

The New Build Project of the Year Award is presented to the building project 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 should be for projects completed during the period **1 April 2011 to 30 September 2012**. Entries may be submitted by any or all members (together) of the project team. This allows for a full year of data on the actual performance of the building.

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.

Project Details

Project name

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

M&S Cheshire Oaks

Project Address

Ellesmere Port, Cheshire CH65 9LF

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:	Sustainable Design Solutions Ltd
Building Owner:	Marks & Spencer plc
Building Occupier:	Marks & Spencer plc
Project Manager:	Click here to enter text.
Quantity Surveyor:	Gleeds
Brief Consultant:	Click here to enter text.
Architect:	Aukett Fitzroy Robinson
Interior Designer:	Click here to enter text.
Mechanical / Electrical Engineer:	Sustainable Design Solutions Ltd
Contractor:	Simons Group Ltd
Investment / Property Company:	Click here to enter text.
Developer:	Click here to enter text.

Entry Details

Summary

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

Cheshire Oaks is the latest of Marks and Spencer's Sustainable Learning Stores, designed and constructed to be their most sustainable, energy efficient and environmentally friendly store to-date.

Throughout the concept and feasibility stages of the scheme, the Project Team were committed to the development of a truly sustainable store with an emphasis on optimisation of the site, building form / envelope, materials to be used, operational and embodied carbon and meeting / exceeding the M&S Plan 'A' commitments including energy, water, biodiversity, transport, waste management, procurement / resource use and stakeholder engagement.

Local Authority planning conditions required a minimum reduction of operational carbon and energy of 20% and 25% to 50% respectively, when compared to a peer premier store.

The predicted operational carbon and energy (as submitted for planning) targeted reductions of 34% and 29% respectively, again when compared to a peer premier store.

The actual measured energy consumption (period end August 2012 to end August 2013) identified the building performing considerably better than the predicted consumption figures with carbon and energy reductions of 44% and 43% respectively (against peer premier store).

A Carbon Consultant was employed to undertake a full life cycle assessment of the development from 'cradle to grave' (60 year period). The impact assessment demonstrated that the development achieved an embodied carbon reduction of 24% (including sequestration) against a notional store baseline.

An industry leading 12 month post occupancy evaluation is currently drawing to its conclusion. This study is examining in detail the building efficiency, performance, comfort levels and user satisfaction. Copy of the initial Customer Satisfaction Survey is appended.

The store at Cheshire Oaks represents Marks & Spencer's desire to create a positive environment to improve the health and well being of staff, customers and the community within which they operate. The store serves as a vehicle to educate building users and raise visitors awareness of sustainability and environmental issues via the use of in store and online QR codes and messaging.

This learning store has built on a strong bank of knowledge and experience in sustainable building practices and will inform M&S strategies and specifications for both the existing estate and new development schemes, moving forward.

Jonathan Porritt (Forum for the Future) remarked that "Cheshire Oaks raises the bar for sustainability within the built environment."

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:

Any documents, charts or photos can 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 Carbon Buzz site.

As a learning store and to meet BREEAM requirements, energy and water consumption has been fully metered and sub-metered to enable detailed interrogation of usage and to facilitate a clear understanding of store operation and performance.

Meters and sub-meters are remotely monitored by M&S Energy and provide continuous ½ hourly data. Default values are allocated and should readings fall outside these settings, alarms are generated for investigation and rectification as appropriate.

Appendix 1 (attached) provides a summary of the Cheshire Oaks actual metered consumption verses peer group store consumption, consumption figures to meet minimum planning requirement and projected energy consumption (submitted to discharge planning conditions).

Appendix 2 (attached) is the weekly energy consumption tracker which schedules the actual weekly consumption figures obtained from M&S Energy (electric / gas / water).

Appendix 3 provides a % split of the annual power consumption across the main MEP services installations.

It is worthy to note that the HVAC consumption is some 14% of the total electrical consumption.

This is extremely low for a retail store of this nature and is a consequence of the following factors:

- Highly efficient envelope (including revolving doors).
- Optimisation of store HVAC systems. Use of highly efficient displacement ventilation.
- Use of 'Free Cooling' plant for displacement. Greatly limited use of both mechanical cooling and gas heating.
- Demand LED control. Fan speeds limited to 50% for substantial periods (inverter control).

Energy consumption figures have been independently validated by the POE Consultants.

Typical examples of daily and weekly energy profile details from M&S Energy are attached for information (Appendix 4).

The Cheshire Oaks store is part of the TSB BPE and the data will be published under the TSB BPE section of CarbonBuzz <http://www.carbonbuzz.org/publishedportfolio.jsp?id=55>

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

M&S, as the world's first carbon neutral major retailer committed to deliver Cheshire Oaks as their most carbon efficient store to date (operational and embodied) with minimum targets of a 29% reduction in energy and a 34% reduction in operational carbon (against a peer group store).

Use of natural resources such as daylight and outside air enthalpy (free cool displacement), together with highly efficient natural materials have resulted in the building out-performing its targets.

Fundamental to the design, construction and subsequent operation of the store has been a full alignment with the 5 main pillars of the M&S Plan 'A' commitments:

- Climate Change
- Waste
- Natural Resources
- Fair Partnerships
- Health and Well being

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

- The building is partly sunk into the ground with earth mounding around the perimeter, improving the insulation and inherent thermal mass.
- Use of hempcrete wall panels.
- Measured air tightness of 2.93m³/hr/m² @ 50 pascals.
- Use of revolving doors to main customer entrances and exits.
- Optimisation of natural light. North Lights and glazed facades.
- Highly energy efficient displacement ventilation system using 'free cool' air handling plant. Supply air delivered at constant 19 C year round. Limited mechanical cooling and gas heating (outside air / return air utilised via mixing box).
- Demand led HVAC. Displacement fans operate to 50% volume for substantial period of time.
- Sales Floor supply air is distributed via 5 no. earth ducts installed beneath the ground floor slab. Works installed as part of shell contract. This resulted in the omission of conventional ductwork within the fit out phase leading to benefits in programme and waste reduction.
- All major plant and plant rooms are fully packaged and manufactured off site. Plant and plantrooms pre-commissioned prior to delivery. Benefits to programme, quality control and waste management.
- Biomass boiler provided. Biomass boiler in conjunction with heat reclaim from the Store food refrigeration systems deliver 70% of the store overall heating load requirements.
- An 80,000 litre rainwater harvesting tank is installed. Rainwater system serves the public and staff WCs and the extensive Green Wall to the deck car park.
- Water saving measures include:

- Metering
- Dual Flush Cisterns
- Waterless Urinals
- Flow Restrictors
- Sensor Taps

24% of the overall store water consumption has been met by rainwater harvesting.

- HFC free food refrigeration and HVAC systems. Food refrigeration plant uses a HC primary and CO₂ secondary. HVAC plant uses HC. (Chiller and packaged heating / cooling units).
- Main and deck car parks are fitted with LED lighting.
- Highly efficient, fully dimmable sales floor ambient lighting with DALI control (digital addressable lighting interface). Daylight control provided to optimise maximum use of daylight from North Lights and glazed facades.
- Highly efficient back of house lighting with integral PIR / occupancy control.

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

- Extensive metering and sub-metering was provided (as a learning store) to enable detailed remote monitoring and interrogation to facilitate a clear understanding of system / store operation and performance, and to measure actual consumption against predicted targets.

A copy of the Store main LV schematic is appended to this submission (Appendix 5). This drawing provides details of metering and sub-metering provided.

½ hourly data is collected and collated by M&S Energy. Default values are set and alarm functions activate investigation / rectification works as appropriate if values are exceeded.

- Whilst continuous monitoring is carried out by M&S Energy, SDS and Faithful & Gould (POE Consultants) reviewed in detail the energy performance of the building for the quarterly POE meetings held on site. Outputs of these reviews informed minor adjustments to certain control functions and set points to further improve actual energy performance at no detriment to store comfort conditions.
- The store building services installations are controlled and monitored by a fully automatic BMS system (Trend). Control systems are remotely monitored with default values applied. Controls are locked down with any adjustments requiring agreement between Store Management and M&S Engineering / Energy (Head Office).
- 100% of mains electricity is supplied through a 6 year contract with NPower to provide green tariff electricity to all M&S stores in England and Wales.
- Factors contributing to the high thermal efficiency of the building envelope include:
 - Use of 2600m² of hempcrete pre-fabricated wall panels (incorporating hemp fibre insulation) - U value 0.12 w/m² K and saving circa 360 tonnes of CO₂ against a conventional walling system,
 - Earth mounding around perimeter sections to improve insulation and thermal mass.
 - Air tightness of 2.93m³/hr/m² @ 50 pascals (measured),
 - Use of revolving doors on main customer entrances and exits.

light Whilst providing high thermal efficiency, the building envelope integrated high levels of natural light through North Lights and areas of glazed facades / clerestory glazing.

- A thermographic survey of the building has been carried out. A copy of the report is appended (Appendix 6). The report identified a small number of junction details for further investigation. A site review of the detail (hemp wall with rain screen cladding) concluded the local condition

resulting from a combination of retained heat under eaves / reflected heat from claddings.

- The Sales Floor HVAC system (displacement ventilation using free cool plant) has maintained excellent and constant comfort conditions throughout the full year operation (validated by monitoring, Staff and POE feedback), whilst only using 14% of the overall store power consumption. This figure would typically be 30-35% for a retail store of this nature.

Contributing factors to this operating efficiency include:

- Constant year round supply air temperature at 19°C (displacement). No mechanical cooling or heating required for large external ambient window (typically -2°C to 18°C). Cooling and heating provided via outside air / return air / mixed condition.
- Demand led control. Fans run down to 50% volume under lower occupancy periods.
- The Lighting Consultants were set a target to reduce the M&S store lighting load from 20 circuit watts/m² (delivered on previous low energy stores) to a maximum of 16 circuit watts/m². The brief was to maximise the use of natural light and rigorously challenge ambient lighting levels across the floor plates.

The design connected load was 15.5 circuit watts/m². A check on the metered sales floor lighting boards indicated an actual load of 13.35 watts/m² during a clear bright day.

Sales floor ambient lighting uses T5 Eco lamps. Accent lighting uses 20W metal halide lamps. Ambient lighting is fully dimmable using a Dali (digital addressable lighting interface) control system.

Daylight harvesting is achieved by grouping luminaires in relation to the amount of daylight received in each zone using the Dali control system.

Luminaires in central zones dim to a maximum of 10% and luminaires on perimeter zones (adjacent to glazed facade / clerestory glazing) switch off as appropriate under daylight control.

- The structure of the building incorporates a wave style roof created using timber FSC glulam beams from renewable timber sources.

Cheshire Oaks is the first retail building within the UK to have a 100% FSC timber structure with full FSC project certification.

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

The Cheshire Oaks 12 monthly measured energy consumption delivers the following overall reductions to the normalised consumption figures of the peer group premier store.

Electric	2,644,503 kwhr/annum
Gas / Biomass	815,392 kwhr/annum

These reductions provide a saving of running cost of £308,870 per annum and carbon emissions by 1,413,943 kg/annum. (Based on Electric £0.15/kwhr. Gas @ £0.034/kwhr. Biomass @ £180/tonne)

The principle areas where energy consumption has been reduced are Sales Floor HVAC and Sales Floor lighting.

Sales Floor HVAC – Minimum mechanical cooling and gas heating on displacement system due to use of ‘free cool’ air handling plant.

Payback periods for ‘free cool’ plant versus conventional minimum / fixed outside air plant is typically 1.75 to 2.0 years.

Sales Floor Lighting – The installed lighting and lighting control systems were delivered at no additional capital cost (£/m²) than previously delivered M&S low energy lighting schemes. Reduced consumption due to lower ambient and accent lighting levels and daylight harvesting.

Several other initiatives have been installed at Cheshire Oaks and whilst not offering short term payback periods, they are contributing to both M&S Plan 'A' commitments and enabling M&S to expand their knowledge base in respect to use, operation, performance of the technology and equipment (Learning Store). These include:

- Biomass boiler plant. On site renewable. Reduced carbon.
- HFC free HVAC plant. Hydro-carbon packaged air handling plant. Hydro-carbon air cooled liquified chiller.
- HFC free food refrigeration plant. Hydro-carbon primary and flooded CO₂ secondary.
- Heat reclaim from food refrigeration plant serving Food Hall heating to offset 'cold aisle' issues.

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

Summary of key stages to commissioning / handover:

- Commissioning process was fully collaborative with all stakeholders including:
 - Main Contractor
 - MEP Contractor / Specialist Commissioning Contractor
 - Specialist Contractors / Suppliers:
 - Life Safety (Sprinklers / Fire / Smoke)
 - IT
 - Security
 - Major Plant / Equipment
 - MEP Consultant
 - M&S FM / M&S Engineering (HO)
 - M&S FM (Store)
 - Maintenance Contractor
- Meeting held with Contractor / MEP contractor / Appointed Commissioning Company prior to production of For Construction Issue drawings for final review of 'commissionability' of MEP services. Minor adjustments made in response to comments received.
- Meeting held prior to start on site (Fit Out) to input into first draft of detailed commissioning programme. Sequential activities and numerous interface requirements built into base programme.
- A fully detailed commissioning programme was produced with input from all stakeholders. Programme was updated as required throughout the construction works.
- During later stages of the install, the M&S FM Team and appointed Maintenance Contractor were invited to a series of site inspections which enabled them to obtain an excellent understanding of the installed systems and to raise any queries in respect to the operation and maintenance of same.
- MEP systems were fully commissioned by the Contractors / Specialists in line with CIBSE commissioning guides.
- Completed systems fully witnessed by Main Contractors Site Services Manager. Once systems validated as performing in line with design criteria and all documentation in place and signed, the systems were offered to the MEP Consultant for acceptance on behalf of Client.
- MEP Consultant validated commissioning results and documentation. M&S FM and Maintenance Contractors attended a number of these validation inspections and were given the opportunity to witness the operation, control of the system and functioning of interface devices.
- A detailed staff training programme was undertaken. Initial staff training was carried out prior to Practical Completion with a refresh training course held some 4 weeks post PC. A detailed building user guide was produced and reviewed as an integral part of the staff training.
- Formal handover of the MEP services was at PC albeit all systems had been fully witnessed and accepted prior to this date. Copies of completed and signed commissioning documentation were issued within the O&M Manuals. M&S FM (HO and Store) and the Maintenance Contractor were present at the PC and handover meeting.

- M&S have a 'store care' post opening review process where 3,6,9 and 12 monthly review meetings are held on site with the store team to review and discuss operations and performance of the store and discuss any issues the store may have with any aspect of the delivered schemes. These meetings sit alongside the normal day to day response to any site issues that may arise and be reported. Staff and customer feedback is on the agenda of these quarterly meetings.
- Seasonal commissioning has occurred with input from the Contractors, MEP Consultant, M&S FM and M&S Energy. Detailed interrogation of the sub-metered energy data resulted in some adjustment to lighting control and HVAC control which further reduced energy consumption.
- MEP control systems are remotely monitored by M&S Energy. Control systems are locked down to prevent tampering and maintain optimisation of operation. Default valve are set within the control systems and if alarms are generated, these are investigated and rectified as necessary by the Energy Team. The Cheshire Oaks store is being closely monitored by M&S Energy against the targets set.

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

Collaborative working from concept and feasibility through to store opening and trading has been the key to the success of Cheshire Oaks.

Full engagement of the M&S Plan 'A' Team and the appointed BREEAM Assessor during the feasibility stages of the scheme reinforced the Client brief to deliver their most sustainable store to date.

The appointed Contractor Simons, fully embraced the defined scheme targets and objectives, pro-actively working as an integral part of the Project Team and fully engaging with their supply chain partners. In order to ensure all materials met with the stringent requirements established for the development, Simons Procurement Team managed a new approach to responsible procurement which is now embedded within their normal procedures moving forward on development projects.

Early involvement of the M&S FM Team and the appointed Maintenance Contractors provided the opportunity to establish a clear understanding of the building and its associated building services installations. M&S FM and Maintenance Contractors were also very much involved in the final commissioning, handover and staff training activities pre and post PC.

The store employs nearly 500 staff and during the build up to store launch, a number of staff engagement events were held during which the Project Team presented and explained the sustainable features of the store and responded to questions and queries during break out sessions and Q&A Forum. The store staff are fully engaged, actively promote the store sustainability features and are fully informed of store performance against targets.

The Project Team and Store Operational Team are contributing to the 12 month post occupancy evaluation study currently drawing to its conclusion. Further details provided within this submission.

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

The project achieved BREEAM Excellent with a score of 74.68%. Copy of BREEAM certificate attached. A copy of the BREEAM Certification report is available, if required.

Further Information

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

Post Occupancy Evaluation

An industry leading 12 month post occupancy evaluation is currently drawing towards its conclusion. The study examines the building performance and efficiency together with detailed stakeholder analysis.

The study is part funded by the Technology Strategy Board and also includes an in depth building user consultation which is being carried out in partnership with University College London.

An initial customer survey was carried out in April 2013 (report attached – see Appendix 7). The report confirms high levels of customer satisfaction in respect to the shopping experience within the Cheshire Oaks store.

The in depth building user consultation is currently underway and is engaging with four focus groups (FM Staff, M&S Staff, Customers and Local Community) with an aim to understand the sustainable aspects of the store and how they translate and affect people's relationship to it.

Waste

The Project Team adopted the principles of Waste & Resources Action Programme (WRAP) and carried out a number of 'Designing Out Waste' workshops, carrying through the benefits of these in order to reduce waste and increase design efficiency. 100% of waste was diverted from landfill during construction with 99% of shell and 90% of fit out waste segregated on site. Resource sharing of left over materials and packaging through community initiatives enabled 126 tonnes of material to be diverted from the waste stream including pallets, plywood, cable drums and timber sections. Lime stabilising below the building and car park helped reduce the quantity of concrete required in the foundations by 25% and the enabling works involved a bulk earth removal totalling almost 55,000 tonnes of soils, stones and clays of which 100% was used in local projects. All waste diverted from landfill was checked for its final destination which was in all cases to supply waste to energy at local third party incineration plants. In use the store continues to divert over 90% of food waste to AD and diverts 100% of all waste streams from landfill. Cardboard and plastics are baled and backhauled to M&S' local distribution centres for resale and recycling.

Sustainable Procurement

First retail building in the UK to have a 100% FSC certified timber structure with full FSC Project Certification (TT-PRO-003615).

Over 60% of aggregates used in the groundworks were from locally recycled sources. Virgin aggregates and gabion infill natural stone were also locally sourced.

The build was made up of 30% recycled content by value including a 100% recycled aluminium roof. The fit-out included a fermacell dry lining board and a 40% recycled floor tile.

Biodiversity

M&S' largest living wall system with a huge variety of local plants and grasses covers one elevation of the car park, acting as a pollution filter and biodiversity habitat.

9 swift and 6 bird boxes have been installed on the building and in perimeter hedgerows and trees. Bat and bird boxes have also been installed in the community using recycled untreated timber sourced from FSC certified formwork and joinery off cuts collected on site.

The site is now more biodiverse with 228 new trees, enhanced existing hedgerows and locally significant Oak and Black Poplar contributing to 12,000m² of planting. Also as part of M&S ongoing Climate Change Adaptation strategy, an enhanced SUDS swale helps to mitigate flooding whilst the gabion walls, insect boxes and log piles help attract local wildlife.

Transport

M&S are contributing £100k per year, for 10 years, towards improving local bus services and electric car charging points have been installed in the car park to encourage sustainable travel to the store.

They have also contributed £5m towards a highways scheme which includes improving junctions, crossings, cycle ways and footpaths.

Dedicated store facilities for cyclists have been included such as a cycle lane, staff showers and 100 covered cycle stands.

Community Engagement

The store employs nearly 500 people with 400 new positions, approx 50 were allocated for Marks & Start and 350 were from the local area. M&S has contributed to a town centre remodelling improvement fund of £1m and to the design of a children's play area, 1km from the Store. The project optimised website use, social media pages and newsletters to keep the community informed and were awarded a Considerate Constructors Scheme National Gold Site Award in addition to their best practice score of 38/40.

Educational site visits by Salford & Chester Universities, West Cheshire College and Christchurch School's Eco-Council contributed to over 100 hours of guided walks around the site. Undergraduates and researchers from a number of universities and special interest groups such as BuildOffsite also had tours during construction.

A total of 200 hours has been volunteered to community events in 'brawn' and 'brain' over the two year programme. Two local schools had wide ranging experiences including making biodiversity habitats, meeting newts under the care of the site ecologist, waste and segregation management. Furthermore, a one year Construction BTEC project was held with a local college incorporating design, presentation skills, business and cost planning.

Supply Chain Integration

Regular Plan A meetings were held throughout the construction process with key contractors and the sustainability champion to ensure Plan A specification and features were embedded throughout.

Supply chain partners were encouraged to be holders of ISO14001, FSC timber chain of custody certifications

and use products which have BES6001 certification.

A full-time sustainability champion was employed as part of site team to monitor and manage sustainability.

Economy

50% of the value of the project construction spend was in the North West and 12.5% in the local area.

The enabling works involved a bulk earth removal totalling almost 55,000 tonnes of soils, stones and clays of which 100% was used in local projects.

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): <http://www.carbonbuzz.org/publishedportfolio.jsp?id=55>
- Other (please specify): **Appendix 1** Summary of Cheshire Oaks Actual Metered Energy Consumption vs Peer Group Store Consumption, Consumption Figures to Meet Minimum Planning Requirement and Projected energy Consumption. **Appendix 2** M&S Weekly Consumption Tracker (Electric / Gas / Water). **Appendix 3** % Split of Overall Power Consumption Across Main MEP Services Installations. **Appendix 4** Typical Daily and Weekly Energy Profiles (M&S energy). **Appendix 5** Main LV Schematic Detailing Metering and Sub-Metering. **Appendix 6** Thermographic Survey Report. **Appendix 7** POE – Customer Survey Report. **Appendix 8** Client's Testimonials