



**MODULAR AND
OFF-SITE CONSTRUCTION**

BUILDING THE FUTURE

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INTRODUCTION

The construction industry did not change much during the 20th Century; indeed, it would not be unfair to describe it as resistant to change.

An industry based on skills, experience and personal relationships had little incentive to adopt different working practices when established procedures had done pretty well for building companies, large and small.

But a number of factors, events and influences, arriving together, are putting so much pressure on construction that it will have to change. The companies that remain wedded to old methods of working will fall by the wayside, left behind by an industry that has to make better use of materials, cut waste and satisfy changing needs of end users, while meeting regulatory and consumer demands for improved energy and environmental performance, driven by needs and regulations intended to address and mitigate climate change.

The UK is facing a housing crisis – not in the future: now. House prices make that clear. For decades, the average house price was around 4.5 times average salary – a ratio that applied nationally and regionally. It is now just under 10 times average pay.

According to the UK's Office for National Statistics (ONS), average annual wage in 2020 amounted to £25,780, which was a little higher than in 2019, despite the impact of Covid-19. The average house price across the country was £252,000.

That includes depressed prices in areas of high deprivation; in London it was nearly double, at £496,000. Average earnings were higher, too – but, at £38,000, nowhere near in line.

Prices are driven by demand and availability. Demand is led by population. Despite headlines about 700,000 EU citizens leaving the UK, the population actually grew in 2020. It has been increasing at 250,000 to 350,000 annually for nearly 20 years; that's a city the size of Reading, every year.



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Britain is not alone. Global population is forecast to continue rising, from its present nearly 8 billion to approaching 10 billion by 2050. All those people need somewhere to live. In the developing world, they are choosing cities; in the advanced economies, post-Covid, there is some evidence of movement away from cities like London in favour of remote working. This will put pressure on space in the non-urban areas, in England especially.

This all leads to pressure on land, for housing, work, leisure and food production.

Whatever the circumstances and environment, from 'infill' and brownfield building in the UK's older cities to corporate and commercial construction in fast-growing cities, conventional building methods will not meet the need. They are wasteful of materials, slow, difficult to supply in inner-city areas and have quality issues that have, for too long, been accepted as 'normal' and embedded in the culture.

Forward-looking construction companies recognise the need for technologies and methods that can rise to the demands of the 21st Century. They will embrace established information technology to monitor and manage better building, with proper sequencing, improved control of materials and supply, better quality assurance, and more effective deployment and management of human resources.



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The UK has a housing deficit of around 4 million homes; Heriot-Watt University says that bridging the deficit in England alone would require building 1000 new homes a day, every day, for 10 years.

The UK Government has set a target of 300,000 new homes a year; that's or 822 homes, seven days a week. The total number of completions in 2018/19 was 203,870, or 548/day; new starts amounted to 188,672.1 In the public sector, modular construction is being used to provide much-needed classroom accommodation in schools, as well as hospital and other healthcare premises. Retailers in the private sector use modular construction to get their buildings built fast, from Tesco in the Orkneys to fast-food restaurants located roadside on motorways. Warehouses and large-footprint buildings use modular techniques. Wolverhampton Wanderers FC had a new training pavilion erected very quickly, over the inter-season Summer of 2018, in time for its promotion to the English Premier League. Not only can modular buildings be constructed quickly but they have demonstrated quality in operation and improved energy performance.

According to the ONS (Office for National Statistics), the value of new construction work in the UK reached nearly £119 billion in 2019. Total employment declined (six per cent), for the first time in five years; at the same time, average earnings grew, taking total payroll to around £44 billion. The country's trade deficit in construction materials and components in 2019 was over £10 billion. In 2018 the UK Government announced that £72 million of the £170 million Transforming Construction challenge fund would go to establish the Construction Innovation Hub, which brings together the specialist expertise of the MTC (Manufacturing Technology Centre), BRE (Building Research Establishment) and the CDBB (University of Cambridge Centre for Digital Built Britain).

Source 1: [Construction Industry in the UK - Statistics & Facts | Statista](#)



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The industry hasn't seen much innovation or progress in the past 40 years, despite numerous initiatives including the Egan Report on Rethinking Construction in the late 1990s. Transforming Construction's primary goal is to overhaul the industry to overcome the skills gap and increase productivity. The public sector accounts for over 40% of construction contracting and, because of that, is well able to influence the industry into more efficient practices. A more efficient industry is more profitable. Rising raw material costs can be offset by controlling wastage (and 'shrinkage' – ie, theft). Higher labour costs can be offset by improving productivity per person. Costs of rework and snagging can be reduced by improving sequencing and quality control. The gains that have been achieved in industries like manufacturing can be achieved by a shift from traditional site-building to offsite construction, also known as modular building or manufactured housing. In a report published in June 2019, consulting firm McKinsey & Co said that modular construction in Europe (including the UK) and the United States could deliver



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A number of factors contribute to the current shortfall in the rate of construction in the UK.

Planning regulations. England is one of the most densely-populated countries in Europe. Planning regulations have been eased but potential pressures are likely to arise in traditional Greenbelt and rural areas. Brownfield land is available but the prime, waterfront positions in old dockland areas have already been developed; what remains often has problems of access and pollution, sometimes at unknown levels.

Skills shortages. There are very few unemployed skilled tradespeople in construction. Post-Brexit, the loss of productive workforce from the EU may worsen shortages. The Guardian newspaper reported in 2017 estimates from the Royal Institution of Chartered Surveyors (RICS) that the UK construction industry could lose more than 175,000 EU workers (8% of the workforce), which will put key infrastructure and construction projects at risk².

In April 2021, Construction News reported that employing a non-UK resident EU worker could cost up to £10,000. Changes in labour regulations require that non-UK employees must earn in excess of £20,000 in order to get a work permit; the supply of low-skill and unskilled labour from the EU could become uneconomic³.

Productivity has actually fallen in some areas. Professor Ian Reeves CBE, former Chairman of Constructing Excellence and with a 40-plus year career in construction, recently pointed out that, 100 years ago, pieceworking bricklayers were expected to lay 1000 bricks a day; today's levels are well short of that.

Culture. Comfort with the status quo is a barrier. 'Lifestyle' companies (small, family-owned companies, employing two or three generations of the same family, for example) in the supply chain and at the smaller end have little incentive to change. The building industry is notorious for personal relationships that can become wasteful, lax and, in extremis: corrupt.

Complexity. Dispersed, paper-based systems make it very difficult to exert effective management control. Materials are over-ordered, 'just in case', delivered to the schedule of the supplier rather than the customer, and not always supplied from approved and monitored sources.

Source 2: [Single market exit: UK construction 'could lose 175,000 EU workers' | Construction industry | The Guardian](#)

Source 3: [Bringing in an EU worker can cost up to £10k | Construction News](#)



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Lack of integration. House drawings are pretty standard across the country but project management, site management and purchasing are based more on personal relationships than standard working practices.

Housebuilders have been able to live with inefficiencies and absorb increased costs because of high demand and soaring prices. This won't continue forever. There are lessons to be learned from commercial construction; warehouses and retail premises, such as fast-food restaurants, rely on economies of scale and have embraced offsite and modular-built construction delivery processes.

The challenge for construction is to become more effective and efficient. It must raise its game in supply chain management and make the best use of materials and manpower.

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SUMMARY & LOOKING FORWARD

That the construction industry has to change can be in little doubt – but resistance to change cannot be doubted, either.

The need has been talked about for decades and initiatives have come along at regular intervals.

Hitherto, the government and public sector have usually left the industry to pick up the good ideas and run with them. Despite being the largest single source of contracts for construction, across the whole piece, from housing to hospitals and infrastructure, it has rarely used its power to drive through improvement.

That may be in the process of change, with the establishment of the Construction Innovation Hub and the Transforming Construction Challenge Fund. The Construction Innovation Hub is deliberately reaching out beyond the traditional construction arena, to the Manufacturing Technology Centre. It recognises that the industry has lessons to learn from manufacturing and engineering.

The automotive industry, in particular, has transformed itself over the past 25 years, with investment in automation and the focus on driving out waste and improving performance across the whole, from materials usage to task management.

Key to the transformation of the construction industry is offsite construction. Factory building offers the opportunity to improve quality, process management and material usage, cutting waste and rework and to more effectively deploy assets.

Modular construction can help save billions of GBPounds and to deliver the smart buildings that are increasingly in demand, in a controlled, managed and efficient environment. We will consider what the benefits are for construction companies more closely in the second part of this Paper.





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