The surest way is steel

www.steelconstruction.info
Contents

4 Steel delivers on all fronts
Selecting steel as a framing solution routinely delivers a wider range of benefits.

6 Living with steel
The Waterfront South development in Walsall found a steel solution gave flexibility and economy.

8 A safety first culture
Continuous focus on improving health and safety has made steel construction an example for others to follow.

10 Aiming for Zero
The steel sector has proven its commitment to supporting the achievement of ambitious Government emissions targets through the Target Zero project, which gives architects and structural engineers detailed guidance on cost-effective fire carbon designs.

12 Target Zero - Vital statistics

14 Cradle-to-grave
Experts all agree that sustainability of materials requires a whole lifecycle approach.

16 Landmark offices for Birmingham
With a shortage of high-spec offices in Birmingham, speed was a key benefit on the 17-storey Snowhill development.

18 Sustainable steel is cost-effective
New research shows strong cost and programme advantages as well as lower embodied carbon benefits of steel construction.

20 Selecting with confidence
Choosing suitable steelwork contractors from the wide number available is made easy using the BCSA website or App.

22 Steelwork contractors for buildings and bridgework
A comprehensive listing of BCSA members and their specialist work areas.

Introduction by Sarah McCann-Bartlett,
Director General, British Constructional Steelwork Association

The surest way is steel

Choice of framing material depends on many factors – design, cost, speed, safety, and sustainability are among the most critical. This supplement highlights steel’s inherent advantages across all these areas and more, demonstrating that steel is flexible, cost efficient, quick and safe to build, and beats other materials hands down in the sustainability stakes when we take a whole lifecycle approach.

So what are the facts?
• A recent independent cost comparison study showed that the frame for a three-storey business park office cost 13% less using steel rather than concrete
• The same study showed that a steel composite frame for an eight-storey city centre office block would be built 12 weeks faster than if it were made from concrete
• Reportable accidents in the steelwork sector have reduced by 60% since 2000
• Optimum thermal mass is mobilised from less than 100mm thickness of a concrete floor slab, meaning it is an option using standard steel construction without the excessive weight and high carbon footprint of a full concrete frame
• The Target Zero study based on a real supermarket showed that the carbon footprint of the timber frame was 15% higher than the steel frame using a whole lifecycle assessment

The choice of steelwork contractor is also critical – with skill, commitment to quality, health and safety, sustainability and a proven track record of successful project delivery all important factors. British Constructional Steelwork Association (BCSA) members are regularly assessed against a number of key criteria and this information is available to search on the BCSA website or by an App available for download at the Apple App Store.

I’m sure you’ll find this supplement interesting and informative. There are many critical factors to consider during the design and construction of buildings, but using steel is the surest way to satisfy them all.

Steel - the go-to solution

Profitable developments and value for money infrastructure depend on the cost-effectiveness and certainty of programme that steel construction has consistently proven that only it can deliver. Over the past 30 years steel has been the framing solution of choice for buildings of all sizes from single-storey logistics hubs and sheds of all types, to the largest multi-storey buildings, to the iconic structures that define our age.

Now, in a world focused on value for money and quality, developers and clients of all types increasingly appreciate the smaller upfront development costs, sustainability benefits and long-term cost advantages of operating and eventually decommissioning buildings and other structures made using steel.

Steel is enjoying increasing recognition as the go-to construction framing solution with a UK market share of over 50% of single-storey and 70% of multi-storey buildings. The UK’s steel construction sector is the most successful and technically advanced in the industrialised world and members of the British Constructional Steelwork Association (BCSA) lead their field in investments in productivity and quality enhancing fabrication facilities.

Steel is an inherently safer method of construction, with a first-class record that is the envy of other sectors of the construction industry. Small teams of highly skilled construction professionals carry out the entire on-site process quickly and safely. Most of the work involved with steel frames and bridges is carried out offshore, in carefully controlled and monitored factory conditions, where exacting tolerances are routinely achieved regardless of the complexity of the structure.

Steel has more flexibility than any other material and buildings can be easily extended or reconfigured with minimal disruption to existing building users, and without expensive or reconfigured with minimal disruption to existing building users, and without expensive...
Steel delivers on all fronts

Designing and building in steel is the surest way to guarantee the many value benefits such as safety, cost, aesthetics, efficiency and other gains that are demanded by clients for modern buildings, bridges and other structures. It is the best assurance that your project will be completed on time, cost-effectively, safely and to the most exciting quality and performance standards.

The market agrees, as is evidenced by steel construction’s market share of 70% of multi-storey buildings, almost all single-storey industrial buildings, and an increasing share of other buildings sectors and bridges. Here are some of the wide range of benefits that are routinely delivered simply by choosing steel.

SURETY OF SPEED
You won’t fail to be impressed by the speed at which your steel building frame is safely erected, with much of the hard work to exacting tolerances already achieved offsite in factory-controlled conditions – a truly modern method of construction. There are no labour intensive shuttering and propping activities to worry about, and no need for on-site storage for these bulky items. Early erection of a steel frame means that even the most complex operations, or where on-site time is at a premium, can be safely secured. Trial erections can ensure that everyone understands their precise role when they reach site. Steel construction is inherently safer than alternative forms of construction. Fabrication takes place offsite in the far safer environment of a factory; almost all of the potentially hazardous activity that is unavoidable with other methods of construction is managed out of the construction process by selecting steel.

SITE SAFETY SECURED
Steel construction is inherently safer than alternative forms of construction. Fabrication takes place offsite in the far safer environment of a factory; almost all of the potentially hazardous activity that is unavoidable with other methods of construction is managed out of the construction process by selecting steel.

Factory fabrication processes are standard and well practiced; providing a repeatable process that is predictable and inherently safe. Highly trained, specialist erectors work from mobile elevating work platforms where they are securely harnessed. Trial erections can ensure that even the most complex operations, or where on-site time is at a premium, can be safely rehearsed to ensure that everyone understands their precise role when they reach site. Steel construction’s proven safety record is the envy of the construction industry.

LONG LASTING
A steel building is as flexible as its owner or user needs it to be. The light and airy column free spaces that can only be created with steel are capable of easy adaptation to multiple uses, and can be easily extended or reconfigured. Refurbishment and refreshing the appearance of a steel-framed building and changing its internal layout is relatively straightforward. However, steel buildings retain their modern appearance far longer than structures built with alternative materials. Consequently, refurbishment or adaptation to exteriors are not usually needed. Steel structures can be designed for dismantling; demountability will prove its worth on the legacy performance of the 2012 London Olympic and Paralympic Games where the main stadium and other venues have been designed to be reduced in size if required, and possibly relocated elsewhere in the country.

LONG LASTING
A steel building is as flexible as its owner or user needs it to be. The light and airy column free spaces that can only be created with steel are capable of easy adaptation to multiple uses, and can be easily extended or reconfigured. Refurbishment and refreshing the appearance of a steel-framed building and changing its internal layout is relatively straightforward. However, steel buildings retain their modern appearance far longer than structures built with alternative materials. Consequently, refurbishment or adaptation to exteriors are not usually needed. Steel structures can be designed for dismantling; demountability will prove its worth on the legacy performance of the 2012 London Olympic and Paralympic Games where the main stadium and other venues have been designed to be reduced in size if required, and possibly relocated elsewhere in the country.

STEEL AND SUSTAINABILITY
Steel has sustainability built in – and has perhaps the strongest sustainability case of any rival material. It is the zero waste choice as steel is the world’s most recycled material, none of it need ever go to landfill as it has a positive value and a key role to play in the production of new steel – some 94% of steel construction components in the UK are recycled or re-used. Steel is multi-cycled; meaning it can be recycled repeatedly without any loss of its original properties – a characteristic not possessed by any other construction framing material. Steel structures generally have lower carbon footprints than concrete ones as a tonne of steel goes further than a tonne of concrete. Steel sections can also be re-used on other structures as the working life of a steel section will typically far outlast the life of a modern building. Steel offers environmental, social and economic advantages that feed through to an outstanding sustainability case – the Triple Bottom Line of economic, social and environmental benefits.

WORLD LEADING SPECIALIST STEELWORK CONTRACTORS
The BCSA (Steelwork contractor members are acknowledged world leaders. With partners steel producer Tata Steel and the Steel Construction Institute they have consistently invested in research and development and in new fabrication technology over the past 30 years. There is a wide range of sizes and types of specialist contractors suitable for all projects of any scale from small sheds to the largest projects like Olympic venues, major commercial developments and airport terminals like Heathrow’s Terminal 5. Advice on how to select the most suitable steelwork contractor for your project is freely available from the BCSA. BCSA members work to the highest standards and are regularly assessed. They have prepared for the new Eurocodes and the steel sector has already produced design guidance for using Eurocodes. BCSA members can undertake full turnkey design and build projects when required, and most now have in-house designers who can provide advice to clients as well as undertake design for key elements from connections to entire structural frames.
Steelwork has proved to be beneficial, on a number of fronts, for construction of a major development of canal-side apartments in Walsall.

The second phase consists of a further 164 apartments, in two separate eight-storey blocks. The steelwork frames for this phase were completed during November 2011. Each of the four residential blocks has reaped the benefits of being constructed with structural steelwork. Cost, efficiency and speed of construction were all important considerations when the choice of framing material was made. “Steelwork met all our needs and was ideal for this project as we needed a lightweight framing solution because there are many old limestone mine workings beneath this part of Walsall,” adds Mr Jessup.

Jessup Build Develop bought the site in 2005, and commenced building the apartments in January 2010. Prior to purchase most of the site had already been cleared of any old structures and the mineshafts grouted. Interestingly, one industrial unit has remained and stands in between phases one and two; this building is adjacent to a plot which has been earmarked for a commercial development consisting of 4,797m2 of office space.

As previously mentioned, speed of construction was an important criteria, as the first phase had to be completed by March 2011. Steelwork contractor Traditional Structures’ package also included supplying curved feature balconies, metal decking, precast stairs and the installation of insulated membrane roofs.

“Steelwork met all our needs and was ideal for this project as we needed a lightweight framing solution because there are many old limestone mine workings beneath this part of Walsall,” adds Mr Jessup.

“Many of this building’s apartments had already been leased to the Walsall Hospital Trust and they asked if they could have a few more three-bedroomed units, which was not possible,” says Mr Jessup. “The architect, Steve Fazley, quickly realised that we could include an extra floor within three of the top floor units and convert them from two to three-bedroomed flats.”

Steelwork erection was already underway, but this design alteration was easily and quickly incorporated into the steel package, and the entire project team say it could not have been achieved so effortlessly with any other framing material.

After analysing the structural model, the solution proved fairly simple and the supporting columns remained the same; only a few extra floor beams needed to be inserted into the framework to create what is in effect a mezzanine level. Summing up the project, Mr Jessup says Jessup Build Develop has never built a residential scheme with steel before and the company pretty much learnt about the material as they went along.

Would they use steel again? Yes, he says. “We’ve used all other framing systems before and this one has worked well for us on this project, helping us to keep to a tight deadline and be economical and flexible.”

Waterfront South, Walsall

Mem client: Jessup Build Develop
Architect: S.P. Faizey
Main contractor: Jessup Build Develop
Structural engineer: B. Marshall
Steelwork contractor: Traditional Structures
Steel tonnage: 1,100t

Walsall’s Waterfront South project is located on a former industrial site and one with a long history of mining - limestone in this case. Before the construction of the residential blocks could get underway the site was thoroughly surveyed and all of the old mine workings were grouted. A lightweight framing solution was still needed for this site and steel was chosen because it offered not only the lightest but also the most economical solution. Steel’s flexibility and ease of construction also came to the fore on this job, helping Jessup Build Develop meet a tight deadline for the completion of the first phase, and allowing for a design change to take place while the frame was being erected.

“Many of this building’s apartments had already been leased to the Walsall Hospital Trust and they asked if they could have a few more three-bedroomed units, which was not possible,” says Mr Jessup. “The architect, Steve Fazley, quickly realised that we could include an extra floor within three of the top floor units and convert them from two to three-bedroomed flats.”

Steelwork erection was already underway, but this design alteration was easily and quickly incorporated into the steel package, and the entire project team say it could not have been achieved so effortlessly with any other framing material.

After analysing the structural model, the solution proved fairly simple and the supporting columns remained the same; only a few extra floor beams needed to be inserted into the framework to create what is in effect a mezzanine level. Summing up the project, Mr Jessup says Jessup Build Develop has never built a residential scheme with steel before and the company pretty much learnt about the material as they went along.

Would they use steel again? Yes, he says. “We’ve used all other framing systems before and this one has worked well for us on this project, helping us to keep to a tight deadline and be economical and flexible.”

Steelwork has proved to be beneficial, on a number of fronts, for construction of a major development of canal-side apartments in Walsall.
Steel construction is one of industry’s safest sectors due to safety improvements made by the BCSA and its membership.

Steel is statistically one of the safest construction sectors, as the sector’s ‘safety first’ approach has resulted in some creditable and noteworthy performances. For instance, since 2000, reportable accidents in the sector have been reduced by 60%, while there has also been a significant reduction in the number of falls - examples is the Safe Site Handover Certificate (SSHC). This is a BCSA initiative which ensures steelwork is erected safely by providing a checklist for key areas of safety that can be used as a basis of discussion between the principal contractor and the steelwork contractor. The entire construction industry gains from steelwork’s safety regime, as the sector’s ‘safety first’ approach has resulted in some creditable and noteworthy performances.

In many ways the best, safest and most efficient way of erecting steelwork is for the entire project team to fully communicate and cooperate with each other. The SSHC provides this important and vital communication link, while also ensuring a safe working environment, where poor site conditions - which could hinder the movement of that vital piece of steel erection equipment, the Mobile Elevating Work Platform (MEWP) - are either eliminated or avoided.

Although the use of MEWPs has brought significant improvements to the health and safety of the construction industry, good site conditions are necessary for plant equipment. A safe working environment is also a prerequisite for cranes, so they can perform safe lifting and placing of steel components.

Early planning and preparation are key parameters always undertaken by the BCSA’s steelwork contractor members in order to maintain a safe environment. Site conditions are always maintained to a high level throughout the steel erection programme and the SSHC provides the means for monitoring this. When a contract involves phasing, the SSHC can be used as a means of monitoring each individual phase.

All of the above criteria can be guaranteed by selecting a competent subcontractor for the job. This is a main benefit on a job where the main contractor wanted the follow-on trades to start work on the project as quickly as possible.

Putting the ease-edge system in place with an edge protection system provides significant benefits for this project. Steelwork contractor James Killelea erected the steel in conjunction with the edge protection system. In this case it was the ease-edge system, and like all of these systems it is bolted to the steelwork on the ground and then lifted into place with the sections.

“Putting the ease-edge system in place with the steel was a real benefit as it stayed in place until the concrete floors were complete and the cladding was ready to commence,” says John Fowler, Vinci Construction Project Manager. “Once the steelwork was erected we were left with a safe working environment for the other trades.”

Vinci says the edge protection system was incorporated a certain amount of working at height. Whether dealing with cranes or MEWPs, the steelwork contractor will always cordon off the area where steel is being erected, thereby creating a safe environment.

An example of this safe practice was the work undertaken at the Rotherham Community Stadium, a new home for the town’s football club. More than 1,100t of structural steelwork was erected to construct the stadium’s four structurally independent stands.

“Where possible the steel was erected on a platform so that it would be ready for the next phase of the work,” says Gary Oates, Senior Project Manager for GMI Construction. “This guarded against any potential hazards while steelwork was being lifted into place.”

As a matter of course, edge protection was erected along with the steelwork for each stand, creating a safe environment for follow-on trades such as metal decking installers and the concrete flooring contractor.

Elland Steel also installed the precast terrace units which sit on top of the steelwork itself. By choosing a BCSA member, the contractor wanted the follow-on trades to start work on the project as quickly as possible.

As well as the speed with which steelwork was erected for an extension to the Royal Oldham Hospital, steel was primarily chosen as the main framing material for its speed of construction, a major benefit on a job where the main contractor wanted the follow-on trades to start work on the project as quickly as possible.

More than 900t of structural steelwork was erected for an extension at the Royal Oldham Hospital. Steel was primarily chosen as the main framing material for its speed of construction, a major benefit on a job where the main contractor wanted the follow-on trades to start work on the project as quickly as possible.

Although the use of MEWPs has brought significant improvements to the health and safety of the construction industry, good site conditions are necessary for plant equipment. A safe working environment is also a prerequisite for cranes, so they can perform safe lifting and placing of steel components. Early planning and preparation are key parameters always undertaken by the BCSA’s steelwork contractor members in order to maintain a safe environment. Site conditions are always maintained to a high level throughout the steel erection programme and the SSHC provides the means for monitoring this. When a contract involves phasing, the SSHC can be used as a means of monitoring each individual phase.

All of the above criteria can be guaranteed by selecting a competent subcontractor for the job, one which will ensure a safe environment for the erection plant and installation of the steelwork itself. By choosing a BCSA member, main contractors waive they are employing the correct specialist subcontractor for the job. This is in no small part due to the fact that the BCSA regularly assesses its membership, continually verifying their competence and capabilities, thereby ensuring a safe steelwork construction sector.

Working in isolation provides safe environment

One of the main health and safety requirements for any construction site is to provide a safe working environment for all of its workers. Areas of activity should be covered by a safety system or even an exclusion zone, which may be necessary where people are working at height and the area below has to be kept clear.

This is always the case with steelwork erection as the job always has to incorporate a certain amount of working at height. Whether dealing with cranes or MEWPs, the steelwork contractor will always cordon off the area where steel is being erected, thereby creating a safe environment.

An example of this safe practice was the work undertaken at the Rotherham Community Stadium, a new home for the town’s football club. More than 1,100t of structural steelwork was erected to construct the stadium’s four structurally independent stands.

“Where possible the steel was erected on a platform so that it would be ready for the next phase of the work,” says Gary Oates, Senior Project Manager for GMI Construction. “This guarded against any potential hazards while steelwork was being lifted into place.”

As a matter of course, edge protection was erected along with the steelwork for each stand, creating a safe environment for follow-on trades such as metal decking installers and the concrete flooring contractor.

Elland Steel also installed the precast terrace units which sit on top of the steelwork itself. By choosing a BCSA member, the contractor wanted the follow-on trades to start work on the project as quickly as possible.

As well as the speed with which steelwork was erected for an extension to the Royal Oldham Hospital, steel was primarily chosen as the main framing material for its speed of construction, a major benefit on a job where the main contractor wanted the follow-on trades to start work on the project as quickly as possible.

Although the use of MEWPs has brought significant improvements to the health and safety of the construction industry, good site conditions are necessary for plant equipment. A safe working environment is also a prerequisite for cranes, so they can perform safe lifting and placing of steel components. Early planning and preparation are key parameters always undertaken by the BCSA’s steelwork contractor members in order to maintain a safe environment. Site conditions are always maintained to a high level throughout the steel erection programme and the SSHC provides the means for monitoring this. When a contract involves phasing, the SSHC can be used as a means of monitoring each individual phase.

All of the above criteria can be guaranteed by selecting a competent subcontractor for the job, one which will ensure a safe environment for the erection plant and installation of the steelwork itself. By choosing a BCSA member, main contractors waive they are employing the correct specialist subcontractor for the job. This is in no small part due to the fact that the BCSA regularly assesses its membership, continually verifying their competence and capabilities, thereby ensuring a safe steelwork construction sector.

Safe treatment for hospital project

More than 900t of structural steelwork was erected for an extension at the Royal Oldham Hospital. Steel was primarily chosen as the main framing material for its speed of construction, a major benefit on a job where the main contractor wanted the follow-on trades to start work on the project as quickly as possible.

Although the use of MEWPs has brought significant improvements to the health and safety of the construction industry, good site conditions are necessary for plant equipment. A safe working environment is also a prerequisite for cranes, so they can perform safe lifting and placing of steel components. Early planning and preparation are key parameters always undertaken by the BCSA’s steelwork contractor members in order to maintain a safe environment. Site conditions are always maintained to a high level throughout the steel erection programme and the SSHC provides the means for monitoring this. When a contract involves phasing, the SSHC can be used as a means of monitoring each individual phase.

All of the above criteria can be guaranteed by selecting a competent subcontractor for the job, one which will ensure a safe environment for the erection plant and installation of the steelwork itself. By choosing a BCSA member, main contractors waive they are employing the correct specialist subcontractor for the job. This is in no small part due to the fact that the BCSA regularly assesses its membership, continually verifying their competence and capabilities, thereby ensuring a safe steelwork construction sector.
The Government set a deadline for all new buildings to be zero carbon by 2019. To achieve these lofty aims, Target Zero, the first study of its kind, offers designers the necessary guidance. 

Aiming for zero

The British Constructional Steelwork Association (BCSA) and Tata Steel have together completed a £1M project to provide guidance on the design and construction of sustainable, low and zero carbon buildings in the UK. Known as Target Zero, the project took two and a half years to complete and is the first ever study to detail a comprehensive comparison of different energy efficiency measures and low or zero carbon technologies to identify the most cost-effective means of carbon reduction. 

The guides on five different building types – schools, warehouses, supermarkets, offices and mixed-use buildings – provide the results of in-depth research to help construction professionals understand the most effective routes to achieve the Government’s objective of zero carbon buildings. By identifying the most cost-effective combinations of materials and technologies needed to construct low and zero carbon structures, Target Zero provides designers with the guidance they need to make informed decisions when designing cost-effective, sustainable buildings. Alan Todd, BCSA Director Market Development, explains: “When these targets were initially set there was very little guidance available and engineers had to simply make assumptions as to which materials and technologies offered the best solution for particular projects.”

The independent consultants which carried out the study were Aecom, hired by the Steel Construction Institute and Sustee Group. Design information from actual buildings was used for each of the five guides. These were then theoretically ‘stripped back’ to meet the minimum requirements for the 2006 Part L of the Building Regulations. These changes to the fabric and services of the actual buildings created the base case buildings which were used as benchmarks for the study. Energy efficiency measures and other sustainable improvements were then applied to the base case so that their effect could be measured and fully costed over a 25-year period. Alan Todd said: “The work has been undertaken by leading organisations in the field of sustainable construction to provide information and guidance for construction clients and their professional advisors on how to design and construct sustainable structures. Our guides will enable designers to turn the aspirations of Government into reality.”

The research for each building type considered operational carbon emissions, embodied carbon emissions and BREEAM. The guidance provides good insights on the cost-effectiveness of different operational energy efficiency measures; it provides the embodied energy of different construction forms using a whole-life ‘cradle-to-grave’ assessment; and advises how the three highest BREEAM ratings can be achieved. The Target Zero guidance covers many complex subsystems, but also highlights that some simple measures can be very effective. Many require little outlay in cash terms, but just require some forethought during the design stage. Examples are the building’s orientation, optimisation of natural light by correctly positioning windows and use of efficient lighting.

Prior to the publication of the Target Zero reports, there was very little information available. Each Target Zero report contains around 80 pages and they are available for download from www.targetzero.info. The reports provide useful information that will help designers meet the emissions target reductions set by Government. The industry experts who worked on the Target Zero guidance reports are available to deliver in-house training on the key messages of low and zero carbon construction. Details can be found on the Target Zero website.

Thermal mass with steel

Many designers are looking to mobilise the thermal mass of a building to help minimise the energy required for cooling. It is believed in some quarters that large, heavy buildings are capable of mobilising greater amounts of thermal mass than lightweight alternatives. This has led to a situation where many designers wishing to utilise thermal mass turn to reinforced concrete frames. However, independent research has shown that optimum thermal mass is provided by the first 100mm of concrete in a floor slab. This is available using standard steel-framed construction, so there is no advantage in using heavyweight buildings for thermal mass. The additional weight has no useful purpose, but does increase the building’s carbon footprint. To confirm this, the issue of maximum effective floor thickness was addressed in three of the buildings analysed in Target Zero: the school, the office, and the mixed-use building. 

Assessment of the school’s carbon emissions showed that the cooling requirement was small and so there was little point in trying to utilise thermal mass. However, the study was expanded to address what might have been the case had the cooling requirements been higher. This showed that the amount of extra thermal mass needed to make the thermal mass work. For both the office and the mixed-use building, the thermal mass in the buildings was provided equally by steel and concrete framing solutions. It was interesting to note that, in both cases, detailed thermal analysis showed that the benefit of thermal mass was negated by the need to heat and cool an extra volume of air created by the removal of the ceiling tiles to expose the concrete slabs.

In addition to the Target Zero research, there are numerous real world examples where thermal mass has been successfully utilised using a steel frame.
Target Zero’s vital statistics

The key findings of the five Target Zero guides, at a glance.

**Schools**
The building on which the schools research was based, is the Christ the King Centre for Learning secondary school in Bispham, Merseyside. This BREEAM building was completed in December 2008 and is occupied by 900 pupils and 50 staff. The gross internal floor area of the school is 9,637m².

**Key findings for Schools**
- The 2010 Part L compliance target of reducing operational carbon emissions by 25% is achievable by using a package of compatible, cost-effective energy efficiency measures, which is predicted to yield a 54% reduction in regulated carbon emissions relative to the base case’s supermarket, achievable at a capital cost reduction of 0.36% using high efficiency lighting alone.
- A zero carbon supermarket is achievable by using energy efficiency measures and on site low and zero carbon technologies. However they incur a minimum capital cost increase of 26.5%. They include a large (330kW) wind turbine and a biogas-fuelled CCHP plant.
- The estimated capital cost uplift of the base case supermarket to achieve BREEAM ratings was:
  - 0.24% to achieve BREEAM ‘Very Good’
  - 1.76% to achieve BREEAM ‘Excellent’
  - 10.1% to achieve BREEAM ‘Outstanding’

**Warehouses**
The warehouse study was based on the DCI distribution centre on Prologis Park, Stoke-on-Trent. It was completed in December 2007 and is currently leased to a large UK retailer. The net internal floor area of the warehouse is 34,000m² and the warehouse is a two-storey office wing providing 1,400m² of floor space. It is a four span, steel portal frame, with each span measuring 35m with a duo pitch, lightweight roof and external walls are clad with steel-faced composite panels.

**Key findings for Warehouses**
- Lighting was found to be the most significant energy demand in the warehouse building studied, accounting for around three quarters of the total operational carbon emissions. Consequently efficient lighting systems coupled with roof light design were found to be key in delivering operational carbon reductions.
- The 2010 Part L compliance target of reducing regulated carbon emissions by 25% is achievable by using a more efficient lighting system alone. This is predicted to yield a 57% reduction in regulated carbon emissions.
- A package of compatible, cost-effective energy efficiency measures were predicted to yield a 54% reduction in regulated emissions relative to the base case’s warehouse, with a reduced capital cost of 0.38%.
- The estimated capital cost uplift of the base case warehouse to achieve BREEAM ratings was:
  - 0.04% to achieve BREEAM ‘Very Good’
  - 0.4% to achieve BREEAM ‘Excellent’
  - 4.8% to achieve BREEAM ‘Outstanding’

**Offices**
The office research is based on One Kingdom Street, located in the Waterside regeneration area near Paddington station in London. This Grade A office building accommodates 24,490m² of open plan space on ten floors and, on the eastern half of the building, two basement levels provide car parking and storage. The building has a steel frame, on a typical 12m x 10.5m grid, comprising fabricated cellular steel beams supporting a lightweight concrete slab on a profiled steel deck.

**Key findings for Offices**
- Significant reductions in operational carbon can be achieved relatively easily and cheaply using energy efficiency measures and low and zero carbon technologies. For example, the 2010 target of 25% reduction in regulated carbon emissions can be achieved using energy efficiency alone at a capital cost increase of only 0.28% and a 44% reduction can be achieved by the addition of low and zero carbon technologies at a capital cost increase of 1.6%. However, one bit the law of diminishing returns kicks in and large reductions in carbon emissions will be heavily dependent on the availability of Allowable Solutions.
- Relative to the base case building, an equivalent post-tensioned concrete office building had an 11.9% higher embodied carbon impact and was 72% heavier.
- The estimated capital cost uplift of the base case office building to achieve BREEAM ratings was:
  - 0.17% to achieve BREEAM ‘Very Good’
  - 0.77% to achieve BREEAM ‘Excellent’
  - 9.8% to achieve BREEAM ‘Outstanding’

**Mixed-Use**
The mixed-use research is based on the Holiday Inn tower located in MediaCityUK. Part of a much larger scheme, MediaCityUK includes 65,032m² of office space across five buildings, a 23,225m² studio block, 7,432m² of retail space and two residential apartment tower blocks. The Holiday Inn is attached to the main studios building at ground mezzanine and first floor levels, made up of office space in its lower half and the hotel above with the hotel reception and restaurant on the ground and mezzanine levels.

**Key findings for Mixed-Use**
- The 2010 Part L compliance target of reducing regulated operational carbon emissions by 25% is achievable by using a package of compatible, cost-effective energy efficiency measures, without the need for L2C technologies.
- The greatest on-site carbon reduction of 139% of regulated emissions is achieved by a package of advanced energy efficiency measures such as photovoltaic panels, a wind turbine and biogas-fuelled CCHP supplying heating, hot water, power and cooling.
- The estimated capital cost uplift of the base case’s mixed-use scheme to achieve BREEAM ratings was:
  - 0.14% to achieve BREEAM ‘Very Good’
  - 1.54% to achieve BREEAM ‘Excellent’
  - 4.96% to achieve BREEAM ‘Outstanding’
Cradle-to-grave

Assessing the environmental performance of building materials plays a crucial role not just for clients but for the sector as a whole. The BCSA and Tata Steel are committed to helping the construction industry obtain a true and accurate picture of environmental performance. Cradle-to-grave assessment is the next step.

In recent years global warming and the greenhouse gases emissions which cause it has risen to the top of the sustainability agenda. A large part of the problem is the carbon footprint. The greenhouse gases emitted during production, transport and disposal of a building’s parts should also be minimised for a project to be truly sustainable. The challenge to do this sensibly is that enormous environmental burden of later stages of a product lifecycle. For example, a cradle-to-grave analysis does no differentiation at all between a product which wears out quickly, needs frequent replacement and has no useful further purpose so finds its way to landfill, with one that is durable, recycled easily through numerous further uses and never becomes obsolete.

These end-of-life scenarios are incorporated in a whole lifecycle analysis referred to as cradle-to-grave. Steel benefits hugely from a cradle-to-grave analysis as it can be re-used or recycled endlessly without loss of property or performance. Other materials, such as timber, do not compare as favourably. Timber sent to landfill will decay to form methane, which is 20 times more emissive as a greenhouse gas than carbon dioxide. Recent TRADA figures indicate that up to 80% of timber waste in the UK goes to landfill. This enormous environmental burden is completely ignored using a cradle-to-grave analysis.

There is no doubt that, given the option, anyone serious about sustainability would choose a whole lifecycle cradle-to-grave assessment. The alternative is misleading and may ignore the major burdens. If environmental problems are ignored there is no necessity to correct them.

Best practice is to use the best whole lifecycle data available, which is based on current end-of-life outcomes. These may change over time, but that will only happen if the problem receives attention. Figures for some of the major construction frame materials are listed in the table opposite.

**Embodied carbon comparison**

This cost programme is a key criteria in assessing design options for many projects, the comparative environmental credentials are also important.

Peter Brett Associates (PBA) has carried out an embodied carbon assessment for a typical building using steel or concrete framing options. The study considered the whole building rather than just the structural frame for each option; however, it focused on the emissions from the structural elements as they represent the main carbon differences between the options. The results of the study are shown in the diagram below.

PBA firstly assessed the buildings using Portland Cement for the concrete mix, which demonstrated that the embodied carbon was significantly lower for the steel frame than for that for the concrete frame; with the steel option having an embodied carbon over 23% less than the concrete option. The substitution of OPC with cement replacement reduced the embodied carbon by 20% for the steel frame.

The impact of using steel bearing piles on the embodied carbon of each option was also assessed based on alternative substructure assumptions. **PBA and Tata Steel which utilised 356 + 368 = 152 MWP in lieu of CPIa piles.**

The use of steel bearing piles results in an increased number and length of piles for both frame options, from 147nr (2,490m) to 241nr (5,400m) for the concrete option; however, there are offsets in terms of a significant reduction in the size of pile caps and associated reductions to excavation and disposal for both options.

“Steel bearing piles can also be extracted at end of life and recycled or re-used elsewhere,” says Fergal Kelly, PBA Director.

**Carbon footprint of buildings**

The above table of values can be applied to the weight of materials used in a building to provide the overall carbon footprint. The table shows that the embodied carbon of steel and timber are similar when assessed in a cradle-to-grave basis, due to the high recycling rate for steel and the less satisfactory end-of-life options for timber. The embodied carbon of concrete is less than steel when measured on a per tonne basis. However, one tonne of structural steel goes a lot further than one tonne of concrete, so steel-framed buildings have a lower carbon footprint as shown in the adjacent table. In reality, buildings are made up of a mix of different materials.

The independent Target Zero study of sustainable low and zero carbon buildings using different primary framing materials. The results are summarised here on a per metre basis.
Landmark offices rise in Birmingham

Speedy steel-framed construction has allowed a 17-storey Birmingham office block, complete with a glazed atrium roof and bow-string trusses to be built in just 30 weeks.

A shortfall in high-spec offices in Birmingham is making Number Two Snowhill a highly anticipated property. The 17-storey office block with four additional basement levels for car parking, scenic lifts and a stunning steel-framed glazed atrium is the second of three landmark office blocks in the Snowhill area of Birmingham and will be 65m tall. While this premium office space is eagerly awaited in the city, construction came to a standstill two years ago, but restarted in May 2011 with developer Hines at the helm and Balfour Beatty Project Director David Tighe keen to pick up the pace of construction.

“Every steel connection to the core is bespoke, requiring us to measure the exact geometry and fabricating elements to exact dimensions,” says Mr Tighe. The contract was let on a design and build basis to steelwork contractor Caunton Engineering. The company has designed, fabricated and supplied over 2,000t of structural steelwork together with metal decking and shear studs for the project.

The building footprint covers an area 54m long by 45m wide and is made up of a 9m × 9m structural grid. The main entrance façade tapers out from ground level up to level 13 where the building then steps back, creating balconies. Double height spaces at level 15 and 16 contain plant. Above ground level, floors are of composite construction with steel beams and columns framing into the three main stability elements – the reinforced concrete cores.

A steel-framed solution was an obvious choice for the building explains Curtins Consulting Project Engineer Yvonne Aust, since it could connect back to the existing cores easily and construction could proceed quickly. With offices occupying the majority of the floors, clear spans and a flexible structure were also very important for the client.

“Cellular steel beams offered the most practical solution by being able to achieve long spans efficiently without being too heavy,” says Ms Aust. Services could also be threaded through the openings in the beams and concealed within the ceiling void. Metal decking and a 150mm thick concrete slab make up the floor depth. Floor beams have been pre-cambered in readiness for cladding loads and other finishes.

An atrium occupies the centre of the building from ground floor. The curved roof for this structure is supported by a system of steel “trees” which spring from level 14 and 15. The tallest double-storey tree sits at level 14 and is made from a 406mm diameter circular hollow section “trunk” with four “branches” supporting steel beams in the atrium roof. The remaining “trees” sit at level 15 and support the perimeter of the roof. These elements are all circular hollow sections, apart from two bow section columns which support the lower edge of the roof and sit at level 14.

“Caunton erected the atrium roof in the factory first to make sure everything would fit perfectly because there was no room for error on-site,” says Mr Tighe. He adds that there is sometimes just a few days between a survey being carried out, steel elements being approved and then fabricated. The atrium steelwork has been erected using tower cranes at night time, when there is less demand for cranes by other trades. Some floorplates around the atrium have been left out to allow some of the longer roof elements to be skewed up through the building.

Bow-string trusses which support glazing for the scenic lift offer some of the most technical challenges for the design and build team on this project. The trusses were originally designed to work in tension, but the main contractor felt that this would take too long to build and impact on the construction programme. “Building the bowstring trusses in tension meant that we’d have to weigh them down from the top so the trusses could only be erected after the [entire] main structure had been built,” recalls Mr Tighe.

Engineer Yvonne Aust, since it could connect back to the existing cores easily and construction could proceed quickly. With offices occupying the majority of the floors, clear spans and a flexible structure were also very important for the client.

“Cellular steel beams offered the most practical solution by being able to achieve long spans efficiently without being too heavy,” says Ms Aust. Services could also be threaded through the openings in the beams and concealed within the ceiling void. Metal decking and a 150mm thick concrete slab make up the floor depth. Floor beams have been pre-cambered in readiness for cladding loads and other finishes.

An atrium occupies the centre of the building from ground floor. The curved roof for this structure is supported by a system of steel “trees” which spring from level 14 and 15. The tallest double-storey tree sits at level 14 and is made from a 406mm diameter circular hollow section “trunk” with four “branches” supporting steel beams in the atrium roof. The remaining “trees” sit at level 15 and support the perimeter of the roof. These elements are all circular hollow sections, apart from two bow section columns which support the lower edge of the roof and sit at level 14.

“Caunton erected the atrium roof in the factory first to make sure everything would fit perfectly because there was no room for error on-site,” says Mr Tighe. He adds that there is sometimes just a few days between a survey being carried out, steel elements being approved and then fabricated. The atrium steelwork has been erected using tower cranes at night time, when there is less demand for cranes by other trades. Some floorplates around the atrium have been left out to allow some of the longer roof elements to be skewed up through the building.

Bow-string trusses which support glazing for the scenic lift offer some of the most technical challenges for the design and build team on this project. The trusses were originally designed to work in tension, but the main contractor felt that this would take too long to build and impact on the construction programme. “Building the bowstring trusses in tension meant that we’d have to weigh them down from the top so the trusses could only be erected after the [entire] main structure had been built,” recalls Mr Tighe.

A steel-framed solution was an obvious choice for the building explains Curtins Consulting Project Engineer Yvonne Aust, since it could connect back to the existing cores easily and construction could proceed quickly. With offices occupying the majority of the floors, clear spans and a flexible structure were also very important for the client.

“Cellular steel beams offered the most practical solution by being able to achieve long spans efficiently without being too heavy,” says Ms Aust. Services could also be threaded through the openings in the beams and concealed within the ceiling void. Metal decking and a 150mm thick concrete slab make up the floor depth. Floor beams have been pre-cambered in readiness for cladding loads and other finishes.

An atrium occupies the centre of the building from ground floor. The curved roof for this structure is supported by a system of steel “trees” which spring from level 14 and 15. The tallest double-storey tree sits at level 14 and is made from a 406mm diameter circular hollow section “trunk” with four “branches” supporting steel beams in the atrium roof. The remaining “trees” sit at level 15 and support the perimeter of the roof. These elements are all circular hollow sections, apart from two bow section columns which support the lower edge of the roof and sit at level 14.

“Caunton erected the atrium roof in the factory first to make sure everything would fit perfectly because there was no room for error on-site,” says Mr Tighe. He adds that there is sometimes just a few days between a survey being carried out, steel elements being approved and then fabricated. The atrium steelwork has been erected using tower cranes at night time, when there is less demand for cranes by other trades. Some floorplates around the atrium have been left out to allow some of the longer roof elements to be skewed up through the building.

Bow-string trusses which support glazing for the scenic lift offer some of the most technical challenges for the design and build team on this project. The trusses were originally designed to work in tension, but the main contractor felt that this would take too long to build and impact on the construction programme. “Building the bowstring trusses in tension meant that we’d have to weigh them down from the top so the trusses could only be erected after the [entire] main structure had been built,” recalls Mr Tighe.

Trusses support glazing

To allow the trusses to be erected as the building went up required Curtins and Caunton to redesign it so that some tension elements resisted compression. Caunton steelwork designer Matt Shrimell explains how the bow-string trusses work. “To maintain a very slender design, combinations of triangulated compression and tension members were used. These members took the form of tapered Macalloy compression struts and tension rods. The glazing is supported laterally at each storey level by means of both feature bow-string trusses and cantilevered arms braced off the shear walls. To enable the structure to be erected from the ground up, tapering vertical trusses act as columns which support approximately 35t of glazing. The glazed panels also transmit an eccentric load to the bow-string trusses, which is resolved into tension forces resisted by inner vertical tie rods.”

A steel-framed solution was an obvious choice for the building explains Curtins Consulting Project Engineer Yvonne Aust, since it could connect back to the existing cores easily and construction could proceed quickly. With offices occupying the majority of the floors, clear spans and a flexible structure were also very important for the client.

“Cellular steel beams offered the most practical solution by being able to achieve long spans efficiently without being too heavy,” says Ms Aust. Services could also be threaded through the openings in the beams and concealed within the ceiling void. Metal decking and a 150mm thick concrete slab make up the floor depth. Floor beams have been pre-cambered in readiness for cladding loads and other finishes.

An atrium occupies the centre of the building from ground floor. The curved roof for this structure is supported by a system of steel “trees” which spring from level 14 and 15. The tallest double-storey tree sits at level 14 and is made from a 406mm diameter circular hollow section “trunk” with four “branches” supporting steel beams in the atrium roof. The remaining “trees” sit at level 15 and support the perimeter of the roof. These elements are all circular hollow sections, apart from two bow section columns which support the lower edge of the roof and sit at level 14.

“Caunton erected the atrium roof in the factory first to make sure everything would fit perfectly because there was no room for error on-site,” says Mr Tighe. He adds that there is sometimes just a few days between a survey being carried out, steel elements being approved and then fabricated. The atrium steelwork has been erected using tower cranes at night time, when there is less demand for cranes by other trades. Some floorplates around the atrium have been left out to allow some of the longer roof elements to be skewed up through the building.

Bow-string trusses which support glazing for the scenic lift offer some of the most technical challenges for the design and build team on this project. The trusses were originally designed to work in tension, but the main contractor felt that this would take too long to build and impact on the construction programme. “Building the bowstring trusses in tension meant that we’d have to weigh them down from the top so the trusses could only be erected after the [entire] main structure had been built,” recalls Mr Tighe.

Trusses support glazing

To allow the trusses to be erected as the building went up required Curtins and Caunton to redesign it so that some tension elements resisted compression. Caunton steelwork designer Matt Shrimell explains how the bow-string trusses work. “To maintain a very slender design, combinations of triangulated compression and tension members were used. These members took the form of tapered Macalloy compression struts and tension rods. The glazing is supported laterally at each storey level by means of both feature bow-string trusses and cantilevered arms braced off the shear walls. To enable the structure to be erected from the ground up, tapering vertical trusses act as columns which support approximately 35t of glazing. The glazed panels also transmit an eccentric load to the bow-string trusses, which is resolved into tension forces resisted by inner vertical tie rods.”
Sustainable steel is cost-effective

Higher sustainability due to advantages like lower levels of embodied carbon is being routinely achieved on steel-framed buildings when compared to concrete alternatives, along with the traditional cost and other advantages of steel construction.

Embodied carbon assessment for a city centre office

A cradle-to-grave assessment for carbon dioxide emissions was made for the city centre office block. This considered the embodied carbon of producing the framing material and frame elements, constructing the building and what happens to the material when the building is decommissioned. It excluded carbon emissions related to running the building.

Industy data on materials’ emissions was supplied from ‘Target Zero’ publications for steel and from Concrete Centre publications for concrete.

PBA initially assessed the buildings in line with the cost study and used Ordinary Portland Cement (OPC) for the concrete mix, which demonstrated that embodied carbon was significantly lower for the steel frame than for the concrete frame. The steel option had an embodied carbon over 25% less than the concrete option. The assessment was recalculated for best practice where 30% of the primary sourced OPC was replaced with more sustainable fly ash and ground granulated blast furnace slag. This reduced the embodied carbon of both framing options, but the steel composite option still had around 11% less embodied carbon than the post-tensioned concrete one.

Adopting driven steel piles for each option was also considered as a more-sustainable alternative to concrete continuous flight auger piled foundations. This resulted in longer piles for both options, which increased foundation costs. However, these were offset partly by a faster substructure construction programme.

Across the whole building, the embodied carbon reduced to 195kt CO₂eq for the steel option and to 250kt CO₂eq for the post-tensioned concrete option.

Building a three-storey business park office

This is an out-of-town rectangular building with a gross internal area of 3,200m² with an 18m deep floor plate and structural grid of 7.5m x 9m with a central core. Its external envelope of brick outer-skin has an allowance for windows at 35% of the facade area.

Four viable framing solutions were developed by PBA:

- Steel composite beams and composite slab
- Steel frame and precast concrete slab
- Reinforced concrete flat slab
- In-situ concrete frame with post tensioned slab

The two steel design solutions were found to be cheaper to build than either of the concrete options because of a shorter construction period for the steel frame and its foundations. A steel frame is inherently lighter than a concrete frame, so the foundations were quicker and cheaper to build. The steel composite beam and slab frame solution had the lowest frame and floor as well as overall building cost.

Building two an eight-storey city centre office

This L-shaped building has a gross internal area of 16,500m² with a 7.5m x 15m structural grid and double height reception area and central core. The external envelope is a curtain wall system. Two viable framing solutions were developed by PBA:

- Cellular composite beams and composite slab (steel composite option);
- Post tensioned band beams and slab with insitu columns (post-tensioned concrete option).

The steel composite option had both a lower frame and floor cost and lower total building cost than the post-tensioned concrete band beam option. The steel composite option also had a lower floor to floor height (4.18m compared to 4.375m) which resulted in a 5% smaller external envelope and reduced cladding cost.

G&T’s programme study revealed that the steel composite option provided a 12-week faster construction programme for the frame and an eight-week faster programme for the overall build compared with the post-tensioned concrete option.

The frame and floor cost for the steel-framed options are up to 10% lower than for the concrete option and the overall building cost is up to 6% per cent lower than for concrete. Both steel-framed options can be built on average over five per cent faster than the concrete options.

A new report based on research by quantity surveyors Garth & Theobald, consultant Peter Brett Associates (PBA) and contractor Mace shows the cost and lower embodied carbon benefits of steel being delivered on two typical modern office blocks — a three-storey business park office, Building 1; and an eight-storey city centre office, Building 2.

The frames were designed by PBA, with cost information for each option from G&T with Mace considering constructability, logistics and programme. PBA also carried out an embodied carbon assessment for Building 2.

The research discovered that the total building cost for the steel options are on average 5% lower than the concrete options because of lower floor and frame costs, smaller foundations, lightweight roofs, lower storey heights, reduced cladding costs and reduced preliminaries costs.

The steel-framed options were up to nine per cent lower cost than for concrete when the frame and upper floors alone were considered.

Construction programmes for steel-framed solutions were 1.3% shorter compared with the concrete-framed option for the three-storey office, and 11% shorter for the eight-storey city centre office.

The city centre office cellular steel option also had an 18-30% lower embodied carbon total than the post tensioned band beam option.

“To benchmark steel against alternative materials on cost and sustainability, we commission construction experts to design real buildings as they would for any client,” says Tata Steel Construction General Manager Alan Trust. “We look at the frame individually and also the whole building as a steel frame generates a cost and carbon saving for other elements, such as foundations and cladding.”

Assessing the embodied carbon of the steel and concrete alternatives for the eight-storey city centre block took account of the fact that almost all steel used in a building will be re-used at the end of a building’s life, rather than sent to lower grade uses like granular 18 after being crushed, as concrete would be.

Best practice for sustainability currently is to consider replacement of Ordinary Portland Cement with fly ash and ground granulated blast furnace slag in concrete, so this was also considered in the embodied carbon assessment for Building 2. Other sustainability benefits from using steel that came into the picture included the impact of using steel piles rather than concrete, as easily removable steel piles leave no legacy effect whereas sometimes near impossible to remove concrete piles can hinder some future developments.

Driven steel piles are the sustainable option for foundations because they require smaller pile caps, no excavation or disposal of spoil and can be extracted for recycle or re-use when the building is decommissioned.

More detail on the study can be found at www.steelconstruction.org/ comparison
Selecting with confidence

Choosing which of the BCSA’s regularly assessed steelwork contractors is most appropriate for your project has been made straightforward by a special section on the BCSA’s website and by a new App.

The search for suitable BCSA members is narrowed by applying the following filters:

1. Building or Bridgework
2. Location
3. Size
4. Type of work
5. Certification
6. Sustainability Charter

The BCSA member database may be searched by location. This may be a factor for smaller jobs, but not as significant on larger projects.

The search allows multiple categories to be selected. The categories for both buildings and bridgework are shown opposite.

Each company only qualifies for inclusion on the BCSA’s membership listings after being assessed by specialists who check financial and technical resources as well as track record and employed personnel; the assessments are carried out annually with a physical factory inspection every three years.

### STEELWORK CONTRACTORS FOR BUILDINGS

- **C** Heavy industrial plantwork for plant structures, bunkers, hoppers, skips etc.
- **D** High rise buildings
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction joins a large part of the steelwork
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stands (over 5,000 people)
- **Q** Specialist fabrication services
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks

### STEELWORK CONTRACTORS FOR BRIDGEPARK

- **BA** Bridges for machinery, supports for plant and conveyors
- **CM** Cable-supported bridges and other major structures
- **FG** Footbridge and Sign gantries
- **PG** Bridges made principally from plate girder
- **TW** Bridges made principally from trusswork

The search for suitable BCSA members is narrowed by applying the following filters:

1. Building or Bridgework
2. Location
3. Size
4. Type of work
5. Certification
6. Sustainability Charter

The BCSA assessment process is very rigorous. All member companies are visited and experienced assessors carry out checks on their capability and financial probity.

**Sustainability**

The BCSA Steel Construction Sustainability Charter was developed to help identify companies that practice sustainable steel construction and are prepared to commit to continuously reviewing and improving their performance. Members are assessed against 12 criteria and can apply for different levels of recognition. "Member" level relates to six of the criteria being satisfied. Silver means nine, and Gold means all 12 criteria have been met.

The 12 criteria for sustainability charter membership:

1. A published sustainability policy (mandatory)
2. Monitor progress towards sustainability using specific management targets
3. A programme of involvement with their local community on social issues and with the steel construction community generally
4. An accredited Health and Safety management system to British Standard OHSAS 18001 or health and safety management as an integral part of a Quality Management System accredited to BS EN ISO 9001
5. Investors in People accreditation or a structured programme for personal training, development and communication
6. A published equal opportunities policy
7. A published ethical trading policy
8. An accredited Environmental Management System to BS EN ISO 14001
9. Use of environmental impact assessment for process improvement
10. A policy to manage energy and vehicle fuel usage in the business
11. A policy to question whether suppliers have published sustainability policies
12. An accredited Quality Management System to BS EN ISO 9001
Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.

For a more detailed search, visit www.steelconstruction.org

For more information, contact gillian.mitchell@steelconstruction.org

Steelwork contractors for bridgework

The Register of Qualified Steelwork Contractors Scheme for BridgeWorks (RQSC) is open to any Steelwork Contractor who has a fabrication facility within the European Union.

 Associate Members

Associate Members are those principal companies involved in the direct supply to all or some Members of components, materials or products. Associate Members must have a registered office within the United Kingdom or Republic of Ireland.

Details of BCSA membership and services can be obtained from Gillian Mitchell, Deputy Director General, BCSA, A Whitall Court, London SW1A 2ES
Tel: 020 7747 8711 Email: gillian.mitchell@steelconstruction.org

For a more detailed search, visit www.steelconstruction.org

The SUREST WAY TO STEEL