

FUTURE OF CONSTRUCTION

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OF PLANNING

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TO GO GREEN

18 LESSONS AFTER
GRENFELL



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Contributors

Sophia Akram

Journalist with an interest in human rights and global development and their crossover with business, featured in Al Jazeera, Vice and other outlets.

Morag Cuddeford-Jones

Business journalist with 20+ years' experience delving into evolving topics covering major commercial and transformation issues.

Jim McClelland

Sustainable futurist, speaker and writer, committed to exploring space where economics, environment and social equity meet in business.

Johanna Parsons

Award-winning journalist covering all aspects of supply chain, transport, and logistics through the warehouse, the cloud and beyond.

David Benady

Writer, editor and analyst who specialises in media, marketing, retail and IT. His work appears in The Guardian, on Bloomberg.com and NYTimes.com.

Sean Hargrave

Former Sunday Times Innovation editor who now works as a freelance journalist covering technology, business issues, and financial services.

Charles Orton-Jones

PPA Business Journalist of the Year, former editor of EuroBusiness, specialising in fintech and high-growth startups.

Raconteur reports

Publishing manager
Jean-Philippe Le Coq

Managing editor
Sarah Vizard

Deputy editor
Francesca Cassidy

Reports editor
Ian Deering

Sub-editors
Neil Cole
Gerrard Cowen
Chris Ryder

Commercial content editors
Laura Bithell
Brittany Golob

Head of production
Justyna O'Connell

Design/production assistant
Louis Nassé

Design
Celina Lucey
Colm McDermott
Samuele Motta
Sean Wyatt-Livesley

Illustration
Elisabetta Calabritto
Kellie Jerrard

Design director
Tim Whitlock

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SECTOR OVERVIEW

Construction seeks stronger foundations for the future

The construction sector endured the pandemic but is now beset with crises. It must learn from recent years to adapt for the future

Morag Cuddeford-Jones

The construction industry faces a perfect storm of challenges, from the cost-of-living squeeze to supply chain disruptions. The sector must learn the right lessons from recent years to seize the opportunities of the future.

In many ways, the past couple of years have been record-breaking for construction. Annual construction output increased by a record 12.7% in 2021, compared to the year before. This was the largest increase since records began, though it followed the pandemic-stricken 2020, which saw the largest decline in annual growth at 14.9%. On top of that, prices charged on work in the construction industry increased 7.3% in the 12 months to March 2022 – the strongest annual rate of output price growth since records began in 2014.

But these figures don't tell the whole story. The recent dramatic rise in inflation, rising energy prices, materials shortages and uncertainty stemming from the war in Ukraine have driven extreme price fluctuations. The latest data from the BEIS materials tracker suggests that year-on-year prices for all building work rose by 24.5% from March 2021 to March 2022. Roof tiles rose 24% in a year, steel was up 25% and concrete reinforcing bars jumped an astounding 63.6%.

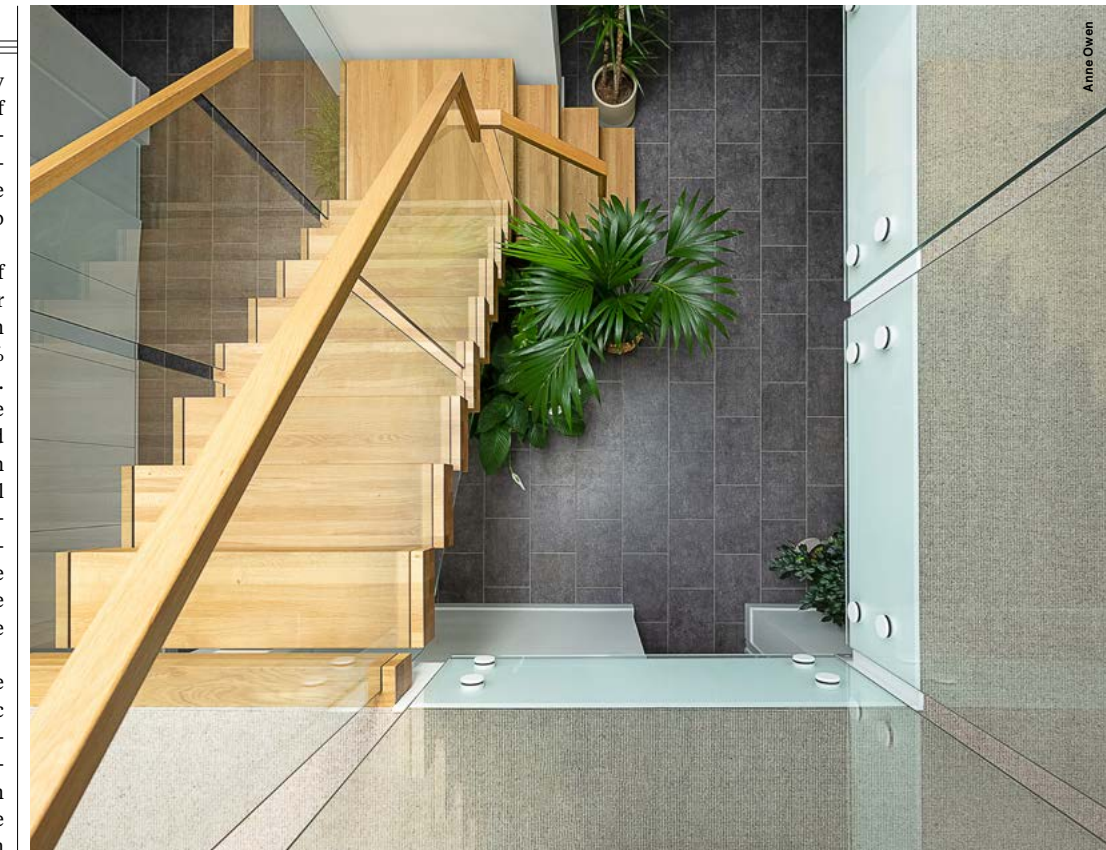
Add in question marks over labour availability, a cost-of-living squeeze and ongoing supply chain disruptions that many attribute to Brexit and you have a perfect storm for the building industry, one that seems incredibly difficult to navigate.

Many sectors emerged from the turbulent months of the pandemic with renewed focus and a different perspective on their operations. Digital transformation is said to have been accelerated, plunging sectors such as retail and banking into brave new worlds of efficiency and customer-centricity.

12.7%

increase in annual construction output in the UK in 2021

Office for National Statistics, 2022



“Every day is like swimming through treacle. There's a Covid hangover

that conditions are tough. “Every day is like swimming through treacle. There's a Covid hangover. The legal system, the banking industry, local authorities or utilities: no-one is back to normal.”

Even on sites, there's a marked difference in attitudes towards a work/life balance, he says. “If we're honest with ourselves, we're on a three-day week,” he says, noting that this seems to be more apparent in Wales, where Jehu is based.

It seems as if the planning sector has yet to work out what hybrid working means, Jones reckons. “When there are problems that need resolving it's a lot easier to do face to face with a big, red marker pen. It's a brainstorming exercise – we work in a creative industry.”

Despite today's widespread use of Teams or Zoom, videoconferencing still isn't an adequate replacement for getting everyone in the

room and hashing out a problem. “Council [planning departments] are reluctant to bring people back into the office. That's where the breakdown is happening.”

Still, with so much talk of digital transformation, you'd think that two years of pandemic-accelerated innovation would have provided some kind of solution. Martyn Wallace is chief digital officer for the Digital Office for Scottish Local Government, whose latest digital planning strategy focuses on better data and intelligence for decision-making.

“The trouble in councils is due to cuts where we have had to let go of a lot of admin folk, including people who used to be able to answer all the enquiries for planning applications. In some councils, the actual planners have to deal with information requests, including Freedom of Information (FOI) requests, which means the whole process is slowed down.”

Delays bring more than just frustration. With prices currently so volatile, it's becoming almost impossible to manage client expectations. The fixed price contracts that could absorb moderate price fluctuations and the low inflation of the past couple of decades is suddenly no longer fit for purpose.

“We are used to sub 2.5% [inflation] and have got into the position of using fixed price contracts,” says Jehu. “There have been

fluctuations [in inflation], but that fixed price cost was still manageable. Now you can't get [long-term] prices for key materials. The quote would only be valid for today."

James Nevin is partner at Blue Engineering, a London-based structural engineering firm. Despite the challenges, he sees cause for optimism "It's very busy, meaning we can command good fees and make good money. But where do we go from here?"

Nevin sees first-hand from clients the nervousness of balancing cost and client expectations. "Builders are scared about going up another percentage because modern contracts just don't have that much wiggle room. Everyone is worried about getting ripped off and they want a simple contract." He points out that the builder now feels the need to price with a much larger margin. If they win the job but prices go up, they haven't just lost profit, it's eating into wages.

Although smaller contractors are potentially nimbler, they're experiencing the same difficulties. Simon Plummer, owner of Reading-based Ruscombe Design & Build, says the average client had their job priced up nearly a year ago. But within six months, such a job had seen a 20-30% price rise. "How do you go back to the client and say that? In jobs that you've taken, you have to take the fallout."

An inflated market means it's even more difficult to get boots on the ground, with contractors expecting to be flooded with work in the near term. "When [customers are] asking when builders can start, we're giving lead times of at least 15 months. How can we possibly say how much it's going to be at tender when that's traditionally a three-month lead in?" asks Anne Owen, whose eponymous architecture practice focuses mostly on domestic projects in the Berkshire region.

In practice, this means companies like Plummer's are advising clients to move from the typical 10% project contingency in case of overspend to at least 20%. Shifting tack mid-job because certain materials have become prohibitively expensive is not possible for smaller contractors, "if something has already been approved, it's not easy to go in and change it."

Owen agrees that clients must be much more pragmatic about their contingency planning. On more than one occasion clients have been shocked to discover their original plans have come in "probably a third more than [they] wanted to pay". This necessitates a return to drawings, a return to planning and another trip through the system.

The scarcity of certain materials isn't helping to take the heat out of the market. Bricks that would normally turn up in four to five days are taking up to 26 weeks to arrive, says Jehu. He's even taken to rationing materials on site. Smaller contractors say managing product availability and price can often come down to personal relationships at builders' yards, with the cost of materials varying even from one outlet to another, depending on how well the trader is known to the manager.



C2J Architects & Planners

There is a sense that the industry is working flat out to keep up, despite all the challenges. Construction appears so in demand that it could, in theory, take its pick of projects. And yet, it's not showing up in profit.

"We're still turning over 50% of what we were during lockdown but it's not through a lack of work. Even though we kept going during the pandemic, very few contractors were profitable but kept going. Now a lot of balance sheets need to recover. We have the biggest pipeline we've ever had, we just can't deliver on stuff," Jehu reveals.

The architecture business also seems to be motoring. "Probably the biggest challenge we face is availability of builders, particularly here in the southeast," Owen warns. "The way people live in their space has had a dramatic shift from pre-pandemic so the demand for this kind of work has gone through the roof."

One of C2J Architects & Planners projects in London

But this could be a false dawn, according to Nevin, who says unexpectedly high prices are causing potential clients to cast their nets wider in search of an acceptable quote. That means more builders are quoting for more work, yet the actual volume of projects hasn't changed much. "The conversations I've been having with my architects is that we have to remind builders that they might be pricing on 10 projects but that doesn't mean that's the number of projects out there."

In fact, Nevin calls for a more widely available database that lists the projects going through planning; this could be shared with builders and business owners so they can better understand the true size of the market. "That might help them reduce their prices and feel more confident."

Plummer says that good old-fashioned word of mouth has given his firm a realistic view of his market. "We're fortunate because we don't advertise so the people who approach us are genuinely looking to get started."

There may have to be a fundamental rethink of how the sector is organised. C2J's Jones points to a need to bring the supply chain much closer together. "We should probably be more self-sufficient, something the pandemic showed everyone when it came to shopping locally. Construction has started to push towards using more local suppliers and building up relationships so that everything is on a smaller footprint." This would also help address growing demands around sustainability, he adds.

With prohibitive steel pricing perhaps giving the industry a nudge in the right direction, Nevin agrees,

“It’s very busy, meaning we can command good fees and make good money. But where do we go from here?”

revealing that the company is reporting how much steel is used on each project at the front of its client documents and offering the option to offset its carbon. "What [that] means is clients are asking how they can move to timber which is more sustainable and cheaper."

"If we learn anything from all of this, it's that we should be more independently sustainable," Jones adds. "Surely it's got to be more sustainable to get it from 10 miles away than from China?"

Efficiency is also a key point. While rationing bricks is an extreme approach to reducing waste, Jehu cautiously welcomes the ability to take stock – sometimes literally – and find ways of being a leaner operation overall. "It is encouraging better planning. From an overheads level, we're getting by with far less."

Technology is expediting the process to a degree, as all parties involved in projects begin to use more collaboration software or look for innovations that will build up efficiencies. Nevin points to the fact that "during lockdown it made us really think about processes and where we can cut fat without cutting people."

Blue Engineering has created its own software division to develop

software that can streamline and automate tasks, "freeing us up to focus on more creative things, communicating with clients".

Ultimately, communication is key. This is perhaps where many other sectors have taken lessons from the pandemic that the construction sector is yet to fully appreciate. Jones agrees, for example, that using remote tools effectively means he saves many hours which used to be spent on the road, travelling to meetings.

Owen says that while she has good relationships with her local planning team and can often pick up the phone to them, this tends to be the exception rather than the rule. Rigid form filling where the architect's version of the approval list is different to the planner's is just one aspect of a system that still uses old structures to deal with modern expectations.

Jehu explains that 75% of a project's lifecycle, in terms of time, occurs before a spade even enters the ground. "There is very little we do have control over," he admits. "But if technology can do a self-drive car, perhaps it can do a self-administering planning department? Our industry needs to evolve. It isn't going to die, but we must adapt." ●

INSIGHT

You can't just focus on getting greener, safer, or fairer. These things are interdependent

Steve Bratt, CEO of the ECA and founding member of engineering services alliance, Actuate UK, on how to make the construction industry a better place to work

Q Actuate UK was created to foster a greater sense of collaboration within the industry – why is this so important?

A Engineering services - the things that go into an infrastructure project and make it work - represent about 40%, by value, of the initial build cost. Many of the things at the top of the government's priority list are significantly impacted by these services. The green agenda, energy efficiency, net zero and the ongoing monitoring of fire and safety systems.

There's a strong correlation between what we do, where the money is spent and what's important to society. Given this, it was an easy decision for us to say "If we're going to have a voice and influence in these critical areas, then we must come together".

Forming Actuate UK was about our sector saying: "hang on a minute, let's not make government and stakeholders talk to 15 different people, when they want to talk to us, let's let them talk to one body that can represent not just contractors, but the people manufacturing products, doing the design, installation, maintenance, the whole footprint."

Q How can greater collaboration drive the sustainable agenda?

A The construction industry is a complex and fragmented arrangement. We build a new product in a new place with new people every time. Imagine trying to build a car that way.

You end up with a long chain from funders through to specialists. The problem is that those at the top want to fix the price and pass the risk on. So, at tiers two and three, the primary concern is having risk handed down. Their focus turns to cost and risk management, rather than innovation or investment in skills. We need models to be more collaborative if we're to become more sustainable.

On a practical level, we have things like integrated project insurance and the Construction Playbook and Actuate UK has launched a net zero working group. But there is still a way to go.

You need to bring the chain together so when we build this new thing in a new place with new people, they feel joined up, they feel like they're working for the same aim.

Q What does the industry need from the government, to ensure construction's future is greener, safer and fairer for all?

A Fundamentally, we want to see them enforce things. We're going through a review of the Building Regulations. Currently, a responsible business will make sure that what they design is compliant with building regulations on the assumption that when it's installed, someone will check. The reality is that that doesn't happen.

There's a perception that the industry is anti-regulation. It's not - what it wants is regulation that's properly enforced, so the people doing it properly are rewarded.

In terms of "safer": competence is a critical component of the building safety regulations. It's a word that means different things to different people, and we would like to end up in a place where the industry knows what competence looks like. The government needs to get this sorted.

In terms of "fairer" - we need to create a fair commercial environment. I described the structure where you work your way down the tiers and the risk gets dumped. If we can create an environment where people feel able to invest in themselves, we will see a much better outcome.

You can't just focus on getting greener, or safer, or fairer. These things are interdependent. If we can create an environment where people feel safe to innovate and invest, you're much more likely to get an outcome which is greener and safer and fairer for all. ●



Steve Bratt
CEO of ECA and member of Actuate UK

How digital innovation supports sustainable building portfolios

Digital twin technology can play a key role in decarbonising built assets, helping companies meet net-zero targets and drive down rising energy costs

Decarbonisation is now a priority, not only in construction, but across the entire design-build-operate lifecycle of real estate assets. Developers and property portfolio holders are looking to reduce their carbon footprints to achieve net-zero goals and reduce operational costs, as they grapple to mitigate the climate impact of their buildings and deal with energy price shocks.

Many organisations have committed to sustainability pledges including Race to Zero and SBTi, says Sadaf Askari, sustainability partner manager at IES, but most still have some way to go in defining and implementing decarbonisation strategies. "With buildings accounting for almost 40% of global emissions, companies and portfolio holders need to make decarbonisation investment decisions based on data they can trust," she adds.

What they may not know is that technology - referred to as 'digital twins' - can provide just that. By enabling the creation of real-time digital counterparts of buildings and portfolios, companies can analyse their carbon output and find ways to reduce it.

IES, which develops digital twin technology to reduce the environmental impact of buildings and cities, sees several ways the technology can support decarbonisation; helping inform net-zero investments, divest from fossil fuels, mitigate rising energy prices, and even optimise conditions for building occupants.

IES' ICL digital twin suite has helped companies simulate entire building portfolios to monitor operational performance in real-time, understand the impact of net-zero investments and identify inefficiencies and improvements. This can help inform decarbonisation roadmaps, showing what actions are needed to meet client targets or by identifying shortfalls in existing plans. "Our digital twin is a model of the actual building representing its performance at any point in time," says Askari. "We use data and physics powered simulations to understand a diverse range of scenarios and support decision-making."

As countries seek to cut reliance on Russian gas and the need to divest from fossil fuels gathers pace, many are also turning to digital twins to identify alternative energy solutions. "The technology can be used to simulate whole energy systems and assess how groups of buildings integrate with heating and cooling networks,



“Digital twins allow companies to make sense of their data, predict a diverse range of scenarios and ensure they are on track to reach their decarbonisation goals

renewables, EV charging stations and demand optimisation solutions," says Askari. "We can identify ways to reduce reliance on the grid, share energy locally and increase the capacity of renewable energy generation and storage to improve resilience."

That's without even mentioning the ability to support the regulatory minefield that is ESG. Like many sectors, real estate owners are facing pressure to bolster their ESG credentials, with 60% - according to Deloitte's 2022 'Commercial Real Estate Outlook' - believing ESG initiatives bring new opportunities and give them a competitive edge. "This is another area where digital twins can help," says Askari. "Portfolio owners can measure and continuously monitor ESG KPIs, identifying improvements via bespoke dashboards. That helps them meet reporting and disclosure requirements, but also minimises potential investment risks."

Using technology to boost your buildings' environmental credentials can raise their value and lower associated climate risks, but the business benefits extend to occupants too. Research suggests better indoor air quality can lead to productivity improvements of 8-11%. In organisations where 90% of typical overheads are spent on

employees, minor improvements in productivity can substantially impact turnover and profit. Portfolio owners can balance energy use with occupant needs, using their digital twin to monitor and improve air quality, comfort and ventilation. "The wellbeing of occupants remains a top priority of building management. You can't reduce energy use to the level that occupants are unhappy," adds Askari.

There is no "one size fits all" approach to decarbonisation. However, the power of digital twins for real estate lies in their ability to handle complex and dynamic building portfolios, analysing data and producing highly accurate simulations to inform business decisions. "To have a real-time understanding of your portfolio you need to accumulate multiple sources of data in one place," says Askari. "Our digital twins allow companies to make sense of that data, predict a diverse range of scenarios and ensure they are on track to reach their decarbonisation goals."

To find out more, please visit iesve.com/real-estate



14.9% decline in annual growth in 2020, the largest in recorded history



6.2% increase in prices in the construction industry in the 12 months to December 2021

Office for National Statistics, 2022

Time to redraw a flawed planning regime

Few people – both in construction and beyond – would disagree that the UK’s rules are a mess and the outcomes are often poor. What should be done to improve the system?

Charles Orton-Jones

Planning rules in this country are not designed to shape development. They are designed to prevent it.”

That’s the view of Freddie Poser, director of PricedOut, a pressure group lobbying for more affordable housing. But anyone in the construction business could be saying this.

The UK’s planning system provides a frustratingly slow and unpredictable process for property developers. And it’s getting worse: in April, the government’s conservation watchdog, Natural England, demanded that plans to build 120,000 homes around the country be put on hold until the developers can prove that these won’t pollute local watercourses with phosphates and nitrates. Even the Community Planning Alliance – a group campaigning for environmentally friendly developments – has called the situation “a complete mess”.

The most obvious consequence of this dysfunctional regime is the UK’s continuing housing shortage. Vacant dwellings comprise 2.6% of the nation’s total stock – by far the lowest proportion among comparable countries. In France, for

instance, the figure is 8%. Homes are tiny too. The average new-build dwelling in England is 76m2, compared with 137m2 in Denmark.

So where exactly do the main problems lie?

“There’s no one rulebook in the UK – or rather England, Wales, Northern Ireland and Scotland – as planning is devolved,” Poser says. “Instead, there are multiple acts spanning decades. There are endless sticking plasters, endless changes and endless levels of environmental and design reviews that councils must consider.”

Planning teams must take many factors into account, including ground conditions, land stability, flood risk, highway safety, sustainability, biodiversity, noise, air quality, energy, heritage and public engagement. Then there’s the location: there are national parks, areas of outstanding natural beauty, green belts and conservation areas. Any land containing a listed building brings its own set of problems.

It all means that a relatively straightforward project such as the recent proposed replacement of a two-storey building in the London Borough of Enfield with four tower blocks generated 195 documents. These included an estimate from Sport England of the likely increase in demand the development would create for leisure facilities in the area (0.04 of a swimming pool and 0.05 of an indoor bowling rink, it turned out). It is hardly surprising that planners are becoming overwhelmed. Not enough of them exist and the few that do are usually under-resourced. The Royal Town Planning Institute (RTPI), which represents planning officers, recently conducted a survey



seeking its members’ views. Nearly three-quarters of respondents agreed that constant tweaks to the system by various governments had hindered their effectiveness.

Alister Scott, professor of environmental geography at Northumbria University, is a vocal defender of planning officers. He notes that the RTPI’s 2019 Resourcing Public Planning report revealed that “total net investment in planning in England is just £400m a year. That’s 50 times less than local authority spending on housing welfare and 20 times less than the estimated additional uplift in land values that could be captured for the public during development.”

Another key problem is the “very political” nature of planning, notes Grace Manning-Marsh, chief of staff at proptech firm LandTech.

Decisions on all major applications which involve 10 residential units or more are made by local councillors. These councillors have the power to override planning

“**If councillors want to block a development, the Section 106 is so onerous that no developer can tick all the boxes**

officers’ recommendations. This is frequently done for a non-planning reason, obliging the local authority to find a policy to which it can attribute their decision.

“Applications refused on political grounds often end up being successful when taken to appeal, but this is a time-consuming and costly way to get permission,” she says.

Research published by flooring retailer Leader Floors in March exposed something of a postcode

lottery in the UK when it comes to obtaining planning approval. It conducted a nationwide audit of local authorities’ planning decisions over eight years and found that some councils were far more obliging than others. For instance, in East Hertfordshire, the London Borough of Hillingdon and the Essex town of Maldon, barely 60% of applications were approved, whereas more than 95% were signed off in the City of London, Wigan and even Northumberland National Park.

To illustrate the subjectivity built into the system, Manning-Marsh tells the story of a planning committee in Oxford, run by Labour councillors, that opposed their planning officer’s recommendation and vetoed the proposed construction of a primary school.

The development at issue was a so-called free school, part of the Conservative Party’s education policy. One member of the planning committee declared that they couldn’t support a Tory initiative.

The application went to appeal and the school opened a few years later.

Last, but not least, is the developer’s bane: section 106 of the Town and Country Planning Act 1990. In theory, the provisions of section 106 ensure that developers contribute to the community to compensate for the extra burden their projects are likely to place on local infrastructure. It should be a sum that’s calculated objectively, but that’s not always the case in practice.

“The process has been weaponised,” says one commentator, who prefers to remain anonymous. “If councillors want to block a development for political reasons, they make the section 106 obligations so onerous that the developer declines.”

The ‘not in my back yard’ (Nimby) instinct thrives in this environment. Even cabinet ministers can throw a spanner in the works.

Back at Enfield, the Labour-run council approved the plan proposed by Transport for London (TfL) to build four tower blocks, including 132 affordable flats, next to Cockfosters Tube station. Yet the project was vetoed in February by Grant Shapps, the transport secretary, at the behest of his colleague Theresa Villiers, the MP of Chipping Barnet, a neighbouring marginal constituency. Her objections focused on the design and scale of the development. Shapps used his powers under the Greater London Authority Act 1999 to block the project on the grounds that it would significantly reduce the number of car parking spaces on the site.

The mayor of London, Sadiq Khan, has instructed TfL to “consider all options” for getting the decision overturned. One of these could be to seek a judicial review.

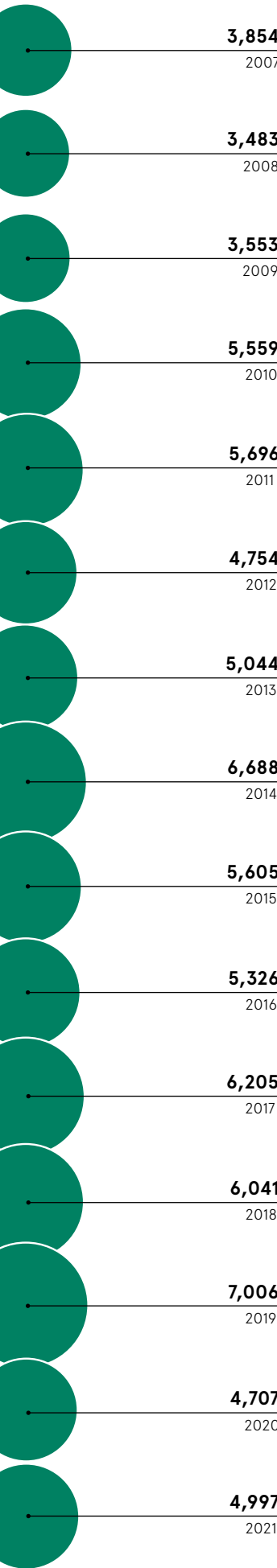
The overall cost of this byzantine system to the industry and nation is incalculable. The government itself readily acknowledges that change is needed. The housing secretary, Michael Gove, has been vocal about the “barriers that can gum up planning applications”. His predecessor, Robert Jenrick, recently admitted that the system “clearly doesn’t work. It doesn’t produce outcomes that anyone seems to support.”

The reforms that have been proposed – for instance, a revision of design codes and an infrastructure levy on big developers to fund local projects – are not enough, according to Jenrick, who believes that deeper changes are needed to “make any dent on the housing crisis”.

An effective solution will be tricky to find. For one thing, it will take political commitment to counter entrenched interests. Building more houses means taking on the powerful Nimby lobby and councillors who may have been elected on the strength of their opposition to local developments. Even simple improvements such as permitting mansard roofs demand a rethink from planners who decided – fairly arbitrarily – on design principles favouring flat linear skylines.

ARE WE SPENDING ENOUGH BUILDING NEW HOUSES?

Construction output value of new housing in the public sector in England, Scotland and Wales (in million GBP)



Office for National Statistics, 2022

Jenrick believes that the will in Westminster to take on such challenges is lacking, so it may be a while yet before the government applies itself to the task. It’s just as well that the sector is accustomed to long waits. ●



Connected construction steps closer

Following years of falling behind other industries, construction has woken up to the powers of digital transformation with companies moving closer to the vision of truly connected workflows

It’s no secret that the construction industry has historically been a laggard when it comes to the adoption of technology. Yet in the last five years, helped along by survival instincts during a global pandemic, companies have seen the monumental value of digitisation to their business.

Of course, the Covid crisis was a major accelerant of digital transformation across all parts of the economy and society, igniting years’ worth of technology investment in a matter of months. But few sectors were as enlightened by the capabilities of digitisation as construction.

Forced to really embrace connected technology for the first time, construction executives saw how advanced solutions can solve their most pressing challenges. These include labour shortages and supply chain disruptions, both exacerbated by the pandemic, and the growing pressure on organisations to limit their impact on the planet by being more environmentally sustainable.

“Almost every industry has been a faster adopter of technology than construction, but in the last five years the light bulb has finally gone off,” says Jamie Williamson, executive vice-president at Topcon Positioning Systems, whose technology significantly improves workflows. “Stay-at-home mandates necessitated the use of tools that gather data digitally and connect the office to the field, which demonstrated to construction firms how they can be more efficient and productive.”

“The smooth running of construction sites relies on supply chains operating as efficiently as possible, driven by data. Beyond that, by saving on time and labour these tools can also help companies deal with their well-known talent challenges, as baby boomers reach retirement and younger generations

are less forthcoming, as well as enabling them to act more sustainably.”

The holy grail of operational excellence in the construction sector has long been viewed, though seldom accomplished, as an ability to establish truly connected oversight across all on-site operations, fed seamlessly back to the central office location. A silver lining of the pandemic was that it provoked vital awareness and education that cost-effective tools now exist to achieve this.

Further education is, however, still required. As well as offering tools with these capabilities, Topcon has built an e-learning platform filled with informative content for its customers, distribution, support desks and sales teams. This is supported by efforts to grow the distribution further to create more interaction points at which construction firms can learn from the experts.

One of the biggest technology challenges in construction is trying to get the many disparate tools to integrate and talk with each other. Beyond its own intelligent workflow technologies, Topcon has also formed a joint venture with Bentley Systems, called Digital

Construction Works (DCW), to help make connected construction a reality. DCW not only connects different tools but automates workflows with alerts and creates centralised dashboards full of rich insights, powered by data across construction sites, to inform better decision-making. DCW connects the job site machinery and tech with the office planning and design applications.

“The most connected and successful construction companies will seamlessly connect workflows through their organisation,” says Williamson. “Historically you’d buy one control system for a bulldozer, that bulldozer worked every day to grade a building pad and then you moved onto the next task. Nothing came before and nothing connected after from a digitalisation perspective – and therefore nothing was really learnt. Moving forward, everything will be recorded digitally in real time by machines that constantly feed information about tasks back to the office.”

“That then allows, for example, the accounting group to invoice the work that was done that day, improving cash flow by weeks or months as well as enhancing understanding of what happened in the field and what needs to be done next. That’s a big evolution and for that reason the future of construction is brighter than ever. The labour issue is not going away. The sustainability issue is not going away. And the need to be efficient will not go away. To be competitive, companies must adopt technology, and more and more of them are becoming aware of that fact every day.”

For more information, visit topconpositioning.com



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Jessie Casson via Getty Images

DIVERSITY AND INCLUSION

Caution: women at work

Construction companies want to attract more women into the industry. But there is a lack of female role models and clearer routes to the top

David Benady

A woman's place is on a building site, according to a growing number of female engineers, site managers, quantity surveyors and architects. Women have made substantial inroads into construction industry jobs over the past decade, but there's a long way to go to make this male-dominated, testosterone-driven industry more inclusive and diverse.

Females are climbing to the top as crane drivers and showing their mettle as steel fixers. But when it comes to trade roles such as bricklaying and pipe fitting, women make up a tiny proportion of the staff – under 1%.

Former carpenter Kath Moore is managing director of Women into Construction, a not-for-profit group which runs training schemes with building companies to help them hire more women.

"There are real opportunities women can take part in and we have no trouble recruiting them," says Moore. "Construction is a

well-paid job and offers great opportunities for progression."

Overall, women make up about 12.5% of the UK's construction workforce, mainly in engineering, design and administrative jobs. The industry has launched a push to increase female participation with some firms committing to achieving a 50:50 male and female ratio. Construction company Wates Group has announced it is working with WiC to bring 125 women into the industry by 2025.

Women are put off the industry partly by fears of on-site sexism – 72% of female construction workers in a survey said they had experienced some form of gender discrimination in 2019. There's also a perception that it is back-breaking, dusty, dirty work.

"Because there are so few women in the trades, there isn't much in the way of a role model for other women," Moore notes.

"We are certainly seeing more women interested in engineering,

quantity surveying and construction management roles. Some of the women we have on site have said having more women in those senior positions makes for a much more pleasant site environment and makes it easier for them as tradeswomen to be accepted and get on with their work."

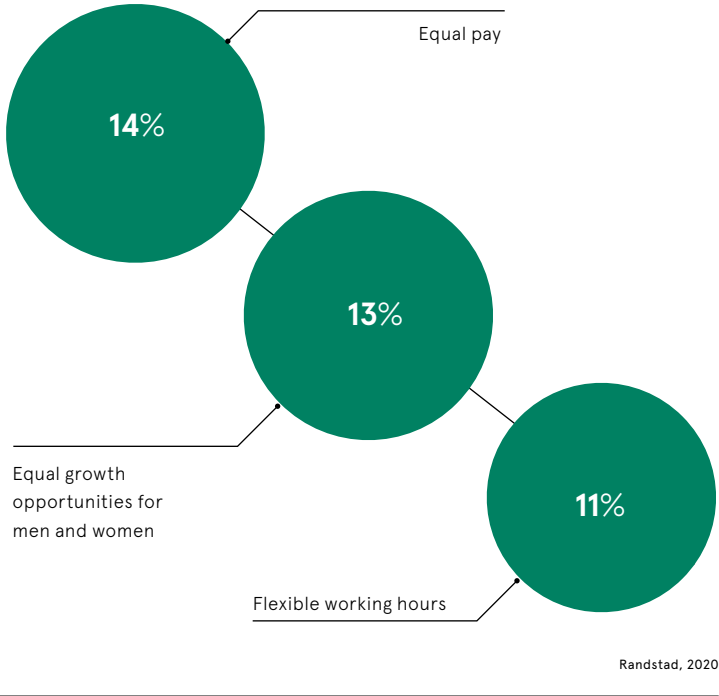
Other countries are making strides in recruiting women to construction. In the more heavily unionised US and in Australia and Scandinavian countries, women have higher



It's important to have a diverse workforce because you get a more holistic view of how the buildings are used and need to be designed

HOW TO GET WOMEN TO STAY IN CONSTRUCTION

The top three reasons identified by those working in construction roles as the most important factors to help women stay in the industry



representation, Moore says. "We are lagging in this country," she adds.

WiC is working with construction companies to run courses for steel fixers, who arrange steel structures for buildings, and for form makers, who make the moulds for concrete.

The industry still has few senior female leaders, though this is gradually changing. Earlier this year, housebuilder Taylor Wimpey promoted operations director Jennie Daly to chief executive, working alongside chairman Irene Dörner. Meanwhile infrastructure services company Amey is led by CEO Amanda Fisher. But there are precious few examples of female leaders among senior staff in construction. To attract more women, having well-defined routes to promotion and some strong role models in senior management roles will be vital.

One advocate for female trade roles is TikTok influencer Darcie Richards, a bricklayer whose videos encourage women to get involved. She shows the fun side of working on a building site – working outdoors, the sense of achievement in finishing a job, the fascination with the different techniques involved. This type of social media advocacy is important in attracting a more diverse workforce into the industry.

An important driver for increasing female participation is the skills shortage which is hitting construction. With fewer European workers after Brexit and the pandemic, and many construction and engineering staff reaching retirement age, the industry faces a staffing crunch as many significant building and infrastructure projects get under way. But improving diversity has broader positive effects too, says a spokesman for construction company BAM.

"The benefit of having more women is that it enriches the quality of decision-making on construction projects," he says.

As a building management company, BAM works with clients and companies on building stores, hospitals, leisure centres and offices. "The public are using the facilities on a

daily basis, so it's important to have a diverse workforce because you get a more holistic view of how the buildings are used and need to be designed and built to satisfy the people who are using them. This is how you get a richness of decision-making that isn't male-centric," he says.

He adds that there is evidence that productivity goes up when you get more women in the workforce.

Persuading more girls to consider careers in construction is a task for schools and parents alike. Lucy Ellis, a geotechnical engineer working on rail infrastructure at Laing O'Rourke, says she was encouraged by her father, himself an engineer and able to help her get work experience.

Her work for Laing O'Rourke involves problem-solving on sites, leading contractors and making sure work is undertaken in a safe manner.

Ellis believes attitudes about women in construction are lagging behind the reality.

"The outside perception of the industry is changing at a much slower rate than the industry itself.

"We're also bringing in a wider community of minorities, ethnic minorities and disabled people. We're making this industry more approachable for people who previously didn't feel it was for them," Ellis says.

While there may still be a fair number of sexist dinosaurs in the industry, she says that in her experience most male colleagues have been more than happy to help their female co-workers.

"Females aren't coming into the industry and being pushed out by males" she says. "During most of my career, the men I've worked with have pulled me up and helped me get to the position that I am in today and they are really encouraging future generations whether that be their daughters or helping with recruitment events."

To attract more women, the construction sector needs to breed new kind of man too: those who are committed to making the aim for diversity a reality. ●

Inside the sustainability impact of dynamic glass

Companies looking to improve their sustainability credits in every aspect of their business shouldn't discount the impact of smart materials and products

The problem for many businesses seeking to reduce carbon emissions is that they have done many of the obvious measures, such as reducing energy usage, recycling where possible and eliminating waste. But there are still plenty of ways in which to go further, including thinking about how offices are designed and used.

One method is through the use of liquid crystal glazing, which can be deployed on both external and internal windows to help create the optimum conditions for people to work in. Solar shading glass, like that developed by eyrise, uses a transparent liquid crystal mixture which is placed between two glass sheets coated with a transparent conductive film.

When voltage is applied, the crystals change their orientation and a specific amount of light is transmitted, as requested by the user. This means workers can avoid having sun blazing in at the height of summer, reducing the need for air conditioning, while also being able to draw on its heat to warm the building in cooler conditions.

For those commissioning buildings, such as architects or landlords, such technology can help comply them with a wide range of environmental standards and certification including the Swiss National Sustainable Construction standard, the German DGNB certification, Leadership in Energy and Environmental Design, Well certification,

The winners will be the companies that have the courage to embrace new technology. This is the future of sustainable offices

Sustainable design in action

When the British Academy of Film and Television Arts (Bafta) looked to update its home at 195 Piccadilly building in London, it decided to implement instant solar shading technology for a newly created fourth floor.

Using eyrise's liquid crystal technology, it installed 82 windows of different shapes and sizes to glaze two restored Victorian rooflights in what are now known as the Richard Attenborough Rooms.

Along with other improvements, the installation has helped the building – built in 1883 and home to Bafta since 1976 – achieve an Energy Performance Certificate (EPC) rating of B.

"At the start of the project, our Victorian heritage building had old

technology and original features which leaked heat, giving us a high EPC rating," says Pauline Campbell, Bafta's head of property. "Putting in a fully glazed roof was a challenge if we wanted to concentrate on sustainability.

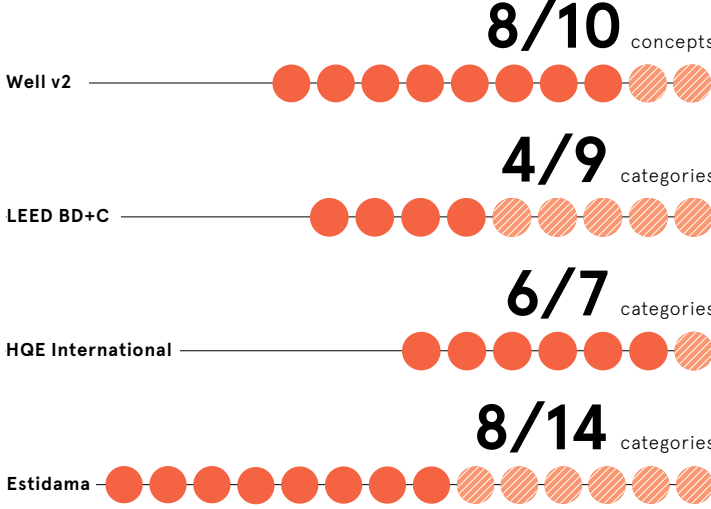
She adds: "The new rooflight structures developed by eyrise can automatically adjust the shading of the glazing to reduce solar gain, resulting in a lower cooling requirement. This is controlled so that the solar gain can be limited when not needed but can also be actively allowed to heat the space when heating is required." The project yielded a UK EPC rating of B48, comparable with that achieved by new builds.

Commercial feature



POTENTIAL CONTRIBUTION ON GREEN BUILDING CERTIFICATION WITH EYRIS

Green Building certification (project specific and subject to the interpretation of the certified auditor)



glass partitions or internal windows into private areas. Just like the solar shading glass, it uses licrivation, a transparent liquid crystal mixture that is put between two glass sheets coated with a transparent conductive film. When voltage is applied, the crystals have the freedom to move between the glass panels and create a perfect orientation, resulting in high transparency. Without voltage, the crystals are in a random pattern that blurs the view.

This gives businesses the ability to transform areas that are either open-plan or breakout areas into private meeting rooms. From a sustainability perspective, this means better use of space, potentially reducing the need to take out larger premises or even to construct a new building entirely; something that creates significant amounts of carbon. Employees benefit from greater flexibility around the

use of space and light, while landlords again can offer a better facility.

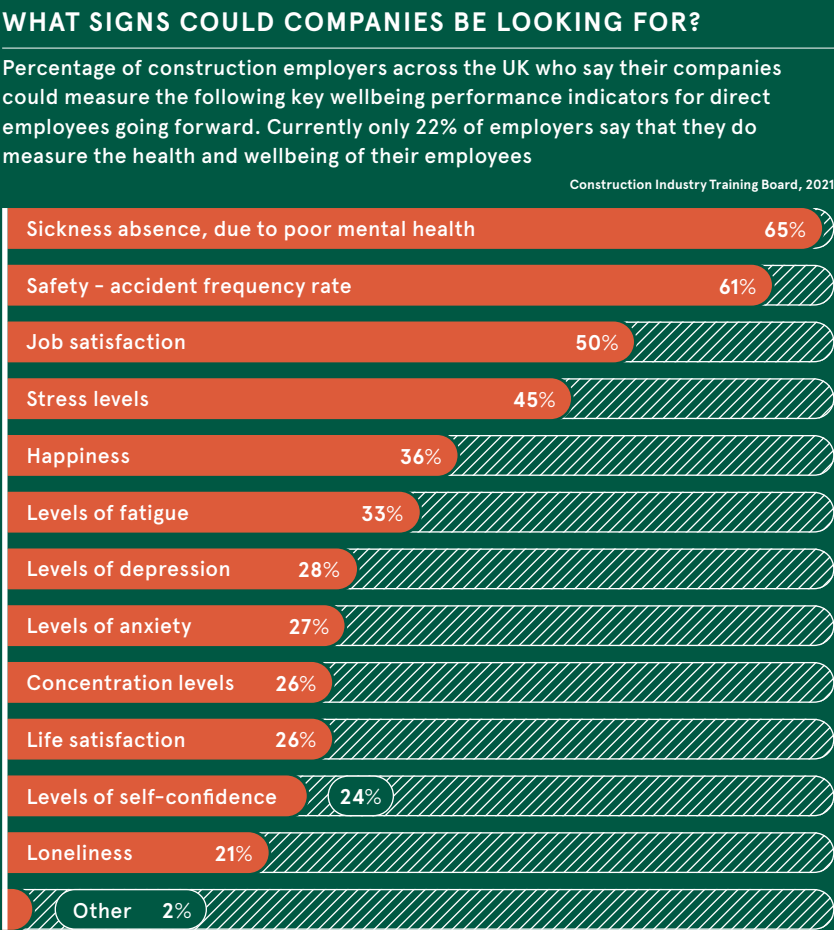
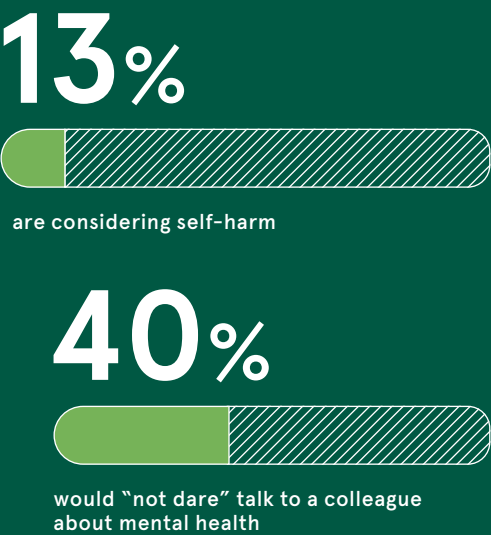
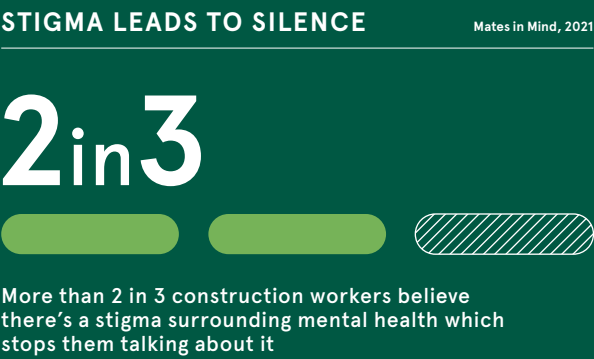
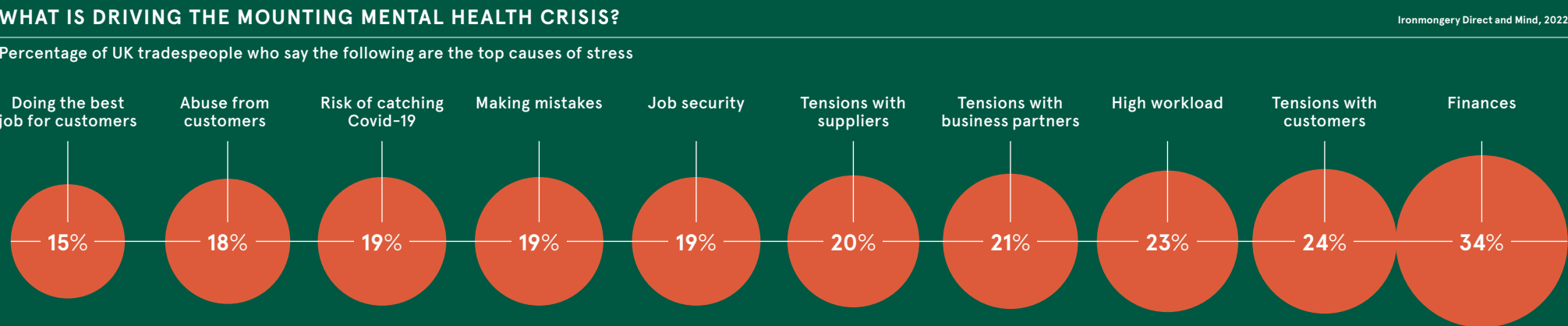
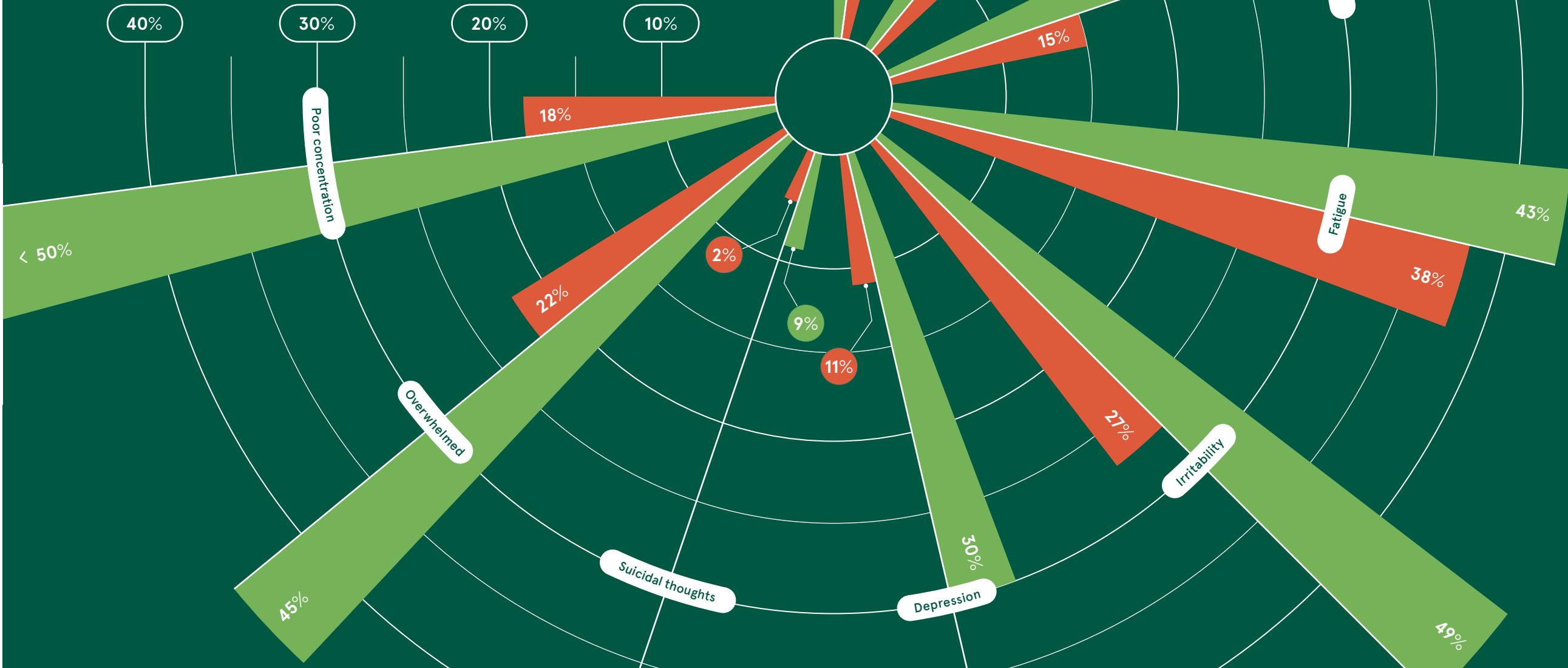
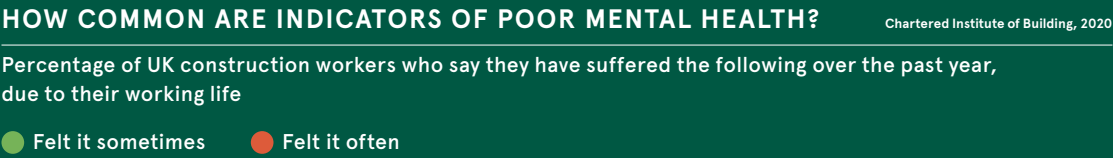
By rethinking how we design buildings and use our workplaces, it's possible for investors, landlords, businesses and employees to play their part in helping to cut emissions and create more sustainable and pleasant working environments. "As innovators in this space, it's clear the winners will be the companies that have the courage to embrace new technology," says Glipa. "This is the future of sustainable offices."

To find out more about how eyrise could help your building or business, visit eyrise.com



STRONG FOUNDATIONS?

According to the most up-to-date numbers from the Office for National Statistics, 589 tradespeople died by suicide in 2020 in England and Wales, nearly two every day. From Covid to the cost of living crisis, the people who build our homes and cities are struggling from increasing external pressures and mounting levels of stress and depression. So just how big is the problem and what should employers be doing to help?



OFFSITE CONSTRUCTION

Offsite construction builds in sustainability

Labouring in the cold, wind and rain, short on skills and surrounded by skips, is not the future for sustainable construction. But there is another way: it is called MMC, and it happens offsite

Jim McClelland

Construction is awash with sustainability targets, and the climate emergency means both regulatory pressures and market expectations are rising like sea levels.

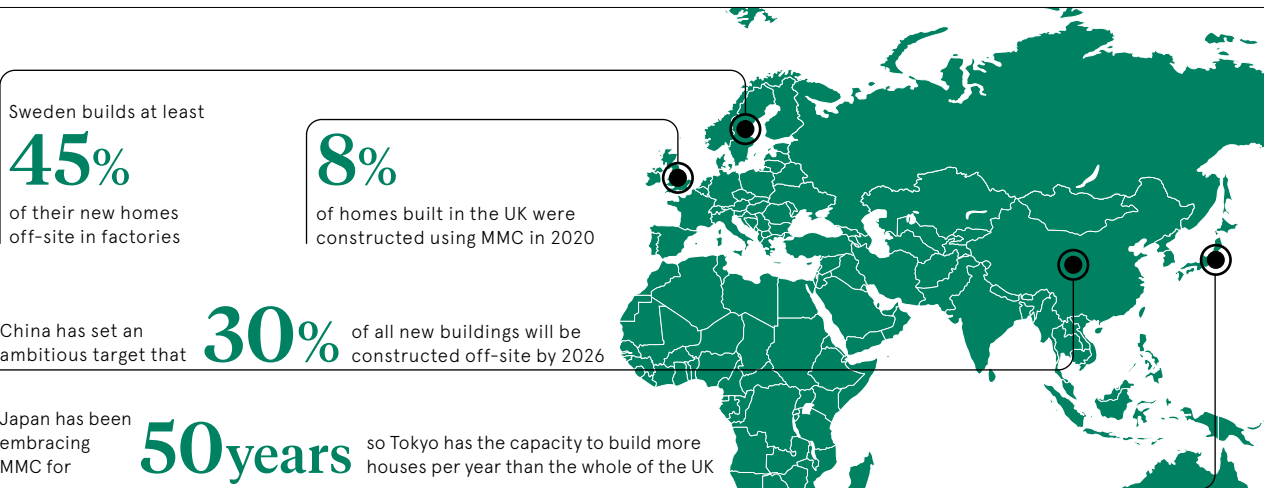
The problems are not new, though. Back in 2013, the UK government published its industrial strategy [itals] Construction 2025[end itals], which set out clear targets for lower costs (down 33%) and emissions (50%), plus faster delivery (up 50%).

With a focus on productivity and labour issues, the Farmer Review followed in 2016, provocatively entitled

Modernise or Die. Among 10 headline recommendations, the report challenged the industry to invest in R&D and innovation to support manufactured technologies, rather than traditional building methods, particularly in the housing sector.

These offsite systems and methods – including modular and volumetric solutions, structural insulated panels, plus design for manufacture and assembly (DfMA) – offer the prospect of building and engineering in factory conditions with greater efficiency and less waste, more quality control and less snagging.

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This can make delivery faster, cheaper, safer and greener. So, what's not to like?

Well, anything that threatens the hegemony of business-as-usual will encounter resistance from the industry old guard. When the palette of design options appeared limited in the early days of MMC, offsite solutions were tagged as 'boxy'.

Pigeonholed as only fit for budget builds and projects with multiple

unit repetitions, MMC became associated with no-frills hotels, student accommodation and prisons. While it might be perfect for schemes seeking economies of scale; it is also much more than that.

Myth-busting is still required. For instance, there is a perception that a standardised approach to building could stunt the creativity of architects when the opposite is true, argues Russell Haworth, CEO of global technology platform NBS.

"Take the example of Lego; its success lies in its simplicity. Yet, within that structured framework, it opens the door for almost infinite creative options – building everything from Hedwig, Harry Potter's owl, through to the Millennium Falcon, the iconic Star Wars craft."

Advances in robotics, automation and mass-customisation nowadays mean components can offer almost infinite design choices, with shorter production runs. Versatility is booming, regardless of whether the primary building material is concrete, timber or steel. The resulting award-winning designs come in all shapes, sizes and sectors.

In education, for instance, there are the timber-clad curves of the

“Delivering building elements in a controlled environment allows us to ‘get it right, first time’

£4.4m expansion to Addington SEN School, Reading, designed by HLM Architects and built by Reds10, housing, the sustainability skills of architects Bryden Wood won acclaim for realising the development potential of a problematic site at Churchwood Gardens, London.

For delivery at speed and scale, though, investment is critical. Despite a challenging start, Legal & General has recently announced further multi-million-pound investments into its modular housing arm. Housebuilder Weston Group has also sunk £35m into its British Off-site operation, creating more jobs at a



Small is scalable for rooftop living

In Bristol, planning approval has just been awarded for an innovative proposal to create 15 new low-carbon, affordable eco homes, utilising modern methods of construction (MMC). But this is not your typical offsite build, as it will be constructed using straw-bale and timber panels up on the roof of the city-centre offices of the client, a charity that works with formerly homeless people.

Complete with food-growing and shared amenity space, the scheme for Emmaus Bristol is being driven by the urgent need to respond to both the housing crisis and climate emergency. The design approach taken to tackle

these sustainability concerns is different, though, suggests Craig White, CEO of project delivery partner, Agile Homes. "Agile goes about it by thinking small and scaling fast, to deliver housing as if people mattered. We work with MMC in a way that respects people, planet, profit and purpose."

Unlike scenarios involving capital-intensive investment in big factories, Agile's model of distributed manufacture optimises the making of build-systems for local job creation. Properties must also be constructed using renewable, carbon-capturing materials – in this case, prefabricated panels made of chopped and compacted straw for insulation.

In addition, by unlocking land on a rooftop site, the accommodation can be made affordable for those in housing need, via simple finance options.

The aim of the project is to deliver people-centred solutions that are adaptive to need, performance and market demand. Small, but scalable, the versatility of MMC is what makes this vision possible.

brand new factory alongside the facility it already runs in Essex.

Even Ikea is getting in on the act, partnering with Swedish construction giant Skanska on its Scandinavian BoKlok homes concept, which is fighting off the flat-pack association in places like Worthing and Littlehampton, in West Sussex.

This creativity and growth need not come at the cost of quality.

Being less labour-intensive, standardisation not only helps drive up quality, but also shortens timeframes, especially when phases of work are undertaken concurrently in factory conditions, with no delays due to inclement weather or skills shortages.

Taking these multiple benefits together, projects utilising MMC can prove faster than traditional builds and require fewer deliveries to site, so minimising neighbourhood impact.

Energy is another area of potential efficiency gain with offsite – in terms of embodied energy, thermal performance, and decarbonisation. Wider factors are in play here, though, explains Simon Richards, head of sustainability, at Sir Robert McAlpine.

"Delivering building elements in a controlled environment allows us to 'get it right first time'. This means we use fewer materials, emit less carbon and drive efficiencies. The level of quality and performance control will also help us to drive down operational energy emissions."

“The success of Lego lies in its simplicity

Ultimately, many of the barriers to uptake are not architectural or technological, says Adam Sanford, operations lead South East and London, at Southern Construction Framework. The issues are systemic and call for revolution, not evolution, he adds.

"Offsite isn't just cabins and doesn't have to cost more. However, traditional construction supply chains aren't geared up for manufacturing-based solutions – a sea change is required. The dire need to decarbonise the built estate poses challenges unique in scale and scope; it also presents unparalleled opportunities for market disruptors."

Employing lean manufacturing techniques to minimise material consumption and waste is one such opportunity afforded by offsite solutions. This is a major industry concern and a critical sustainability metric, given official statistics that show construction, demolition and excavation generate more than three-fifths (62%) of total UK waste.

Looking beyond mere factory efficiency, the onus is on the building sector to take a proactive stance on waste by designing for deconstruction, concludes James Ellis, Construction Industry Group chair at the Chartered Institute of Marketing. "The future for offsite needs to embrace the circular economy – making sure construction considers disassembly either as complete panels for reuse, or through the layering of systems to allow for disassembly down to their singular parts."

This is construction reimaged as intelligent closed-loop manufacturing, complete with a product take-back. This is the built environment of today, leveraging digital tools to deliver on sustainability goals, for a net-zero tomorrow. This is MMC. ●



Building a cleaner future

The construction industry needs to reduce its carbon footprint urgently. A transparent, data-driven approach will help developers make the right decisions for a more responsible future

Construction has one of the highest carbon footprints of all the industry sectors. A McKinsey Sustainability report published in January found that 10% of global GDP is in sectors with high-emissions supply chains, including construction. And it is embodied emissions, as well as operational emissions, that must be reduced if the industry is serious about meeting net-zero goals.

Embodied carbon emissions come from the carbon footprint of materials. This can be measured throughout the entire supply chain, taking into account extraction of materials, transport, refining, processing, manufacturing, fabrication, usage and end-of-life disposal.

For construction, carbon footprint calculation can be complex and embodied emissions need to be considered. The supply chain includes cement and steel industries, which together account for 14% of global CO₂ emissions. The drive towards greener buildings requires construction companies to adapt to new techniques, technologies and materials.

An important first step in decarbonising the construction industry is to ensure companies understand their carbon footprints.

Digital transformation has revolutionised how data is managed across multiple industries and construction is no exception. An engineering platform that enables data gathering and analysis will help construction industry professionals understand the environmental impact of their projects and make good decisions before anyone sets foot on a building site. KBR CleanSPEND is one

such technology that helps the construction industry from project inception through to completion, with analysis of lifecycle carbon emissions and data that distinguishes embodied and operational emissions.

David Cole, director of KBR Project Solutions, said the proportion of embodied carbon emissions is "relatively low, but it is expected to increase as the grid decarbonises, the pressure to build new energy facilities increases and operational emissions decrease."

Improving the entire process is essential for a sustainable circular economy. Steel, for example, is 100% recyclable, but recycled steel only accounts for 30% of global steel demand. Traditional production of one tonne of steel creates 19 tonnes of CO₂, compared with 0.1 tonnes of CO₂ from one tonne of recycled steel produced using renewable energy – this stark comparison highlights the importance of examining embodied emissions.

Cole, and the team at KBR Project Solutions, who invented KBR CleanSPEND, described recycled steel as "a permanent material that underpins the economy, while contributing to environmental goals by reducing the use of virgin raw materials, as well as CO₂ emissions."

Regulatory compliance with stringent environmental standards across different markets makes the need for responsible construction practices more important than ever. In the UK, for example, as well as rigorous new standards for buildings, construction processes need to become cleaner and greener. The Royal Academy of Engineering's September 2021 report, 'Decarbonising Construction: Building A New Net Zero Industry,' recommends reusing building materials when possible, using non-fossil-fuel-powered machinery on construction sites and reducing reliance on imported building materials.

Meanwhile, the EU's Carbon Border Adjustment Mechanism is a climate measure that will have an international impact on construction industry supply chains. EU importers will buy carbon certificates that correspond to the carbon price that would have been paid if the goods were produced under the

bloc's carbon pricing rules. In contrast, non-EU producers that can show they have already paid for carbon used in the third-country production of imported goods can have the corresponding cost deducted for the EU importer. This aims to encourage non-EU operators to green their production processes.

A recent McKinsey report, 'Seizing the decarbonisation opportunity in construction,' found: "Design is the most important factor in determining greenhouse gas emissions ... The ability to influence emissions is highest very early in a project and before construction has started." To do this effectively and transparently, finding best practice ways to calculate the carbon footprint of a construction process from the beginning is essential. Comprehensive, data-driven measurement solutions will give companies the insights they need to reduce emissions during the entire construction project. Underpinned by cloud data services and analytics, KBR CleanSPEND allows operators to enter internal and external data and the carbon footprint is calculated based on rules set within the platform. Results, analysis and scenario analytics delivered quickly in a clear format.

If the construction industry is serious about meeting ambitious carbon goals in time for the 2050 net-zero deadline, it needs the right tools for measuring and mitigating environmental impact. It is imperative that a data-driven process of measurement and analysts starts at the design and planning stage, rather than trying to reduce emissions on an ad hoc basis during construction. Solutions such as KBR CleanSPEND will play an increasing role in making smart decisions at the right time for a greener global construction industry.

To find out more, please reach out to David Cole [vialinkedin.com/in/david-cole-kbr](https://www.linkedin.com/in/david-cole-kbr)



Intelligent solutions to digitally decarbonise construction

With a climate emergency officially declared by over 300 councils around the UK, the public sector building programme is looking for answers to its carbon problem

Construction has a problem: carbon. According to the World Green Building Council, the built environment is responsible for 39% of all carbon emissions. To put that in perspective, the global aviation industry accounts for little more than 2% of anthropogenic CO₂.

Climate action is now the new normal

Of course, climate change is not a new problem for business, in general; or construction, in particular. Morgan Sindall Construction, for example, has been operating at the forefront of action to decarbonise the built environment now for more than a decade. The firm is part of the construction and regeneration business Morgan Sindall Group, which has set itself an ambitious target to achieve net zero carbon emissions by 2030. In recognition of its efforts, the group was awarded an 'A' score for leadership in 2020 from CDP, the not-for-profit charity that runs the global carbon disclosure system, and for the second year in a row, were recognised in the Financial Times Statista Climate Change Leader list, which looks at firms who've achieved the largest reduction in greenhouse gas emissions intensity.

In today's market, addressing corporate responsibilities to both the planet and society are fast becoming the new normal for success in the built environment and the business case is clear, says Pat Boyle, managing director at Morgan Sindall Construction: "Enhanced by a strong focus on social value, our ambition is to be the most sought-after and sustainable business in our industry. Central to this vision is our strategy for decarbonising communities, which underpins and aligns with our own net zero targets."

Bringing it all together under the banner of Intelligent Solutions, the overarching approach is for Morgan Sindall to combine digital and platform design capabilities, along with modern methods of construction (MMC) and

innovative carbon reduction tools, to create unique, sustainable, and inspiring places for its customers.

How do these principles actually manifest in practice, at a project level?

Lessons in fast-track school building

In 2021, Morgan Sindall had no fewer than 30 digital construction projects live on site, plus another 36 in pre-construction stage, with a total value of £1.55bn.

In Aylesbury, the new 1,080-place Kingsbrook Secondary School, complete with sixth form and additional special educational needs unit, is on schedule to open in time for the new academic year in September 2022.

Valued at £35m, this low-CO₂ project is being built in accordance with Buckinghamshire County Council's commitment to achieving zero carbon by 2050. It features renewable energy generation from solar panels that will produce around 28,600 kWh per year.

As its Intelligent Solution, Morgan Sindall opted for MMC, using structured insulated panels (SIPs) for all areas of external wall buildup. Made from a recycled material, SIPs are both quick to install and offer long-term energy efficiency. They enhance the building's thermal performance over time and improve air tightness. This will make the school easier and cheaper to heat and maintain, cutting CO₂ emissions and running costs.

Innovative modular technology has also been deployed to create much-needed pupil places across a trio of new primary schools in Derby. Hackwood Primary Academy, Highfields Spencer Academy and most recently Ravensdale Infant School, all needed to be designed, procured and delivered on a tight timeline, and off-site manufactured modules offered the perfect Intelligent Solution.

On education sector projects where speed is of the essence, Morgan Sindall can use its MySchool solution to fast-track the design stage. This was especially important on the 600-place £17m



“In effect, sustainability is a team game. As good as any team might be, however, it needs the tools to do the job

at every turn, as well as the critical input of the industry's best consultants.

In effect, sustainability is a team game. As good as any team might be, however, it needs the tools to do the job. This is why, as part of its Intelligent Solutions approach, Morgan Sindall has developed its digital carbon modelling tool CarboniCa.

Externally validated by leading global consultants Arup, CarboniCa measures whole-life carbon emissions at the project design and construction stages, also entire building lifecycle. Since its launch last year, it has enabled Morgan Sindall to save hundreds of thousands of tonnes of carbon being emitted into the atmosphere.

To render such volumes achievable, this tool pinpoints exactly where carbon savings can be made, putting customers in a position to make environmentally friendly and climate-forward decisions based on meaningful and robust data.

This is what makes solutions intelligent: they ensure responses to the climate emergency are informed by science and engineering, not just good intentions and guesswork.

Why twinning is winning on carbon

Pushing the envelope still further on sustainability, Morgan Sindall has worked with leading businesses from across the built environment on a groundbreaking digital twin project.

Known as Circular Twin, the initiative has involved digitally revisiting the building process on an already-completed school, reworking the scheme to lower carbon, start to finish.

The study was able to explore radical experimentation with new working methods, notably showing how the ultra-early alliance of designers, clients, contractors, and the supply chain leads to significant cuts in whole-life carbon for modest capital cost uplift.

In comparison to the original school, built as recently as 2017, Circular Twin achieved a significant reduction in whole-life carbon, upfront embodied carbon, annual energy consumption and forest consumption, as well as delivering capital expenditure within standard budgetary parameters over an asset's lifetime.

The project effectively broke the procurement conventions that typically shackle carbon-reduction innovation, to reap huge potential benefits. Tim Clement, head of carbon and environment, at Morgan Sindall Construction, says: "Circular Twin represents a true industry-first for innovation and a credible template for a revolutionary new approach to project delivery in the built environment. It is possible to cut carbon and save energy, at accessible cost – and we now have the hard data to prove it."

To find out more, please visit morgansindallconstruction.com

MORGAN SINDALL
CONSTRUCTION

SUSTAINABILITY

Greener construction starts with government

The government should make building standards greener and offer tax breaks for companies taking the lead in more environmentally friendly construction

Sean Hargrave

It is hard to find anyone in construction who does not agree the industry needs to be greener. According to the Royal Academy of Engineering, the industry is responsible for 11% of global CO₂ emissions and, in the UK, the built environment for 40% of carbon emissions.

Construction knows it needs to change. The question is, how? At the heart of the challenge is a series of governments that have made policy promises to deliver new homes, such as Boris Johnson pledging 300,000 new homes each year. With little more than a half of that figure completed in 2021, it is a challenge for the government to insist on greener standards without impacting supply and affordability.

This is likely to be the reason why a previous Labour policy of making all new homes net zero from 2016 was scrapped by the Conservative government in 2015. The policy has now been watered down to requiring new homes to be "net zero-ready" from 2025. Instead of being net zero when released to market, houses will simply need to demonstrate they are capable of becoming net zero.

Richard Sterling is head of land and development at Willmott Dixon. He sums up the problem as simple economics and is not confident of a solution anytime soon without government intervention.

"Commercial viability is a key consideration," he says. "Building greener comes with a premium, but it is difficult to capture any uplift in

revenue to offset it. The industry is relying on someone in the supply or value chain to take a greener view on a long-term investment. That is all well and good, but it will never ramp up to see industry-wide delivery of greener buildings."

For Sterling, the only solution is for the government to offer better incentives for builders and buyers. These could include preferential interest rates for mortgages on environmentally friendly new-builds, and harmonised standards on what constitutes green building so that tenders can be compared like for like on their sustainability credentials.

Standards may sound like a small point but are the elephant in the room for an industry limited to a system focused on measuring the performance of a building once it is occupied. By measuring just the carbon released by a new home after it is sold, rather than including the embedded carbon produced in building it, the current system of Energy Performance Certificates is little more than a "green herring", according to Chris Gardner, joint CEO of property finance firm Atelier.

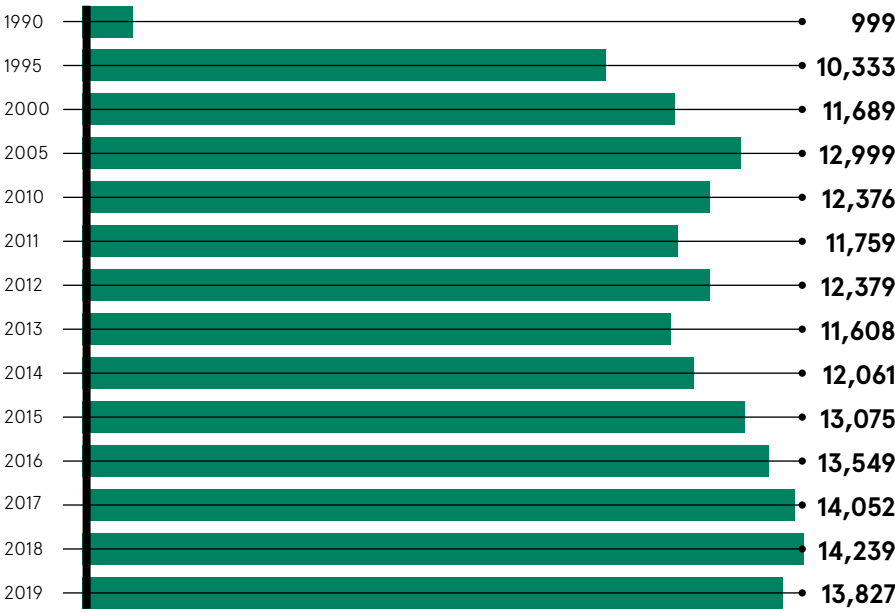
He is calling for the government to switch to a certification regime that covers a project's 'embedded' emissions, those incurred in the building process, so certification can reward good practice and encourage investment from funds dedicated to financing green building projects.

“Will the pace in adopting greener building standards will be led by investment firms



WILL CONSTRUCTION'S CARBON FOOTPRINT CONTINUE TO GROW?

Greenhouse gas emissions from the construction industry in the UK (in 1,000 metric tons of carbon dioxide equivalent)



Office for National Statistics, 2021

"If the government is serious about helping the construction industry get to net zero, we need a robust benchmark that takes into account operational and embodied carbon," he says.

"Two of the most commonly used construction materials – concrete and steel – can be carbon-intensive. But a newly built, well-insulated home could feasibly be awarded an EPC 'A' rating because of its energy efficiency. This would be entirely misleading because the climate impact of the construction process would be overlooked."

If the government genuinely wanted to have an immediate impact on greener house building, the most obvious tactic would be to reappraise stamp duty, says Ian Pritchett, MD of Greencore Construction.

"The government needs to look at the economic drivers that would encourage builders and buyers to go green," he says.

"If you didn't have stamp duty on a zero carbon house, developers would automatically start building them because it would make them more attractive to sell. Plus, every new house has a Community Infrastructure Levy, or CIL. If you didn't have CIL on zero carbon housing, builders would be encouraged to build greener homes. The government just has to go back to the basic economics of making the things they want people to do more attractive and, and the things that you don't want people to do, less attractive."

In the commercial building industry, the tax system could similarly be used in promoting the retrofitting of buildings, according to Madeleine Loughrey-Grant, group director, legal, tax, governance and sustainability at Laing O'Rourke.

New-builds may get a break on VAT, but retrofitting existing buildings does not, even though it is a significantly more environmentally friendly practice.

Additionally, Loughrey-Grant believes the single biggest step the government could take is to use its

considerable buying power, as a commissioner of buildings and infrastructure, to insist on better practice.

"The government needs to align procurement with its environmental aims," she says. "I've spoken to ministers and know how they truly want to make construction greener – yet this isn't built into the design stage of the buildings and infrastructure they commission."

"One part of government just needs to talk to the other. When that doesn't happen, it means that if you're trying to do the right thing – and be more environmentally friendly – you're compared with bids that don't match your potentially more expensive greener proposal."

Such a move would see construction firms asked to bid on a like-for-like basis where the carbon footprint of an entire project is considered when it comes to awarding the contract.

The same policy could also be used by local councils when commissioning buildings and infrastructure, as well as approving planning proposals.

Without such a move, Laing O'Rourke's Loughrey-Grant fears green aspirations will continue to be an afterthought, rather than an integral part of the design specification. Like many in the business, she firmly believes positive change is coming. While the industry waits for the government to align environmental ambitions with greener building standards, possibly with the addition of tax breaks, she believes the pace in adopting greener building standards will be led by investment firms.

With financial institutions awash with funds earmarked for green investments, a future is dawning where only those construction businesses with green credentials or a clear transition plan to net zero building will be the recipients of investors' money.

The rest will simply be "uninvestable", she predicts, and ultimately unable to compete. ●

CIRCULAR TWIN TECHNOLOGY CAN HELP CONSTRUCTION FIRMS DECARBONISE

67% reduction in whole-life carbon

72% reduction in upfront embodied carbon

52% reduction in annual energy consumption

72% reduction in forest consumption (including products and offsets)

Morgan Sindall Construction, 2022

SUPPLY CHAIN

Construction industry hammered by enduring material shortages

Are global supply chain issues merely temporary or here to stay? How can the sector overcome them?

Johanna Parsons

The construction industry has experienced a troubled recovery from the pandemic. Trade tariffs, congested logistics routes, labour shortages, the unavailability of labour and even climate change are hindering recovery in the construction sector. But the most obvious legacies of lockdown are the shortages of construction materials and unprecedented price hikes.

“The volatility in construction material prices experienced this year is unprecedented,” said Henry D’Esposito, JLL Research Manager, Construction in the executive summary to the firm’s 2021 *Construction Outlook* report.

“The increases in lumber and steel prices are by far the largest recorded through available government data back to 1949. For other commodities the records are more recent: aluminum prices have not increased this fast since 1995, plastic since 1976, copper since 2010. The inauspicious distinction this year is that all the records are being broken at the same time. Average material prices for a commercial project increased an astounding 23% in the 12 months prior to August 2021,” said D’Esposito.

It’s tempting to explain such stark statistics as Covid-related. But there are long-term issues at play and no sign of immediate bounce-back.

“The speed of recovery from the pandemic is slower than hoped for as the Purchasing Managers’ Indices indicate,” says Duncan Brock, group director of the Chartered Institute of Procurement and Supply (CIPS). He believes that the scarcity of supplies is unlikely to abate any time soon.

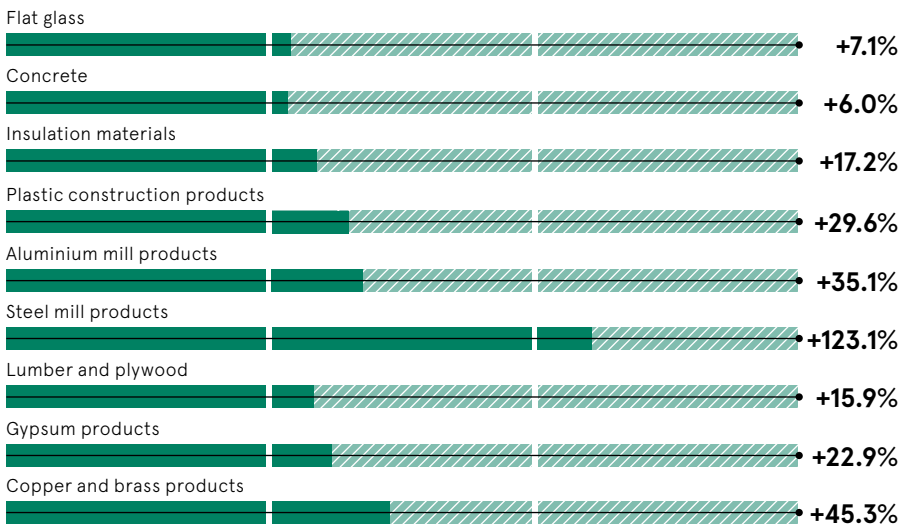
“The Bank of England governor has warned that the UK is likely to go into recession towards the end of the

year... This is worrying and supply chain managers will have to draw on their creativity in the sector as housing affordability rates for housing, for instance, are likely to be affected.”

SKYROCKETING COSTS NOT A UK-ONLY PROBLEM

JLL, 2021

The percentage change in average cost of the following construction materials in the US over the last year



Covid is an obvious reason for the shortages in construction materials. Worldwide lockdowns shut down building sites and factories alike. But while construction has reopened, the processes that facilitate the trade are still faltering. Ongoing lockdowns in China mean that much of its manufacturing is stalled.

Of equal, if not greater importance, the logistics and supply routes that run through the country have been hit hard. Ports are congested and many urgent supplies are stuck in the stacks. The labour required to ensure the smooth running of the world’s supply chains is unavailable.

But not all of this is due to Covid. The lack of available labour, and the cost of it, are long-term issues that Covid exacerbated.

Geopolitical events are also long-term and difficult to forecast. The conflict in Ukraine may have been predicted by political experts but many construction firms were taken by surprise. Brexit bureaucracy jammed warehouses and the

The volatility in construction material prices experienced this year is unprecedented in contemporary history

Trump administration’s trading tariffs contributed to price fluctuations, such as restrictions on Canadian timber. The effects of these are still playing out and there will surely be more to come.

The shortage of lumber is another ongoing challenge, linked to a tangential cause: climate change. Planning for freak weather events has always been a feature of supply chain management but difficult to

tackle such a broad subject as climate change when it is one factor among many.

“What’s challenging is the cascade of disruptions we have right now. It’s not just one,” says Abe Eshkenazi, CEO of the Association of Supply Chain Management. “You’re not just talking about rerouting around an ash cloud, which is temporary and maybe in a few weeks will dissipate. We’re dealing with systemic issues as well as acute issues right now.”

Addressing systemic issues is a complex task. As gifted as project managers are, reversing the labour shortfall, unclogging ports, rescinding tariffs and solving climate change is a lot to ask. But there are strategies that can address some of the worst effects of materials shortages and even have a positive impact on long-term concerns such as sustainability.

“It’s tough to take our eye off the ball in terms of the acute issues to focus on the systemic,” says Eshkenazi but says they shouldn’t take a backseat. “We are not mitigating or minimising the challenges but climate change and the impact on our environment need to be addressed as we deal with the short-term issues.”

It is easy to leave big change to large firms. They have the resources to research and invest in new methods and materials. But larger businesses can use quick fixes that address systemic flaws but don’t tackle the causative issues. Even if the big operators recover faster, businesses that have taken the opportunity to adapt their long-term processes may recover stronger.

A longer-term approach includes exploring sources or types of materials. Brock says that CIPS research from late 2021 showed that supply chain managers were looking at local sourcing, which would speed delivery times while viable alternative materials could improve sustainability and reduce carbon emissions.

Data and visibility are essential tools to manage supply chains. “If you haven’t developed your risk profile on key commodities and supplies, do it now and use data to find additional risks potentially by geography and sector. Hire people who know how to build resilience into your supply chain,” says Brock.

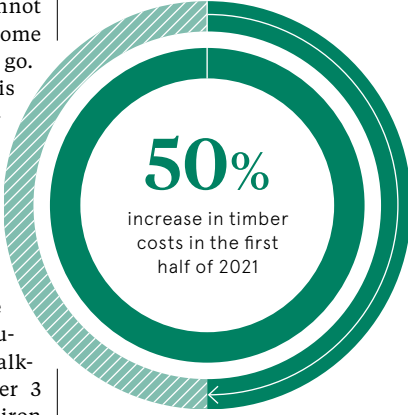
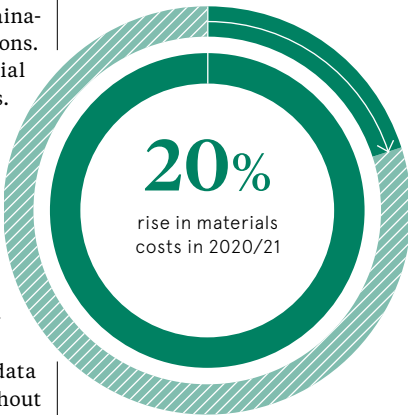
Solid, practical advice. But data itself is in short supply. Without knowing when the people of China will return to work, we cannot know when supplies will become available or where they will go. “The current unpredictability is creating significant challenges,” says Eshkenazi. Without data, there is no end in sight to materials shortages.

But, the cheapest and arguably the most effective tool for mitigating the crisis of materials supply is available to all levels of builders: communication. Eshkenazi favours talking to tier 1, 2 and even tier 3 suppliers to anticipate and iron out bumps in the supply chain.

Likewise, communication with clients goes a long way. It is always difficult to go back on timelines and set prices, but providing timely information to clients may foster the respect that can keep the contract alive despite delays.

Shortages of materials have acted as something of a wake-up call for the construction industry. The costs of ignoring long-term issues have been made clear. Perhaps these unprecedented price hikes will prove to be an effective impetus for systemic change.

What’s challenging is the cascade of disruptions right now. It’s not just one. We’re dealing with systemic issues as well as acute issues right now



re:build Britain and Womble Bond Dickinson, 2022

Making data work for construction

To bolster productivity in construction, tech solutions must be fit for purpose

Looking from the perspective of other sectors, the construction industry must appear seriously Luddite in its seeming reluctance to embrace data. While studies suggest that many industries have enjoyed a trajectory of continual productivity gains over recent years – in part down to their embracing of the cloud, IoT and other data-rich innovations – the construction industry has sat on its plaster-coated hands.

At least, that’s the story you usually hear. “The tech sector has effectively argued that the construction industry just doesn’t get the importance of data. But if the tech is not suitable for the context in which it’s meant to add value, then that’s the tech company’s fault, not the users,” argues Felix Neufeld, CEO of data solutions company Disperse, which launched seven years ago.

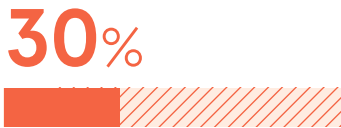
Neufeld concedes that there are particularities to construction that can make common approaches to data difficult. But he also notes that the tech industry has not been open-minded in its incorrect assumption that because its products work in other sectors they’re also a shoo-in for construction.

“One way Disperse has countered this challenge is by not taking a purely software-based approach, which unfortunately is something that is inherently unsexy to a lot of venture capitalist investors,” Neufeld laughs. Rather it employs the latest data capture tech, including 360° cameras, to provide an out-of-the box, on-the-ground weekly data snapshot of a building project, using hybrid AI and human processing to make data actionable.

The approach is made possible by a team of over 70 architects and civil engineers – a core and crucial human element working in tandem with machine learning. This approach provides useful insights from the resulting overview to answer a range of questions. For example, what aspects of the project are



of respondents stated increasing need for rapid decision making in the field



of respondents felt that more than half their data was “bad”

Autodesk, 2021

ahead of time and so may require an earlier order of materials? What bottlenecks are forming? Is labour in the right place for the coming week?

Bernard McGarrity is director of strategy and performance at construction company John Sisk & Son, a Disperse client. Better data might be the solution in a pressurised market, he notes. “Access to real-time, accurate and relevant progress data on projects is paramount to effective decision making in the construction industry, now more than ever. It’s critical for firms to select those tech vendors with which we can work as strategic partners so we can get full value from that tech.”

Certainly, the industry needs to make changes – increased specialisation, value-chain control and customer-centricity, among them – that will give it the scale to “allow higher levels of investment in digitalisation”, according to a 2020 McKinsey report. “[Digital] innovations will change the way companies approach operations,

design, and construction, as well as engage with partners.”

Yet crucially, Neufeld argues, the tech sector has also failed to deliver data in a way that makes sense to individuals in the construction industry.

“It’s no good just giving the construction industry a business intelligence platform to look at – the way the industry works means it needs a strong service element too, which is something the tech sector hasn’t accepted,” Neufeld suggests. “Typically in construction you most need clarity when you least have it,” he adds.

Might Disperse represent the tip of the spear in the construction sector’s better-late-than-never embrace of the potential in appropriate data analysis? Certainly there’s rapidly growing data awareness and demand. According to an FMI/Autodesk study, 55% of respondents say they have implemented a formal data strategy, with the volume of data available doubling over the last three years. But 30% of respondents reckon that over half of their data is bad, with massive cost implications.

And inevitably, there remains an understandable element of resistance within the sector to any wooing from Silicon Valley. This will have to be overcome. Perhaps Disperse’s rapid growth suggests the tide is turning.

“Competition [in construction tech] is already happening,” says Neufeld, “and that’s a good thing, because the construction industry would benefit hugely.”

Learn more at Disperse.io





Bloomberg via Getty Images

SAFETY

Has Grenfell changed the face of construction?

An independent review, public inquiry and outpouring of rage; is it enough to force safer construction in the UK?

Sophia Akram

At fifty-four minutes past midnight, 14 June 2017, Behailu Kebede placed a 999 call to report a fire in Flat 16 on the fourth floor of Grenfell Tower, a 24-storey, 67.3m block of flats in North Kensington, situated in the West London Royal Borough of Kensington & Chelsea. Within the hour, the flames had reached the roof of the building and spread horizontally. The fire escalated into a major incident that officially claimed the lives of 72 people, left a community outraged and in

mourning, a country stunned and a whole industry in the grip of a devastating reputational crisis. The cause of the fire is widely believed to have been the wiring in Kebede's fridge-freezer but culpability for the scale of devastation has extended to the web of firms involved in the refurbishment of the tower between 2012 and 2016. The refit of the council-owned block fell short of safety standards, prompting questions about the culture of the construction industry and regulatory compliance.

Calls for accountability and change, dialogue and political efforts have initiated developments but there's a sentiment that progress is slow and insufficient. If change is still wanting, what will stop a tragedy from repeating? Pre-Grenfell, sub-standard quality and safety in the construction of buildings were not uncommon. "I was aware of similar problems with what happened to Grenfell," says Sean Keyes, managing director of Sutcliffe, a consulting engineers and surveyors

firm. "Unfortunately in construction and engineering, it takes a catastrophe to change the way things are done." Phase one of the Grenfell Tower Inquiry, which was created to examine the circumstances leading up to and surrounding the fire, brought to light various refurbishment flaws. The use of polyethylene-cored cladding panels on the tower walls was cited as the primary cause of fire spreading so quickly, noting that using them breached building regulations. Then there were several tonnes of polyisocyanurate insulation (mostly Celotex RS5000), combustible and toxic when it burns, used on the building's exterior. Combustible insulation was used around the windows, yet cavity barriers were missing, which would have stopped the fire from spreading in the gaps between insulation and cladding panels as per UK building regulations. Such hazardous materials were used in a bid to cut costs and keep within a designated budget while

prioritising aesthetics over fire safety. Issues around safety weren't significantly considered and seemingly the architectural companies, contractors and subcontractors – including Rydon, Arconic, Studio E, Harley Facades, CEP – involved in the refurbishment or its supply chain – all thought safety considerations were someone else's responsibility. What made the incident more hazardous was the fact that residents' previous concerns fell on deaf ears as they lived in a fire trap with exposed gas pipes and faulty lifts. "There's a host of things that typically go wrong when a catastrophe happens," Keyes says. Poor materials, poor workmanship, poor supervision and dismissal of residents' concerns were part of the suite of problems occurring in the background as the prelude to the tragedy. Following the fire, a "lesson-learning" exercise was instigated in the form of an independent review led by Dame Judith Hackitt, whose final report was published on 16 May 2018. The investigation into building regulations and the fire safety of high-rise buildings, in particular, sought to look into the regulatory system around the design, construction and ongoing management, compliance and enforcement. Hackitt damningly stated: "... there is a need for a radical rethink of the whole system and how it works. This is most definitely not just a question of the specification of cladding systems, but of an industry that has not reflected and learned for itself, nor looked to other sectors." As London's Lawrence Stephens solicitors outline, there already exists the Building Regulations, which provide detailed guidance on the safe construction of buildings generally. It has been criticised, however, for being ambiguous and unclear, particularly concerning cladding standards; it also consists of 1,600 pages. The Defective

The key thing is that building control should be involved at the design and planning stages rather than retrofitting



SPA Images / Contributor via Getty Images

The Grenfell Tower fire should never, ever happen again. Otherwise, those lives will have been lost for absolutely no reason

Premises Act 1972 has also been key but this has now been significantly amended by the Building Safety Act 2022 (BSA), which received Royal Assent on 28 April 2022. The BSA also amends the Architects Act 1997 and the provision about complaints made to a housing ombudsman, and it has encompassed some of the 50 recommendations put forward by Hackitt. It essentially serves to provide clarity around those responsible for a building's safety; key introductions include the creation of a Building Safety Regulator, Homes Ombudsman Scheme and to provide oversight of the new system with powers of enforcement and sanctions and a Gateway system, which will see greater scrutiny on buildings as they progress through design and construction. "One of the first parts of the Building Safety Act that will be brought in is an extension to the limitation period... from six years to 30 years for retrospective claims," explains Andrew Parker, a partner and head of cladding at Forsters law firm. "Essentially meaning that a swathe of buildings constructed since 1992 may now be the subject of new claims from residents against building owners and developers." Extended liability has simultaneously been a source of contention and commendation in the industry. On the one hand, it frees leaseholders from responsibility for rectifying dangerous cladding and other safety-related construction faults, but it will have significant consequences for contractors.

Some argue, however, that there needs to be more clarity over the scope of definitions rather than extended liability. Chris Waine, director at Hive Projects, a project management consultancy that works in construction, insists that the "devil is in the detail". "It feels a little bit like trying to hang responsibility on individuals. And I think there's a place for that. But it just feels a bit political in the way it's written," he says, adding that the emphasis should be on genuinely improving the standards in construction. In practical terms, identifying who is specifically responsible is difficult due to the interdependencies around a construction project. Other measures since the tragedy at Grenfell have included the government's Building Safety Fund (BSF), a deal between Michael Gove and large developers to fix fire safety risks and the Fire Safety Act 2021, which supplements the Fire Safety Order (2005) and clarifies who is



responsible for reducing fire risk on the premises. "To think that you wouldn't consult a fire safety expert, when you're building a property like this – I think it's hideous," says Clive Holland, an industry expert and broadcaster for Fix Radio, who has 20 years of experience working in the construction sector. The ongoing inquiry has also exposed general fire safety in high-rise and other buildings to be poor. Data from the Fire Door Inspection Scheme (FDIS) reveals that almost a third (31%) of the fire door inspections failed due to improper installation – meaning the doors were never fit to perform the life-saving role of holding back fire and smoke. Emma Dent Coad, a Labour councillor who served as the MP for Kensington and Chelsea when the fire broke out, notes the considerable lobbying efforts around modern methods of construction, which focus on off-site construction techniques such as mass production and factory assembly. These have been touted as a solution to build social housing. One of these methods includes timber frames. "It's just not safe," she says. "If you just google 'fire in timber frame buildings', there was one literally a few weeks ago...people do not build right, they build cheaply," she adds, lamenting that the UK does not have a sufficiently skilled workforce, having relied on Eastern European skills for decades without skilling up across the board. "We're using semi-skilled workers on skilled jobs." Cost is unfortunately still an issue that's encouraging bad practices, according to the former architecture historian. Furthermore, the housing crisis means buildings are being put up quickly rather than built thoughtfully, and Brexit has meant absorptive costs of construction materials. Add inflation, the end of the red-diesel rebate and a genuine worry about the cost of dealing with historical defects, it's still unclear to some that budget and bottom line won't trump a sincere look at placing safety first. Others see Grenfell as a wake up call for the industry and despite sluggish progress – most provisions will take 12-18 months to take effect – high insurance premiums will penalise those daring to use substandard materials, acting as a de facto enforcement mechanism. Holland says the key thing is that building control should be involved at the design and planning stages rather than retrofitting. "The Grenfell Tower fire should never, ever happen again. Otherwise, those lives will have been lost for absolutely no reason." The Grenfell Tower fire certainly galvanised introspection but concerns remain over whether changes have only addressed those issues raised high on the political agenda. There is still a multitude of factors that continue to threaten building safety in the UK, many of which boil down to cost, shortages and house-building ambitions that haven't matched the slow pace of change of the regulatory landscape. ●



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