CIBSE BUILDING PERFORMANCE AWARDS 2015

Entry Form

New Build Project of the Year (value up to £10m)

This Award recognises the new building that most effectively demonstrates the achievement of high levels of user satisfaction and comfort and delivers outstanding measured building performance, energy efficiency and reduced carbon emissions.

Entries in this category must be from within the United Kingdom (see International Project for projects outside the UK), with a total project value up to £10 million, and completed during the period **1 October 2011 – 30 September 2013**. Entries may be submitted by any or all members (together) of the project team.

Please complete the entry form below. The headings reflect the judging criteria and the judges will be looking for you to provide the relevant information under each heading.

Submission instructions

1. Complete and save this document
2. Click here to submit your entry online
3. Complete the required fields and follow the instructions on the online entry system
4. Upload your entry form and supporting documents.
5. Click finish to submit your entry

If you have any questions then please contact us on 020 7880 7625 or by email to lois.hunt@redactive.co.uk.

Entrant details

Full name	**Job title**
Martin McLaughlin	Regional Director
Organisation	
AECOM	

Project Details

Project name

As you wish the project to be referred to throughout the competition.

Stratford Library, University of East London

Project Address

Stratford Campus, Water Lane, London, E15 4LZ

Organisations

Please provide the names of all organisations that you would like to be credited in your entry. Please ensure that the company names you list are accurate as we will be reproducing these on screen and in print. It is essential that you have the consent of all those named below to include them.

Building Services Engineer:	AECOM
Building Owner:	University of East London
Building Occupier:	University of East London
Project Manager:	JLL
Quantity Surveyor:	Turner and Townsend
Brief Consultant:	Click here to enter text.
Architect:	Hopkins Architects
Interior Designer:	Click here to enter text.
Mechanical / Electrical Engineer:	AECOM
Contractor:	Click here to enter text.
Investment / Property Company:	Click here to enter text.
Developer:	Click here to enter text.

Summary

Please provide a synopsis of the project and its building performance, low carbon and energy efficiency objectives.

The University of East London's BREEAM Excellent Stratford Library is designed to operate 24 hours a day, seven days a week. From the outset, UEL was clear that it wanted the design to adopt an exacting sustainability agenda, to create an eco-friendly place to work and study and to enhance student and staff experience. The challenge was to design a building that was in constant use but that consumed less energy than one that closed after the working day or week was done.

At the project's start an extremely low operational energy target of 100kWh/m^2 was set, in line with Europe's most efficient buildings but now applied to one that operates for far longer. Reaching this ambitious target with a 24-7 building, with low sporadic use at night, would place the design beyond anything previously achieved.

Stratford Library is designed to be ultra-efficient. Early on, a benchmarking exercise established the library's energy demands. Our project design team included AECOM's co-authors of industry-leading guidance on early evaluation of operational energy performance, CIBSE TM54, firmly aligning the building's design with performance. Heat recovery systems and outstanding insulation means top-up heating is negligible, with a high-efficiency boiler providing back up for longer, cold periods only.

Each energy-saving measures and lower small power loads build towards a reduction strategy far in excess of benchmark sector equivalents. Operational since July 2013, the design is hitting its energy targets, exceeding the London Plan's target of a 20% reduction in CO_2 emissions. UEL's new library has been designed to get the simple things right, ensuring energy usage and wastage is minimised. This project is still on a journey to make sure it runs as efficiently as it possibly can. A Soft Landings programme is in place to fine-tune operational performance.

Staff and student feedback has been overwhelmingly positive, with comments including "Can't keep away!" to "It's terrific – I love it."

Entry criteria

Please outline how your entry meets each of the entry criteria – judges will be looking for information in each of the sections when assessing the entries.

Documents, charts or photos should be referenced and included in your supporting documents.

One year's evidence of measured building performance and energy use data, ideally including a DEC and an entry on the CarbonBuzz website.

Under the Soft Landings handover programme, UEL's Stratford Library has been fine tuned to work towards exceptionally low energy targets.

Over the first year there has been teething problems with the energy sub-meters, which have now been resolved. We have to date full energy readings for the year but sub-meter readings have only been accurate over the last four months. The annual figures for the building show energy consumption of 227,106 kWh of gas and 506,354kWh of electricity. Due to some sub-meter issues, data on the PV was only available from 9/11/13 to 3/9/14 with 46,679kWh produced by PV.

We are in the process of reviewing the sub-meter analysis in detail and the energy data suggests that the energy balance in operation is different than estimated. The design estimation for this development was challenging in a number of areas particularly for lighting and small power, further complicated by the building operating 24/7 with low occupancy at night.

We had utilised occupancy profiles developed from the usage of UEL's existing libraries but actual usage has delivered 54% less lighting kWh, 63% less small power kWh and around 80% less energy from the Server/IT room and associated cooling over the period since June. However, higher energy consumption has been found on the mechanical equipment over the same period and a further period of controls fine-tuning will be taking place to hone the building's engineering systems to suit operation.

The project has been submitted to CarbonBuzz.

Special challenges, objectives or constraints and the design solutions adopted.

In a world of growing demand and finite resources, how do we do more with less? This challenge was embedded into the Stratford Library design; that is how we do ensure that a building that is in use at all times, even if only sporadically at night, consumes less energy than one that shuts down at the end of the working day?

This challenge was met through a collaborative approach between architects, engineers, client and

contractors. The team has worked closely to understand demand, knitting elements successfully together to form a low energy, cohesive whole. The library boasts an 'energy in use' design, which means that systems are only on when needed. The architectural fabric is highly efficient, keeping heat in and preventing waste. The focus is on operational design, and simple measures and intelligent demand-led controls have been adopted and will be fine-tuned over the next year to ensure it is one of the most energy-efficient libraries, if not buildings, in Europe.

AECOM's building services design team included the authors of CIBSE TM54, an industry leading guide which provides advice on early evaluation of operational energy performance. This critical guidance was applied to the Stratford Library ensuring strategies aligning design and operation were considered.

Specific elements of excellence and innovation in terms of design, equipment or application including lighting, heating, and cooling, façade or public health services.

For buildings in constant use there is an intensive energy drain from the ICT systems and lighting. The new Stratford Library sports the latest technology and highly efficient, intelligently controlled mechanical services solutions to reduce demand and operating costs. This is a demand-controlled environment, which uses only as much energy as is absolutely needed.

The building's energy-saving measures feed into a reduction strategy far in excess of benchmark equivalents. Ultra-efficient, low energy direct-indirect lighting systems are fitted with automatic dimming motion sensors and daylight detection, ensuring task areas are lit only when and precisely where needed. The design makes the most of natural light ensuring student areas are light and airy. These spaces achieve an excellent daylight factor of 5 – a standard school design targets a factor of 2 – meaning lights can remain switched off even on overcast days. The library's upper floors look onto a glazed light-well, and carefully chosen materials such as bamboo give a modern aesthetic without compromising daylight penetration.

Space temperature and CO_2 sensors have also been fitted into each zone to ensure energy is supplied only where required. The temperature in active IT hubs is controlled by fresh air, minimising energy usage. Heat from these spaces is recovered into the central systems and dispersed throughout the building, reducing the need for additional heating. A review of the library's ICT requirements was factored into the design, including a review of hardware and practices. Energy-efficient measures from the complex to the simple, such as ensuring computers are shut down when not in use, have been incorporated.

A key element of this low-energy building is ventilation, which is designed to maximise heat recovery through thermal wheels with oversized air handling units (AHU) used to slow down velocity and increase efficiency. Active CO_2 controls ensure energy use is fully demand-led with AHU limiting outside air levels; each zoning limits air rates in line with CO_2 levels and temperature. The library uses heat generated from its in-use systems, including ICT, making top up heating largely negligible. The oversized air handling units and very low velocity ductwork systems reduce fan power and improve efficiency.

The building is also extremely well insulated, and the high-performing façade provides an airtight seal. The architectural design features exceptional detailing, helping it to far exceed the minimum infiltration requirements under the UK Government's Part L 2010. The minimum standards allowed by Part L is $10m^3/hr/m^2$ @50 Pa, and the notional building that makes up the target CO_2 emissions rate uses $5m^3/hr/m^2$ @50 Pa. The Stratford Library is far more efficient, achieving an 'as built' air permeability rate of $2.9m^3/hr/m^2$ @50 Pa.

Superb insulation, together with exposed thermal mass, allows for passive cooling and night cooling strategies to be developed in peak summer (when the library shuts at night), minimising heat gain and designing out the need for top-up heat. Extensive photovoltaic roof panelling sails over the building, generating much of the library's electricity. The library has exceeded Part L 2010 requirements by more than 30% and has achieved an EPC of 30.

Specific energy efficiency aspects of the project, such as energy metering, monitoring and targeting, use of recycled/recyclable materials and other low carbon features.

The construction materials used in the design were assessed as having a low environmental impact over the building's lifecycle, scoring highly with BREEAM. The majority of the materials achieved an A

or A+ rating under the Green Guide, which is a measure of overall environmental impacts including climate change, water and mineral resources extraction. Key materials used in the build were responsibly sourced earning the project a BREEAM top score. The materials are covered by environmental management standard for responsible sourcing, BES 6001.

UEL's Stratford campus is situated in Newham, East London, a very built-up urban area. To create natural habitats within this setting a brown roof was incorporated into the design, encouraging wildlife including black redstarts, listed as a local protected species. Native planting has been added to the landscaping, along with bird boxes and an 'insect hotel'.

Careful management of the construction phase ensured 91% of the waste, by weight, generated during construction and demolition was diverted from landfill to be recycled and reused.

Rainwater recycling systems are in place, with the water harvested and used in low-flush toilets, reducing reliance on treated water. Sanitary shut-off systems have been installed to eliminate dripping taps, and low water fittings have been fitted throughout.

A campus-wide Green Travel Plan has been implemented to encourage sustainable travel to and from the library. Work has been done to improve accessibility, and, through informed decision-making, the scheme actively encourages walking, cycling and the use of public transport. New cycle-parking facilities have been created as part of this campus project, but no additional car parking has been provided, and tight controls restricting on-site parking are in place.

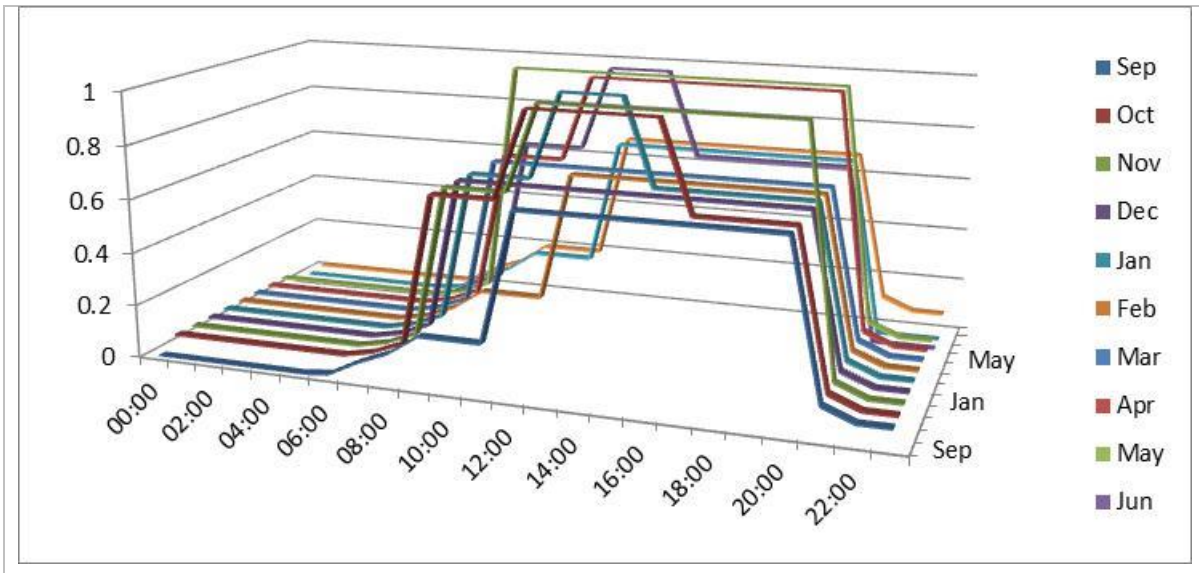
Following a full and comprehensive handover, a post-completion Soft Landings monitoring programme was established, with options for an extension if required. This programme means the design is under constant review so that operation meets design standards. Monthly on-site meetings have allowed the design team to adjust the services in response to usage and performance. During the12 months the building has been in operation, the design has been fine-tuned to ensure it works efficiently. The library will be continued to be reviewed to maximse performance in all seasons, both in and outside of term time.

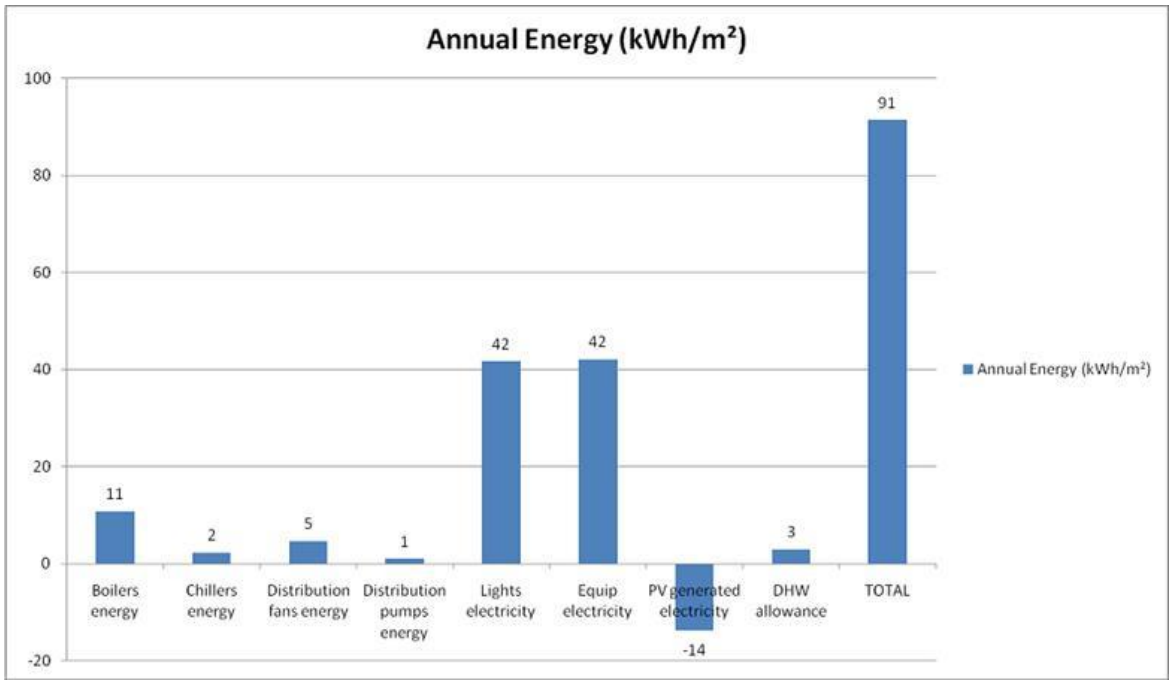
The Soft Landings process is currently well underway reviewing actual energy consumption against design energy consumptions and will continue into the future.

Evidence of costs and expected savings associated with these measures and anticipated payback periods.

This operational approach to design means that the library's systems use half the energy of a standard building of this type whilst operating 24/7.

The building itself went through an intensive energy analysis process throughout the design with occupancy profiling done on a typical day per month (graph overleaf), and energy analysis undertaken through all stages of the design (shown on following page - Stage D summary Graph of Energy). The photovoltaic system was subject to considerable development and optioneering with an estimated simple payback ranging from 9-12 years and a present value payback ranging from 11-16 years.





Description of commissioning, handover and soft landings processes, and how they contributed to achieving the designer's intended building performance.

As a member of the Soft Landings task force, AECOM is an active supporter of this approach to ensure building performance is optimised. Our aim is to stay involved with the buildings we work on beyond completion to ensure performance matches design intent.

We are working closely with the Stratford Library building management to help them to understand how the installed systems work, and to hone performance and develop strategies to suit how the building is actually being used. These adjustments are ongoing and we are only part way through the Soft Landing process for this building. We have had some problems with energy sub-meters (not primary meters) in year one, which have now been resolved, and adjustments continue to be made as the building evolves. The building's occupancy at night has been lower than expected and systems have been largely switched off from design, with one floor shut down at night. One of the key challenges engineers face is in understanding how a building is actually being used. As we learn more about Stratford Library in operation, we can adjust the systems accordingly to optimise performance, and as this usage continues to evolve over time we can keep it operating efficiently.

The scope of the Soft Landings programme for the library included a pre-construction review with the design team and with the future building managers, looking at control options in detail, evaluating the practicality of the design solutions and the operability of the services, as well as potential impacts on the design and design targets.

Through the construction phase a detailed roles and responsibilities document was produced outlining client, contractor, sub-contractor and commissioning managers responsibilities throughout the process. A Soft Landings engineer (SLE) independent to the core MEP team was engaged during construction in the run up to the commissioning stage and witnessed the controls and metering strategies in detail. Our Soft Landings expert worked closely with the sub-contractors and project specialists to lead the client training session, demonstrating key control interfaces and ensuring that, pre-building handover, the client team was ready and familiar with the building's operational requirements and armed with full technical guidance.

A final inspection of systems in operation was undertaken on handover in conjunction with the design engineers. The Soft Landings engineer was based on site for two days a week for the first two weeks of occupation, and one day a week for the subsequent month, working with the contractor and client to verify that the systems were fully operational. We worked closely with the architectural team to develop a post-occupancy evaluation to try to understand how the building was being used and operated. The focus of this review was not just on hours of usage and key assumptions made in the design, but also on behaviours and how spaces are being utilised, and the impacts of this usage against energy targets. In the first 12 months post-completion, monthly catch-up sessions have provided the opportunity for the data to be reviewed and discussed. As the building settles down, these meetings will switch to quarterly with the adjustments being made on a seasonal basis.

As we move into a second year of occupation, a full TM22 assessment is underway to evaluate building performance against benchmarks and design targets. A further assessment will be made at the end of the second year.

Evidence of collaboration between members of the project team that has contributed to improved performance.

From the outset the brief was to design an ultra-efficient building that far exceeded current design norms – to create a library in constant operation that uses less energy than a building that shuts down at night and on weekends. For this project to be a success it required a collaborative approach across the entire design team, with the architects and engineers working closely with the building's management team and the contractors.

From Stage A onwards, the team explored ways of introducing simple, cost-effective ways of reducing energy and maximising operational performance, from glazing to an air-tight façade, from heat recycling to task lighting, from rainwater harvesting to exposed concrete mass – all the elements work together to create one of Europe's most efficient buildings.

This design has required a collaborative approach at every stage and at every level. It's an approach that will continue under the Soft Landings programme, as we all continue to work closely together to ensure the building carries on serving the students that use it and performing to its capacity, with energy costs and usage kept low.

Evidence of any BREEAM or LEED assessment, or other third party evaluations.

The UEL Stratford library was certified BREEAM Excellent at design and post-construction review (77.14%). The design exceeds the London Plan's target of a 20 per cent reduction in CO_2 emissions. The design far exceeds Part L requirements (see table below).

Item	Part L minimum standards	Notional building standards	UEL's Stratford Library
Roof U-value (W/m²K)	0.25	0.18	0.17
Wall U-value (W/m²K)	0.35	0.26	0.24
Floor U-value (W/m²K)	0.25	0.22	0.16
Window U-value (W/m²K)	2.2	1.8	1.5-1.87

Curtain walling U-value (W/m²K)	2.2	0.26	1.5
Rooflight U-value (W/m²K)	2.2	1.8	1.56-1.88
Solid pedestrian doors U-value (W/m²K)	2.2	2.2	2.2

Further information

Please provide any further information, evidence or references that you would like to include in your entry.

Click here to enter text.

Supporting documents check list

Entries should include supporting documents or evidence to supplement this written part of the submission. All supporting documents should be collated into one PDF document for upload.

☐ DEC
☐ BREEAM Certificate
☐ LEED Certificate
☐ CarbonBuzz entry (please supply a link): Click here to enter text.
☐ Other (please specify): Click here to enter text.