



Shaping society 5.0 Building trust in AI as a force for good

How AI can transform the
built environment from the
ground floor up



Foreword



**By Harold Pradal,
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2023 will be viewed as the point that Artificial Intelligence (AI) tipped into the mainstream, with a 286% rise in media coverage of the topic¹. And whilst headlines were grabbed by ChatGPT, the real AI story is much, much deeper.

This transformational technology is accelerating progress – and has the potential to go further as a force for good and move us towards Society 5.0, a ‘human-centered society that balances economic and technological advancement to solve society’s problems’². Importantly, it also raises questions around how we build trust in AI and what guardrails are needed to ensure AI shapes our future in a positive way.

In this collection we go behind the headlines to explore the real-world impact of AI through the eyes of BSI experts, drawing on the views of 10,000 people in nine countries. For anyone in doubt, AI is here and it’s here to stay – 38% of people use AI in their jobs daily, rising to 70% in China and 64% in India. By 2030, 62% expect their industry will use AI³.

At BSI we are committed to shaping the impact of technology and innovation for the benefit of individuals, organizations and society. AI sits at the heart of this because it has the potential to be a powerful partner, changing lives and accelerating progress towards a better future and a sustainable world.

We commissioned these essays to turn the spotlight on this generational opportunity – recognizing that the better we understand it, the better we can harness its power. Whether it’s creating new workplace opportunities, improving patient outcomes, tackling modern slavery or building a safe global food system, AI has a pivotal role to play.

We examine the importance of embedding digital trust in AI, the critical role for collaboration – between nations, policymakers, organizations and individuals – to unlock AI’s true potential, and the fast-evolving regulation designed to ensure consistency and certainty.

With AI crossing over from small, contained environments into mainstream technology at work and at home, this offers a transformational opportunity to unlock a multitude of benefits – provided trust and confidence are present too.

AI is just getting started. At BSI we are excited to partner with our clients as we embark on this journey. We are delighted to present these essays to explore the enormous potential AI offers to shape Society 5.0 and deliver a sustainable future powered by innovation.

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2. Society 5.0: The Fundamental Concept Of A Human-Centered Society, Open Business Council, Aug 2023
3. BSI Trust in AI Poll 2023



How AI can transform the built environment from the ground floor up

As a purpose-driven organization, BSI believes AI can be a force for good, changing lives, making a positive impact on society, and accelerating progress towards a sustainable world. In this essay, Rahul Shah, Global Director – Built Environment, examines the specific opportunity AI offers to shape a sustainable, safe built environment.





By Rahul Shah

Global Director for the Built Environment, BSI

How could this building optimize energy performance? What would be the most effective way to reuse the materials from this site and reduce waste? How can it be made water efficient? What are the critical factors to ensure this construction project runs to time and stays on budget?

When it comes to the built environment, questions like these abound for everyone involved, from architects and designers to engineers, developers, and the contractors themselves. As set out by the World Business Council for Sustainable Development¹, thanks to advances in technological tools such as the Internet of Things, appliances fitted with sensors, image capturing drones and more, it is becoming easier for the sector to capture and readily access data to inform the answers.

In particular, while human involvement in answering these questions is key, we are starting to see how AI can be a partner to experts in the sector. As we will come on to, we are starting to see how it has the potential to help to inform decision-making and pave the way for a built environment that is sustainable and cost-effective, timely and well-designed, efficient and, most importantly, safe – and ultimately that has a positive impact on all of us across society.

- From design to procurement, construction, operation, and decommissioning, the potential applications of AI for the construction industry could be transformative.
- This is already in play as designers and contractors apply AI and machine learning to the massive volumes of data involved in the design of buildings, the planning of construction projects and the day-to-day operations of sites.
- Shared data and strong standards frameworks can help to improve safety, quality, efficiency and sustainability.

52%



of people globally think AI can help us create a built environment that is more energy-efficient

Making the most of data

Already, according to BSI's Trust in AI Poll², 45% of people working in the built environment sector³ globally say their job uses AI. Of those who say it doesn't yet, two fifths (42%) expect it will by 2030 and 68% expect the sector will. And while KPMG has found that only 4% of firms are applying AI to every project, a third are starting to use it on some⁴.

AI's ability to rapidly assess and synthesize information, in volume and at scale, offers potential to proactively create buildings that are more efficient – both in terms of energy, and in terms of how people will use them. There are plenty of players in this space already, for example Tel Aviv start-up Buildots⁵, which uses AI to extract data and generate share images with Buildots' software, which uses AI capture, track and measure on-site activities.

As asset usage data (a measure of how efficiently assets are being used) influences building design⁶ and AI offers the potential to correct for human bias⁷, we are at an exciting moment. Perhaps everything from large storage of materials ahead of construction beginning to snaking queues for toilets in public buildings could become a thing of the past.



68%

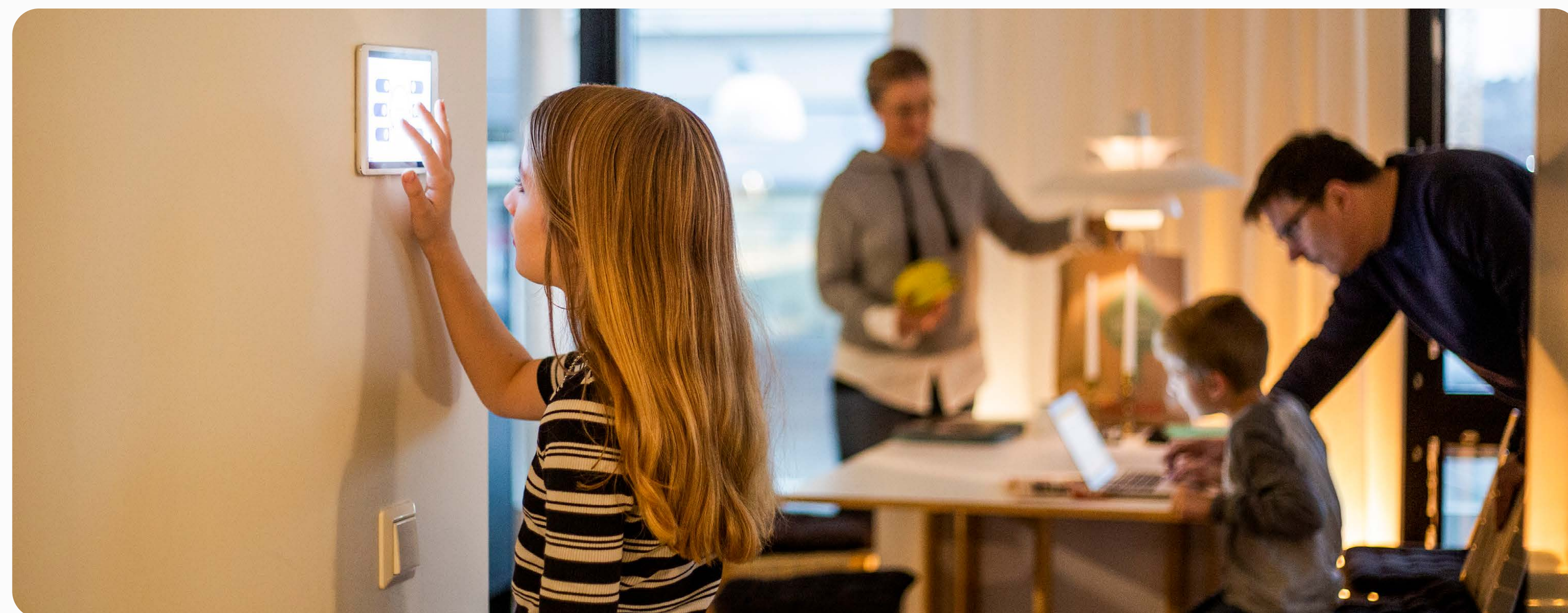
of those working in the built environment expect their sector will use AI by 2030.

AI can transform the built environment from start to finish

Within seven years, 41% of people expect they will be using AI at home, for example for energy saving with automated lighting or heating. Just as the introduction of CAD (computer-aided design) transformed the practice of building design⁸, the use of AI tools could transform our built environment from start to finish. For example, AI could allow small teams to run large projects, transforming the way developers procure construction designs.

Already there are a host of AI enabled tools⁹ that can generate basic architectural designs which in the past might have taken several professionals to generate. For example, generative AI art software like Midjourney¹⁰ use neural networks to transform users' text inputs into AI-generated images. For design practices, using AI in this way offers the potential to free up their human expertise to dedicate time to more creative and complex design projects. In fact, nearly two thirds of people in the sector said AI can be used most effectively to take on tasks that humans don't have time to do.

Or consider the potential of AI on complex projects where there are thousands of people working on site and hundreds of different subcontractors.



In the UK, HS2 is partnering with tech start-ups to 'harness the power of AI to help drive smooth delivery of design changes across the construction phase'¹¹. In one example, AI and Virtual Reality technology are being used to design future HS2 train stations by capturing real-time passenger data¹². In future, AI systems could be able to do just this as the norm¹³, building more accurate projections and business cases that predict spend and timeframes effectively, whether for a small-scale build or a future-facing nationwide infrastructure project.

41%

of people expect they will be using AI at home by 2030.

AI offers the potential to free up human expertise to dedicate time to solve more complex problems and be more creative in how we approach integration of natural and built environments through innovative designs

By Rahul Shah



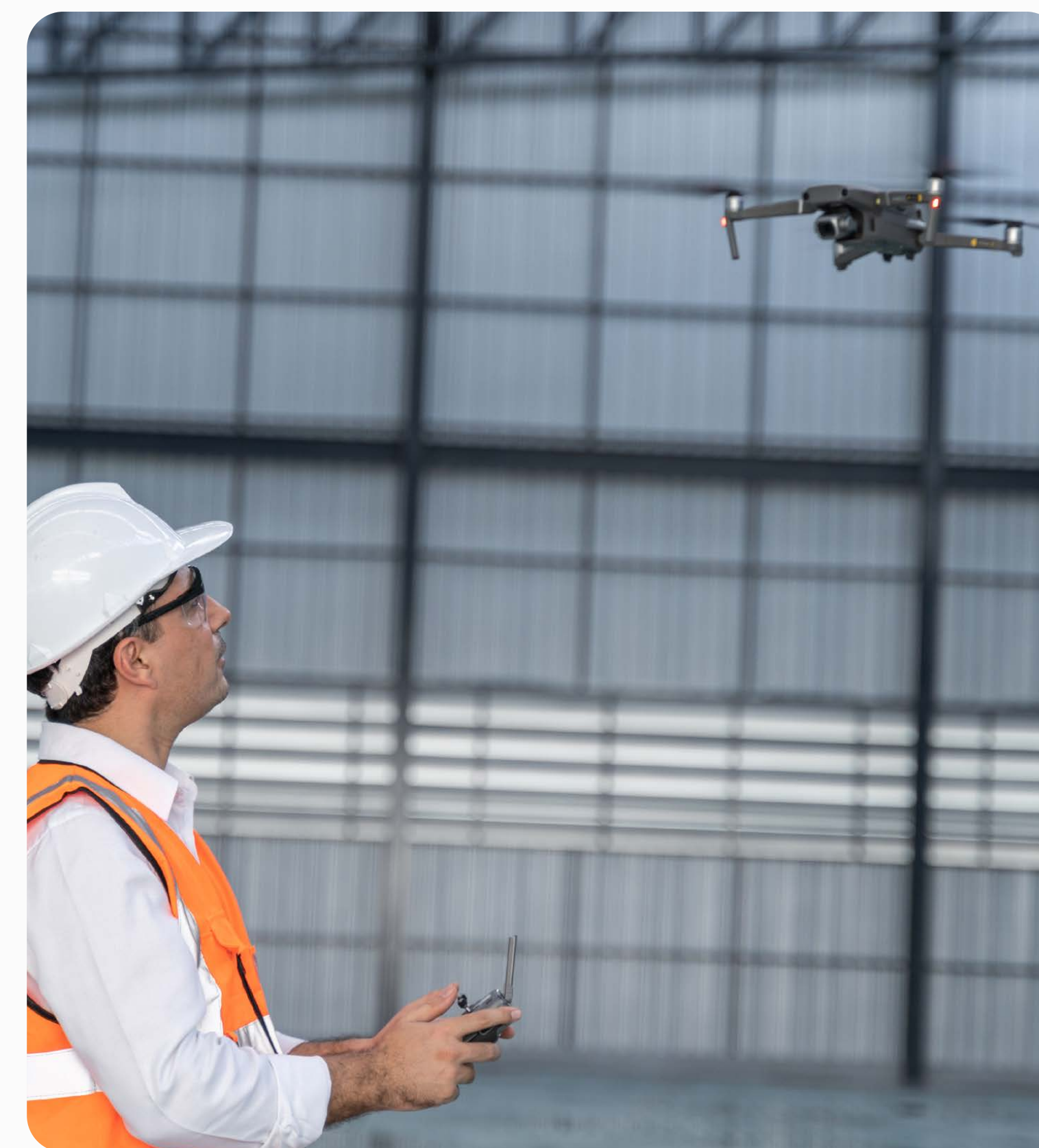
Boosting safety, quality and productivity

According to the CIOB¹⁴, the fatal injury rate in the construction sector is around four times higher than the average. As a high-risk industry, AI is expected to have an important role¹⁵ to play in improving safety. From real time safety monitoring using sensors and cameras to predictive trend analytics, AI is already helping to make construction sites safer and more efficient¹⁶. Take Building Information Modelling (BIM), where a digital representation of, for example, people at work or using part of a construction site or a building, can simulate a real situation and its outcomes, highlighting risks in construction before they become a reality. Nearly half of the firms are already utilizing digital twins (digital models of a planned or actual physical product, system or process¹⁷). Given the innovation we're already starting to see around Digital Twins and AI, it's likely that in the coming years, AI could make digital twin technology more accurate.

Likewise, having AI-powered tools like drones and IoT sensors¹⁸, alongside real-time building information modelling, could allow site managers, particularly those overseeing complex sites with hundreds or even thousands of workers, to coordinate operations more effectively and more safely, day to day.

Weak productivity is a sustained issue of concern in the sector, as RICS's global report shows¹⁹. According to analysis by McKinsey in 2017²⁰, real-time analysis of the data is critical to boost productivity in construction – again something that AI is perfectly poised to support.

Equally, given the costs of fixing, repairing or redoing poor quality construction – around £25 billion a year in the UK alone, according to the Get it Right Initiative²¹ – contractors have already begun to look to technology to help. For example, drones can spot quality issues and defects before a project is complete to reduce this wastage of time, materials, labour, and money. With 73% of firms surveyed by KPMG already using drones in some or all projects, building this capacity through AI could offer enormous potential gains.



73%



of construction organizations surveyed by KPMG are already using drones in some or all projects.



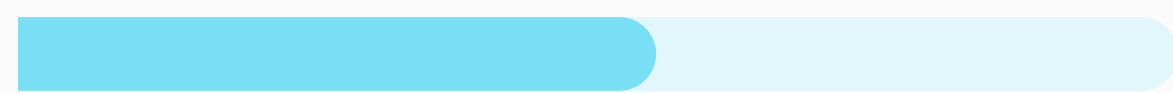
AI is the route to carbon neutrality

At present the built environment accounts for over 34% of energy demand and around 37% of energy and process-related CO2 emissions²². With a growing, increasingly urbanized global population²³, demand for new buildings is set to continue, meaning finding ways to make construction more sustainable is critical.

More than half of people surveyed by BSI globally think AI can help us create a built environment that is more energy-efficient, rising to 55% for those in the sector. There's an exciting opportunity for us to utilize AI to accelerate progress towards a sustainable world. Over the long-term, AI could facilitate greater circularity within the construction industry – whether that's using data to assess how best to repurpose and reuse materials from buildings coming to the end of their lives or building from scratch water and energy efficient designs to avoid costly retrofitting.

Technology offers the industry the opportunity to address this challenge head on and shape a better future for us all. This could be by using data to create carbon-neutral design, employing AI tools to improve procurement of materials, ascertaining how constructors could work more efficiently in terms of energy and water usage, reducing waste through efficient planning or collecting data across all scopes on site in real time in order to produce accurate carbon accounting.

55%



of people working in the built environment sector think AI can help us create a built environment that is more energy-efficient



Again, there are plenty of start-ups active in this space, like Satellite Vu²⁴, which uses high resolution thermal imagery to evaluate the thermal performance and efficiency of building structures to identify where retrofitting could make an impact.

Such tools could be particularly good news for small to medium firms, as automating carbon data collection and analysis could allow them to increase their project capacity while still ensuring a positive impact on people and the planet.

For construction firms, developers and contractors, educating the workforce about how they can use AI tools to enhance their existing work and realize its benefits – whether that be at the start of the process in design or at the end in finishing – will also be critical if they are to take the lead in this space.

Advances in technology have the potential to make construction safer, more sustainable and designed with people and planet in mind. The opportunity for innovation and improvement within the built environment, enabled by AI, is there to be seized.

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Find out more

Quality and consistency of data is central to the effective use of AI in construction and BSI has been partnering to accelerate innovation in the built environment sector through building information modelling (BIM). BIM is the management of information through the whole life cycle of a built asset, from initial design all the way through to construction, maintaining and finally decommissioning, through the use of information management. Find out about the collaboration – between engineers, owners, architects and contractors using BIM [here](#).



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