Policies and outcomes for UK sustainable schools

A.M. Moncaster & P. Simmons

RESEARCH PAPER

Policies and outcomes for UK sustainable schools

A.M. Moncaster[1] and P. Simmons[2]

[1]Interdisciplinary Design for the Built Environment, Department of Engineering, University of Cambridge, Cambridge CB2 1PX, UK
E-mail: amm24@cam.ac.uk

[2]School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK

The 1997–2010 UK government's priorities for education and improved social equality led to the development of two major school building programmes: the Academies programme and Building Schools for the Future (BSF). Political concerns for social, economic and environmental sustainability were increasing during the same period, leading to stated new aspirations from 2004 for the schools to be 'models of sustainable development'. The key political discourses for 'sustainable schools' during this era are examined. While some aspects of the initial focus on social equity were retained, there was a rapid shift in emphasis towards environmental sustainability, and specifically carbon reduction. The impacts of these shifting discourses are then considered on four school building projects, examining the technical decisions made and their intended and unintended consequences. Within the diversity and complexity of individual building projects, the paper also exposes both the changing priorities within the construction sector during this period and the impacts of some specific policy tools. The considerable interpretive flexibility in the implementation of the policies is demonstrated, along with variability in their outcomes. Built environment policy should be understood as a continuous process that shapes and reshapes what happens.

Keywords: carbon emissions, outcomes, policy formation, policy implementation, public policy, schools, socio-technical systems, stakeholder participation, sustainable development

Introduction

During the first decade of this century 'sustainable development' was rapidly becoming the predominant global concern (Carter, 2007, p. 208). The agenda had been set by the World Commission on Environment and Development (WCED) (1987) report *Our Common Future* and the United Nations Conference on Environment and Development Agenda 21 (United Nations, 1992), which set out widely ranging aspirations for increasing social and economic stability and equity, as well as environmental protection. The increased globalization of institutions and political agreements on sustainable development exemplified by these reports (Martello & Jasanoff, 2004, p. 3) was meanwhile coupled with a call for local leadership in the implementation of sustainability principles, and for widespread consultation and involvement of local communities in decisions which affected them (Carter, 2007, p. 311).

At the same time climate change was becoming an increasing concern. Also in 1992 the United Nations had produced its Framework Convention on Climate Change, leading to the Kyoto Protocol. By 2007 the Fourth Report of the Intergovernmental Panel on Climate Change (IPCC) (2007) stated with increasing certainty that climate change was due to greenhouse gas emissions from human activities, and in the same year Sir Nicholas Stern estimated the economic impacts for the UK to be between 5% and 20% of gross domestic product (GDP), urging instant action (Stern, 2006). The following 2008 UK Climate Change Act made the reduction of greenhouse gas emissions a legal responsibility of the UK government.

Meanwhile, the 1997–2010 Labour Government's priority for education had led to the development of two major school building programmes in England: the Academies programme from 2000 and Building

Schools for the Future (BSF) from 2004. Over £60 billion of private and public money was promised, with the major share aimed at BSF. Both were originally envisaged as programmes for improving social and economic equity, and were focused on areas of social and educational deprivation. Through the provision of well-designed school buildings, the programmes aimed to 'engage and inspire young people, their teachers and the wider community' (DCSF, 4PS, & PFS, 2008).

In 2004 these aspirations merged with the evolving focus on sustainability, with then Prime Minister Tony Blair, in a speech to business leaders, calling for the new schools to be 'models of sustainable development' (Blair, 2004). The original aspiration of the programmes and one of the original key themes of sustainability discourse, the reduction of social inequality, was not mentioned in this speech; instead Blair linked 'sustainable development' directly to 'global warming', reflecting the trend in wider policy concerns, and focusing on technical design solutions to mitigate climate change (Moncaster, 2012, p. 27).

As the Education and Skills Committee report noted three years later:

> The issue of sustainability was not addressed when BSF was launched, yet now it is a central part of the project. We welcome this change, but it is not yet clear how the aspirations on sustainability will become reality.
>
> (House of Commons Education and Skills Committee, 2007)

This paper examines both what these 'aspirations' were within the multiple and evolving definition of sustainability, and how they became 'reality' for schools built during this period. The following section proposes a theoretical framework that might help to inform policy-making for the future. The third section then examines the interpretations of and aspirations for sustainability through the policy discourses from the main government departments involved, while the fourth section traces the development of four school building projects to understand how the policies were implemented through tracing the micro-actions within each project. The final section then compares the policies and the material outcomes, and discusses what conclusions can be drawn.

Theory

The subject of this special issue of a 'policy gap' refers to the disparity between policy conception and outcomes. Although the policy implementation process has been the object of research for several decades, a new wave of research emerged during the 1980s and 1990s which suggested that policy is not formed only in the policy communities and networks of central government, but continues to be shaped through the process of implementation (Barrett & Fudge, 1981). Far from being merely a 'technical' exercise, implementation can therefore be highly political: through the professional contest over control of decisions, through the negotiations with and influence of clients and users, and through the technical choices and compromises that are made, implementation both interprets and reshapes policy.

The degree of ambiguity of the policy itself is a significant factor within its implementation (Matland, 1995). The challenge this poses becomes particularly acute when dealing with intractably complex or 'wicked' problems (Rittel & Webber, 1973) such as those of the global environment. The complexity not only of the problems to be addressed but also of the interactions of fragmented networks and systems which make up society introduces multiple uncertainties – including cognitive, strategic and institutional – across the different sites in which policy is shaped (Koppenjan & Klijn, 2004).

This perspective on implementation as shaping policy has consequences for how it is studied:

> Rather than hiding or ignoring political dimensions of public action, 'bringing politics back in' [. . .] means the incorporation within research of attention to power mechanisms, stakes, values, symbolic aspects and other non-technical dimensions of public policies. All these elements, however 'political', can be treated in a clinical way by looking at 'what happens' rather than 'what should happen'.
>
> (Hupe, 2014, p. 178)

In other words, to understand the 'gap' between the policy that is formulated and the outcomes of its implementation, rather than ask merely 'why hasn't it worked?' it is necessary to examine 'what happens and why in social interaction in micro-networks' (p. 177).

Although this perspective on policy implementation has been subject to the vagaries of intellectual fashion, questions that it has posed remain unanswered and pertinent today, with the result that there are periodic calls for its revival (Barrett, 2004; Hupe, 2014). Where this approach typically falls short, however, is in assuming that only the social ('non-technical') aspects continue the political work of shaping policy into the implementation process. The field of science and technology studies (STS) has long demonstrated that the technical is also entangled with the social and the political (Bijker & Law, 1992; Rip, 2010).

Following from this, it is argued here that it is impossible to understand the implementation of construction policy without also attending to the technical aspects of what happens. This perspective informs the description and discussion of the construction projects outlined in the case studies below.

Emerging policy objectives for sustainable schools

The dominant political and social concerns of UK governments have often been realized through their aspirations for school buildings (Cooper, 1981, p. 133; Moncaster, 2012, p. 29), and the increasing focus on 'sustainability' within the pre-existing school building programmes of the first decade of this century is a further example of this. This paper considers the impact of three government departments in translating this dominant concern for buildings, for the construction industry and for schools, and the development of their policies which fed into the implementation of 'sustainable schools' during this period.

Office of the Deputy Prime Minister (ODPM) and Department for Communities and Local Government (DCLG)

The ODPM formed in 2002 with a remit for housing, planning and local government; in 2006 part of its role moved to the DCLG. In 2003 their report on *Sustainable Communities* (ODPM, 2003) was focused on how to create 'successful, thriving and inclusive communities [. . .] that will stand the test of time and in which people want to live' (p. 3). The 'key requirements' needed to achieve these sustainable communities included strong leadership, effective engagement of local people in the 'planning, design and longterm stewardship', good transport links and a 'flourishing local economy', as well as a high-quality local environment (including education and health services) and minimizing the use of resources (p. 5). The following Sustainable Buildings Task Group (ODPM, 2004) was focused on how to develop 'High quality buildings, which are constructed and perform in an environmentally sound way', seeing these as 'central to the Government's drive for sustainable communities'. The buildings would need to 'lower their demand on natural resources whilst boosting the economy and providing for the individuals that live there' (p. 3). The task group was therefore focused on the technical design and construction of buildings, but as positioned within the wider interpretation of sustainability, social and economic as well as environmental.

One major outcome from this task group was the Code for Sustainable Homes. This defined sustainability in terms of nine categories; however, these demonstrated

a clear hierarchy, with only 'Energy/CO_2' and water use having increasing standards with each code level, while materials, surface water run-off and waste being set minimum standards, and with no standards set for pollution, health and well-being, management or ecology (DCLG, 2006b). The reduction of carbon emissions was to be demonstrated through the Building Regulations, with additional points awarded for energy 'supplied from local renewable or low carbon energy sources' (DCLG, 2006b, p. 14). 'Zero carbon' was defined by the code as 'zero net emissions of carbon dioxide (CO_2) from all energy use in the home' (p. 27).

However, in the same year the department published a public consultation on *Building a Greener Future: Towards Zero Carbon Development* (DCLG, 2006a). The replies to the consultation included a high number of comments on the need to include *embodied* carbon in the definition of zero carbon, and these comments were reported by the Department's published response, which concluded that 'embodied energy of materials and methods of construction should be assessed' (DCLG, 2007b, p. 13). However, a month later the resulting policy statement ignored this advice from its own published response, stating instead that 'We do not believe a full consideration of embodied carbon is practical or realistic in the short-to-medium term' (DCLG, 2007a, p. 14). A report in the same year on carbon reductions in new non-domestic buildings reiterated that 'zero carbon' did *not* include embodied carbon, but only that from energy in use (DCLG & UKGBC, 2007, p. 21).

The ODPM/DCLG can therefore be seen to have led the development of an interpretation of sustainability for buildings which was increasingly focused on improving energy efficiency and reducing carbon emissions; furthermore in its definition of 'zero carbon' the DCLG excluded consideration of embodied carbon, focusing only on carbon emissions from the use of buildings. The dismissal of industry concerns on this subject suggested that the importance of stakeholder engagement was, at least in this case, empty rhetoric. The strong focus on social sustainability in the ODPM 2003 report on *Sustainable Communities* no longer seemed to be reflected in the policy documents for sustainable buildings just four years later.

Department for the Environment

Meanwhile, the first Strategy for Sustainable Construction had been published at the beginning of the century by the Department for the Environment, Transport and the Regions (DETR) (2000). This defined the contribution of the construction industry to the aims of the UK Sustainable Development Strategy as minimizing energy, carbon and natural resources, but also as social inclusion measures such as 'delivering buildings

that provide greater satisfaction, well-being and value', and 'respecting and treating its stakeholders more fairly' (p. 8).

By 2006 the environment portfolio had moved to the Department for Environment, Food and Rural Affairs (DEFRA). DEFRA commissioned a report on sustainable procurement identifying construction as the top priority for the public sector and, in striking contrast to the reports being published by the DCLG, stated that:

> Government […] should focus much more attention on the carbon emissions from the production and transport of construction materials […] 72% of a building's life cycle carbon is embedded into the physical asset.
>
> (DEFRA, 2006, p. 18)

In 2008 a much revised Strategy for Sustainable Construction was published, now as a joint publication between government and industry (HM Government & Strategic Forum for Construction, 2008). This important document demonstrated the involvement of stakeholder engagement through its very authorship, and indeed still identified this as an important issue for sustainable construction (p. 15). Perhaps most notably, though, the strategy now set a target of 15% reduction of carbon emissions from the construction sector between 2008 and 2012. A following report clarified that these emissions should include those due to activities on and off site, and to the transport of materials, waste, plant and personnel. Unlike the report on sustainable procurement the target excluded the production of construction materials, but nevertheless both reports were focused on reducing the 'embodied carbon' of construction works.

'Department for Education'

The actual delivery of the Labour Government's new school building programmes was the responsibility of the Department for Education and Skills (DfES). From 2006 this became the Department for Children, Schools and Families (DCSF). To promote the government's aspirations for the new school buildings, the DfES/DCSF published a number of reports on school design. One of the first, *Classrooms of the Future: Innovative Designs for Schools*, defined the 'major drivers of change' for the buildings as including design for inclusion of pupils with special educational needs, as well as 'developments in building technology' and 'sustainability of building development and construction'(DfES, 2002).

Two further reports followed in 2004. *Schools for the Future: Exemplar Designs: Concepts and Ideas* (DfES, 2004) was based on 11 concept designs commissioned by the DfES. The Foreword sets out the intention of the

BSF schools as 'radically improving educational opportunities' (p. 1). Environmental sustainability aspects were also apparent; individual designs were required to achieve a 'Very Good' rating in the BRE Environmental Assessment Method (BREEAM) (BRE, n.d.), and many proposed various renewable energy sources through which, the report stated, 'the zero carbon school is achievable' (p. 21). The concept of 'zero carbon' therefore was already introduced in the discourse for schools as early as 2004.

The second 2004 report was on remodelling existing schools (DfES, 2004b). The summary section commented that 'the involvement of all stakeholders in the briefing process is vital to creating the best design solutions' (p. 18), and recommended the use of the Design Quality Indicator (DQI) (CIC, n.d.) tool to facilitate this involvement. Introduced in 2002 by the Construction Industry Council (CIC) (Adamson & Pollington, 2006), a specific version of the DQI was now developed for use in the BSF and Academy projects.

In 2006 the DfES held a wide consultation on 'Sustainable Schools' (DfES, 2006b), for the first time clearly identifying the aspirations for and definitions of sustainability for the new buildings. This led to the National Framework for Sustainable Schools, which described eight 'doorways to sustainability': food and drink, energy and water, travel and traffic, purchasing and waste, buildings and grounds, inclusion and participation, local well-being, and global dimension (DfES, 2006b). While the original aims of the new school building programmes do not appear to have been the main focus, the vision for social inclusion was still retained within this definition of sustainability.

A further publication in the same year, commissioned from independent researchers, reported real examples of new school buildings. *Schools for the Future: Design of Sustainable Schools: Case Studies* (DfES, 2006a) exposed a rather different emphasis. It identified six 'themes' of sustainable schools, and although the first was 'stakeholder engagement', four others – 'getting the basics right', 'low energy design', 'renewable energy systems' and 'managing energy and ICT [information and communication technology]' – were focused on energy reduction. Only one, 'the building as learning tool', was concerned with the educational aspect, and that only in terms of education *about* the low energy design aspects (DfES, 2006a). The report also discussed, and implicitly encouraged, 'tools promoting sustainable design', which included BREEAM schools and the DQI for Schools.

In 2007 the DCSF made £110 million additional funding available for school designs which could demonstrate 60% carbon saving through the use of a spreadsheet-based tool called the 'carbon calculator'

(DCSF, 2008). The funding was particularly intended to encourage 'low or zero carbon energy generation'; in the same year the DCSF published guidance on the applicability of various technologies for different school contexts (DCSF, 2007b), and a spreadsheet and accompanying report specifically evaluating biomass heating for schools (DCSF, 2007a). The addition of 'renewable' energy technologies, and an increasing focus on carbon reduction, was becoming apparent from this department too.

Overview

During this period the concepts for sustainable school buildings were rapidly evolving. Policy positions from the different government departments, however, reflected slightly different values and concerns. The DCLG had developed a strong focus on improving energy efficiency in buildings and on encouraging on-site energy technologies; meanwhile they specifically *excluded* any consideration of embodied carbon. However, embodied carbon was the key focus of both the DEFRA report on sustainable procurement (DEFRA, 2006) and the Strategy for Sustainable Construction. The DCSF, like the DCLG, increasingly supported the reduction of operational carbon through energy efficiency and onsite renewables, but retained a focus on the importance of stakeholder involvement in decisions, and on design for social inclusion. While the DCLG enshrined their policies within the Building Regulations, the DCSF relied on encouragement through published 'best practice' case studies, and through a number of tools to support a sustainable design process, including the DQI exercise, BREEAM and the carbon calculator.

In spite of the holistic and wide-reaching global agenda for sustainable development at the start of the millennium, and of the original aspirations for the new school building programmes for improving educational achievement, within a few years the interpretation of 'sustainability' had, in the context of school buildings, narrowed to a primary focus on carbon emissions and energy use; although there were some disparities between government departments, only stakeholder engagement and inclusive design appeared as social aspects of sustainability within the discourse of 'sustainable schools'.

Case studies of school building projects

To understand how the policies were implemented in practice, and through their implementation further formed, Hupe (2014) recommends that we look at '"what happens"' rather than '"what should happen"' (p. 178). This paper summarizes detailed case studies of four school building projects, originally reported in full in Moncaster (2012). Data gathered included extended interviews with key stakeholders in multiple roles, direct observation during site and project office visits, copies of the DQI, BREEAM and carbon calculator tools used, and numerous project and public documents. The projects were studied during their design and construction stages in order to examine not the final outcomes but instead the 'social interaction in micro-networks' of Hupe (2014, p. 177), and the impacts of the technologies encouraged by the STS literature.

In choosing the case studies attention was paid to the diverse legacy of state school governance in England which had led to a number of procurement routes for school building projects co-existing during this period. Figure 1 maps the key routes and organizations involved, focusing in particular on the procurement of new buildings for existing secondary schools.

Outcomes from the projects could not be known in advance as the buildings were not completed, but considerable care was taken to identify four projects that were comparable in temporal, spatial, social and financial characteristics, while representing the range of procurement routes. The key parameters are given in Table 1. All are existing medium-sized secondary (11–19 years) state schools in the East of England, undergoing a substantial building programme designed and constructed during the period 2006–10. The four very similar projects were chosen to demonstrate the diversity of outcomes in construction projects, dependent on the micro-interactions and the social networks, and also to examine the construction sectors' response to sustainable schools during this period.

Some of the emerging policies for sustainable schools identified in the previous section were focused only on the new building programmes, and were embedded within the procurement methods through the use of tools such as BREEAM, the carbon calculator and the DQI. Therefore two of the projects chosen were procured through pre-existing processes, while two were procured through the BSF and Academies programmes; these latter were also analysed for any specific impacts of the tools and procurement processes. For further details of the project selection process and rationale, and research design and methods, see Moncaster (2012, pp. 57–80).

The original research this paper is based on was undertaken with the intention of exploring 'sustainability as consciously interpreted by policy and project actors' (Moncaster, 2012, p. 247). As demonstrated above, the political discourse for 'sustainable schools' had narrowed to a primary focus on carbon emissions, although stakeholder involvement in decisions, and the inclusion of disabled pupils, had also been retained to a certain extent within this discourse by the DCSF. Within the case studies, the prevailing political
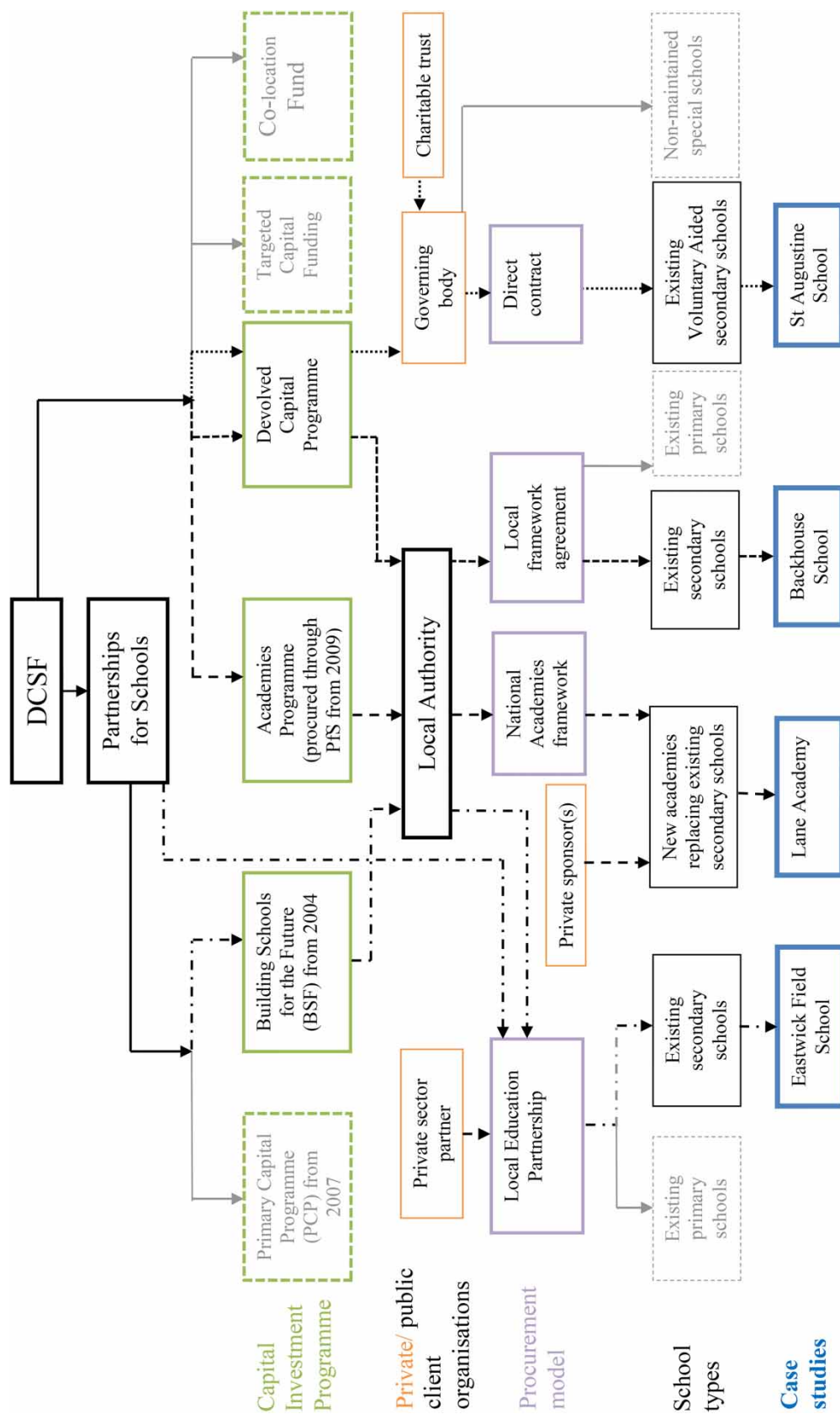
Figure 1 Schools procurement routes, 2004–10

Table 1 Key parameters of four case study projects

School	Client	Number of pupils/age range (years)	Cost (construction plus design fees) (£, millions)	Percentage new build	Feasibility	Design team appointed	Contractor	Contractor appointed	Construction period	Design and build at RIBA stage	Single/multiple procurement	Funding model	
					Similar characteristics						**Contrasting characteristics**			
Backhouse School	County council A	1350/11–19	12	50%	Spring 2005	Autumn 2007	C1	January 2008	2008–10	E	Single, as part of a local framework agreement	Devolved capital funding via the local authority	Existing procurement processes
St Augustine Roman Catholic School	RC diocese	850/11–19	13	50%	2005	Summer 2006	C2	September 2007	2007–09	E	Single, one-off project	Devolved capital grant from the DCSF	
Eastwick Field School	Borough council	1500/11–19	21	20%	Spring 2006	Autumn 2007 (preferred bidder)	C1	October 2007	2008–10	B/C	Multiple, one of three 'reference schemes'	BSF Local Education Partnership	New building programmes
Lane Academy	County council B	1350/11–19	20	100%	2007	Summer 2008	C2	September 2008	2009–10	B	Multiple, one of two academies	National Academies Framework	

discourse of sustainability as low carbon had clearly permeated and defined the conscious interpretation of the vast majority of the actors consulted, and the studies presented below therefore reflect that interpretation. Stakeholder consultation and disabled access were the only two issues that emerged as aspects of (social) sustainability; economic issues were only identified as such where connected to potential cost of energy.

Case study 1: Backhouse School

Backhouse School is a large comprehensive on the outskirts of a small city. The plans to rebuild the 1950s' buildings first arose from a legal responsibility to make the buildings wheelchair accessible. The feasibility design was undertaken in 2005 by the council's in-house architectural team, and by an engineering firm that had a longstanding framework agreement to provide design services to the council.

During this first design phase the consultation process with the school and the wider community was limited to the minimum required by the planning process. For this project the dominance of the client, the council, over design decisions was clear, and perhaps particularly visible in the choice of low carbon technology. The mechanical services engineer's stage C report had strongly encouraged 'from both a cost and environmental perspective' the choice of an electricity-producing technology; the school – both governors and business manager – also had a strong preference for photovoltaic panels. However, the final choice, of a ground-source heat pump (GSHP) coupled with underfloor heating, was made by the council based on preference and a very preliminary assessment of the capital cost (which later turned out to be a considerable underestimate) with no consideration of whole-life cost or of likely carbon savings, and with no consultation with the school. The choice of GSHP therefore went against the preference of the end users and the recommendation of the mechanical engineer. It also went against the advice given in government reports (DfES, 2004; DCSF, 2007b) which suggested both that the heat pump was only effective in reducing carbon in areas not connected to the gas network, and that underfloor heating was insufficiently responsive to be a suitable technology for schools.

The planning application in 2006 meanwhile required only a light touch and in-house 'pre-assessment checklist' for BREEAM with no external validation. The project was then delayed for a year by the planning authority; although during this period the use of BREEAM for all new school projects had become mandated by government (with a minimum requirement of 'Very Good' rating for schools procured through the new programmes), there was no later review of the checklist. Instead this section of the report was

repeated word for word in the 'Milestone 4 Report' two years later, showing little response to the developing policy agenda.

Once the project was on site, however, and with responsibility moved from the design team to the design and construct contractor, there was a noticeable change in approach. The main contractor ran a competition between their sites under four headline issues, which included the reduction of construction energy, the calculation of embodied carbon (both excluded from government policy as discussed above), the reduction of operational energy, and client and end user satisfaction. The contracting team for Backhouse School made several changes to materials' specifications in order to reduce the embodied carbon, and reused all excavated material. They were also particularly praised for their involvement of the school in all decisions, in contrast to the behaviour of the client and design team in the previous phase. Their commitment led to them winning the in-house competition.

Case study 2: Eastwick Field School

The second project was built by the same contractor. It was one of the earlier schools to be procured through the BSF programme; while designed and built at much the same time as Backhouse School, BSF required a BREEAM score of 'Very Good', and the use of the DQI exercise for stakeholder consultation. The expectation was that this case would achieve a better outcome in these two particular policy interpretations of sustainability.

As part of BSF, the inner London borough client were required to appoint a private partner with which to form a local education partnership (LEP) (PfS, 2008). In order to do so, it first undertook feasibility designs for three 'reference schemes', including Eastwick Field.

An important outcome from the feasibility stage process was the budget. This was determined by the crude BSF funding model that assigned a fixed sum per metre of floor area depending on four categories: 'new build', 'remodelled', 'refurbished' and 'untouched'. While the feasibility stage design identified only 20% of the school as 'new build', with the majority described as 'untouched' and therefore attracting no funding at all, the DQI consultation at the same stage also identified the requirement for 100% disabled access as one of the school's key motivations for the building project.

A lengthy 'Competitive Dialogue' process then followed to appoint the private partner of the LEP. In this process, two bidding teams both produced a complete design scheme for each of the three schools. The confidentiality requirements of the process meant that stakeholder consultation during this design

development stage was extremely limited, excluding the pupils and the wider community. Furthermore, as the winning bid retained almost nothing of the feasibility design, much of the input from previous consultation was lost.

Once the 'preferred bidder' had been selected and with it its team's design, the confidentiality requirements were lifted, and the school held its first own public consultation exercise. The intention of the BSF process was to have a fully agreed design by this stage, with just three months allowed in which to agree 'project specific data' before reaching financial close. The documents clearly stated that 'Any activity during this phase relates solely to inserting project specific data into the Building Contract' (PfS, n.d.). The attendees at this late stage consultation therefore felt that this was 'consultation as window dressing', with little sense that they had a say in any meaningful design decisions. The school and governors were also clearly unhappy with both the lack of consultation and the resultant design. The Director of Resources documented the process through an online blog, itemizing many significant design issues with which the school was still unhappy, including the 'energy saving/environmental impact' and the continued lack of full accessibility. The blog also stated that 'the governors are absolutely clear [. . .] that they won't approve entry into BSF until they feel we have had full consultation with stakeholder groups'. A particularly strong initial focus on environmental sustainability for this project had stemmed from the borough council, the community and the school (Moncaster, 2012, pp. 150–153). The winning architects had also produced a report as part of the bid that described their extensive approach to sustainability; however, none of the materials or technologies mentioned in the architect's report was later included in the design.

The policy requirement was for renewable energy technologies to provide 10% of the power for the school. The client chose to install a biomass boiler, despite the fact that the contractor advised against it, as did the DCSF report (DCSF, 2007b), who both considered it an unsuitable option for an inner London location due to space on site and delivery issues. Indeed there was emerging evidence that many schools only ever used the 'backup' gas system, never switching on their biomass boilers (Moncaster, 2012; Palmer, 2006). The client's decision however was once again determined by the structure of the funding model, which focused on capital cost rather than either whole-life cost *or* a detailed assessment of any likely carbon savings.

The DQI exercise, repeated at this stage, also highlighted the level of dissatisfaction with the design. The facilitator's report noted, among other issues, that the proposals had failed on the 'fundamental' requirement of accessibility.

In the first three months after the appointment of the preferred bidder, there had been over 100 changes to the design developed through consultation between the architects and the governors. The quantity surveyor was not party to these meetings, but appears to have been instrumental in limiting the options that were offered to the school through his value engineering spreadsheet: '[it was] up to us to come up with a scheme that was affordable', as he put it. The information he presented on each option was further limited to its capital cost rather than to any wider interpretation of 'value'. Major design decisions were still being made at this late stage, therefore, but based chiefly on financial cost.

Financial close was finally agreed 11 months late, but in spite of constant negotiation during this period no one seems to have been entirely satisfied with the outcome. As the Chair of Governors put it, 'It was weird how we had literally hundreds of meetings beforehand but still had a solution that didn't particularly reflect what we needed.' Ultimately the governors and the school felt forced to accept the design offered, in spite of several issues about which they remained unhappy; two of the major issues were stakeholder consultation and disabled access, the key remaining aspects of social sustainability incorporated within the BSF programme. Although stakeholder consultation was actively encouraged within the BSF programme through the DQI process, the school's Director of Resources described DQI as 'horrible! It was the worst thing we did!' The 'Competitive Dialogue' process also limited wider consultation through the most critical phase of design. Therefore although the policies for stakeholder consultation had been embedded within the BSF programme, the tools used had the unintended consequences of limiting this consultation. Meanwhile, the width of existing door openings in the areas that had been designated as 'untouched' at the feasibility stage cost plan proved prohibitively expensive to adjust later, and this work was never done, with 100% accessibility never achieved.

The school did achieve BREEAM 'Very Good' rating, as required by the BSF programme. However, the carbon reduction was not measured; as with Backhouse School, initial costing and client preference had determined the choice of 'low carbon' technology, against the advice of the professional experts who believed that the biomass boiler was unusable in that setting. In spite of the strong initial aspirations, the Chair of Governors noted that 'It's hard to [point] to anything particularly sustainable in the new design [. . .] and our energy bills seem no lower than before.'

Case study 3: St Augustine Roman Catholic School

St Augustine is one of a number of state-funded faith schools run by the Roman Catholic Diocese. In order

to replace the dilapidated 1950s' buildings, the diocese applied directly to the DfES for a capital grant. It was granted with a singular 'sustainability' requirement on the project of achieving BREEAM 'Good' rating. Unlike the local authority clients for the other three case studies, the diocesan client, and its independent consultant had very little experience in managing such major projects.

Not built as part of either of the two new schools programmes, stakeholder consultation, beyond the limited extent required for planning consent, was not enforced in this project. Renewables were not a specified requirement either; however, a GSHP was installed, in this case as suggested by the services engineer with the full involvement and support of the diocese client, school bursar and architect. Even so, the electric pump was unlikely to have been as carbon efficient as the natural gas through mains supply, an argument also supported by the DCSF guidance (DCSF, 2007b).

One unusual aspect of the project was the introduction by the structural engineer of a major design change at RIBA Stage D to replace the proposed steel frame construction with cross-laminated timber, with the clearly expressed purpose of reducing the embodied carbon – an issue that had been omitted from the policy documents, as described above.

The use of this material was highly innovative for the UK at the time, with only one other cross-laminated timber (CLT) school building under construction, but in spite of the risk of such a late change and of the use of a material and process previously unknown to the contractor, the change was accepted. The design team could be seen, therefore, to have had far greater power in design decisions than in the other projects studied, perhaps due to the lack of a detailed brief as incorporated within the new building programmes, as well as to the inexperienced client and the lack of early contractor involvement.

The project won a prize from the Institution of Civil Engineers (ICE) as 'a showcase of sustainable engineering', with particular mention of its embodied carbon. Both in its introduction in this project and in this award, embodied carbon was clearly seem as an important aspect of sustainability by professionals in the construction industry in spite of its non-existence in policy. The building also, and separately, achieved a BREEAM 'Very Good' rating, higher than the original DCSF requirement for the project of 'Good'.

Case study 4: Lane Academy

The final project was a new academy, replacing, and built on the same site as, an existing school, and procured by the county council through the National Academies Framework. Partway through the bidding

process and following the successful introduction of CLT at St Augustine, the contractor (leading the design-and-construct bid team) decided to introduce this material at Lane Academy; he also decided to replace the original structural engineer on the bid team with the St Augustine engineer who had experience of this material. This time the procurement process clearly gave power over the key decisions to the contractor. Having been successfully demonstrated at one school, this more experienced client was prepared to accept the still novel solution.

The DQI tool was a requirement of the Academies projects, as with BSF, but as for Eastwick Field it was considered by the client to have been just 'a paper exercise'. Also as for Eastwick Field, during the bid-and-design development stage a confidentiality agreement restricted stakeholder participation in design decisions. A particular omission in this case was the head teacher of the existing school, ostensibly because she had not yet been appointed principal for the new academy – in reality it was more likely to have been due to a personality clash with the project sponsor.

The council's project manager decided to apply for the additional funding by demonstrating a 60% reduction of carbon emissions through the carbon calculator. As in other cases, in order to demonstrate the reduction the calculator strongly encouraged the choice of a biomass boiler. This appears to have been a blip of the calculator, well known to professionals working on the schools programmes (Moncaster, 2012, pp. 212–213). However, although again the choice of technology was at least partly prompted by financial considerations, unlike at Eastwick Field the Lane Academy does have the space for fuel delivery and storage, so in this case biomass made a more sensible decision.

The project manager had also increased the DCSF requirement to a BREEAM rating of 'Excellent'; the project went on to achieve this, only narrowly missing 'Outstanding'. In this project it appeared clear that the construction industry, with the right client, was able to improve performance even above the high requirements set by the policy for the new school building programmes, and significantly above the requirements of the pre-existing procurement routes followed by Backhouse and St Augustine schools.

Discussion: impacts of policy discourses on school buildings

This paper has reviewed the formation and implementation of policies for sustainable schools in England, during the period 2004–10, while two major school

461

building programmes were underway. A shifting definition of sustainability is traced from the social–environmental–economic discourse at the start of the millennium to a narrower focus on climate change mitigation.

A stated focus on sustainability was only incorporated within the building programmes once they had already started. However, from that point in 2004 the policies emanating from three government departments, and at times contradictory, showed a rapid narrowing of the definition of sustainability for schools as a principal concern with carbon emissions in use. The original intention of the school building programmes had been to improve educational attainment as a route to social equality; this was a key theme of the sustainability discourse at the start of the millennium, but the theme had been eroded and eventually all but lost from the interpretation of 'sustainable schools' in less than a decade.

The focus on the reduction of carbon emissions was to be achieved through energy efficiency in use, 'a recurrent theme since the 1970s energy crisis', as Guy and Shove (2000) point out, rather than a radical change from business as usual, and the incorporation of onsite low carbon technologies.

The four building projects discussed were used to examine both what happened and why in response to, and in some cases in spite of, these developing policies. The studies, carried out during the design and construction stages of the projects, examined the individual decision-making contexts set up by the policies and the procurement structures, the multiple values and relationships of the social actors, and the consequences, intended and unintended, of the technologies used.

While the Building Regulations encouraged the incorporation of low carbon technologies with no required assessment of the carbon reduction to be achieved, the DCSF did provide advice on the suitability of different technologies for different circumstances. However, in none of the projects studied was the DCSF advice taken by the clients. Instead the choice of technologies in two of the projects was based on preliminary estimates of capital cost, and against the advice of the design-and-construction teams; the lack of calculations of the carbon reduction to be achieved meant that the likely result of the choices was of *increasing* over all carbon emissions (Moncaster, 2012, ch. 7).

Meanwhile, the introduction of low *embodied* carbon that had been specifically omitted from the DCLG policies was introduced as a strong demonstration of sustainable design at St Augustine (incidentally the project following the most traditional procurement structure)

and then at Lane Academy. The specific award for this design aspect at St Augustine from the ICE showed the continued inclusion of embodied carbon within industry discourses on sustainable buildings, at odds with the policy discourse.

The remaining social aspects still perceived within the policy documents as part of sustainable design were accessibility for disabled students and stakeholder participation. However, the cases showed that the design support tools and processes incorporated as part of the new procurement processes, rather than supporting these aspects had in places had the opposite effect. The DQI process rather than allowing meaningful stakeholder dialogue at Eastwick Field and Lane Academy instead was felt by both design and client teams to have controlled and constrained participation. The 'Competitive Dialogue' process of procuring the design-and-construction teams also unintentionally further restricted stakeholder dialogue. The early cost model introduced by BSF had the result of preventing 100% disabled access being achieved in the final design of Eastwick Field, in spite of having been identified as one of the key motivations for the building project.

Some of the findings of this qualitative study are supported by other, quantitative, research which demonstrates that the new school buildings use far more energy, and emit far more carbon than they were designed to do. Burman, Mumovic, and Kimpian (2014, p. 155), for example, report that over 150 educational buildings in the Carbon Buzz database consume on average 1.48 times as much energy in heating as predicted and 1.9 times as much electricity. Godoy-Shimizu, Armitage, Steemers, and Chenvidyakarn (2011) demonstrate that the average energy use of the new academies is 20% higher than *the schools they had replaced*. Meanwhile, there is evidence emerging that embodied carbon is also likely to be increasing, with the draft assessment of the 2008 Strategy for Sustainable Construction finding that:

> the carbon efficiency (emissions per £ spend) of construction activity has increased by 2% between 2008 and 2012. [...] Therefore, the target [of 15% reduction] has not been met.
> (Greening the Industry Group and WRAP, 2014, p. 2)

It is clear from these wider studies that even the singular policy aim of reducing carbon emissions from schools is unlikely to have been achieved.

Conclusions

It can be seen that the shifting and diverse interpretation of sustainability for school buildings, within

both different government departments and the different contexts of implementation, has led to ambiguity and diversity in the responses. The outcomes for individual school buildings are not necessarily those that the original policy-makers had envisaged. However, through both the translation of the policies and the impacts of different social and technical interactions, some changes have been made.

The final story of the policies for sustainable schools, and what was built in answer to them, is not so much one of identifying a 'policy gap' as it is about understanding the continual policy-implementation process: a negotiation of multiple perspectives, values, interests and actions, through the intended and unintended consequences of tools and technologies, in government departments, industry networks and within individual projects. This paper does support, and further explains, the oft-repeated call for 'evidence-based policy', and suggests that climate change mitigation will only be achieved if actual whole-life (operational and embodied) carbon reductions are calculated. However, it has also made clear the importance not only of a quantitative assessment of what has been built in the implementation of particular policy agendas, but also of a qualitative assessment of how and why. The multiple individual decision-making contexts have been shown to be fundamental to how the regulations and policies are implemented in practice.

The lesson from the policies for sustainable schools and what was built in response, is not therefore so much one of a 'policy gap' as it is about the way in which policy, for all the efforts to present it as being 'evidence based' and to give it an ordering framework, is first of all the product of multiple rationalities and interests. Although there is a mismatch between what is intended and what is delivered, of perhaps more consequence is the multiplicity of intentions, stemming from multiple perspectives, values, interests and actions that act throughout the process. This can result in ambiguous policies that possess considerable interpretive flexibility in the details of their implementation and consequently considerable variability in their outcomes.

Rather than identifying the 'gap' between policy conception and outcomes, there is a need for a reinterpretation of policy as a continuous process, which shapes and reshapes what happens. Although this will not make the task facing policy-makers any easier, it will at least ensure that their endeavours are informed by a more realistic understanding of the socio-technical networks in which and through which they attempt to intervene. It will also thereby open up for explicit consideration both the means and the ends of policy aspirations to move society towards a more sustainable future, however approximate or contested that notion will continue to be.

Disclosure statement

Funding

References

Adamson, D. M., & Pollington, T. (2006). *Change in the construction industry: An account of the UK construction industry reform movement 1993–2003*. Abingdon: Routledge, Taylor & Francis.

Barrett, S., & Fudge, C. (Eds.). (1981). *Policy and action: Essays on the implementation of public policy*. London: Methuen.

Barrett, S. M. (2004). Implementation studies: Time for a revival? Personal reflections on 20 years of implementation studies. *Public Administration*, *82*, 249–262. doi:10.1111/j.0033-3298.2004.00393.x

Bijker, W. E., & Law, J. (1992). General introduction. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in technological change* (pp. 1–14). Cambridge, MA: MIT Press.

Blair, T. (2004, September 15). Blair's climate change speech – Speech given by the Prime Minister on the environment and the 'urgent issue' of climate change. *The Guardian*.

BRE. (n.d.). *BREEAM* [Online]. Retrieved from http://www.breeam.org/

Burman, E., Mumovic, D., & Kimpian, J. (2014). Towards measurement and verification of energy performance under the framework of the European directive for energy performance of buildings. *Energy*, *77*, 153–163. doi:10.1016/j.energy.2014.05.102

Carter, N. (2007). *The politics of the environment*. Cambridge: Cambridge University Press.

CIC. (n.d.). CIC design quality indicator Online. Retrieved from http://www.dqi.org.uk/dqi/Common/DQIOnline.pdf: Construction Industry Council.

Cooper, I. (1981). The politics of education and architectural design: The instructive example of British primary education. *British Educational Research Journal*, *7*, 125–136. doi:10.1080/0141192810070202

DCLG. (2006a). *Building a greener future: Towards zero carbon development – Consultation*. Wetherby: Dept. for Communities and Local Government.

DCLG. (2006b). *Code for sustainable homes*. London: Communities and Local Government Publ.

DCLG. (2007a). *Building a greener future: Policy statement*. London: Dept. for Communities and Local Government.

DCLG. (2007b). *Building a greener future: Towards zero carbon development – Analysis report of consultation responses*. London: Dept. for Communities and Local Government.

DCLG, & UKGBC. (2007). *Report on carbon reductions in new non-domestic buildings: Report from UK Green Building Council*. London: The Stationery Office.

DCSF. (2007a). *Evaluating biomass heating for schools: A guide to accompany an excel calculator tool*. Annesley: DCSF Publ.

DCSF. (2007b). *The use of renewable energy in school buildings – A summary*. Annesley: DCSF Publ.

DCSF. (2008). *Carbon calculator v1.1.xls*. Annesley: DCSF Publ.

DCSF, 4PS & PFS. (2008). *An introduction to building schools for the future*. Department of Children Schools and Families. Annesley: DCSF Publ.

DEFRA. (2006). *Procuring the future: Sustainable procurement national action plan: Recommendations from the sustainable procurement task force*. London: The Stationery Office.

DETR. (2000). *Building a better quality of life: A strategy for more sustainable construction*. London: The Stationery Office.

DfES. (2002). *Classrooms of the future: Innovative designs for schools*. London: The Stationery Office.

DfES. (2004). *Schools for the future: Exemplar designs: Concepts and ideas*. London: The Stationery Office.

DfES. (2004b). *Schools for the future: Transforming schools: An inspirational guide to remodelling secondary schools*. London: The Stationery Office.

DfES. (2006a). *Schools for the future: Design of sustainable schools: Case studies*. London: The Stationery Office.

DfES. (2006b). *Teachernet – Sustainable schools*. London: The Stationery Office.

Godoy-Shimizu, D., Armitage, P., Steemers, K., & Chenvidya-karn, T. (2011). Using display energy certificates to quantify schools' energy consumption. *Building Research & Information, 39*, 535–552. doi:10.1080/09613218.2011.628457

Greening the Industry Group & WRAP. (2014, May). *15% carbon reduction by 2012: 2012 Carbon Assessment: Draft*.

Guy, S., & Shove, E. (2000). *A sociology of energy, buildings, and the environment: Constructing knowledge, designing practice*. London: Routledge.

HM Government, & Strategic Forum for Construction. (2008). *Strategy for sustainable construction*. London: The Stationery Office.

House of Commons Education and Skills Committee. (2007). *Sustainable schools: Are we building schools for the future?*

Hupe, P. (2014). What happens on the ground?: Persistent issues in implementation research. *Public Policy and Administration, 29*, 164–182. doi:10.1177/0952076713518339

Intergovernmental Panel on Climate Change (IPCC). (2007). *Climate change 2007: The physical science basis*. Cambridge: Cambridge University Press.

Koppenjan, J. F. M., & Klijn, E. H. (2004). *Managing uncertainties in networks: A network approach to problem-solving and decision-making*. London: Routledge.

Martello, M. L., & Jasanoff, S. (2004). Introduction: Globalization and environmental governance. In *Earthly politics: Local and global in environmental governance*. Cambridge, MA and London, UK: MIT Press.

Matland, R. E. (1995). Synthesizing the implementation literature: The ambiguity-conflict model of policy implementation. *Journal of Public Administration Research and Theory, 5*, 145–174.

Moncaster, A. M. (2012). *Constructing sustainability: Connecting the social and the technical in a case study of school building projects* (PhD thesis). University of East Anglia, Norwich.

ODPM. (2003). *Sustainable communities: Building for the future*. London: The Stationery Office.

ODPM. (2004). *Better buildings – better lives: Sustainable buildings task group report*. London: The Stationery Office.

Palmer, J. (2006). 'Full marks for effort': Sustainability of Kingsmead School. *Building Services Journal, 28*, 43–47.

PFS. (2008). *BSF Guidance Note: Economics of the LEP Version 2.0*. London: The Stationery Office.

PFS. (n.d.). *PFS National Framework Guidance Document for BSF and One School Pathfinder projects*. London: The Stationery Office.

Rip, A. (2010). Processes of entanglement. In M. Akrich, Y. Barthe, F. Muniesa & P. Mustar (Eds.), *Débordements: Mélanges offerts à Michel Callon* (pp. 381–392). Paris: Presses des Mines.

Rittel, H. J. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*, 155–169. doi:10.1007/BF01405730

Stern, N. (2006). *The economics of climate change: The stern review*. Cambridge: Cambridge University Press.

United Nations. (1992). United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil, 3–14 June.

WCED. (1987). *Our common future*. Oxford: Oxford University Press.