs might be well developed, they might not work in conjunction to provide a good overall solution. Value engineering based on poor understanding of building performance is another key issue that impacts on the success of carbon reduction measures. For example, designers sometimes replace shading devices with blinds that increase solar gain, impact daylight performance and interfere with lighting controls and natural ventilation designs.

To overcome the above issues, clients or their technical adviser must be able to interrogate the design on individual technical fronts, as well as holistically, to ensure a joined-up approach to

operational carbon reduction. Based on the experience of the KP team, the following attributes were identified as key responsibilities of supporting the design and delivery of low carbon schools:

- a) Testing compliance of the designs against regulations, contracts and specifications.
- b) The ability to interrogate the holistic performance of the designs, based on a thorough understanding of the cross-cutting themes that influence low carbon designs.

#### **6.2.4. Post-handover support**

The KP team engaged with schools after the handover from the Contractor through a three-stage approach:

##### **Building User Guide**

The Operation and Maintenance (O&M) manuals, provided to schools at the end of handover by the Contractor, include large amounts of technical information that can be difficult to understand and apply. The KP developed Building User Guides for schools that convert the technical information in the O&M manuals into simple graphical representations of the technology, their controls, locations and operational strategy.

The Guides cover heating, cooling (where installed), ventilation and lighting. Rooms with a similar operational strategy for each of these areas are classified under a colour-coded system. Seasonal operation strategies are developed for each of these classifications. The manual is presented in two parts:

**Part 1:** For teaching staff

School staff were provided with a copy of the Guide that includes simple posters for rooms and classrooms. Images with seasonal control strategies are provided and recommendations made to ensure good behaviour around energy use. These are displayed in all classrooms and staff areas.

**Part 2:** For the premises team

This section is more technical and provides visibility of installed technologies and their locations and controls. To support understanding of the design strategy and operation of key HVAC solutions, it includes sections on:

- a. Heating systems in rooms and the location and method of their controls. It is particularly useful for rooms with more than one form of heating.
- b. Heating zones, showing the rooms under the same zone and location of controls.
- c. Ventilation designs within rooms and their controls.
- d. Location of mechanical units and the rooms they control.
- e. Lighting strategies and controls for each room or zone.

These Guides (and the process used to develop them) have been extremely well received by staff in schools.

*“The work done by [the Associate] and her internship students has been outstanding. It has helped us understand the heating, lighting and ventilation systems used throughout the new*

*school building and given us detailed but simplistic plans which can be utilised to support sustainability across our school.” (School Business Manager)*

The Building User Guides have enabled the schools to understand their building services and what can be controlled. The end user can respond to localised issues. Although created specifically for the schools, the Guides are now being used by local authority staff to understand the new buildings:

*“Getting to know the building and what can be controlled, in terms of energy management; leads to an increased awareness within the end user and over time will save money. Each building gets their own personalised manual which will have common themes and actions but considers local variations. It is informative, easy to take in and well-presented rather than being an overburdened technical manual that is left on the shelf.” (Head of FM, LCC)*

### Energy monitoring system

DYNAMATlite is a web-based energy monitoring system linked to Databird, an automatic meter reading system that physically interfaces with utility meters to gather and transmit energy consumption data via wireless loggers to a central logger. This initiative was led by the LCC Energy team, and allows them to remotely monitor and manage energy in all non-domestic Council-owned buildings.

The Energy team runs a help desk and a bureau service that proactively sends warnings to schools when there is an energy consumption issue. This will include high overnight/weekend/holiday consumption, continuous high baseload or unusual spikes.

The Databird system was installed in all 15 schools and is linked to all utilities’ main meters and sub-meters. As a result the schools now have access to half-hourly energy consumption data for their building(s) through the DYNAMATlite website. It is important to note that all Leicester BSF schools have half-hourly metering for all utilities and all new buildings have a significant amount of sub-metering. This provides LCC with the ability to gather a comprehensive picture of energy use across the whole school estate, monitor performance and efficiency and suggest remedial or innovative action to improve efficiency.

### Energy management training

The third and final stage of post-handover support involved engaging schools in a training event on energy monitoring and management. This built on the engagement and knowledge transfer between the KP and the initial focus group. A training day was organised that involved schools having the opportunity to learn and engage with energy monitoring and management through a web-based tool. The training was based on the following objectives – for school staff to:

- learn how to use the online web tool to monitor their energy use
- understand the consumption of their school against similar BSF schools nationally
- learn how to read graphs and identify issues
- understand potential causes for the issues
- develop an energy management plan for their school
- understand how to use the web tool within the curriculum and student engagement.

The training was attended by business managers, premises officers and curriculum leads. Attendees were given access to their school consumption data, and a questionnaire helped them to understand

the performance of their building and to identify key issues for their school. Every school came away from the training day with an understanding of the performance of their school, focused practical actions to reduce energy demand, and continuous access to the energy consumption data for their school.

The training was followed by a workshop on developing a school action plan based on the key issues identified. Schools were given the opportunity to network and engage with each other and work collaboratively to develop ideas around engaging staff and students. Every school walked away with actions and a draft action plan.

### **Energy Management Manual**

The Energy Management Manual contained all the information covered in the training session. It also contained resources on developing energy action plans, sample plans, school walk-around checklists and guidance to engage staff and students.

Staff evaluation of these workshops and training courses were (again) extremely positive. Analysis of event feedback forms shows participants rated the utility and content very highly. On a scale of 1 to 5 (with 5 being excellent), usefulness of the event was rated 4.3, communication: 4.6 and energy management training: 4.2.

*“Looking at the data using DYNAMATlite was a real eye-opener. The next step for the school is to develop an eco-warriors team, conduct surveys and staff awareness before the summer.”*

*“Understanding energy management and how [the College] can better make use of its energy and reduce wastage has been helpful. The course has been very useful and will help [the College] with its responsibilities towards energy management. I would like [us] to get successfully involved in eco-schools. The next step for us is to engage staff and students to discuss opportunities on energy management.”*

## 7. What public value was created?

This section plots the tangible **outcomes** of the Knowledge Partnership. The positive analysis should be tempered somewhat, in the awareness that full data is not available for all 22 Building Schools for the Future (BSF) schools. However, solid data is available for a majority of the schools, and this offers strong evidence of positive outcomes resulting from the work of the Knowledge Partnership.

Although 11% larger in area, energy consumption of schools built under **the Knowledge Partnership are 30% lower** than pre-BSF costs.

Carbon emissions of the five schools built under **BREEAM (prior to Knowledge Partnership involvement) are 60% higher** than pre-BSF performance

*“I know the KP team did a lot in the background, but there was a lot going on that schools weren’t included in. I know that the Associate was fighting in the background with [the Contractor] to get the school that she thought we needed.” (School Business Manager)*

The Knowledge Partnership developed a ‘whole systems’ design process that can be used in other public building programmes.

Schools continue to benefit from the physical products of the Knowledge Partnership and the legacy services set up. However, Leicester City Council would need to invest further to ensure all schools benefit from the outputs and services created for the prototype group of schools.

The Leicester BSF programme consists of 22 secondary and special educational needs (SEN) schools that have either been rebuilt or refurbished in the period 2009-16. The Knowledge Partnership (KP) was directly involved in the design and building of 17 of these BSF schools.

In 2009, Leicester City Council (LCC) published its BSF Strategy for Change (SFC) in response to a funding initiative set out by Tony Blair’s Labour government. The main priorities of BSF were to boost educational outcomes, increase diversity and fair access, provide choice, a broad and balanced curriculum and to promote personalised learning. Whilst achieving this transformation, in its final section, Leicester’s strategy document asks how the local authority will ‘harness the opportunity of BSF to drive down carbon emissions from schools and promote sustainable behaviours among pupils and their communities.’ As Section 3 of this report explained, the KP was set up to support the strategic ambition to drastically reduce carbon emissions from schools in Leicester City, once it became apparent that the first four schools built under the BSF programme had singularly failed to achieve these ambitions.

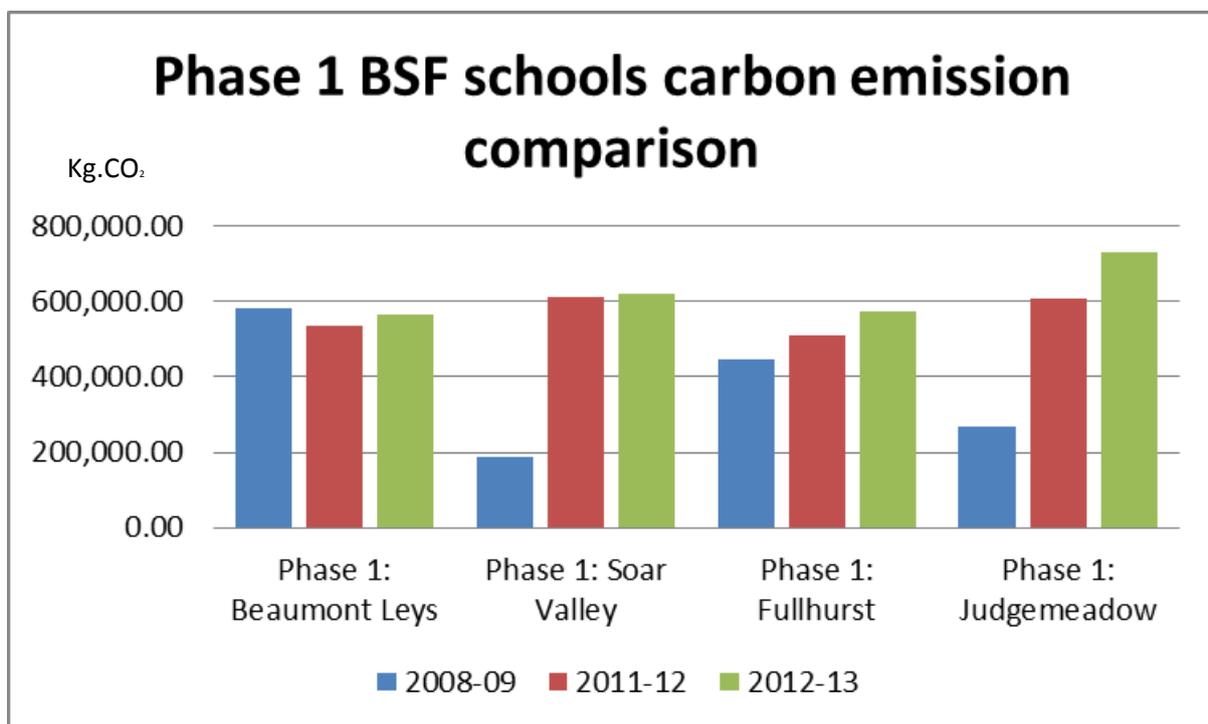
The findings presented here relate to the energy and carbon performance of 11 of the 17 BSF schools influenced by the KP, where a full year of monthly consumption data was available, as well as partial energy use data from four of the first five BSF schools built. Please note that two schools, Hamilton Community College and Nether Hall School, are co-located and are thus treated as a single project for the purpose of this study. Full consumption data was not available for six of these schools – please see note 7 later in this section. This means that the evaluation is based on only a partial picture of the performance of the complete BSF schools estate. Nevertheless, given these caveats, the report presents a compelling analysis of the vastly different level of performance between the earlier schools built without the involvement of the KP, and those that were influenced by the expertise martialled by the KP team.

It is not the purpose of this report to review the overall success of the BSF programme, although it was clear from many remarks made by contributors to the evaluation that there were many more building ‘snags’ than any client would have wanted. The vast majority of these problems did not relate to sustainability. It is also important to remember that these issues will be resolved in time, and students in Leicester City will benefit from many fabulous new learning spaces for many years to come. One School Business Manager volunteered that, “despite the snags ... staff and children agree that we have some fabulous new learning spaces.” Some of the more significant sustainability related ‘snags’ are dealt with in Section 10.

It is also important to note that reducing carbon emissions was not the only (or indeed main) objective of the KP, and although we feature the tangible impact of the KP in the sections below, there were other outcomes related to building expertise and capacity that are dealt with later.

### 7.1. Improved energy efficiency of schools

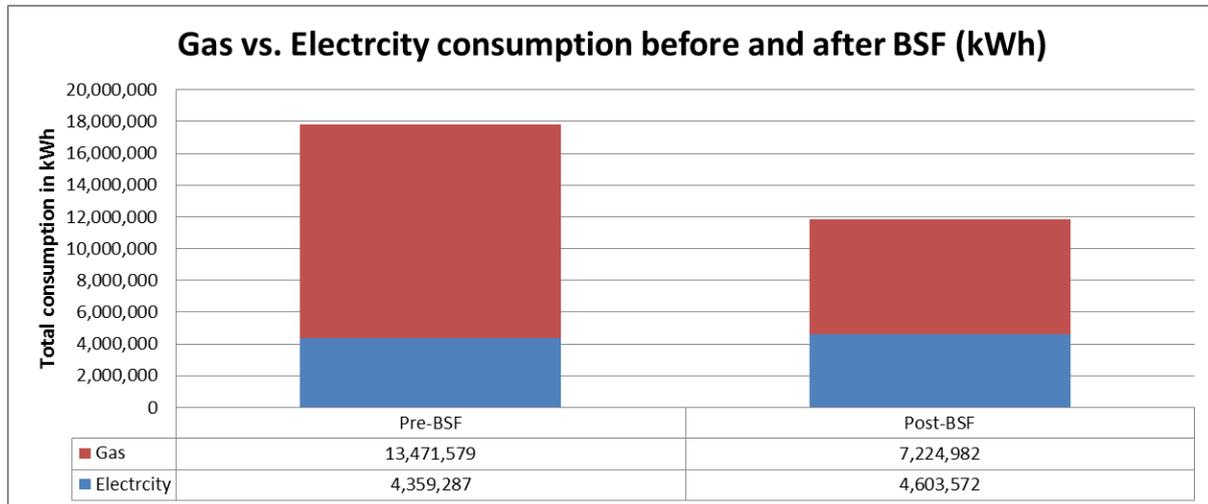
Analysis shows that carbon emissions of the schools built under BREEAM (Phases 1 and 2a) are **60% higher** than the buildings they replaced. With the involvement of the KP, the buildings that followed in Phases 2b-6 were significantly better performing.<sup>5</sup>



The following analysis is based on data from 11 of the 17 BSF schools influenced by the KP. As a result of the BSF programme the size of the secondary schools estate is 11% greater than previously. There has also been a significant increase in energy demand from additional IT and other energy hungry resources such as heating, ventilation and air-conditioning units (HVAC).

<sup>5</sup> Please note that there is no January-December 2015 data for Rushey Mead, so the graph is based on 2014 data for Rushey Mead and 2015 data for Ellesmere and Babington. The data represents, therefore, the first year of operation for all three schools. However, it should be noted that annual temperature differences in the different years reported might not provide a fair comparison of energy performance, that is, if 2014 was cooler than 2015, it may have resulted in higher energy use.

We can see from the figure below that **post-BSF energy consumption is 30% lower** than pre-BSF consumption for the KP-supported schools. This provides a very hard measure of one positive outcome that the KP has delivered through ensuring effective low carbon design. This point is validated by a substantial benchmarking study undertaken by University College London (UCL), which shows that Leicester BSF school energy efficiencies compare favourably with other BSF schools nationally. This is discussed in Section 7.2 below.

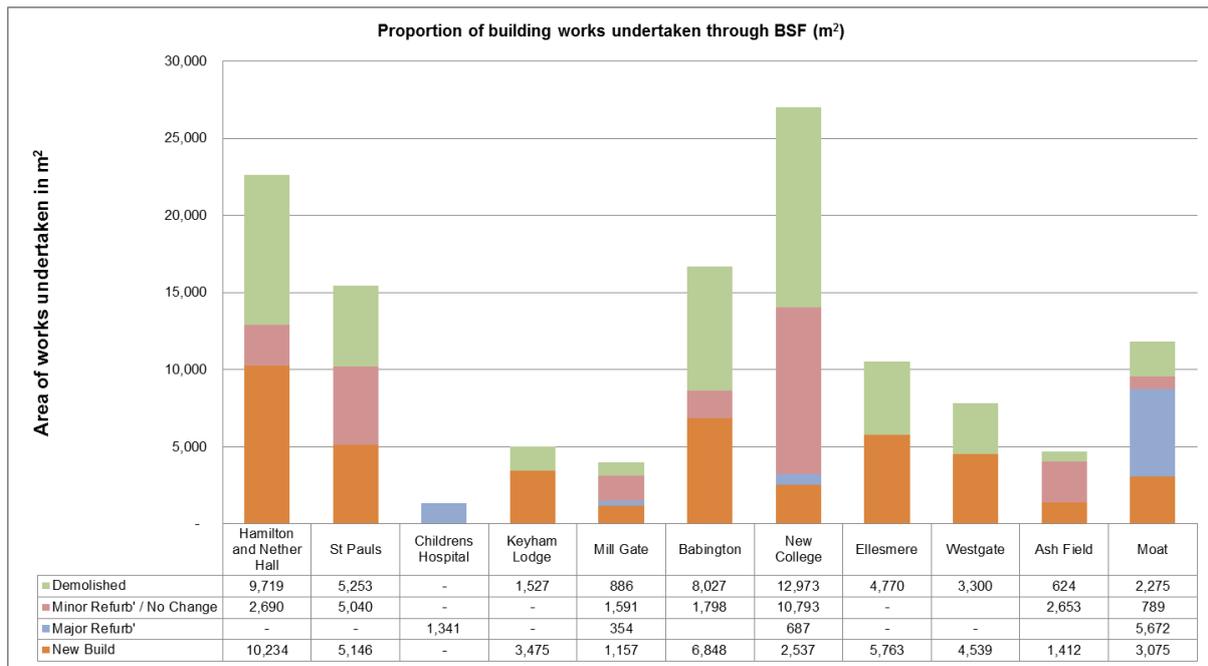


We can see from the figure that whilst electricity use across the estate is similar before and after BSF, there has been a substantial reduction in gas consumption – as buildings become more efficient, heating demand reduces. Although certain efficiencies have been achieved in electricity consumption, overall post-BSF electricity remains almost the same as pre-BSF consumption due to increased ICT and other service loads (ventilation, specialist technology and lighting).

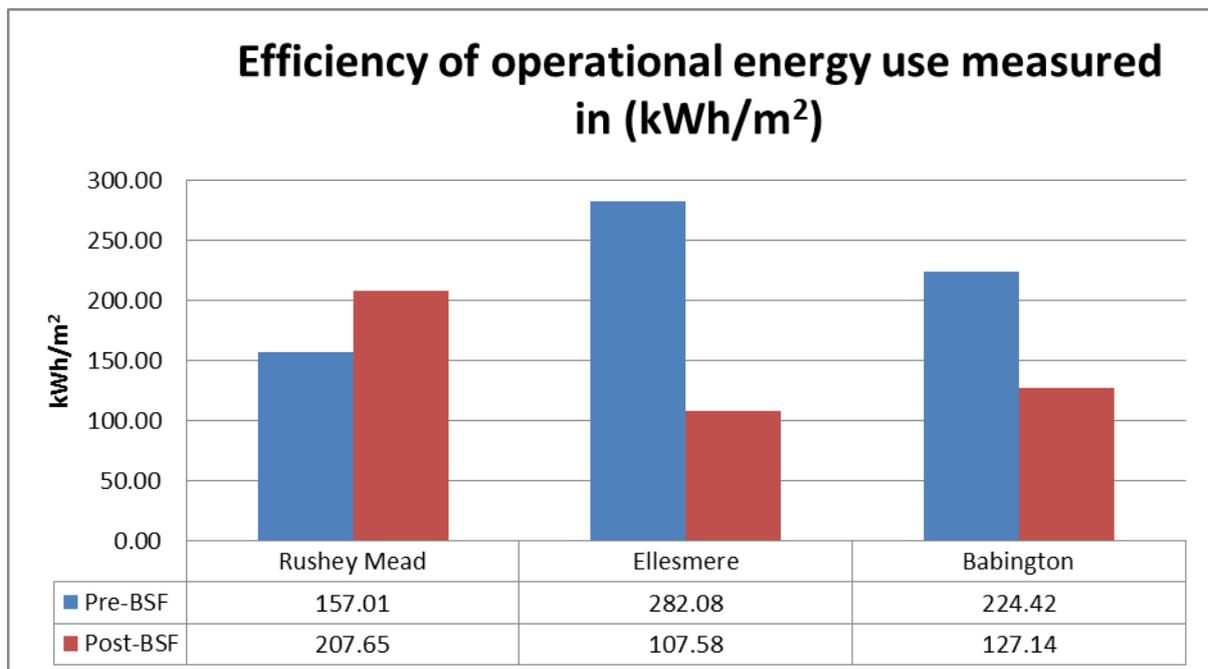
It should be noted that there are complicated issues associated with bio-fuel systems installed in some of these schools, and information is not sufficiently reliable about schools’ consumption of bio-diesel. For further discussion of these issues, please see the associated ‘Lessons learned’ in Section 10.<sup>6</sup>

Comparing total energy demand of buildings of varying designs and sizes can be misleading, in terms of understanding the efficiency of energy demand and use. To overcome this issue, the analyses that follow show the energy consumption per unit area (kWh/m<sup>2</sup>), with lower kWh/m<sup>2</sup> indicating a more energy efficient building. The reader should remain aware, however, that whilst building stock post-BSF is 60% new build/refurbished, 40% of the estate is still old ‘beyond life’ buildings that are severely inefficient. So as we review the data, it is important to be aware of which schools are wholly or predominantly brand new BSF schools with all the energy efficiencies associated with an eco design, and those that have been only partially ‘upgraded’.

<sup>6</sup> If schools are not using their bio-diesel systems, the figures here would remain unchanged. However, if the schools in the last year have used their bio-fuel systems as prescribed (which is unlikely), the total energy consumption figures post-BSF would increase by a maximum of 5-6%, and the costs would increase significantly.



The figure below compares two of the better performing schools built under the influence of the KP (Ellesmere and Babington) with one of the earlier schools (Rushey Mead) for which appropriate data is available.



Rushey Mead was the fifth school built under Phase 2a of the BSF programme (see Appendix 1). It enjoyed £1 million funds towards sustainability measures in addition to the budget for building and IT provided through BSF. Even so, the new Rushey Mead building is less energy efficient than the building it replaced. In reviewing the data shown we need to bear in mind that this represents the 'in-use' energy performance of the school and not the efficiency of the design or actual build potential. In the KP Associate's view, Rushey Mead has lots of technical issues rooted in poor design decisions and very little operational support on energy use. With appropriate support it is possible

that the school could surpass the energy performance of the other two schools it is compared with in the figure above.

The other two schools in this figure represent 'best case' examples of the 17 schools that the KP supported in the design, planning, build and handover phase (Phases 2b-6 of Leicester City's BSF programme). The 'in-use' performance of these buildings overall is substantially better than the five schools built in Phases 1 and 2a, and this report makes the case that the KP has had a significant influence on this improved performance.

Of course, it is important to guard against over-simplistic analysis and comparison of performance in buildings that are different in fabric and operation. Investigation of the 'in-use' versus predicted energy use of these schools shows that although Ellesmere was designed to be more efficient than Babington, Babington is actually performing better because its operational energy use is much lower than predicted. One reason for this is that Babington has had a good deal more support than Ellesmere from the KP on energy management practices – through development of a tailored Building User Guide, energy management training and the eco schools programme. The KP Company Supervisor considered the operational support provided to schools by the KP to be a keystone of their work, saying,

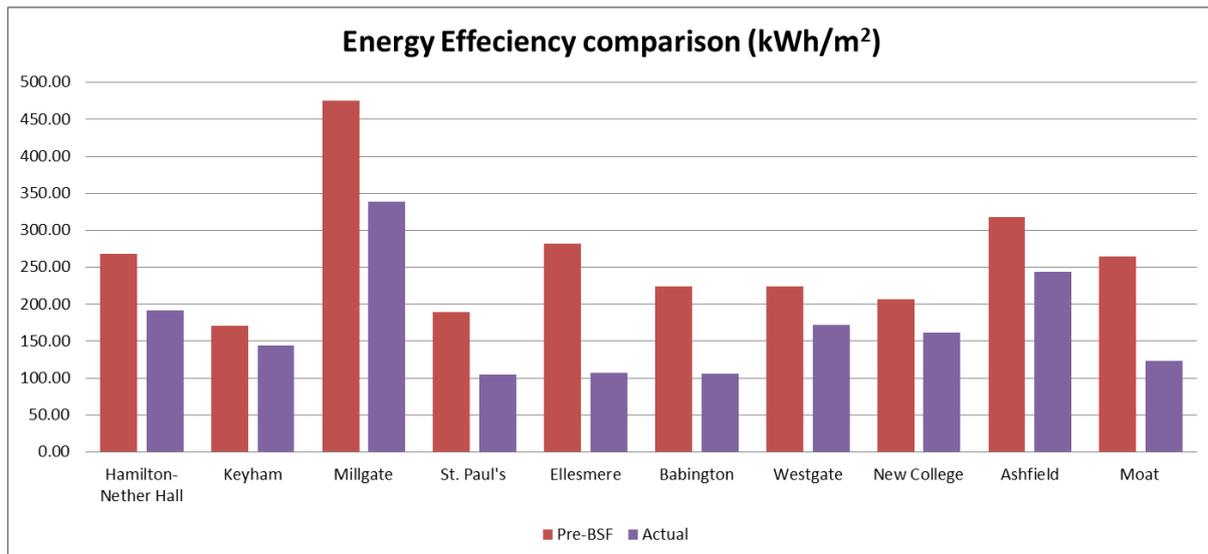
*“Our biggest success has come from working with the end user. When the designers are starting their work they are not thinking about who we need to engage to get this work done.”*

The LCC Client Liaison Manager echoed the views of many school staff who said,

*“The school User Guides are absolutely fantastic – they are the best thing. I can't praise them enough. Every single building in the authority should have one of these. They should be rolled out to all of our assets. They have been so well received from many different people from all different levels. They are so easy to understand.”*

With the appropriate level of support, Ellesmere would probably perform better than Babington. Thus, this report recommends rolling out the operational support provided by the KP to all BSF schools to secure further significant efficiencies – that would, over time, exceed the costs of support involved.

Robust, in-use data is available for 11 of the 17 BSF schools built with the influence of the KP. The positive picture offered by Ellesmere and Babington is replicated across these schools – although with more variability.



The figure above is based on actual energy consumption in the first full year of occupation for 11 of the 17 BSF schools that the KP has supported.<sup>7</sup> All 11 of these schools were found to be more efficient than the baseline year. Phase 2b-6 BSF **new build** schools (Babington, Ellesmere, Keyham and Westgate) are significantly more energy efficient than those built in Phases 1 and 2a.

The efficiency of mixed estates is particularly impressive – where large portions of the old estate have been retained and new buildings have been added to effectively increase overall area, for example, Ashfield and Moat schools. Overall, the schools with significant retained estate perform less well than new builds because they had no investment in upgrading energy efficiency in their older buildings. So, whilst, their new buildings are highly energy efficient, their retained estate consumes a lot of energy. New College, Millgate, St Paul’s and Sir Jonathan North are good examples of this. However, overall consumption for a school like St Paul’s has still improved because the new building is so efficient that it compensates for the deficiencies of the old building.

Also note that these figures relate to the first year of operation with all the associated snagging and teething problems. These figures are, therefore, likely to improve over time:

*“Whether we are talking about new builds, refurbishments or extensions we have some quality teaching and learning spaces. Anyone can see that. The spaces are absolutely great.”* (Client Liaison Manager, LCC)

## 7.2. Improved design into delivery process

Extensive research has been undertaken in the UK to understand and reduce the performance gap between actual and predicted energy consumption of new buildings. For an average building, actual

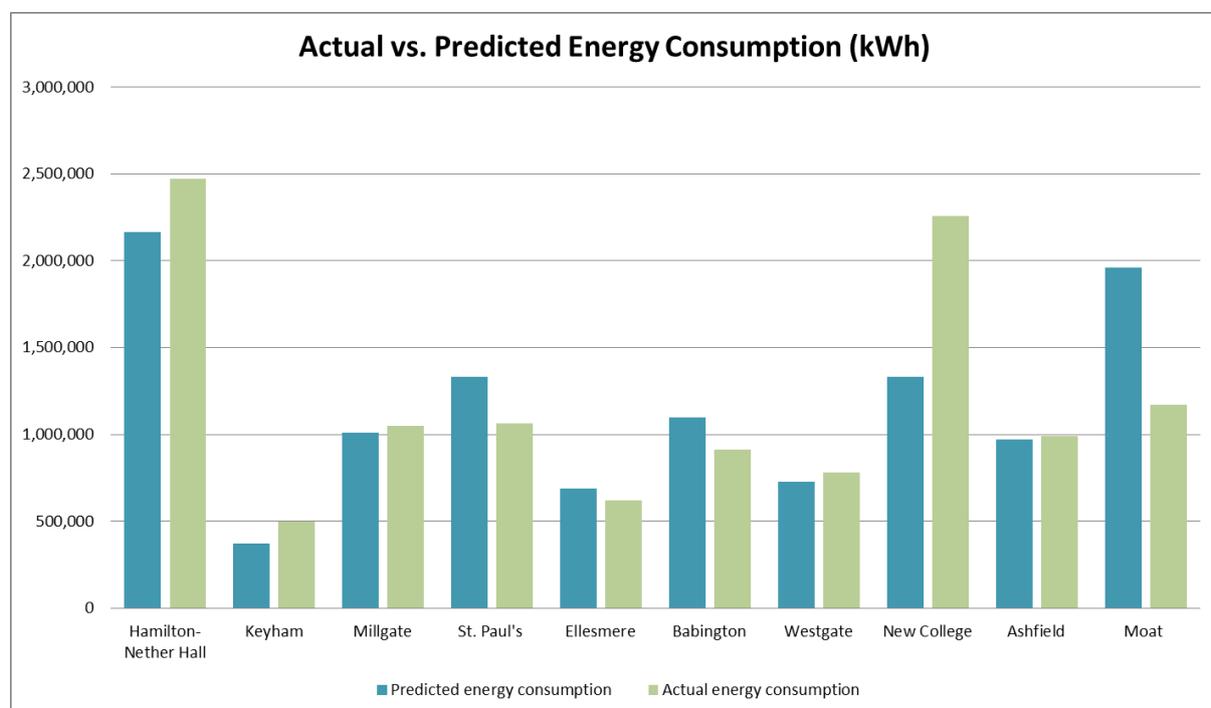
<sup>7</sup> The actual consumption data is based on energy metering data from January to December 2015. The schools excluded from this study are:

- Judgemeadow, Soar Valley, Beaumont Leys, Fullhurst and Rushey Mead  
Rationale for exclusion: Phases 1 and 2a schools that were not a part of KP, and consumption data is unavailable.
- City of Leicester College and Crown Hills Community College  
Rationale for exclusion: Consumption data for January-December 2015 unavailable.
- English Martyrs, Children’s Hospital, Sir Jonathan North and Lancaster  
Rationale for exclusion: Gas consumption data unavailable.

performance can be more than 2.5 times higher than the predicted (designed) energy use. Indeed, in Leicester, actual energy use in Phase 1 BSF schools was found to be two to three times higher than that predicted by the building design.

The KP endeavoured to reduce this gap, through a step-by-step approach that has included a move away from the National Calculation Methodology (NCM), changing the approach to modelling predicted energy use through the Sustainability ARs and a continuous engagement with the Design and Delivery teams to streamline designs and reduce the gap between perceived/intended and actual use of educational facilities.

If we consider only those schools that have higher energy use than predicted, the performance gap ratio is 1.22, and across all 11 sites the gap is only 1.04. The extremely low performance gap ratio has been hard won. One Project Manager reported that, “sometimes the sustainability thing has felt more like waging a war than a partnership approach and I am not quite sure why that is...”



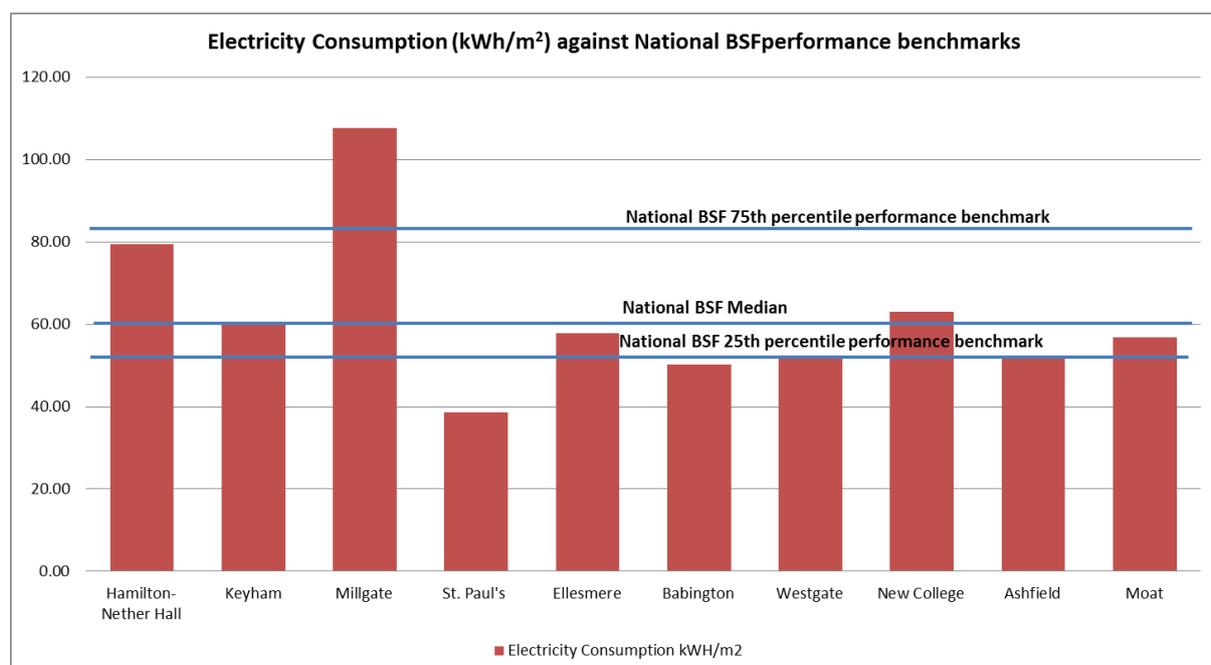
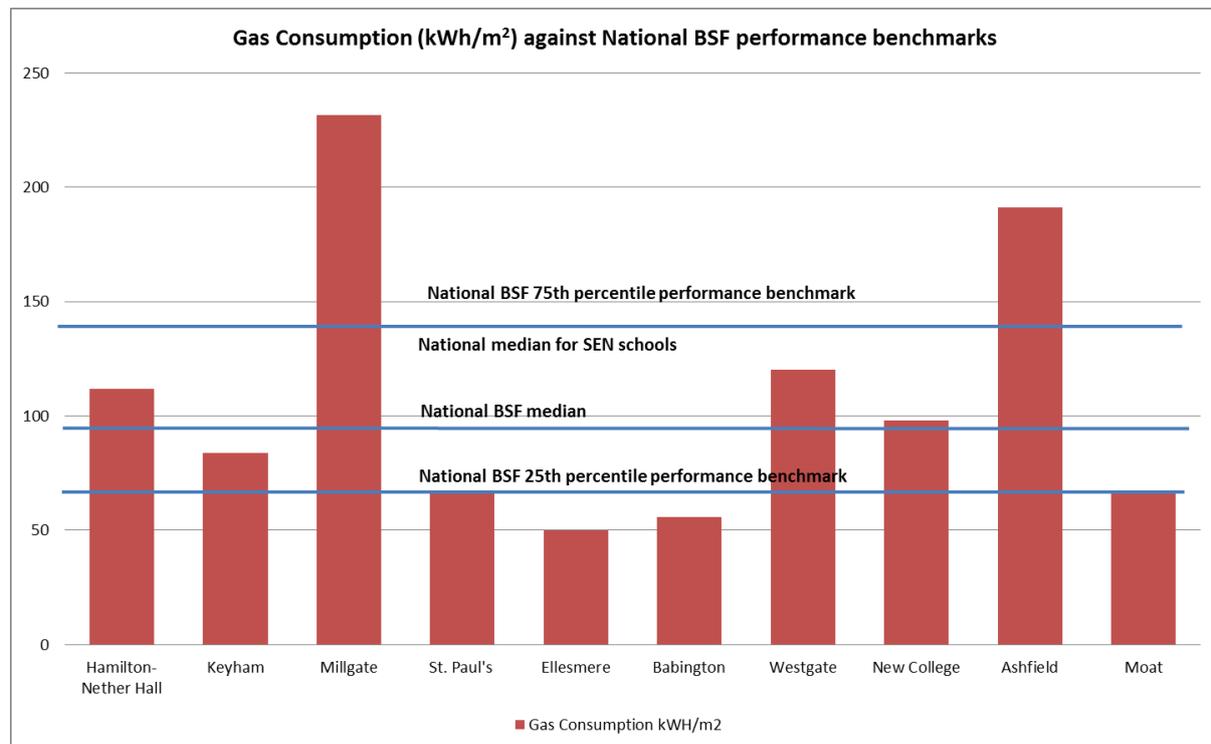
These positive performance figures are the result of the knowledge, expertise and consistent determination that the Associate applied in engaging the Contractor’s staff in working with these methods. The figure evidences the success of the KP approach.

The predicted energy consumption as opposed to actual consumption shown in the figure does not include community use. So in reality the performance gap would be even lower. The maximum gap is found in New College, which is 1.69 times higher than the predicted energy use. Closer analysis of this site shows high heating consumption in one part of the building that is supplied through the district heating network. Additionally New College’s retained estate has a high energy demand profile due to poor building fabric and inefficient heating controls and distribution network.

So the BSF buildings appear to be performing much better than national trends, offering some justification to the claim that the KP has had a significantly positive influence on the energy efficient

design of these schools. This claim is backed up further by data obtained through a benchmarking study by UCL.

In 2013 the KP set up a collaboration with UCL to undertake a benchmarking project that involved creating a set of energy benchmarks for primary, secondary, SEN and BSF schools based on latest energy consumption data collected from 7,627 schools in England, benchmarking Leicester schools against these national benchmarks. The figures below show the outcome of that study.



Although two schools are above the 75th percentile for gas consumption, both have extensive retained estate, which means that it's likely that the high consumption reflects the poor condition of

the retained estate and the heating services. Millgate is also found to be above the 75th percentile for electricity consumption in BSF schools nationally.

However, four of the schools lie below the 25th percentile for both gas and electricity, with the majority lying near the median level. This indicates that Leicester school energy efficiency compares favourably to other BSF schools nationally.

These two sets of UCL data offer a strong indicator that the approach taken through the KP helped to create a successful model that could be applied more widely. These figures also show the potential that taking a 'whole systems' approach to data capture, analysis and monitoring can offer. The displays provide an instant stimulus for school business managers, site managers and head teachers to enquire into the possible causes of poor building efficiency. Equally, for schools demonstrating high efficiency, it provides a cause for celebration and encouragement to share their approach with others.

### 7.3. Cost benefit analysis of Knowledge Partnership

- Knowledge Partnership intervention in bio-diesel systems design alone resulted in **cost reduction of £658,000 per annum**.
- Knowledge Partnership technical advice on another project prevented a **£250,000 capital cost variation** going through.
- Additional building lifetime benefits will be well in excess of £4 million for schools.
- Senior managers made better informed decisions as a result of Knowledge Partnership intervention.
- Several key risks were averted, that is, higher energy costs, higher overheating, bigger issues with bio-diesel, higher carbon, lower due diligence.
- Leicester City Council teams are more aware of sustainable design approaches.
- Outsourcing this function would be two to four times more costly than those for the Knowledge Partnership.

Of the 22 schools built under Leicester BSF, five were delivered by Leicester Miller Education Company (LMEC) without any direct influence from the Knowledge Partnership (KP). Originally BREEAM was the mechanism by which building quality in general and sustainability outcomes in particular would be delivered – at a cost of around £50,000 per building. Once the BSF programme funding constraints began, the Contractor made a strong case for removing this aspect of the project in order to make savings of around £850,000 across the programme. Following this decision the KP became the key mechanism by which emissions reduction and energy efficiency would be assured.

Interestingly, the operational **energy costs of the first five new buildings are 1.6 times higher than their pre-BSF energy costs**. In the second year of operation this represents a cost escalation from £367,000 to £580,000.

With the KP in place, the Council has supported the 11 schools for which full annual energy data is available to save **£160,000** in their first year of operations, representing a 20% carbon reduction and 30% energy reduction. Projecting over 25 years (the design life of the new buildings), the KP will have helped these 11 schools to save at least **£4 million** over their design life. These funds could be played back into Leicester schools' budgets to purchase teaching and learning resources rather than

energy – and provide additional investment in the future opportunities for Leicester’s young people. This does not take into account the potential savings that will be made by the other six schools supported by the KP for which sufficient data was not available at the time of this evaluation.

In addition, technical advice for one school prevented a £250,000 variation (capital cost) from going through because the design was both technically flawed and would also have increased ongoing revenue implications for the school in question. The KP also helped secure £60,000 to install and implement an energy monitoring system for all the Phase 3-6 schools.

The costs of the KP are summarised in the table below.

External funding	£110,836
LCC funding	£252,836
<b>Total KP funding</b>	<b>£363,672</b>
Total operational energy cost saving across 11 BSF schools in first operational year	£160,000
<b>Total operational energy cost saving across 11 BSF schools over 25 years</b>	<b>£4,013,175</b>

#### Value for money

The KP Company Supervisor made a strong case for internal capacity to fulfil the aims of the KP, based on the argument that much of the acquired knowledge gained through such a process is likely to be lost by using consultants – who carry any acquired knowledge out the door once the project ends.

The overall cost of **£363,672** for the KP equates to approximately **£56,000/annum**. This has bought LCC a full-time staff member, access to multi-disciplinary support for carbon reduction and sustainable development from DMU, and supported the delivery of a holistic and successful approach to carbon reduction. It is worth noting that the direct investment of LCC was only **£39,000/annum**, given that the Technology Strategy Board and HIEF provided around £110,000 of the project funds. In addition, the full costs of DMU staff contributions are, undoubtedly, only partially covered by the external funding element of these figures.

The work of the KP has involved a varied but high level of expertise. To match this, the LCC would have required either a senior consultant with multi-disciplinary experience or an organisation that could offer a group of individuals to provide professional support with a range of technical and non-technical skills. Due to austerity measures, LCC was unable to buy into this level of expertise, and so the KP became an attractive approach to support access to the appropriate level of multi-disciplinary expertise via a suitably experienced associate and links to DMU’s Institute of Energy and Sustainable Development (IESD).

Had the carbon reduction and environmental performance function been delivered through a contractual partnership with LMEC or some other arrangement, the costs would have been substantially more. An outline of potential costs is offered below for comparison purposes.

In 2012, LCC approached Arup (an engineering consultancy) to undertake a sustainability review to develop a plan for the carbon reduction of four schools under Leicester BSF. A senior consultant costing £130/hour (£1,040/day) and a sustainability consultant costing £82/hour (£656/day) were brought in. Other consultants, who were asked to conduct a design review of the BSF Contractor's proposals for one project, cost the City Council £465/day. These consultants were hired under the LCC procurement framework, and are comparatively cost-effective compared with other firms.

**Replacing the KP with a consultancy approach would, therefore, have cost LCC between £107,000-£230,000 per annum**, which suggests that the £39,000/annum spent by LCC on the KP offers extremely good value for money.

It is also worth noting that LCC does not now have the capacity to offer a holistic carbon reduction programme such as that delivered under the KP, and it therefore becomes likely that the costs of employing suitable consultancy expertise will need to be shouldered by LCC in the future. Thus, establishing an ongoing and long-term partnership with a trusted civic stakeholder such as DMU offers obvious cost and other benefits.

*“The work done by [the Associate] and her internship students has been outstanding. It has helped us understand the heating, lighting and ventilation systems used throughout the new school building and given us detailed but simple plans which can be utilised to support sustainability across our school.”* (School Business Manager)

## 8. What supported this process?

In this section we look at the **approaches** (inputs) and **artefacts** (outputs) that supported the knowledge exchange process and ultimately the creation of public value as described in Section 7. We explore the approach to knowledge exchange with schools, Leicester City Council teams, De Montfort University and beyond.

Documentary and interview evidence shows that the Knowledge Partnership (KP) provided a range of inputs that have been instrumental in delivering the positive outcomes described in Section 7. The KP:

- held the Contractor accountable for delivering the agreed carbon reductions
- became the key mechanism by which emissions reduction and energy efficiency was assured for BSF schools – once BREEAM was removed from the requirements
- created a step-by-step ‘whole systems’ approach to energy reduction that balanced technical outputs with end user outcomes
- fought hard over 18 months to gain Contractor agreement to a sustainability contract, where none had previously existed
- provided/accessed multi-disciplinary expertise in design, modelling and sustainable services delivery that is now beyond the capability of Leicester City Council (LCC)
- provided programme support – continuity, contract negotiation, technical advice, strategic planning and delivery, Facilities Management (FM) and Mechanical and Electrical (M&E) due diligence
- through challenging circumstances over six years, the KP helped LCC and De Montfort University (DMU) to collaborate well and cement their strong commitment to the process of knowledge exchange.

The KP drew on the knowledge, expertise and commitment of various people from across the partner organisations and beyond. However, as noted in Section 3, there were three key roles: the KP Associate, KP Company Supervisor and KP Academic Supervisor. Below we briefly outline some of the key inputs from each of these roles.

The KP Associate:

- provided ‘dogged attention’ to the sustainability aims of BSF, and provided leadership of internal staff and project managers to ensure delivery of agreed requirements
- used technical knowledge and expertise to significantly improve contractual agreements and push staff on all sides to meet expectations for creating sustainable buildings and high-quality learning spaces

- fulfilled a crucial role as ‘translator’ of the languages and culture of LCC and Contractor technical staff, Contractor commercial staff and project managers and non-technical school staff.
- The KP Company Supervisor:
  - drove the shift from an output focus and compliance mind set to an approach that emphasised outcomes
  - played a crucial role in shifting the focus on to the needs of the building end users and mentoring the Associate’s contribution
  - ensured as many tangible benefits as possible would be realised by end users – in terms of building comfort, end user satisfaction and ongoing running costs
  - provided a bridge between the Education and Construction teams to ascertain what was viable with reduced budgets
  - provided a bridge between school staff interests and what the budget and design possibilities could viably offer.
- The KP Academic Supervisor:
  - provided consistent technical support relating to system design or modelling on issues relating to building thermal performance, daylighting, ventilation, overheating, indoor air quality (IAQ) and post-occupancy monitoring of overheating.

In addition to these various inputs supporting the aim of embedding sustainable design, the KP produced various tools and tangible knowledge products that provide valuable insight for architects, planners, building contractors, policy officers and academics as well as for the building end users themselves. As mentioned above, the resources (and approach) associated with operational/handover support for users have been particularly successful.

In the following sections, the report adds further detail to the approaches and artefacts (inputs and outputs) associated with knowledge exchange with schools, LCC teams, DMU staff and beyond.

## 8.1. Knowledge exchange with schools

Artefacts	Approaches
<ul style="list-style-type: none"> <li>• <b>School’s Strategies for Change</b></li> <li>• <b>Education Design Briefs</b></li> <li>• <b>Building Schools for the Future (BSF) website</b> – details of low carbon features</li> <li>• Schools <b>sustainability guide</b></li> <li>• Tailored <b>Building User Guides</b> produced in collaboration with De Montfort University architecture students</li> <li>• Room ‘efficient comfort management’ <b>displays</b></li> <li>• <b>Energy management systems user guidebook</b></li> </ul>	<ul style="list-style-type: none"> <li>• One-on-one mentoring on developing Strategies for Change and Education Design Briefs</li> <li>• Schools Strategies for Change workshops</li> <li>• Sustainability Design Tracker FAQs</li> <li>• Project managers and neighbourhood relationship officers as first port of call</li> <li>• Tailored face-to-face handover engagement with 14 schools</li> <li>• Workshop events on building operation with six schools</li> <li>• Web-based energy monitoring system</li> <li>• Energy management systems training workshops</li> <li>• Walk-arounds to review building management systems</li> <li>• Energy team help desk and bureau service</li> </ul>

*“Our biggest success has come from working with the end user. When the designers are starting their working they are not thinking about who do we need to engage to get this work done.” (KP Company Supervisor)*

As the Knowledge Partnership transitioned from the Knowledge Transfer Partnership (KTP) to the Knowledge Exchange Partnership (KEP) in 2012, the KP Company Supervisor drove the move to become more outcome- and end user-focused. This helped shift the focus away from seemingly endless wrangling about compliance and towards activity that, although challenging for the Associate, was immediately more fulfilling and productive. The KP engaged with schools in a variety of ways:

1. Schools were supported to include sustainability as an aspect of their own Strategies for Change (SFC) and Education Design Briefs (EDBs). During the period when the Associate worked with schools on developing these documents, she spoke to every school individually, sometimes over two to three meetings. These conversations were held with the head teacher, business manager, teacher(s) and sometimes even students from eco groups. This involved talking about building design and other aspects of sustainability. This one-to-one knowledge embedding, similar to a coaching workshop, ultimately led to the draft of their sustainability SFC and EDBs.
2. The Sustainability Design Tracker was also adapted and circulated to schools, and included FAQs for schools. The LCC Client Liaison Manager was heavily involved in this.
3. A lot of knowledge transfer to the schools was done using the project managers and neighbourhood relationship officers. The KP Associate would share knowledge with them and vice versa. This involved challenging their school design as presented at that stage – for example, the building orientation, room layouts, adjacency, heating, cooling, zoning etc. – and often involved

further conversations, bringing school staff and the design team together to explain the impact of design decisions so that the KP could influence change.

4. The BSF website held sketches and explanations of features of low carbon design that were being introduced. This helped embed knowledge within schools about what features they were getting and why, and what the benefits would be. Schools were able to use this material within their curriculum, and various extra resources were also provided.

5. Two schools workshops focused on design were held in 2010 and 2011 along with EPSRC – national schools.

6. Links to a wide variety of external resources were also provided.

In addition to all this, a whole range of approaches and artefacts were developed by the KP Associate to support schools as they took over their new buildings. Even though many of the schools were still frustrated by unresolved snags in their building, one School Business Manager talked about how the Contractor’s handover support had been very poor, and that the additional support from the KP had been very gratefully received, and said,

*“Despite the snags ... staff and children agree that we have some fabulous new learning spaces.”*

## 8.2. Knowledge exchange with City Council teams

Artefacts	Approaches
<ul style="list-style-type: none"> <li>• <b>Building Schools for the Future (BSF) Strategy for Change</b></li> <li>• <b>Sustainability policy document</b></li> <li>• <b>Sustainability element matrix</b></li> <li>• <b>Sustainability Design Tracker</b></li> <li>• <b>Sustainability ARs</b></li> <li>• <b>Schools carbon action plan</b></li> <li>• <b>Bio-diesel study</b></li> <li>• <b>Solar panel study</b></li> <li>• <b>Carbon impact assessment</b></li> <li>• <b>Phase 1 energy benchmarking</b></li> <li>• <b>District heating feasibility studies</b></li> <li>• <b>UCL benchmarking study</b></li> <li>• <b>BSF website:</b> sustainability resources</li> </ul>	<ul style="list-style-type: none"> <li>• Whole systems design approach</li> <li>• Whole systems data analysis</li> <li>• City Council teams needs analysis</li> <li>• Sustainability workshops for project managers, neighbourhood relationship officers and others</li> <li>• Negotiating contractual disputes on sustainability issues</li> <li>• Collaborative forum – LCC focus group</li> <li>• BSF carbon monitoring</li> <li>• Support for BSF EMAS</li> <li>• Liaison between Environment, Design and Construction teams on BE16</li> <li>• Design advice and support for primary schools</li> <li>• Support for the Carbon Trust SCoRE project</li> </ul>

The KP Academic Supervisor explained that initially, “We thought we were embedding the KP within the property department but with budget cuts people left the department and so the knowledge wasn’t embedded.” The KP Associate expanded on this, saying “I think knowledge was embedded but lost as individuals left the team/organisation.” This point is important. Although explicit knowledge in the form of artefacts is important, it has a very short shelf life. More significant to a

team or organisation is the tacit knowledge held by individuals. The two positions articulated here recognise that even though design knowledge was being transferred, it was lost to the organisation. This led the KP to shift tack, and, although the KP has produced (or made a significant contribution to) various artefacts, approaches and tools for building design and planning to support the work of teams across the Council, it realised that embedding knowledge in schools would have much greater longevity and impact than attempting to embed knowledge in LCC teams at a time when there was significant turnover and reduction in staff numbers.

### Engaging teams within Leicester City Council

Although a great deal of information is available on school buildings within the local authority, it is scattered across a variety of teams. There is no single database where all information available on a school/project can be found. To overcome this barrier, in the early stages of the project the KP conducted a needs analysis, and relevant teams were contacted to engage in the project. Individual staff were brought on board, and awareness raised about the benefits of engagement.

A focus group was created with colleagues from Children's Strategy, Facilities Management, Energy, Environment and Finance teams. The focus group met regularly to discuss progress and solutions. Roles within the focus group were delegated on the basis of existing skills within the teams. Collaborating with members of other teams meant that they were better informed and learned the fundamental co-dependence and need for coordination between strands. Working on a coordinated project plan to develop a solution to a multi-faceted problem with social and technical dimensions helped the teams to develop a strong model within the local authority. A programme of actions was drawn up against the secured funding, and Key Performance Indicators (KPIs) set against key milestones to ensure that planned actions were being delivered against clear measures of success. This inter-team forum was a significant factor in building a collaborative approach across the local authority team. A number of key artefacts also helped to guide activity:

- Sustainability policy document
- Sustainability Design Tracker
- Sustainability Authorities' Requirements (ARs)

The BSF schools were procured under a D&B contract. This is an output specification, which means the desired outcomes can be specified but not how they should be achieved. As a result, the Sustainability ARs can only guide the Contractor so far. The Sustainability Design Tracker bridged this gap. It is a collection of good practices and rules of thumb that describe how the client (LCC) expects the projects to be delivered. Where the tracker indicated a move away from the fundamental aims, the design would be challenged by the KP Associate in order to bring the design back to its fundamental principles.

The Associate said that:

*"The tracker helped to set out what was expected from the designers from the outset. The best thing was that when we couldn't speak to every individual design team during the process they still understood what we wanted. It was meant to be a design tool but worked quite well as a management tool as well."*

However, the Associate adds a note of real concern about LCC's ability to replay this approach:

*"The City Council now has no expertise in terms of design and delivery of low carbon buildings – this expertise rested with the KP. There is an engineer and some FM staff who understand the issues but sustainability is not their specialisation and they don't have the holistic expertise."*

According to the Associate, the great benefit of the KP was that it could 'draw down' expertise from multiple individuals at DMU as needed, and become the conduit of that knowledge at exactly the right time for the programme.

### **Engaging senior management within Leicester City Council**

The KP embedded knowledge of low carbon schools throughout the design and construction phase of the schools, for example, with findings from research by the KP Associate presented to senior managers in Children's and Property Services. This cemented a good working relationship with senior management within Property, Finance and Children's Services. For example, the case for a 'soft landing' project was built around increased building energy use and other costs in the BSF schools having a direct impact on educational budgets. On the back of this activity, funding of £60,000 was secured to install and implement an energy monitoring system within Phase 3-6 schools, and commitment towards allocating internal staff time to engaging in the project sought (for more details, see Dasgupta, 2015).

### 8.3. Knowledge exchange with DMU

<p><b>Artefacts</b></p> <ul style="list-style-type: none"> <li>• University College London <b>benchmarking study</b> commissioned and outcomes shared</li> <li>• One <b>journal publication</b> and one <b>conference publication</b></li> <li>• More <b>academic papers</b> in press</li> <li>• <b>Presentation</b> at East Midlands Low Carbon Conference</li> <li>• CIBSE <b>technical memorandum</b> on school design</li> <li>• <b>Case studies</b> created</li> </ul>	<p><b>Approaches</b></p> <ul style="list-style-type: none"> <li>• The Building Schools for the Future (BSF) programme has been a ‘real world’ test-bed for academic expertise in the whole systems approach to sustainable design</li> <li>• Delivered MSc guest lectures on bio-diesel, adaptive architecture, school design: opportunities, barriers and gaps and sustainable building design at De Montfort University</li> <li>• Projects developed for the MSc in Energy and Sustainable Building Design</li> <li>• Additional links between Leicester City Council schools and De Montfort University Smart Spaces</li> <li>• There is enormous potential for future research and development</li> </ul> <p>This is an area that the Knowledge Partnership could improve on. As the Academic Supervisor noted, “The main output for DMU was intended to be academic papers. These are still a work in progress.”</p>
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DMU has been involved with BSF since its inception, and was involved in the selection of the consortia contractors. Professor Paul Fleming has been the Senior Academic Adviser to the KP since its launch. He chairs the Mayor’s Environment Partnership that oversees the City’s low carbon action plan that aims to reduce greenhouse gas emissions across the city, create jobs and improve quality of life; he is also a member of the Local Enterprise Partnership (LEP) European Structural Investment Fund (ESIF) Committee that targets funding at low carbon initiatives across the City and County. Paul contends that senior stakeholders all want Leicester to be seen as an innovative, ambitious city that addresses low carbon issues from an economic as well as environmental perspective.

DMU has a new strategic framework 2015-20 that includes a section on ‘Improving our City’, and has set up a number of new ‘Theme Boards’ (including one on ‘Improving our City’) to work with all stakeholders, including community groups, businesses, public service and the university. To date, DMU’s ‘Improving our City’ activity has been relatively simple, short, light-touch projects or tasks in which staff or students have engaged to create a benefit for the City. Paul said that these activities “haven’t yet addressed the type of complex issues that the KP has dealt with”, and that the building industry often focuses on the technical skills required to deliver low carbon buildings. He argued that industry publications take the position that “... there isn’t enough technical knowledge on designing and building low carbon schools within the industry.” Insight from the KP shows that delivering a successful energy and carbon reduction programme relies on awareness and understanding of a range of cross-cutting themes that impact on performance. Policy, regulations and technical knowledge are in themselves not always enough to ensure success. Alongside the ability to integrate

all this into the pragmatic requirements of a large-scale construction programme, in addition to any technical expertise, a deeper understanding of the social, legal and economic dimensions is required to ensure success.

The integrated methodology adopted by the KP ensured a more holistic, robust and demonstrably successful approach to delivering energy and carbon reductions in buildings. One key factor has been the KP's ability to draw on expertise from a variety of DMU staff, understand the parameters that influence success in the construction programme, and integrate these into a sustainable framework. Over the duration of the project, the Academic Supervisors have provided consistent technical support on issues relating to building thermal modelling, daylight modelling, ventilation, overheating and IAQ. This also extended into post-occupancy monitoring of overheating and IAQ in some schools. The Academic Supervisor also worked with the Associate to develop the methodology for creating future energy consumption scenarios for schools based on prediction, partial consumption data and analysing the impact on school budgets. The Associate argued that:

*“Some of his finer interventions and comments on designs led to critical design changes in terms of natural ventilation design and increased success of the daylight design. School K is a great example where [his] challenge of the ventilation design led to roof-top ventilation systems.”*

Although the KP has been highly successful in fulfilling its objectives, one area that could have been improved was in academic knowledge outputs. The Academic Supervisor commented that “the project has been dominated by the needs of LCC, and DMU's objectives have been subsidiary and pushed to the end. The main output for DMU is intended to be academic papers. These are still ‘a work in progress’.”

However, the Academic Supervisor has integrated a great deal of learning from the BSF programme back to academia – with four BSF schools becoming live design projects and a wide variety of KP findings being embedded back into lecture materials for the Institute of Energy and Sustainable Development (IESD).

## 9. What hindered this process?

<p><b>External conditions</b></p> <ul style="list-style-type: none"> <li>• 2008 financial crash</li> <li>• 2010 coalition government public sector austerity measures</li> <li>• 2010 national zero-carbon school's policy dropped</li> <li>• 2011 BSF budget cut by 17%</li> <li>• Compressed timelines imposed by funding process</li> </ul>	<p><b>Internal conditions</b></p> <ul style="list-style-type: none"> <li>• Eight Building Schools for the Future (BSF) directors in six years</li> <li>• Loss of key legal and commercial expertise in Leicester City Council</li> <li>• Compliance mind set</li> <li>• Leicester Miller Education Company not a fully functioning partnership</li> <li>• Lack of clear common purpose due to conflict between output aims of Contractor and Property division vs outcome aims of the Children's Capital team</li> </ul>
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It was not the aim of this study to evaluate the BSF programme itself, nor to explore in detail the prevailing conditions. However, it was apparent from comments by many of the respondents that the conditions within which the programme operated were challenging, to say the least. This was as true for the Contractor as it was for Leicester City Council (LCC) as the client. Given the rigours of the BSF funding process and the sharp political reversal on commitments in 2010, it is a testimony to all those involved that so many great new learning spaces were built.

### 9.1. External conditions

In 2003, the biggest school building programme in the UK since Victorian times was introduced by the Labour government of the day to meet the demand for new school places, replacement of buildings beyond their life cycle, and to address the carbon reduction challenge. This included the BSF programme that aimed to rebuild 3,500 state-owned secondary schools in England and the Primary Capital Programme (PCP) that aimed to rebuild and/or refurbish 50% of the 19,000 primary schools in England.

The BSF programme was delivered through a public-private partnership called the BSF Local Education Partnerships (LEPs), which were joint ventures between local authorities (10%), BSF investments (10%), and private specialist providers (80%).

### BSF public-private partnership

Until 2010, the Private Finance Initiative (PFI) was the main delivery vehicle for new build projects under the BSF programme. Under PFI arrangements, a consortium of private sector partners provided an asset-based public service to a public body. In this approach, the private sector designs, builds, finances and operates the asset, and the public sector pays an annual payment once the facility is operational, based on specific performance standards over the term of the contract. In the case of BSF the contract period was 25 years. The private sector consortium consisted of a building firm, a bank and a Facilities Management company, established as a separate legal entity known as a Special Purpose Vehicle (SPV). The BSF programme also allowed for non-PFI schools that were either managed and maintained by the LEP directly, or as regular maintained schools by the local authority.

However, after the financial crisis of 2008, and following the change in UK government and comprehensive spending review in 2010, the new coalition government announced a 60% reduction in capital spending over the period 2010-15. This led to the closure of the PCP and the BSF programme was shut down in all local authorities except those where programmes were well within their delivery phase and the abortive costs of closing down the programme would have been consequently higher.

At the same time, for similar economic and political reasons, the national zero-carbon school's policy was dropped. This meant that the wider imperative (set out by the previous Labour administration) to ensure all new schools would be zero-carbon by 2016 was lost. The Leicester BSF programme managed to avoid being closed, but this new situation provided highly constrained circumstances for both LCC as client and the Contractor.

## **9.2. Internal conditions**

In this section we explore how contract deficiencies and organisational culture hindered the work of the Knowledge Partnership (KP).

Prior to the KP commencing in 2009, Leicester had completed four schools under its BSF programme. The assumption was that carbon reduction would be delivered through BREEAM and the BE16 planning condition that at the time required between 10-11% of the energy demand for the four schools to be met through renewable technology. However, it became apparent in the first years of operational use that the schools were consuming two to three times more energy than expected, and were dealing with various issues relating to energy management and costs.

### **The role of contracting and weak requirements**

There was an initial budget of £340 million for the entire programme of building in Leicester. After efficiency measures, the budget for Phases 2b-6 was reduced from £240 to £210 million to deliver building works of 131,000m<sup>2</sup> (as well as furniture, demolitions and grounds, staffing and resources). Given that build costs alone can be anything between £1,000-£1,500 per m<sup>2</sup> this provided LCC with a considerable challenge to deliver 22 new schools at the desired quality, whilst maintaining some degree of value for money.

Schools under the BSF are procured under the Design and Build (D&B) contractual route. The design and delivery is led by the building firm who sub-contract aspects of the design to various sub-contractors including architects, engineers and suppliers. The local authority being the landlord of the school estate acts as the client on behalf of the school. The local authority sets out contractual output specifications that need to be met alongside statutory compliance requirements, regulations and planning conditions. The project risk sits with the building firm where, in essence, all that the local authority asks for is a compliant building delivered on time and to budget.

Delivering a successful energy and carbon reduction programme relies on the understanding of cross-cutting themes that impact on carbon performance and the ability to influence every stage of a building programme, from visioning to operation. Policy, regulations and technical knowledge within themselves are not always enough to ensure success. It is the deeper understanding of the technical, social and commercial dimensions and the ability to integrate this into a construction programme that ensures success in the end.

One of the first things that became evident to the KP team was that there was no clear link between LCC’s carbon reduction aspirations and the BSF project requirements and delivery plan. During early engagement with the Contractor a number of issues became apparent:

- LCC had not allocated funding to match their carbon reduction aspirations.
- Leicester Miller Education Company (LMEC)<sup>8</sup> were clear that the 50% reduction was not a part of their brief and couldn’t be delivered without additional funding and resources.
- The D&B contracts were based on output specifications, but there were no clear output specifications relating to energy and carbon reduction.
- BREEAM was an excellent approach to guarantee a holistic environmental performance, however, the main priority was Scope 2 carbon reduction (building energy consumption).<sup>9</sup> This meant that BREEAM alone was not ambitious enough to meet the carbon reduction aspirations of LCC (see the figure in note 9 below).
- The BE16 planning condition would contribute to a de-carbonised energy supply, but for this to be truly successful it would need to be complemented with reduced energy demand.

In summary, at this stage LCC had no clear project carbon reduction targets, output specifications, mechanisms or funding to deliver the carbon reduction aspirations.

### The role of organisational culture

*“[The KP] has worked. I don’t think without [it] you would have got the buildings that you have got. [In] order for the Council to be secure in what they were getting they needed that person in place or that organisation in place to protect them, because quite frankly they are naive, quite frankly they need that protection ... [the KP has] been important, I think it has been important.”* (Operations Director, Galliford Try, construction company)

<sup>8</sup> The LEP in Leicester is called the Leicester Miller Education Company. It is a consortium of public and private sector partners that includes LCC, Miller Construction (later bought out by Galliford Try Plc), G4S and CAPITA as their main shareholders. LMEC was responsible for the design and delivery of all schools under the Leicester BSF programme. They are additionally responsible for FM for seven BSF schools that have 25-year facilities management contracts.

<sup>9</sup> Credits under BREEAM cover a diverse set of sustainability issues that extend beyond building energy use. The client and designers have a choice in the credits that they will target to meet the overall BREEAM aspiration.

Greenhouse gas emissions are categorised into three groups or ‘scopes’ by the most widely-used international accounting tool, the Greenhouse Gas (GHG) Protocol. While scope 1 and 2 cover direct emissions sources (e.g., fuel used in company vehicles and purchased electricity), scope 3 emissions cover all indirect emissions due to the activities of an organization. These include emissions from both suppliers and consumers, as shown in the table below:

Scope 1	Scope 2	Scope 3
Fuel combustion Company vehicles Fugitive emissions	Purchased electricity, heat and steam	Purchased goods and services Business travel Employee commuting Waste disposal Use of sold products Transportation and distribution (up- and downstream) Investments Leased assets and franchises

Categorisation of GHG emissions by scope [www.carbontrust.com](http://www.carbontrust.com)

This quote from the Contractor's Operations Director, mentioned earlier, was mirrored by comments made by LCC and KP staff, and reflects a deeper issue of the extremely high turnover in the BSF director role (eight in six years), and the associated point that LCC did not replace experienced legal and commercial staff with appropriately qualified substitutes. This resulted in weakened strategic and operational leadership of this substantial public building programme. It was this weakness that the Contractor (perhaps implicitly rather than deliberately) took advantage of in contractual negotiations.

At least one other senior stakeholder in the LEP held the view that LMEC did not operate as a partnership, indeed, that its culture was adversarial, lacking openness and common purpose. This was a culture in which the Contractor was perceived to be constantly negotiating down any liabilities, and meant that what could be achieved was always going to be limited. This perspective from senior staff on both the private and public side of the partnership reinforced a compliance mind set – in that the Contractor's staff became focused on delivering exactly what was stated in the contractual requirements, and LCC staff focused on holding the Contractor to account on its commitments. At best, the focus was on problem-solving rather than opportunity-creation.

Although one BSF Director also recognised the dangers of working within LCC silos, and encouraged cross-team collaboration that resulted in a halcyon period that saw alignment of BSF vision, Sustainability ARs and design briefs, the KP Company Supervisor saw a very clear divide between staff working on capital budgets and those working on revenue strands. Disputes over output and outcome issues were more complicated because these responsibilities lay in different divisions of the local authority. 'Tricky issues' (epitomised by the bio-diesel systems issue) were difficult to resolve without clear 'common purpose' and single lines of responsibility. For example, one team would be working to the 'output' aim of minimising the build cost of installing renewable facilities, whilst the KP was representing the long-term 'outcome' revenue issues that schools would face in paying uneconomical bio-fuel prices.

The KP Company Supervisor said, "Because we have had so many changes of BSF directors there has been no consistency of intention behind what we were trying to do." Each (new) director worked to very short-term goals: "complete the business case for this phase of schools, or get them to complete the build, close the financial project, or secure the funding ... there were opportunities to act more strategically but LCC weren't joined up enough to see that through. We didn't have the consistency to see it through." Neither the Carbon Board nor senior colleagues had the appetite to push for a more strategic/long-term approach to sustainability outcomes once the contracts were finalised in 2013.

Property teams and the Contractor were (understandably) focused on delivering short-term building outputs and complying with contractual obligations whilst the KP team were focused on ensuring that the desired longer-term outcomes of energy efficiency and emission reduction were delivered. Although the KP Associate became heavily involved in discussions with LCC and Contractor staff, it was never intended that the KP would engage in any of the contractual discussions. That was the responsibility of the LCC commercial leads and partners, and was problematic, in part, due to the constant staff turnover – especially in the role of BSF director. LCC also lost staff with commercial and legal expertise which meant that contractual resolution of the problems was lacking and commercial engagement with the KP fragmented.

The KP Company Supervisor was keenly aware that, with extremely tight time lines, the BSF directors had a key responsibility for ensuring effective closure of the BSF project contracts. She concedes that the KP "... must have been a bit of a nightmare for them – with our constant focus on outcomes. Is it about the building or the Strategy for Change? There was always this tug of war happening – pull and push."

## 10. What lessons were learned?

In this section we describe a number of key lessons that can be drawn from the evaluation.

### 10.1. Commissioning and contracting

As noted in Section 9.2, staff on the Contractor's side identified the naivety of the Council in initial commissioning, and a poor commercial understanding of what Leicester City Council (LCC) was asking the Contractor to deliver through the Building Schools for the Future (BSF) programme.

This was particularly true for the sustainability aspects of the programme. Section 5 above describes how the KP identified the lack of sustainability outcome objectives in the building contracts as a major risk to the Council's strategic objectives. It took the Knowledge Partnership (KP) 18 months of negotiation with the Contractor to redress this omission and finally agree a sustainability contract and Authorities' Requirements (ARs) to this effect. The degree of clarity this provided was welcomed from both the client and Contractor sides. The Contractor's Operations Director argued that the contract should be something the Contractor could be judged fairly on:

*"... we want an AR that we can be judged on which isn't vague. Because by negotiating the contract, I want to make sure that the company is not exposed to a risk and [contract] interpretation is a risk... So the devil is in the detail and the detail is in project requirements."*

As the school outcome data shows, these negotiations (supplemented with the Sustainability Design Tracker, see Section 6.2.2) paid real dividends for the schools delivered under the KP compared to the performance of earlier projects.

This is doubly amazing given that, due to ongoing public sector downsizing, it was the KP Associate rather than suitably qualified commercial staff who took the lead in contract negotiations with the Contractor on this issue. Several respondents argued that if LCC is to become an intelligent commissioner of services within a leaner corporate structure in the future, it desperately needs to ensure it has staff with the right technical skills to fulfil this new remit, or become very much more 'outcomes-focused' from the outset.

This is found most significantly in the issue of bio-fuel heating. The Contractor was given a requirement to provide building services that operated on 16% renewable fuel. There was no stipulation around the ongoing running costs of the building. So the Contractor design included bio-diesel boilers that were much less costly to install but more expensive to run than other renewable options. When it became apparent that schools would not accept these ongoing costs, a series of unsatisfactory compromises were agreed. Whilst LCC staff might berate the Contractor for holding a compliance mind set and intransigence, it is important to recognise their complicity in the 'war' of attrition that was a result of weak contracting. It is an obvious conclusion to draw, that including clear sustainability outcome objectives from the outset would have resulted in better performing schools and reduced the significant human capacity needed to re-negotiate the project contracts, human capacity that would have been better employed ensuring sustainable design delivered the highest performing buildings. This conclusion concurs with 'lessons learned' by the programme design team and others, although we have to bear in mind that in the earliest days of the project commission much less was known about the costs and performance of sustainable buildings than is known today. These lessons are part of the price of working at the leading edge of eco building design.

## 10.2. Leadership and the authorising environment

This section explores two aspects of the leadership of the KP. First, we consider the degree to which senior managers set the 'authorising environment' (Moore, 1995) for the work of the KP. Second, we explore the leadership of the knowledge exchange work from within the KP itself.

### Senior leadership and the 'authorising environment' for sustainability aims

When the funding cuts hit home in 2010, there was a huge debate across the BSF programme stakeholders about the nature and focus of the project. Was it a building programme or an education improvement programme? Although the Contractor and some LCC Directors considered it very much the former, the Lead Member at the time and Chair of the Leicester Miller Education Company (LMEC) Board agreed that although the City had lost some funding, it was in a fortunate position because it hadn't lost all of it, so the programme would remain an education programme.

However, over the six-year period of the KP there were eight directors of the BSF programme. This level of 'churn' inevitably led to shifts in emphasis, and meant senior leadership of the programme was fragmented. As noted earlier, the KP Company Supervisor argued that this led each (new) director to work to very short-term goals. Similarly, the Chair of the Local Education Partnership (LEP) noted that the churn in staff provided a consistent challenge to bring people up to speed on the technical progress and issues, and not having the time or opportunity to understand the ambition of the overall strategy. The focus was on problem-solving rather than opportunity-creating. From the KP Company Supervisor's point of view, this situation was compounded by weak executive governance of the programme. The Stakeholder Board had no responsibility for how funding was allocated and no ability to make key decisions. Many decisions that had implications for school building use were made bi-laterally by the Contractor and BSF Director – based largely on financial considerations – and the implications for educational outcomes, or LCC's relationships or partnerships thereafter, were not considered as fully as they might have been.

Another feature of the Board was its focus on ongoing contractual issues, which the KP team felt should have been dealt with by the commercial team outside the Stakeholder Board. Although both BSF and LMEC Directors attended the Board, issues around the contract were a common sticking point, which prevented the Board from focusing on outcomes or looking at how engagement could be better achieved. The KP Company Supervisor commented, "I still don't understand, if the contract wasn't working, why haven't we fixed it? If it didn't work before, why are we fixed on having a similar arrangement again?"

Over the six-year duration of the programme the political focus on BSF also shifted. Whilst initially the Lead Member understood, valued and promoted sustainability outcomes for the programme, and many on the Stakeholder Board were 'on side' with these aspirations, this changed with a new lead member and with the last of the eight directors who placed more emphasis on outputs and delivering on the contractual obligations. As the Council now shifts its attention from secondary to primary schools, the KP Company Supervisor argued that the

*"... Council is very contract driven. Here's the money we have, this is how many places we need and this is when it needs to be completed. Here's the contract, get on with it officers. I don't blame the officers. They are running around like headless chickens to try and get enough information in to complete a report – but there is no one taking a single approach to*

*leadership around the whole programme. It's no single director's fault because they have changed over the period too and have a job to do in a particular time frame."*

This implies that whilst there was an overarching political aim to reduce emissions across the City, once the pragmatic work of agreeing contracts and managing the build began, leadership of the sustainability agenda was inconsistent – with no real ‘common purpose’ or compelling vision of what this meant for BSF schools. This was clearly exacerbated because the time scales became impossibly tight as the programme progressed.

Below is an extended extract from Robin Hambleton’s latest book that highlights the importance of leadership for any form of place-based innovation:

... walking the talk ... involves leaders signalling through their behaviour what they want for their organisation. For an organisation to embrace innovation, leaders will set the tone by taking some risks themselves. This is true at all levels of the organisation. In particular, they will be role modelling the leadership skills of boundary crossing, building bridges between different groups of people with something to contribute to a shared place. For senior leaders, building bridges entails getting out of their office, organisation and comfort zone. Leaders who are concerned with the future of their locality – at whatever scale – need to be connected with others, know what actors in other realms are thinking, and doing, and bring different interests together. This means working through, ideally on a regular basis, the Zone of Uncomfortable Debate (ZOU). The ZOU refers to an unspoken process that prevents people from questioning current practices too closely. Civic leaders need to be adept not just at recognising the zones of uncomfortable debate, but also encouraging staff and colleagues to move into and out of this zone. (Hambleton, 2015, pp.167-8)

Whilst it seems from this analysis that the bridging skills of senior leaders were found wanting in the prevailing challenging circumstances, this was not the case for those involved in the KP, who demonstrated a good deal of effective leadership from the middle.

### **Leading from the middle**

In Section 8 and elsewhere in this report, both the KP Company Supervisor and Associate were commended by many respondents for their knowledge, determination, enthusiasm and expertise, and their positive and proactive leadership of the sustainability agenda within the BSF programme.

The KP Company Supervisor’s role in the Stakeholder Board was to present the Strategies for Change (SFC), how investments would deliver outcomes, and provide updates on progress. Developing individual school strategies for change was her idea. These were based on an engagement programme of two or three visits to every school, to discuss the overall City BSF strategy, and what that might look like for their particular needs and capabilities. This was important because schools’ baseline understanding about sustainability measures was initially very weak. The KP helped turn around this lack of awareness through the engagement meetings, the design process and finally, with the Building User Guides and associated training.

The KP Company Supervisor encouraged and supported the Associate to work much more closely with school staff in the latter stages of the programme, in the understanding that direct engagement with the end users was crucial to positive outcomes.

So the Associate danced between engagement with the Contractor's teams, LCC teams, the supply chain and school staff. This translation and bridging role was crucial to the overall success of the programme.

The LCC Client Liaison Manager said that

*"... the success of the programme is all in the soft skills and the way [the Associate] manages expectations, be it discussion and negotiation with the supply chain and as much as yes, you sometimes need to say 'look you are not delivering to the contract' or this is what I expect with respect to clause x, y or z, but actually how you go about it and how you get the best out of the programme."*

This is described further in the following section.

### **10.3. Partnership and relationships with stakeholders**

There is a long history of collaborative activity on environmental and sustainability agendas within the Council and across the City. Respondents referred to a number of initiatives such as the Carbon Priority Board, the Sustainability Officers Group and Environmental Experts Group that came out of the Environmental Partnership chaired by De Montfort University's (DMU) Professor Paul Fleming involving various organisations from across the City, as well as staff from teams within LCC. As we saw in Section 5, both DMU and LCC are signatories to the City-wide carbon action plan to help 'green Leicester' and champion carbon reduction across the City. KPs thrive where such common purpose exists, and as Professor Paul Fleming noted,

*"Usually, there is a massive disconnect between LA [local authority] staff and academics. Academics are driven by research outputs – which are often too academic for LA staff to understand or implement. The KP has successfully bridged that divide."*

Although initially LCC technical teams valued the KP Associate's ability to work with engineers and architects to understand the energy modelling for the buildings, and to find a way through some of the potential pitfalls with the proposed approaches, latterly the Associate helped the LCC Environment team focus on behavioural measures – helping schools to understand how best to use the complicated technology that had been installed. However, as the Head of Energy Services noted, whilst the Associate's expertise was very welcome, more of the problems that were encountered could have been avoided if all the relevant LCC teams had been involved in the BSF programme from the outset.

As well as bridging between the LCC Environment, Planning and Energy teams, the KP Associate also provided an important bridge between LCC and the substantial and varied knowledge and expertise offered by specialists at DMU. However, her considerable success in translating academic knowledge into practical insight for the BSF school building process meant that some senior staff were unaware of the expert knowledge that she was drawing in to the programme. It was apparent that the role of IESD was hidden to some LCC and Contractor staff, and that more could be done to raise the University's profile, with the commensurate benefits to the credibility of the knowledge, advice or guidance that was provided.

Although her capacity was stretched, the KP Associate also worked with project managers who increasingly began to realise the benefits that such involvement meant for the building outcomes,

although others were much more compliance-led and simply wanted to see their project through without getting the best possible sustainability outcomes. The Associate said,

*“Some PMs [project managers] came to us for design decisions as well as sign off. The confidence in what I was offering was increasing. I didn’t need to sign off ventilation design but they were asking me about these things because they realised it had an overall impact.”*

### Strategic partnership

In addition to the poor commercial foundations noted above, the Chair of LMEC referred to the *classic friction* between different *corporate personalities* inherent in public–private partnerships, and the three-way pull between academic, commercial and political aspirations. As we saw in Section 9.2, these tensions, in combination with the budget and time constraints, proved to be an unhealthy combination that led to the war of attrition between the Contractor and the KP on the issue of sustainability performance measures:

*“... for whatever reason the corporate personalities of the contractors and the client have really led and would always lead to ... the classic friction ... the discomfort there is between public and private partnerships, you know, they are not a natural fit.”*

As other respondents noted, such public–private relationships had worked well in other situations – but for some reason, this was not the case here. Whilst there might always be some corporate tension between commercial and public sector organisations, this is no surprise, and there had been efforts to resolve or diffuse these tensions, which, unfortunately, had not met with much success. The point to be made here is that early efforts to avoid this situation through the commissioning process, contracting and ongoing flexibility are crucially important in the context of high ambition for sustainability outcomes – which clearly require attention to a wide variety of cross-cutting themes. In part, this is about paying sufficient attention to the ‘cultural fit’ of the collaborating organisations.

One result of this tension was that the Contractor did not encourage or facilitate engagement with the end users in the design and planning process. As the LCC Client Liaison Manager noted,

*“The programme ... fell down at the early stages because the NROs [neighbourhood relationship officers] or others who had a clear operational understanding of schools were not sat at the table when the early designs were being discussed. The first time we got sight of the designs was in front of the schools. It should have been a wider design team and the contractors didn’t want it that way.”*

This was something the KP worked hard to remedy, with some (but not complete) success. The KP team had no involvement with the school users in the delivery phase, and began to realise that the project team was not very effective in communicating with the schools – messages would be garbled about desires and specifications. The Associate realised that in an ideal world she would work in a triangle with the project managers and schools, but this didn’t happen because of capacity constraints and the compressed time frame.

Although the result of this was more building snags than would have been desired by any of the stakeholders, the KP began to work with some of the schools on handover or ‘soft landing’ support.

#### 10.4. Handover and 'soft landing'

A key feature of the KP's approach was its attention to the user experience. This becomes most crucial at the point the users begin using their new buildings. Clients can always expect a range of issues and problems with new buildings once the construction phase is completed and the buildings are handed over. As mentioned above, there have been more building performance issues with the BSF sites than LCC would have expected. Some have been readily solved by contractors, most have not been sustainability related, but a few significant sticking points have emerged that are specifically sustainability features. School business managers and other school staff have reported being disappointed by the level and quality of 'handover support' from contractors, and asked LCC staff to get involved.

One significant context factor influencing these snags is that Phase 2b-6 schools were designed for more active engagement of school staff in managing the heating, lighting and ventilation of their building than the five schools built in Phases 1 and 2a, which had low user involvement designed into the building management systems, and as the evaluation report shows, had not been delivering strong sustainability performance. Given the relationship with the Contractor, the KP Company Supervisor recognised that the KP Associate would need to work directly with school staff to affect some of the changes and rely on commercial colleagues to negotiate with the Contractor on more substantial building issues.

Although six schools prized the KP's handover support, the remaining BSF schools have not enjoyed the benefits. LCC's Eco Schools Officer had been directly involved in this process, and when asked if the approach could be replicated without the KP Associate, he responded that because the Associate had such a detailed knowledge of the technical plans, could communicate with the architecture students (who created the Building User Guides) about the technical issues, and help them translate these into the straightforward diagrams provided in the Guides, he did not feel the process could be replicated without the Associate – or someone with her technical expertise. This makes rolling out the building user support process more widely highly problematic.

Seven schools in Leicester BSF are under a 25-year Facilities Management (FM) contract, whilst the other 15 schools are responsible for their own energy and FM. Ensuring operational energy use is in line with designed carbon efficiency relies on end users using the buildings efficiently. However, stakeholders with the ability to drive carbon reduction – local authority staff and especially staff in schools – often do not have the time and resources to commit to these efficiency issues due to their own priorities. Educationalists want to teach and senior managers within local authorities have services to deliver. This issue becomes even more significant in a climate of economic cuts and savings, where energy reduction is not identified as a key performance target, and reduced staffing severely restricts the ability of individuals to take on the delivery of these 'additional aspirations'. It therefore becomes crucially important to communicate the economic benefits of efficient energy management in addition to its ethical and environmental value.

Another issue that contributed to energy mismanagement was a lack of understanding of new buildings. At the end of a building programme, schools were left with inadequate training and complex Operation and Maintenance (O&M) manuals that are extremely onerous for them to understand and apply in daily working life. Simply put, school staff do not understand the way the

building works, and therefore do not manage the building and the energy-saving technologies effectively.

During the building design and construction workshop led by the KP, Contractor staff argued that ‘soft landing’ was an expensive approach that involved a huge amount of work. Contractor staff argued that for a ‘soft landing’ approach to be truly successful, it needs to be deeply embedded in the programme, its strategic documents, contracts and commitments of its stakeholders and suppliers, and that it would need to be built into the programme of delivery both in terms of time and cost. To illustrate, one of the consultants provided an example from a £10 million scheme their firm was working on, where the ‘soft landing’ itself was costing £200,000. In Leicester the intention to introduce ‘soft landing’ was raised quite late in the programme, and the designers were of the opinion that by that point it was too late to build it into the programme, since all contracts had been (or were close to being) signed, and the BSF programme was simply not set up to deliver something this complex.

So ‘soft landing’ was not delivered by the Contractor because it had not been budgeted and sewn into the programme requirements – in part, as a result of budget constraints, in part, because of compressed time lines, but also because it was not part of ‘common practice’ offered by the Contractor. At the same time, the KP Company Supervisor was of the opinion that the BSF Director did not see the importance of the handover phase because their main focus was on handing over the building, completing the contract and moving on – not on the ongoing needs of the end users.

Once buildings were completed, what was offered by way of handover support was not deemed worthwhile by school staff. One School Business Manager described how the building handover process was “rushed”, and that the documents provided by the Contractor were incomplete and that the quality of the videos provided to explain the use of various systems “was appalling. It was done by one of the guys on site. Very amateur. We just haven’t used them. They are an absolute waste of time. Most of them you can’t hear what is being said. It was atrocious.”

The site staff couldn’t understand how to make the heating system work properly for the first six months of operation: “Contractors were coming in all the time to replace parts; the failure rate of the product was very poor.” He added that,

*“The one thing that would have helped us would be proper training on how to operate the building from the outset – how to operate the bio-diesel, how to operate the lighting systems so we can adapt the sensors to the actual use of the room.*

*“We have used our own experience and knowledge and through talking to other contractors we have learned over 12 months how to use the building.”*

In the end it fell to LCC staff and the KP in particular to provide technical support. This same School Business Manager considered the Building User Guides and energy management training provided by the KP to be really helpful, and continues to use the monitoring systems on a daily basis. Through this engagement the KP recognised that there were a number of key challenges in delivering behaviour change around energy use in BSF schools:

- End users commonly do not understand how the building works and don't know how to manage it.
- There was limited support on energy management provided to schools by contractors post-handover.
- It is important to gain commitment from senior management within the local authority and schools to prioritise and engage with energy use issues in newly built schools.
- Incentives to reduce energy use are not always clear to local authority and schools staff.
- Energy management is not a priority for schools.
- Schools do not have access to easily available and reliable tools for energy monitoring.

The KP Company Supervisor played a significant role in encouraging and supporting the Associate to work directly with schools to solve building efficiency problems by providing a 'soft landing' approach. Based on the 'whole systems' design approach, the strategy for the KP project aimed to:

- create strong incentives for stakeholders to engage and use research findings to substantiate claims
- evaluate and understand key issues around energy management in schools using robust data
- use collaboration to engage existing skills within the local authority in order to embed knowledge, drive teamwork and allow investment in employees who could later roll out the measures more widely
- use collaboration with schools to ensure needs are addressed, ownership developed and solutions become self-sufficient with minimal external support
- create a strong foundation of knowledge and resources to enable a programme of continuous development.

### **10.5. Importance of data and feedback loops for outcomes**

As described in Section 6.2, the KP has been instrumental in creating the infrastructure and procedures for accessing data on school energy use in order to monitor ongoing progress and provide a feedback loop for the system in future – as the various analyses and charts in this report testify. Whilst the various governance arrangements in schools mean that capturing a complete picture of energy use across the secondary schools estate remains problematic, capturing the broadest data set possible will help build a clear and ongoing picture of energy efficiency in the BSF buildings. All Leicester BSF schools have half-hourly metering for all utilities and all new buildings have a significant amount of sub-metering. This provides LCC with the ability to gather a comprehensive picture of energy use across the whole school estate, monitor performance and efficiency, and suggest remedial or innovative action to improve efficiency.

The system level analysis (see Section 7.1) developed by the KP Associate for this evaluation offers the potential to identify (comparatively) poorly energy performing schools. Eco schools colleagues in

LCC have already identified the potential for prioritising activity with the least energy efficient schools, providing detailed analysis of energy (and broader sustainability) issues, targeted support and ongoing autonomous monitoring and peer support via DMU's Smart Spaces project.

This facility puts LCC at the leading edge of local authorities nationally – and with continued effort and ongoing innovation, puts LCC within grasp of creating a self-improving system for energy consumption in public buildings.

#### **10.6. Embedding 'whole systems' design across the authority**

As we saw in Section 6.2, Leicester's Strategy for Change (SFC) document sets out five thematic priorities that form the fundamentals of the sustainability vision for Leicester BSF. Sadly, this strategic vision was not in place at the time the BSF building programme was being commissioned.

Such a framework provides the platform for the procurement of major project services into the future. With ongoing reductions in the technical capacity of the local authority, delivering social outcomes via such a platform will, however, require the leadership expertise to develop robust but flexible contractual relationships that are strong on common purpose and the commitment to fulfil these purposes adaptively, whilst providing both good value for public money and sufficient commercial margins. It seems likely, therefore, that the local authority will need to retain staff with the appropriate commercial contracting and legal expertise to fulfil this ambition.

## 11. Conclusions

Leicester City Council clearly has a strong commitment to carbon reduction, environmental transition and a vision for sustainability in schools – as demonstrated by its Environmental City status, the Mayor’s Delivery Plan and the Greener Leicester strategy. This political commitment did not extend, however, to finding additional funding to support the long-term sustainability aims for the BSF building programme. This is understandable given the four major factors working against these environmental ambitions at the time: austerity and political changes in 2010 constrained the budget and compressed project timelines, which, in turn, fostered a compliance mind set amongst contractors that was compounded by a high turnover of BSF directors and the loss of staff in key areas of the City Council teams.

Nevertheless, the evaluation offers compelling evidence that the Knowledge Partnership added significant value to the Building Schools for the Future (BSF) programme, and was highly successful in meeting its own stated objectives. The success of the knowledge partnership approach can be found in the significant improvement in energy performance between Phase 1 BSF schools and the 17 schools that enjoyed the involvement of the Knowledge Partnership. Even with an 11% increase in estate area, BSF under the Knowledge Partnership has delivered an overall 30% reduction in energy consumption – whereas the earlier projects were creating around 60% more carbon than the buildings they replaced. It is also worth emphasising that only 2 of the 17 schools have had dedicated sustainability funding. This means that these efficiencies have been almost wholly delivered in the absence of any ring-fenced funding for carbon/energy reduction.

The sustainability features of these buildings have been achieved in unpromising circumstances because the two partner organisations came together under a common purpose to make a difference to the schools estate, even at the expense of De Montfort University’s own ambitions for research papers and other academic output.

The ‘whole systems’ approach to design and the end user outcomes focus have been particularly powerful approaches, and the benefits of taking a strong outcomes focus is evidenced by the extremely positive response of school staff to knowledge partnership handover support – such as the Building User Guides and energy monitoring training. However, more could be done to share this approach with the remaining BSF schools. This would require additional capacity from Leicester City Council to shift the ‘failure demand’ around snagging to ‘value demand’ for knowledge partnership-style support. The evaluation also makes the case that making savings on the project by diminishing end user engagement in design, planning and handover stages is a false economy.

It is also clear that the benefits achieved were at significantly less cost than through a standard consultancy approach. This evaluation shows that knowledge partnership offers a cost-effective way to draw expertise and leadership (of the type described above) into complex, high stakes projects of this nature, and also offer great potential and opportunity for other City-wide projects.

It has, however, not been all plain sailing for the Knowledge Partnership. Some of the significant sustainability building ‘snags’ could have been avoided if advice provided by the Knowledge Partnership to Leicester City Council seniors had been acted on. The Knowledge Partnership has also been a courageous ambassador for the Leicester City Council strategic ambition to reduce emissions in the face of weak contracting of building sustainability requirements and variable commitment at

BSF director level to these aims. The evaluation has also highlighted leadership capacity and capability issues in the local authority that would require some investment if Leicester City Council is to become an intelligent commissioner of services with an even leaner corporate structure in the future – most notably in the areas of commissioning and strategic partnership development. The evaluation also argues that the KP could have done more to identify the capacity issues within City Council teams and staff more quickly.

### 11.1. Strategic and operational recommendations

Strategic	Operational
<ul style="list-style-type: none"> <li>• With the prospect of even leaner public service staffing in the future, Leicester City Council need to establish the internal capabilities to be an intelligent commissioner of procured services.</li> <li>• There is a need to ensure continuity in senior commercial contracting and legal roles. This currently appears to be a significant gap in capability within Leicester City Council.</li> <li>• Strategic sustainability aims should be included in contracts from the outset. This will save time, money, energy and erosion of trust between strategic partners.</li> <li>• Consideration should be given at the commissioning stage to the ‘cultural fit’ of the collaborating organisations.</li> <li>• The knowledge partnership approach between Leicester City Council and De Montfort University offers enormous potential to support complex multi-stakeholder City-wide developments.</li> <li>• Leicester City Council should establish a robust energy data capture and monitoring process as part of a feedback loop to schools and staff – to develop a self-improving system of sustainable public buildings. De Montfort University’s Smart Space project offers much potential in this respect.</li> </ul>	<ul style="list-style-type: none"> <li>• Sharing the lessons from the Knowledge Partnership approach more widely would help build capacity across the city for urban regeneration and community transformation.</li> <li>• In particular, establishing the benefits of a strong outcomes approach, with strong end user engagement and credible monitoring and feedback loops.</li> <li>• Ongoing stakeholder consultation and ‘soft landing’ should be deeply embedded into complex building projects.</li> <li>• The operational support provided by the Knowledge Partnership should be offered to all Building Schools or the Future (BSF) schools to secure further significant efficiencies and create ‘value demand’ for such a service.</li> <li>• Building on the success of the Building User Guides and energy management support, Leicester City Council should seriously consider developing a holistic ‘building efficiency’ traded service – perhaps in collaboration with De Montfort University or another external organisation – to deliver training and ongoing support for site managers, school business managers and other school staff.</li> </ul>

This report identifies the need to take a fresh look at commissioning major capital build programmes such as BSF, in that Leicester City Council needs to establish the internal capabilities to be an intelligent commissioner of procured services into the future (many of which were previously held in house), especially in the context of increasingly lean public service provision. This will require the leadership expertise to develop robust but flexible contractual relationships that are strong on

common purpose, and the commitment to fulfil these purposes adaptively, whilst providing both good value for public money and sufficient commercial margins.

Currently, the loss of key staff with commercial contracting and legal expertise is a significant gap in this capability within Leicester City Council. More robust commissioning, contracting and procurement processes could be supported by:

- establishing a ‘Leicester standard’ for the design and operation of all new and refurbished buildings
- developing and agreeing a sustainability contract and outcome specifications early in the commissioning process
- ensuring lifecycle cost predictions and implications of capital decisions are included at design stage
- improving contracting by setting an expectation for a holistic approach to dynamic systems modelling in order to ensure that the realistic performance of a complex building is budgeted for as part of the design phase
- developing financial or other contractual levers to ensure that contractors, neighbourhood relationship officers and schools deliver on their obligations.

Beyond these internal and project/programme-related recommendations, it is worth considering the potential for meaningful local collaborations with other credible stakeholders that could help re-define the public (and private) services offered to local people. Through its Square Mile and other initiatives, De Montfort University has set out its intent to create civic benefits beyond its prime remit as a higher educational institution. This Knowledge Partnership is an excellent example of this ambition in practice. There are undoubtedly many untapped mutual benefits yet to be discovered by engaging in a search for further common purposes with many other local institutions, organisations and businesses that currently share similar ambitions for the City. So it seems eminently sensible to pursue initiatives such as this Knowledge Partnership with a range of stakeholders into the future.

However, to achieve this may require more than simply turning our attention to further collaboration and identifying mutual interests. It is well known (Ghate et al., 2013) that to be successful in this new era of leaner public services, senior leaders need to hold a ‘systems’ leadership perspective that focuses on outcomes and emphasises end user satisfaction over narrow operational targets.<sup>10</sup> This requires a transformational style of leadership that creates distributed responsibilities. Over the six-year Knowledge Partnership project it seems that several senior leaders involved took an output-driven and transactional approach. With the prospect of even slimmer public service staffing in the future, the need to build the appropriate leadership capacity to achieve the above recommendations is posed as a significant strategic objective for Leicester City Council, De Montfort University and other civic stakeholder organisations.

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<sup>10</sup> Systems Leadership in the public sector: ‘The National Skills Academy for Social Care, NHS Leadership Academy, Public Health England, the Leadership Centre for Local Government and the Virtual Staff College are collaborating on a single national programme for “systems leadership development”, which is the first of its kind in England. The construct of Systems Leadership is based on recent international research, and offers new approaches to leadership that are relevant to the challenges of complexity and ambiguity faced by those leading public services today’ ([www.virtualstaffcollege.co.uk/dcs-leadership-provision/systems-leadership/](http://www.virtualstaffcollege.co.uk/dcs-leadership-provision/systems-leadership/)). The research evidence can be found at Ghate et al. (2013).

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## Additional De Montfort University papers related to the work of the Knowledge Partnership

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## Appendix 1: Building Schools for the Future schools by phase

Phase	School name	Building works
Phase 1	Beaumont Leys	New build
	Fullhurst	Part new build, part refurbished
	Judgemeadow	New build
	Soar Valley	New build
Phase 2a	Rushey Mead	Combination of new build, refurbished and old retained estate
Phase 2b	City of Leicester College	New build
	Crown Hills	New build
Phases 3-6	Children's Hospital	Refurbishment
	Hamilton Community College and Nether Hall	New build – co-located schools with a very small proportion of retained estate
	Keyham	New Build
	Millgate	Combination of new build, refurbished and old retained estate
	St Paul's	New build and retained estate
	Ellesmere	New build
	Babington	New build and retained estate
	English Martyrs	New build and retained estate
	New College	New build and retained estate
	West Gate	New build
	Lancaster	New build and retained estate
	Sir Jonathan North	New build and retained estate
	Moat	Combination of new build, refurbished and old retained estate
	Ashfield	New build and retained estate

## Appendix 2: Leicester Building Schools for the Future – Sustainability thematic priorities

### 1. Building design

- Ensure investments in building capital projects support robust and reliable low carbon building designs that anticipate future needs and development. Support the development of innovative and effective practice.
- Monitor and evidence the effectiveness of design.
- Prioritise passive design solutions that support low carbon emissions for all new and refurbished school buildings projects.
- Ensure designs primarily focus on producing low carbon buildings and driving out waste prior to engaging with renewable technology solutions to meeting energy demands.
- Reduce the unnecessary use of ICT. Promote the effective use of ICT to support carbon reduction actions and activities. Ensure ICT procurement, device management, usage measurement and energy data support are used to support carbon reduction targets.
- Ensure that energy efficient equipment and building services are used wherever possible, including lighting and ICT.
- Ensure that building service controls are effective and easy to use and encourage energy efficient behaviour.

### 2. De-carbonising and neutralising energy supply

- Ensure the maximum use of on-site and near-site renewable energy wherever available and feasible. At sites where scope is limited, encourage schools to procure off-site renewable energy/green energy.
- Encourage the use of low carbon fuels including bio-fuels to promote de-carbonising the energy supply.
- Make use of heat recovery wherever possible to reduce energy wastage.
- Distribute surplus energy through neighbourhood networks wherever practical.

### 3. Reducing energy demand

- Ensure the school community fully realises the school building's low emissions potential. Support the school in the effective use of their building. Ensure users are engaged in behaviour change where necessary to take maximum benefits of retrofit and refurbishment measures.
- Ensure school staff are aware of how to use display meters to identify energy wastage and savings.
- Prevent misuse of energy, ensuring controls for equipment and services are simple to use and instructions are appropriately presented and easy to understand by the end users.
- Support facility managers and schools in creating energy benchmarks that promote an incremental decrease of energy consumption, designing and implementing more effective use of facilities as appropriate across the whole school.

### 4. Carbon-aware and active communities

- Ensure the local authority, schools and designers are adequately and effectively engaged in raising awareness and sharing information about climate change and the impact of energy consumption.
- Ensure school occupants and facility managers are clearly aware of simple measures they can take to reduce energy consumption in schools. Generate interest and will within occupants of the school with clear leadership from head teachers, governors and other key decision-makers towards energy reduction.
- Ensure local authority, schools and designers are effectively engaged in defining clear carbon targets and a clear brief for sustainable development to reduce energy consumption and carbon emissions.
- Ensure the local authority and its design advisers champion and implement low carbon measures throughout briefing, design and construction, and in to the operation of school buildings.
- Ensure the local authority and schools work in partnership to embed a clear understanding of low carbon measures, their application and use, from building inception to post-occupancy.
- Support schools to embed environmental education across the curriculum and school activity.

- Encourage and facilitate the use of energy consumption data into the curriculum and school activity in order to support the community in monitoring the effectiveness of local carbon reduction strategies and actions.
- Support schools in adopting a whole school approach towards energy reduction, engaging with the whole school community to embed a culture of energy reduction.
- Encourage schools to make appropriate use of City-wide and national energy-focused organisations, programmes and activities.

#### **5. CPD and training**

- Identify strength and weaknesses with respect to energy management awareness at an estate-wide and local school level.
- Drive increased energy awareness amongst staff, incorporating energy awareness and management into teacher training and continuing professional development (CPD).
- Ensure relevant curriculum staff are aware of opportunities to embed sustainability and energy consumption data and information to facilitate learner-based understanding, activity and impact measurement.
- Ensure that building designs support learning and teaching about and engagement with energy and sustainability.
- Identify best practice with respect to energy management, curriculum design and delivery, and whole school policy and practice. Ensure exemplars are captured, shared and where appropriate, adopted across the whole school estate.

## **A note about the author**

Accelerate the Shift ([www.accelerate-the-shift.org](http://www.accelerate-the-shift.org)) is a social enterprise dedicated to helping change-makers accelerate the shift towards a healthier, fairer and more sustainable future. It does this by hosting events, creating learning spaces, developing leadership skills, brokering transformational collaboration and through research.

As well as being founder of Accelerate the Shift, Dr Fred Paterson ([www.linkedin.com/in/fredpaterson](http://www.linkedin.com/in/fredpaterson)) is an educator, researcher and coach with a PhD in Professional Learning. Fred has worked in universities and public sector organisations for more than 20 years and was previously Head of Knowledge and Learning at the National College for School Leadership. Fred also lectures on research methods and leadership development at Derby Business School, where he leads the Business Innovation for a Low Carbon Economy Group.