

Sustainability lessons from private finance and similar private initiatives

Robert Garwood, Susan Logan, Kate Mills and Nigel Willoughby

BRE PFI Unit, Energy Division

information paper

How has sustainability been incorporated into Private Finance Initiative/ Public Private Partnerships projects? We examine the issues across a range of sectors — hospitals, schools, infrastructure and public buildings. The paper comments on the lessons learnt, pitfalls and opportunities.

It shows that:

- Sustainability can be included in project briefs and reduce whole life costs.
- A positive approach to sustainability can be the crucial factor when evaluating bids.
- There is a link between functionality and sustainability.

The paper provides a summary checklist of the opportunities and pitfalls of integrating sustainability into the PFI/ PPP process. It will inform those involved in PFI/PPP schemes of how to take advantage of lessons learnt from previous projects.

The Private Finance Initiative (PFI), part of the government's Public Private Partnerships (PPP) programme, is one of the main mechanisms through which the public sector can secure improved value for money in partnership with the private sector. It aims to encourage private sector investment, skills and initiative in public sector projects. This paper discusses the sustainability and to a lesser extent functionality of six case studies to highlight the lessons learnt, pitfalls and opportunities within the PFI/ PPP process. The objectives of the study are:

- To encourage construction teams to adopt

more sustainable procurement processes by the dissemination of case studies that demonstrate how PFI and similar public/private approaches deliver benefits to the design and construction process.

- To discover how sustainability and functionality relate in these particular case studies.
- To compare selected PFI/ PPP projects with emerging sustainability indicators produced by The Movement for Innovation (M⁴I). These indicators include aspects such as whole life costs, benefits to local society and the development of supply chains.



Barnhill School

The paper concentrates predominantly on sustainability issues with reference made to functionality. The functionality of any construction is the degree to which it enables a business objective to be achieved. More details on functionality are given by Prior in *Getting it right: a client's guide to achieving functionality in construction*.

Lessons learnt, pitfalls and opportunities

Croydon Tramlink

The Functional Driver for the Croydon Tramlink was the need to relieve traffic congestion in Croydon town centre. Extensive surveys showed that this was a major consideration as to whether businesses remained in Croydon. Retaining and attracting existing businesses and jobs is now a principal aim of Croydon Council's economic programme.

The London Borough of Croydon consulted widely among the local population, who largely opposed proposals for road widening but were 80% in favour of a light railway. The proposed tram system would improve access to Croydon from the east and west with the intention of:

- Increasing the number of visitors to the town
- Encouraging businesses and retailers to invest in the town's economy
- Guaranteeing reliable and short journey times

A PPP for funding was established, central government insisting that private sector commitment to the scheme be achieved. The total capital cost was around £200 million of which government provided £125 million. Such a scheme was in line with its policy to achieve better whole life value for public money. A further central government policy insists that, as far as possible, all public procurement should be environmentally, economically and socially sustainable.

A light railway system (Tramlink) was developed under PPP between Croydon Council, London Transport and Tramtrack Croydon Ltd (appointed in November 1996 for a period of 99 years).

The Tramlink is now in operation and serves a population of around 600 000 people. It is saving journey time through the frequency, speed and reliability of the service, compared with other private and public transport alternatives.

A major functionality outcome has been addressed in delivering an integrated transport system that, at this early stage, does seem to be solving the problems — car park usage is down by 6%, footfall in the shopping malls is up by 11%.

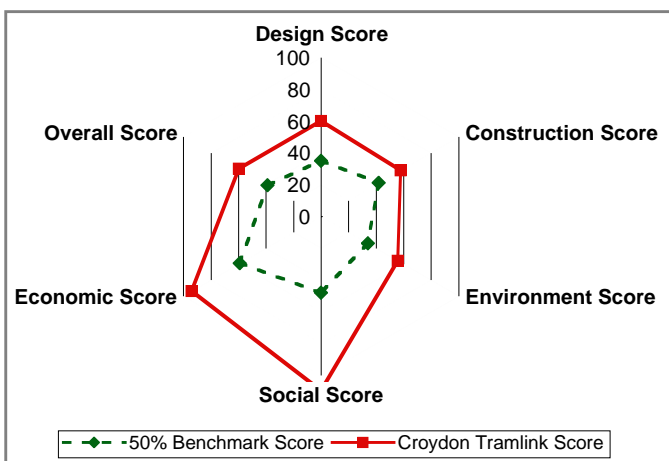
The tram has right of way over other forms of transport where the roadway is shared. All statutory and local utilities were relocated in the construction phase to avoid disruption to travel during maintenance. The system was designed with interchange links with other public transport at railway and bus stations.

The system re-used materials such as old track bed aggregates and sleepers where possible to lessen environmental impacts. The tram stops are of uniform design and were prefabricated to minimise construction defects and wastage.

The social benefits of the Croydon Tramlink scheme have been wide. The tram has provided good public transport to the residents of New Addington, a social housing area identified as suffering social deprivation. The system has also allowed inclusion of mobility impaired and socially disadvantaged groups on public transport by good project specification. Public safety was considered paramount in the original design of the system alongside prevention of noise and graffiti.

The concept of the scheme has sustainability at its core. However, there were, to our knowledge, limited incentives (eg targets) in the PFI contract for the construction company to be a 'champion' of sustainability.

The Tramlink is expected to make a healthy operating profit. Allowing the private sector to keep this revenue for a set period of time enabled the Tramlink Consortium to raise the necessary finance to construct the system.



Sustainability Indicators for Croydon Tramlink

Extension and improvement of the A55 road

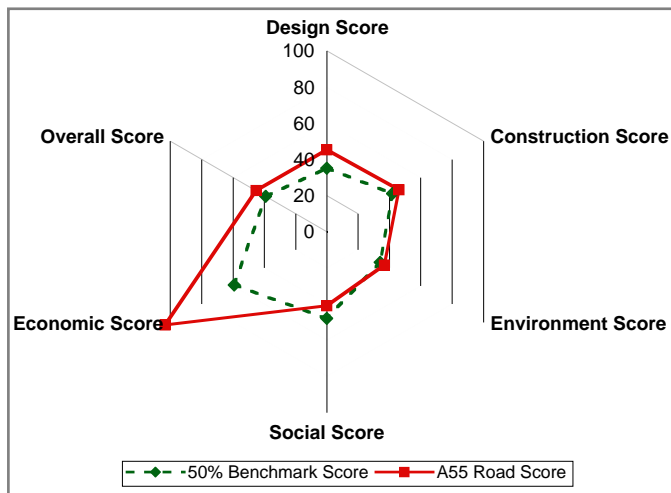
The original A5 road to Holyhead port was proving unsuitable for the increasing traffic flows. Four possible routes were considered for a new dual carriageway across the island of Anglesey, and after a public inquiry in 1990 a preferred new route was chosen. A standard Design, Build, Finance and Operate (DBFO) contract was let by the Highways Agency in December 1998 for a period of 30 years, to a consortium called UK Highways A55. The construction phase lasted two years, leaving a maintenance responsibility for the remaining 28 years.

The original A5 trunk road to Holyhead cuts through the communities of Caergeiliog, Valley and Holyhead before terminating at the main 'old' Holyhead port entrance at Salt Island. Traffic flow was severely restricted by the road width, traffic lights, pedestrian crossings, and vehicles joining and crossing it from side roads, tracks and adjoining properties.

In certain places the sub-standard alignment of the original road led to poor visibility and increased driving hazards. During the period 1991 to 1995 on a particular stretch of the road, accidents resulted in 2 fatalities, 15 serious injuries and 83 slight personal injuries.

The main Functionality Drivers for the Welsh Office to commission a new road were to:

- Enhance road safety and reduce road casualties
- Reduce journey times and operational costs for private and commercial road users including public transport
- Assist economic regeneration



Sustainability Indicators for extension and improvement of the A55 road

- Provide relief from traffic-related problems in communities along the A5
- Take account of the environmental implications of the road scheme and include appropriate mitigation measures
- Procure the scheme under the PFI to enable better delivery of whole life value from the public money invested

Features of the new road which addressed the Functionality Drivers, included levelling and straightening the road to improve visibility and safety. The villages of Caergeiliog and Valley are now totally by-passed. This has improved the quality of life for residents by reducing traffic flow to local access levels, by better air quality from reduced vehicle emissions and by a reduction in obtrusive noise levels. The route was carefully planned through the inquiry and planning process to achieve a social, environmental and economic balance.

The Welsh Office originally produced an Environmental Impact Assessment and Environmental Statement for the chosen route. The consortium has to ensure that the environmental impact of the new road should not exceed that specified in the existing Environmental Statement.

During construction several changes to the road alignment were proposed by the construction company — each change requiring extra assessments. Care was taken to balance earthworks waste and re-use for landscaping. Traditional methods of hedge and bank construction were used with newly trained local labour.

The contract also included penalty points for environmental violations, to encourage contractors to seek solutions that minimised environmental impacts (with the possibility that the contract could be lost if a certain points threshold was breached). This worked well.

Care was taken to mitigate the effects of building this new road in an area of special archaeological and ecological interest. For example, one listed footbridge was recorded by archaeologists before being demolished, and a replacement bridge was built to maintain pedestrian access across both the new road and adjacent railway line. Special measures were also taken to protect wildlife and replace lost habitats.

The new road is now in operation and has improved traffic flows and accident rates. It must be noted however that with the improvement of this major arterial route, traffic volume has increased.

Lessons learnt from these two transport infrastructure case studies are as follows.

- There is a need for incentives or targets, or both, to be specified in the contract to ensure that the contractor is motivated towards sustainability.
- Stimulating public interest through extensive consultation can ensure that sustainability remains high on the agenda.
- The Client is best placed to drive sustainability issues

throughout the construction process and into operational phases.

- Functional requirements of the projects need to be clearly specified and monitored.
- Sustainability issues can have a major influence on infrastructure schemes such as these. The providers, unless thoroughly briefed and involved at project inception, may have little influence over some issues that can have a marked effect when calculating sustainability indices.

The Great Western Hospital, Swindon

Swindon and Marlborough NHS Trust needed to deliver a higher quality of health care to twice as many patients as the existing hospital in accessible, attractive, comfortable and practical surroundings. The chosen site for the new hospital needed to have better access for ambulances, patients, staff and visitors and needed to be able to accommodate future expansion.

The old hospital served a population of 170 000. The new hospital needed to serve a population of 350 000, half of whom would live in Swindon with the remainder being distributed throughout a rural catchment area.

Funding has been achieved through the PFI, enabling the Swindon and Marlborough NHS Trust to commission the construction of the hospital.

The functional requirements of the new site were:

- An outlook to promote well being
- Good emergency access
- Affordable land (every pound spent on the site is a pound less available for patient care)
- Availability for purchase within the set time scale

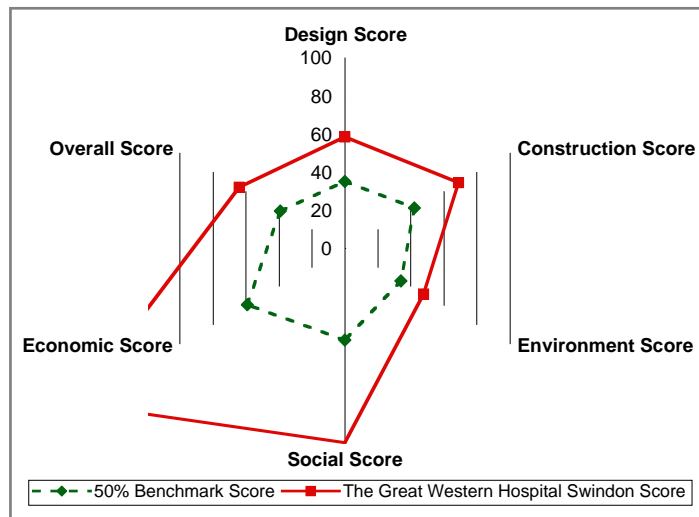
The new Great Western Hospital is close to completion and is at Commonhead, Swindon adjacent to Junction 15 of the M4. It is to be a six-storey, L-shaped building with 55 000 m² of floor space. Compared with the existing hospital it will offer 19% more clinical space and some extra services.

Sustainability was a functional requirement — government policy insists that all public procurement should be environmentally, economically and socially sustainable.

Carillion were contracted to finance, design and build the hospital at a cost of approximately £100 million, and then maintain it and provide all non-clinical services for a period of 27 years.

For Carillion, sustainability was an opportunity and they adopted it as their 'unique selling position'. The output specification did not set specific sustainability targets but Carillion aimed for and achieved a substantial degree of sustainability in practice. This is reflected in the high score for the M⁴I Sustainability Indicators. Sustainable features of the project include:

- Energy-saving measures and reduction of noise and light pollution
- Landscaped grounds and some special facilities for staff
- Environmental Life Cycle Assessments and Whole Life Costing for most materials
- Minimised transport impacts of deliveries to site and reduction of waste by recycling, lean construction and prefabricated components
- Addressing of social issues by setting up a job centre on site to promote creation of local jobs.



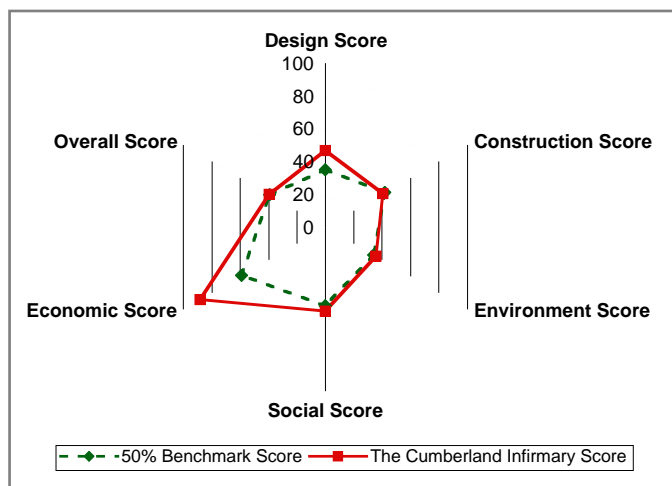
Sustainability Indicators for the Great Western Hospital, Swindon

Cumberland Infirmary, Carlisle

The Carlisle NHS Trust, like the Swindon and Marlborough NHS Trust, needed to improve the scope, quality and efficiency of its healthcare provision.

The Functionality Drivers for the project included:

- Rationalisation of secondary health care provision, including Accident and Emergency departments, to a single-site location
- The adoption of a design that would co-locate departments in a functional way
- An internal layout designed for flexibility — walls and partitions could be moved speedily and cost effectively in the event of a change of use
- The new facility to be constructed close to the then existing facility without disruption to the hospital or the patients



Sustainability Indicators for Cumberland Infirmary, Carlisle

The result of these drivers is the construction of a three-storey, 474-bed hospital built on the same site as the existing Cumberland Infirmary. This is 33 000 m² of new construction and 10 000 m² of retained buildings.

Health Management (Carlisle), a consortium of the Building Property Group Ltd and AMEC Group, contracted to finance, design and build the hospital at a capital cost of £57 million, and then maintain it and provide all non-clinical services for a period of 45 years.

A budget-driven approach to purchasing was adopted. This in essence meant setting a budget and inviting tenders. The purchased components were not least-cost but the best-quality components obtainable for the set budget. This should ensure better-quality components and lower maintenance costs and has reduced the monthly tariff for the hospital.

A life cycle replacement programme for components and fittings is to be operated by the management company to maintain the specified level of functional performance throughout the hospital's life.

Incentives were written into the contract that financially reward improved operational performance compared with set targets. An on-site Energy Manager is successfully delivering good facilities and energy management. However, at the design stage there was little or no attempt at setting energy and environmental targets. This is perhaps understandable in that this was an early PFI project (1996) when sustainability in construction was at an early stage.

Lessons learnt from these two NHS Trust case studies are as follows.

- Potential pitfalls for both hospital projects were that too few sustainability targets or indices were included in the design specification. At the Great Western Hospital this has been addressed through Carillion's approach to sustainability.
- At The Cumberland Infirmary the appointment of an on-site Energy Manager has had a positive impact on energy usage during the operational phase. Energy efficiency can be greatly improved by incentives written into the contract that financially reward improved performance compared with set targets.
- To ensure that the risks of not meeting sustainability targets are minimised, the output specification and 'invitation to negotiate' documentation needs to be coherent and free from contradiction. An example of contradiction might be setting a low energy target then specifying strict temperature regimes making this difficult to achieve.
- 'Invitation to negotiate' documentation requires clarity to enable bids to be evaluated on an equal basis.
- The new Great Western Hospital demonstrates the procurement and use of materials in a sustainable manner without cost penalty.
- Consortia can demonstrate social responsibility, for example, by creating jobs centres on sites to encourage local people to seek employment there.

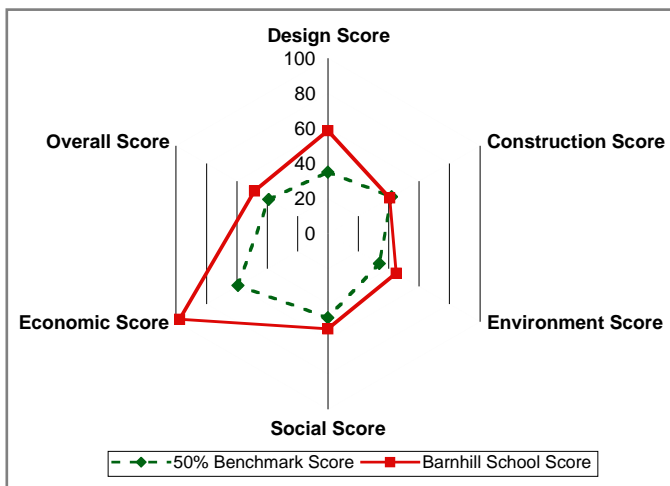
Barnhill School, Hillingdon

Hillingdon's need was to provide additional space within the borough for educating 1450 school children aged 11 to 18 years. The former Department for Education (now Department for Education and Skills: DfES) adopted the formal client role in the procurement of the school.

The Functionality Drivers included:

- A Special Needs Unit
- Facilities suitable for breakfast clubs and after-school clubs for the pupils, starting at 07.00 h and ending in the evening
- A stimulating and exciting indoor environment which avoids looking institutional
- Circulation areas which facilitate ease of movement
- An outdoor environment which creates stimulating external spaces for the pupils to learn, play and relax in safety, whilst being easily supervised

A new school of floor area 12 000 m² and able to accommodate 1450 pupils was built and is now



Sustainability Indicators for Barnhill School, Hillingdon



operational under a 25-year PFI contract between Hillingdon Borough Council and a consortium led by Jarvis Construction (UK) Ltd.

The design concept consisted of five linked faculty buildings that form a series of enclosed private and semi-private courtyard spaces. Important functional relationships between departments were established from the outset and led to the links and interconnections which are vital to the delivery of the school curriculum.

The Department for Education (now DfES) guidelines for the construction of new schools had to be adhered to. An Environmental SEAM (Schools Environmental Assessment Method) rating of at least level 'B' was required. The new school actually achieved an 'A' rating by specification of environmentally friendly materials and energy-efficient design. However, current SEAM assessment criteria may need to be revised to improve sustainability performance further and raise standards higher.

The project team for Barnhill saw sustainability as a positive attribute to be marketed as an advantage over the schemes proposed by competitors. Their faith in sustainability can be recognised by the SEAM 'A' rating achieved and its nomination for 'School of the Future'.

The design team voluntarily set energy targets. Water use/recycling, waste issues and transport issues were all considered and sustainable solutions sought.

The design of the school allowed 'zoned areas' to be open in the evenings for other activities with minimal energy consumption, boosting the revenue of the school.

The project was designed with short time scales and this impacted on the construction phase where difficulty in obtaining some specialist materials caused delays.

Lessons learnt

- The Client must be informed and set a brief which ensures that sustainability criteria are met with suitable targets.
- Time must be allowed to incorporate sustainability into the PFI process.
- Good functional design and energy zoning increased the flexibility of the building and can lead to increased revenues.
- Functional and sustainable design can be driven successfully by the design team.

Pullar House, Perth

Perth and Kinross Council needed a new building to accommodate the 720 staff employed in the Planning and Development Services Department.

The site of an old fabric-dying factory was selected after extensive consultation with the local community.

The Functionality Drivers included the following:

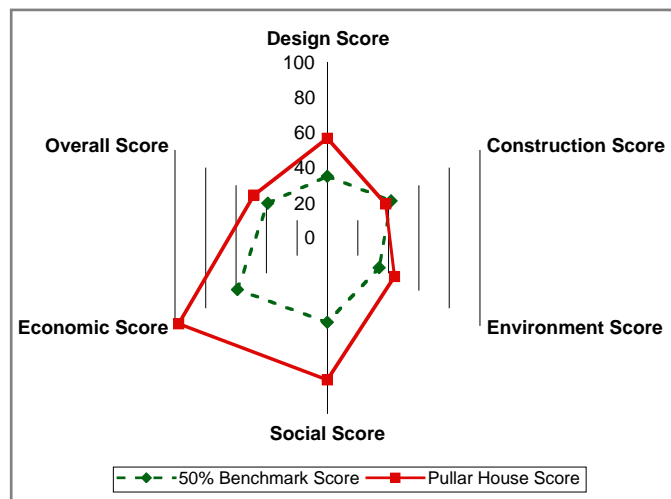
- Office accommodation was required for 720 council staff
- A central Perth location was required within easy reach (100 m) of the main bus station
- The Council environmental and technical performance specification had to be met

The building is now operational and maintained by the PFI provider, Kinnoull House Ltd (a consortium consisting of Morrison plc and the Royal Bank of

Scotland) on behalf of the Council.

A BREEAM assessment was required to demonstrate good environmental sustainability. The building achieved an 'Excellent' BREEAM rating.

The construction re-used the original stone street facades of the old factory to form the south and west elevations. Much of the timber was recycled, shredded or chipped. The ground, which was contaminated with diesel oil, was treated during the site regeneration. The Council used whole life cycle costs rather than initial capital costs in the design specification. The building is predominantly naturally ventilated with openable windows. Social issues were addressed by extensive consultation with the local community at planning stages and during construction.



Sustainability Indicators for Pullar House, Perth

Lessons learnt

- The project demonstrates the incorporation of sustainability from the outset, from the choice of site to significant re-use of materials.
- The value of the selection of a provider with similar commitment to sustainability.
- The importance of setting environmental and other technical targets in the brief.

Summary checklist of sustainability opportunities and pitfalls for PFI/PPP projects

This checklist brings together lessons learnt and general guidelines on incorporating sustainability in PFI/PPP projects. It highlights specific points raised in the case studies and also draws upon broader discussions on the PFI/PPP process from the case study interviews held with key players.

Opportunities

- Sustainability can be used as a competitive advantage for bidders.
- Sustainable construction can provide savings if principles are incorporated in the initial stages.
- Whole Life Costing principles are key in PFI contracts but need to be incorporated correctly.
- Comparison of tenders needs to be made on a like-for-like basis.
- Benchmarks and targets should be set to quantify design performance.
- The output document should encourage sustainability in the construction phase and require method statements and policies from the providers.
- In construction and operation phases, costs of sending waste to landfill can be minimised by re-use or recycling.
- Innovation can be encouraged by allowing flexibility in the brief to enable consortia to meet or exceed targets in new and innovative ways.
- Contractor performance can be maximised by offering incentives for good performance. Payment mechanisms for energy efficiency need to acknowledge that providers have limited control over end users, but encourage training, awareness and diligence in monitoring of energy.
- The output specification should include provision for metering, monitoring and reporting structures with positive incentives.
- Reducing energy bills and greenhouse gases can limit liability under Climate Change levy.
- Performance can be improved simply by good management.
- By incorporating sustainability, risks of failing to meet new environmental legislation/requirements can be reduced to minimise future financial impact.
- Transport impact can be limited through green transport plans and sourcing local products in construction phase.

Potential pitfalls

- There needs to be vision and commitment to sustainability from all parties. The whole team from client to contractor must 'buy in'.
- Sustainability needs to be considered from inception and integrated into the earliest strategic decisions.
- Clients need good independent advice when setting briefs and commissioning to ensure that the brief achieves their expectations and produces a sustainable outcome. CABE (Commission for Architecture and the Built Environment) are now offering some advice on design quality in PFI schemes.
- Monitoring of emerging design should take place to prevent time pressures reducing standards. If problems are not picked up early there may be no opportunity to resolve the issues without compromising the overall programme. In this situation, compromise of standards is very prevalent.
- Poor communication between members of the team will make sustainability difficult to achieve – it is important to get all disciplines involved.
- If timescales are too tight there is no room for debate or finding the most sustainable solution. Clients must be firm in refusing to accept tariff reductions in exchange for abandoning environmental and energy targets or sustainability indices.
- Sustainable cost data is not, to our knowledge, in the public domain; only when it is can it be fully analysed and incorporated into the Public Sector Comparator (PSC).
- Contractors with limited sustainability knowledge will tend to build large risk factors into their bid to insure against failing to meet sustainability targets or indices.
- Fear of the unknown and new technologies can lead to innovative approaches not being taken.

Sustainability Indicators

The Movement for Innovation (M⁴I) is involved in a wide-ranging effort to improve the construction industry at all levels of performance. One of the key areas is the issue of sustainability. As part of the drive towards continuous improvement, the former DETR's Construction Directorate, Research and Innovation programme sponsored the development by BRE of a sustainability indicator for M⁴I, based upon a self-assessment Sustainability Index.

The M⁴I Sustainability Indicator benchmark system is a dynamic system that compares the sustainability attributes of a project with those of the existing database of projects that have been analysed by M⁴I. Benchmarks are allocated for sustainability attributes in design, construction, environment, social and economic impacts.

At any point in time the project attribute (held within the database) with the highest score is allocated the 100% benchmark and that with the lowest score is allocated 0%. Thus a 50% benchmark represents the median of all projects analysed. Benchmarks marked by a dashed line on the Sustainability Indicators charts in this paper are based on an analysis of 30 projects during 1999/2000.

When a new project is analysed it is thus possible for it to achieve a rating of greater than the 100% benchmark if it scores better than any other project currently held within the database. The new project will of course be added to the database and form the new 100% benchmark for future evaluations.

The case studies were compared against these M⁴I indicators to provide a quantitative measure of their sustainability. Most of the case studies score above the 50% average benchmark score for sustainability in all of the five areas of design, construction, environment, social and economic impacts. The 50% average benchmark score will change over time as more data are collected by M⁴I. These case studies give current good practice indicator scores for PFI/PPP projects and were selected for their innovation in this area.

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