

Five ways to boost sustainability in the construction industry

The built environment is a massive polluter, and there is no getting away from it. In the UK, 45%¹ of total carbon emissions come from domestic and commercial buildings. Almost a third of all landfill comes from construction and demolition, and a shocking 13% of products and material delivered to construction sites ends up in landfill without ever being used.

The statistics are grim, but the motivation to do something about them is in good supply. What is still a problem is precisely how we go about addressing the damage. Conversations about improving both building performance and construction processes need to be top of the agenda so that we can effect real change.

In the spirit of such conversations, we've talked to three experts from different corners of the industry and together come up with five key areas for improving the way sustainability is handled in construction.



Paul Cornwell
Engineering Services Director at
Michael J Lonsdale

Paul has over 30 years of experience in the building services arena working at senior levels in both consultancy and contractor roles. He has a passion for delivering quality projects throughout London and the South East and believes that sustainable buildings don't have to cost more. He brings expertise in HVAC, value engineering, engineering, design management and building services and is a chartered engineer and member of CIBSE.



David Bownass
Sustainability and NZC Director at
WSP

David has delivered major projects for WSP and approximately 10 years ago moved into a new role – setting up and running their Sustainable Building Group. Since then the group has flourished and his focus is now leading WSP's Net Zero Carbon (NZC) specialism.



Matt Barrington
Head of Cost Consultancy at GHCS

Matt has over 15 years' experience in the construction industry and has worked predominantly as a PQS supporting developer clients delivering major projects in London. He believes that cost consultants have a social responsibility to consider the long-term value in good sustainability outcomes and advise clients appropriately when making decisions about the cost of different options at the design stage.

Reducing waste

An obvious place to start - and while waste reduction on modern sites is progressing all the time, there's always more that can be done. Innovative solutions are constantly emerging, and it is worth scrutinising traditional methods to continually make improvements.

Modern Methods of Construction (MMC) – such as modular construction and pre-fabrication in factory settings - have been making waves in the industry for many years. MMC can lead both to more energy efficient finished products and improved opportunities to reuse or repurpose the minimal waste materials.

There's also an opportunity to think more holistically about construction – will the sustainable features of a project continue to deliver for years to come? And why concentrate just on minimising material waste when we can finetune processes in order to save time and money?

Paul Cornwell

We believe increasing prefabrication in construction could help. In a prefabricated environment waste can be kept to a minimum and most of that waste we are able to recycle and re-use. Early engagement with the supply chain is needed to support this. The alternative is retrofitting prefabricated components into designs which were intended to be delivered traditionally - potentially increasing cost and compromising on value for clients.

Most people only consider reducing waste at the point of installation i.e. pipe cut offs we don't use. We need to consider the wider aspects such as commissioning. We are trying to drive re-use of water when flushing systems, for example. We can filter dirty water and it can be re-used.

David Bownass

The conversation needs to be broadened to include non-physical waste, for example wasted time. During the design phases of a project, a lot of time is spent going in circles. Briefs need to be clear from the start, so all parties understand the design needs.

We also need to ensure nothing we have provided is wasteful when a building is in use. Building combined heat and power (CHP), for instance, was something that we knew was a poor solution in the long term and not great for environment when in operation but satisfying Part L regulations took us that way.

Matthew Barrington

An advantage of prefabrication is the precision and accuracy of the manufacturing process. This increased accuracy can lead to tighter joints, better air filtration and air tightness and generating better insulation - meaning reduced emissions waste when the building is occupied.

With more traditional methods, main contractors on modern sites have sophisticated methods of eliminating as much waste as possible and monitor waste and recycling. The professional quantity surveyor (PQS) needs to be clear about these processes and needs to consider the extra measures to capture the preliminaries for each scheme. Early engagement will help, as will setting out minimal requirements during tender. This will help contractors include what is required in tender submissions and help the PQS to evaluate more comparable contractor submissions.

Sustainable technology

There is a vast array of technology on offer to boost, enhance and streamline construction. This selection – and competition – means a client can be a discerning consumer, and the cost consultant now has a crucial role in helping them arrive at decisions that offer value as well as realising their environmental goals.

To enjoy the greatest benefits, applying the right technology in the right way is key. Products that promise hefty reductions in carbon or water use might be hard to resist, but it's important to question what technology will suit the project, and even whether the technology as a whole looks set to stick around and provide the best results for years to come. Something that allows for a significant reduction in gas consumption could be great – but is there a way to avoid gas altogether in favour of electricity from renewable sources?

But how can clients make these decisions? The solution is to account for them at every stage of the process – and for all parties to be fully engaged. Consultants can take the initiative and make proactive suggestions. Equipping the client with information directly applicable to their situation early on makes improving green credentials simpler.



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Paul Cornwell

We often have requests at the tender stage to provide value engineering, but at MJL we like to provide the client with a tailored list of smarter options as part of our submissions. We refer to them as alternatives and innovation – ideas that add value as well as save money. These ideas need to satisfy an internal nine criteria check which include “sustainability” and “life-expectancy”.

On one recent project we explored the market for chillers which used more sustainable refrigerants with lower GWP’s (global warming potential). We were able to offer the client choices that aligned with their own sustainability commitment’s.

David Bownass

Technology developed in the past that was supposed to improve sustainability in construction has had varying success. The use of biomass is a good example – where in fact heat pumps are a much better solution. More and more heat pumps for specific applications are being developed. There are now three or four different products for multi-storey residential buildings while 10 years ago there were none.

Another example is bio-methane being injected into the national grid to reduce carbon content of natural gas. Bio methane might reduce the gas grid carbon content by 20% but using electricity instead can achieve 100% zero carbon in buildings.

Battery technology is growing and is a way of linking to offset and storage of electricity for renewables. It is not yet comprehensive at a domestic scale but is being applied at industrial level. In my mind the risk of modern battery technology is that they are not yet 100% recyclable which could potentially create another problem of industrial batteries being discarded.

Solar thermal will likely come to the fore as the grid de-carbonises and will surpass photovoltaics in their sustainable impact.

Matt Barrington

Active and passive solar power can be used to help heat buildings. Active solar power is the use of panels usually placed on a roof to generate power for heating and electricity. Passive could be the strategic placement of windows, position and shape of the building and the use of heat absorbing surfaces to help heat the building. Smart glass helps keep the building cooler and reduces the burden of the mechanical cooling by changing the tint of the glass in the summer months. Water efficiency technologies help to re-use and save water where possible. Examples include grey water re-use, rainwater harvesting and water conservation fixtures in bathrooms.

PQS’s are now able to access relevant and up-to-date market information to help with cost planning for these products. This increased competition in the market also presents the opportunity to seek best value by proposing alternatives through value management and value engineering during early design stages.

Sustainable materials

Materials have a huge impact on the carbon footprint of the finished building. The embodied carbon of a material (which takes its entire supply chain into account), is complex but crucial information. Detailed knowledge would enable service providers to give clients the most accurate advice on how to reduce carbon footprints through the use of greener materials. The opportunity for conducting more research into making basic materials as green as possible is there for the taking.

There is also often the option to switch materials, wood instead of steel, innovative new products like low carbon cement, or recycled materials – which can result in a carbon footprint five times smaller compared to new materials.

Paul Cornwell

We keep an internal database of options for all elements of M&E design so that we can offer more sustainable options to the client. A shortlist is generated following an internal review of what we believe to be appropriate to the specific scheme and client.

David Bownass

In a typical office, substructures account for 17% of the embodied carbon, superstructures 48% and M&E 15%. More insight into the embodied carbon would help us understand who and where we can reduce embodied carbon.

It would be beneficial to understand what the embodied carbon is for specific elements of M&E design so we can specify equipment with lower embodied carbon. There is currently not a lot of evidence-based information showing what reduction of embodied carbon can be achieved. Lots of work needs to be done on product and suppliers to use more “green” materials in specifications with a view to reducing embodied carbon.

Structurally, there is more information available on embodied carbon in materials like concrete and steel. But we do get to a point where there is not much more that can be done to further reduce embodied carbon when using these materials. The alternative is to look at replacement materials. It is very difficult to specify alternative structural materials for concrete in high rise developments, but it is possible in low rise buildings where structural timber could be used.

Matt Barrington

In February of this year, Cemex launched a range of new ready mixed concretes. The lowest-carbon option claims to achieve a 70% reduction in embodied carbon emissions. The company aims to be carbon neutral globally by 2050.

Using wood in structures rather than steel or concrete is an easy way to reduce carbon footprints. Glulam timber has been used in construction for years and its application can create architectural features as well as reducing a building’s impact.

Using recycled materials can reduce embodied carbon by up to 5 times when compared to non-recycled materials. There is also an ever-increasing array of sustainable material that can be incorporated into any project. The PQS has an opportunity to support client’s sustainability agenda through awareness and understanding of the cost of these varied materials, which can sometimes be comparatively high. Fortunately, the market is becoming more competitive and this will help with the cost of materials. Strong PQS support will help clients weigh up the long-term value of improving the environmental impact of their development, the appeal of using sustainable material to the end users and the potential increased cost of incorporating them.

Reuse and retrofit

From entire buildings to the most insignificant seeming detail, the construction industry needs to think more about what can be reused and given fresh purpose, instead of building from scratch being the default. Radical reductions in carbon footprints can be achieved through repurposing and there is certainly a gathering momentum. But a shift in attitudes is required to make sure that in a project where retrofitting could be used, it is used – and considered as a desirable choice. Campaigns like the Architect Journal's RetroFirst² are crucial in championing this change. With well over 100 signatories including clients, architects and consultants, the campaign is just the kind of proactive approach that is needed to drive this shift.

Paul Cornwell

On a recent project, our client was considering re-using M&E plant (FCUs, 100 per floor over 8 floors). The FCU's were 14 years old, not at the end of their life, and the casings were alright, sitting above the ceiling so out of sight. They needed new fans and bearings and testing for compliance to work for another 15 years for the client. The capital costs started to dramatically increase due to careful handling required when taking them down, the cost to return the FCU's to the manufacturer and the time required to refurbish them. However, this could reduce carbon footprint. Bringing specialist advice from the supply chain into the decision-making process earlier could help make an informed decision.

David Bownass

Current trends suggest it is very likely there will be a very big retrofit market. Even if stripped right back to shell, there is a huge reduction in carbon footprint in comparison to building a new frame.

Matthew Barrington

Retrofit is not always an option, as there is a housing shortage in the UK. However, where possible the first option shouldn't always be new build. The Architects Journal's RetroFirst campaign launched in September 2019 and as of January 2020 has 129 signatories. The campaign has three key pillars; Tax, Policy and Procurement and aims to champion retrofitting and reuse in the built environment rather than building new.

Retrofit and refurbishment projects are potentially fraught with risk – something that must be appreciated to be successful. The PQS should work with the client and professional team early on to identify all risks (especially those relating to the fabric of the existing building) and implement a management strategy for each. It is often prudent to carry out extensive surveys and call on supply chain expertise so an appropriate and agreed contingency strategy can be established early in the design process.

² <https://www.architectsjournal.co.uk/news/retrofirst>



Plan to be sustainable

In 2020, it's no longer acceptable for sustainability to be an 'add on' topic. Carbon footprints, waste reduction, retrofitting – these are all concerns that need to be considered in detail from the outset. For example, instead of asking which elements of a design may be suitable for prefabrication after the design has progressed, prefabrication should be kept in mind from day one.

Often the challenge is for the client to properly articulate their sustainability goals, and consultants and professional service providers need to be mindful of this and be ready to proactively offer solutions and goals the client may not have thought of, which fit their vision as well as their budget.

Paul Cornwell

On most projects, we find that the design is developed and then we are asked to look at what parts, components or elements can be prefabricated. Instead, we should start from the outset with the aim of maximising the prefabricated elements. Rather than doing pre-fabrication for the sake of doing pre-fabrication – i.e. horseshoeing in the prefab aspects into a developed design, the supply chain should be engaged around stage 3 when the detailed design is being developed.

Matt Barrington

It is crucial to have an agenda for sustainability from the outset. Professional services have a responsibility to advise clients of their obligations. Clients have a responsibility to be clear about their strategy. By applying intelligent design, efficient procurement practices and modern methods of construction, all parties should be working together with the end goal in mind. We have the potential to dramatically improve the sustainable impact of any construction scheme.

David Bownass

Sustainability plans start at feasibility - as soon as we get involved, and we are seeing two streams of delivering sustainability agendas:

1. Meeting local / national planning requirements such as those in the Greater London Authority.
2. The business requirement: the WSP commitment to its Future Ready philosophy and client's specific sustainability and carbon reduction aspirations on a project.

The 1st stream not as progressive as the 2nd. Clients themselves are pushing to achieve higher sustainability goals and are keen to understand opportunities to increase sustainability and reduce their carbon emissions. We find they are particularly interested in renewable generation, renewable electricity, net zero carbon, wellness, COVID19 mitigation and having a building that enables operators to work safely. This is all in the context of creating value.

We help clients to communicate these sustainable ambitions and help the rest of the professional team understand them and work them into the design, cost and programme.

Planning to be sustainable is about what is valuable and realistic for the client. We need to understand client's aims, what is physically possible in the scheme and then what can be delivered within the client's budget.

Knowledge and collaboration – a killer combination

Better collaboration among all stakeholders from an earlier stage in the project life cycle would help with boosting sustainability in all of these five areas and foster a culture that makes sustainability the priority that it deserves to be. Continual research into the precise benefits of the rapidly growing array of technologies and materials will play a key role – it will support this collaboration, empower PQSs in providing the best possible information for the client to make the choice that works for them in term of value, and ensure the choices are genuinely sustainable and will continue to offer results for many years to come.