Leading Sustainability and Regeneration in Projects[1]

From Green Building to Timber Innovation [2]

Figure 1 PMs can get out of our shells and bring regeneration to the built environment

Abstract

The built environment accounts for 40% of global CO2 emissions , yet project management often treats sustainability as a "tick-box" compliance exercise rather than a driver of value. This article argues that the project manager's mandate must shift from mitigating harm to delivering regenerative outcomes through early-stage decisions in material selection and asset longevity. By utilizing the **Benefits Dependency Network (BDN)** and innovations like **mass timber** and **4D**

[1] *The author Dr. Hugo Minney is a Fellow of APM (Association for Project Management), a Member of PMI and PMI UK, Chair of APM's Benefits and Value IN and Sustainability IN, founder of APM Nuclear Industries IN and AI & Data Analytics IN, and chair of BSI's Working Group on Benefits Management. Minney Org Ltd offers consultancy on ROI and SROI. For more, see his author profile at the end of this article*

[2] How to cite this work: Minney, H. (2026). From green building to timber innovation, Leading Sustainability and Regeneration in Projects, series article, *PM World Journal,* Volume XV, Issue V, May.

Digital Twin planning, project managers can decouple construction from traditional linear constraints, reducing schedules by up to 50%. Through the lens of the **GenZero schools** and **Stockholm Wood City**, we demonstrate how the transition to a manufacturing-led modular approach creates assets that act as "material banks" for the future.

Introduction: Why PMs must lead regeneration

We are currently building liabilities, not assets. Every time a project manager prioritizes 'tick-box' compliance over material longevity, they are effectively signing a check for future rework. It's a dilemma every project manager faces: how to be proactive about sustainability and regeneration (Minney 2025c). Being proactive increases the cost of the project (often mitigated by innovation); whereas the default position: compliance is just something you have to do (or pay a fine for not doing).

Compliance means viewing "green building" through a narrow lens — a series of boxes to be ticked to satisfy benchmarks like BREEAM or LEED (BREEAM 2024; Greenly Institute 2024; Minney 2025d). However as climate extremes escalate, compliance alone can reduce the value of the construction to the client, risking rework and hidden additional costs (Minney 2025f).

The built environment is responsible for approximately 40% of annual global CO2 emissions (UNEP 2025). This figure includes embodied carbon in materials, construction operations and heating and lighting of the buildings once constructed. In UK, the built environment contributes to 25% of the total UK greenhouse gas footprint in a given year (UKGBC 2019). UK has made strides in operational efficiency, but the embodied carbon in the materials of our buildings remains a massive, largely unaddressed liability.

The project manager's mandate is moving from the downstream mitigation of environmental harm (delivering a project using sustainable processes) toward the proactive delivery of regenerative outcomes (arguing for a change in scope) (Minney 2025c). This creates an inspiring place to work, and treats sustainability not as an abstract goal or a moralising exhortation, but as a direct outcome of early-stage project decisions. These decisions — concerning material selection, supply chain ethics, and asset longevity — determine whether a project leaves a positive legacy or an embodied carbon liability (Minney 2025e), and whether a project supports career development or is an anchor keeping the project manager in the 'old way' of doing things.

Reducing embedded carbon can be addressed

Using mass timber can reduce embodied carbon by 20% to 60% compared to traditional concrete and steel structures (Spear et al. 2019). Innovations like geopolymer concrete and cement substitutes can cut emissions by up to 90% compared to traditional Portland cement (Provis 2014; MPA 2020). These solutions and others are covered in more detail in this article.

Construction as a cornerstone to society

Construction has always been the strategic management of a system that generates social, environmental, and economic value for decades to come (Minney 2025e) – but we've often forgotten this in our focus on the project management constraints such as time, budget and a limited view of scope. Projects are the primary unit of change in our society, and the construction project manager now serves as the catalyst (Minney 2025c).

Environmental regulations as a project opportunity

To lead this transition, we project managers must navigate a complex and evolving regulatory environment. Regulations have shifted (at least in UK and Europe) from "command-and-control" to performance-based assurance (Minney 2025f). Regulations are sometimes decried for adding costs, but in reality they are the price for access to market; but regulations are more nuanced – they can be the governance tools through which we define and defend project value.

Modern environmental regulations promote innovation, efficiency, and new economic opportunities (Porter and Kramer 2011). An OECD report summarising multiple studies shows the impact of regulations: in fast growing Asian nations growth is similar between countries with either strong or weak environmental policies, however after five to eight years, countries and sectors with strong environmental policies outperform compared with weaker environmental policies. This is because the poor quality environment creates widespread sickness or emigration amongst workers, resulting in zero growth and losses for investors) (Minney 2025f). Regulation can be viewed as a catalyst, and project managers can use regulation to unlock competitive advantages, such as preference pricing and avoided future costs.

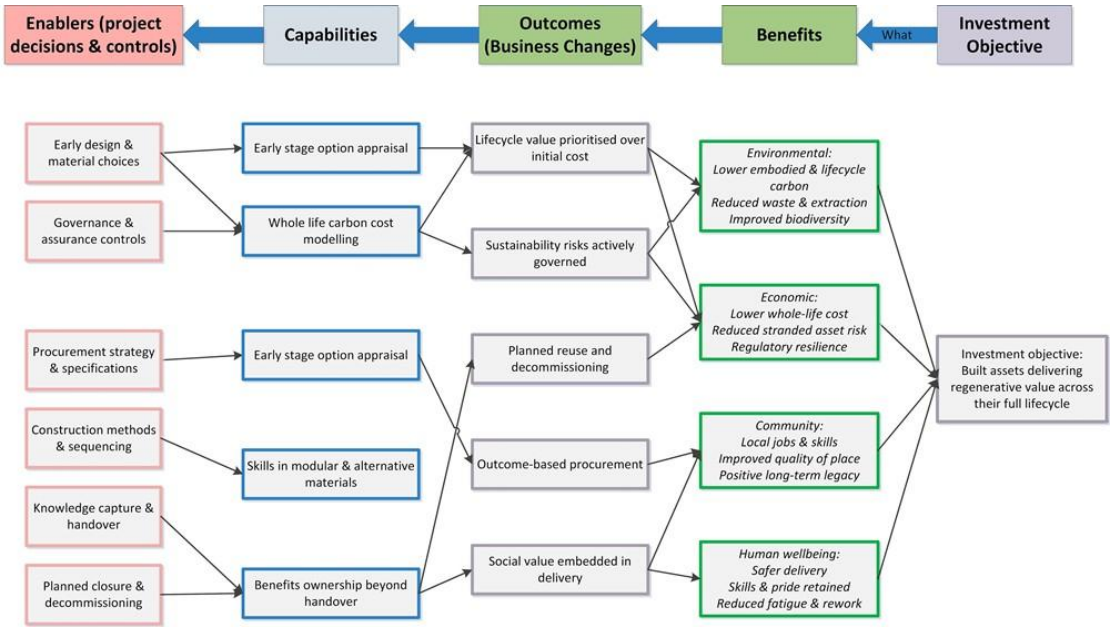

Figure 2 Benefits Dependency Network (BDN) Designing for sustainability

Instead of viewing compliance as a cost to be minimised, project managers can use **Benefits Dependency Network (BDN)** (Minney 2024) logic to link regulatory adherence to strategic objectives. The investment objective is to deliver built assets that provide long-term value. The benefits — higher productivity of workers, reduced risk of stranded assets, lower whole-life costs, and improved resilience — are directly enabled by project decisions that exceed current regulatory minimums. Building to meet or exceed the next round of regulatory requirements avoids rework costs (e.g. insulation or ventilation). By aligning project outputs (such as low-carbon assets) with the strategic benefits, project managers can advocate for upfront investment in innovation.

The regulatory compass: navigating 2026 standards

The current regulatory landscape offers a robust framework to support innovative decision-making. Standards have evolved: they are not just technical specifications; they are risk management tools that protect the project's (and the nation's) long-term value. Project managers can leverage these frameworks to defend decisions that prioritise long-term sustainability over short-term capital cost reduction (CIH 2022).

WLC: turning carbon from a report into a control

The RICS Whole Life Carbon Assessment (RICS 2024) guidance and PAS 2080 (CLC-Green 2016; BSI 2023; Nguyen 2023) are project control frameworks which are now essential for carbon management in infrastructure (Minney 2025d). These standards move beyond operational energy to account for embodied carbon across the entire lifecycle, including the often-overlooked stages of decommissioning and closure (Minney 2025e).

The project manager must integrate WLC assessments into the stage-gate process. A project should not pass the design gate without a quantified WLC baseline and a clear plan to reduce it. This shifts carbon from a reporting metric to a control metric, subject to the same rigour as cost and schedule.

Aligning with Net-Zero – the new 'Triple Bottom Line'

The UK Infrastructure Carbon Review (HMT 2013) and the London Energy Transformation Initiative (LETI 2020) are required reporting. These frameworks redefine the "Triple Bottom Line" by mandating explicit links between project outputs and national net-zero targets (Minney 2025f). These policies provide the essential impetus for bottom-up sustainability initiatives, provided they are integrated into project KPIs from the outset.

The UK Emissions Trading Scheme (UK ETS) and the EU ETS effectively put a price on carbon, currently trading around £40-£80 per tonne, with projections that this will rise significantly by 2030 (EC 2023; DESNZ and BEIS 2024). Project managers must use these shadow carbon prices in investment appraisals to stress-test the project's financial viability against anticipated future regulation.

Mandatory assurance and data integrity

The use of rigorous Measurement, Reporting, and Assurance (MRA) means that every substantive claim regarding a project's impact must be supportable by evidence (Minney 2025b). The Project Management Office (PMO) now plays a critical role in overseeing the quality of this data to avoid "greenwashing" and mitigate the severe reputational damage associated with ESG failures (Minney 2025a). By establishing robust baselines and utilising lagging and leading indicators, we ensure that our projects remain actionable and strategic assets in a regenerative portfolio (Minney 2025f).

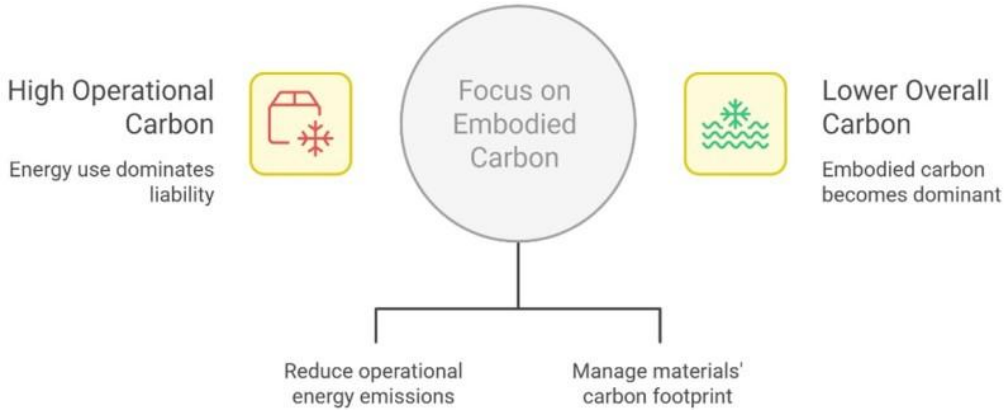

Figure 3 The Iceberg of Carbon (Embodied vs. Operational). As the grid decarbonises, the project manager's risk profile shifts from operational energy to embodied carbon.

Strategic procurement and ethical resilience

A project's sustainability is only as robust as its weakest supply chain link [forthcoming article "Sustainability and Regeneration in IT and Technology Projects: Case Studies in Practice."]. As emphasised in previous discussions regarding wellbeing (Minney 2025g) and community impact (Minney 2025h), the project manager now acts as an ethical auditor seeking organisational success. Procurement is the primary lever for delivering the "Community" and "Human Wellbeing" benefits identified in the Benefits Dependency Network.

Ethical labour practices and legislative compliance

We must identify and mitigate modern slavery risks, particularly in raw material extraction for new technologies (Minney 2025g). The **Modern Slavery Act 2015** requires large organisations to report on the steps taken to prevent modern slavery in their supply chains (CO 2024).

Project managers must ensure that tender documents require suppliers to provide transparency down to the raw material extraction level. This includes the use of **Digital Product Passports** (required under the EU Ecodesign for Sustainable Products Regulation, ESPR) to track the

provenance of materials and ensure they are conflict-free and ethically sourced (EC 2024; EEA 2025; SITRA 2025).

Procurement: building communities not structures

Using Social Value Act (2012) (Social Enterprise UK 2013) requirements in tender specifications ensures that projects deliver local job creation and skills development (Minney 2026).

Instead of evaluating bids solely on price, the project manager should use the PPN 06/20 requirements for public bodies (Anthesis 2021) to weight social value outcomes (e.g., local apprenticeships, SME engagement) at a minimum of 10% of the evaluation of different bids. This aligns with the "Community" benefit of local skills retention and economic resilience.

This ethical resilience directly supports our earlier discussions on employee wellbeing (Minney 2025g) and strengthening local communities (Minney 2025h).

The timber revolution – decoupling the critical path

Construction is changing. The adoption of mass timber and pre-fabrication represents a complete change (Minney 2025e). It moves the industry from a bespoke, artisanal model to a manufacturing-led modular approach, often referred to as **Design for Manufacture and Assembly (DfMA)** (LETI 2020; GCF 2022). This shift fundamentally alters the project's critical path and risk profile, allowing parallel paths and risk mitigation through multiple suppliers.

The scale of the shift

While precise global figures vary, the pre-fabricated buildings market is projected to grow at a CAGR of over 6% through 2030 (Grand View Research 2025, 2026). In the UK, the government's "presumption in favour of offsite" for public infrastructure is driving this shift. However, uptake in residential sectors remains mixed, with timber frame accounting for approximately 22% of new housing starts in England, compared to over 90% in Scotland (STA 2022).

Decoupled lifecycles and schedule compression

We no longer follow a strictly linear "prepare site, then build, starting at the bottom" path, and this has many positive consequences. The project manager can manage two concurrent critical paths: the on-site groundworks and the off-site manufacturing. However they are not heavily interlinked – the off-site manufacturing can carry on regardless of delays to groundworks, and the groundworks can be completed and team move on to the next job even if the off-site manufacturing has delayed. Fabrication also occurs in controlled environments, decoupling the build from weather-related risks and therefore offering much more flexibility in materials (Minney 2025e).

This allows site preparation and building fabrication to run in parallel. Case studies suggest this can reduce overall project schedules by 20-50% (GCF 2022), with corresponding impact on costs.

Material integrity and cost certainty

Working in a controlled fabrication plant ensures materials are not exposed to the elements during the critical construction phase, reducing waste and improving quality (Minney 2025e). While the upfront material cost of mass timber (like CLT – Cross-Laminated Timber) can be higher than concrete, the reduced construction time, lower foundation costs (due to lighter structures), and reduced waste often result in a cost-neutral or cost-positive outcome (WTA 2018).

Advanced planning

This requires a high-maturity 4D/5D planning approach (e.g. using a Digital Twin for a large construction project) to manage two distinct, concurrent lifecycles: off-site manufacture and on-site preparation (EDF Energy, HPC, and CGN 2019). Early versions of this demanded design freeze and rigorous coordination, but the designs are more flexible (see also the greater flexibility in use below).

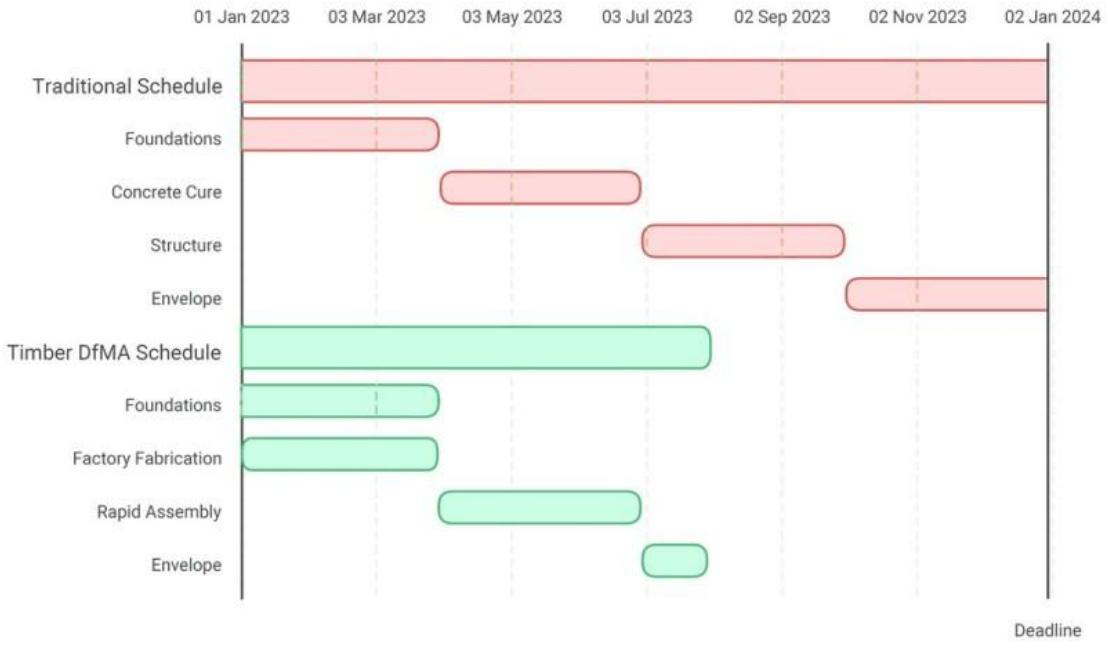

Figure 4 Decoupling the critical path: How off-site timber fabrication compresses the construction schedule.

Case Study 1: The UK Public Sector example – GenZero schools

The UK Department for Education's (DfE) **GenZero** research project (DfE 2023; Transforming Timber 2025) illustrates how major public clients can force market transformation through

strategic procurement. Faced with an ageing estate and Net Zero 2050 targets, the DfE did not simply ask for "greener schools"; it commissioned a standardised, timber-based platform designed for manufacture and assembly (DfMA) (MottMacDonald N.D.).

The project, led by Mott MacDonald, developed a "kit of parts" using sustainably sourced timber for the superstructure. It used standardising components (classrooms, halls, corridors) via a digital BIM catalogue, for construction off-site. The results make interesting reading:

- **Net Negative Carbon:** The timber superstructure sequesters sufficient carbon to offset the emissions from the remaining concrete and mechanical systems, making the structure carbon negative at the point of completion.
- **Operational Efficiency:** The design targets an ultra-low energy intensity of 40kW/ m²/yr, significantly below current averages (200 of heating plus 70 electricity in the same units (Mohamed et al. 2021)).
- **Project Leadership:** The DfE acted not just as a funder but as a "systems integrator," using its purchasing power to de-risk the supply chain for timber and create a predictable pipeline that encourages suppliers to invest in off-site manufacturing capacity.

Case Study 2: The mega-project example – Stockholm Wood City

While GenZero demonstrates standardisation, **Stockholm Wood City** proves the commercial viability of mass timber at scale. Initiated by developer Atrium Ljungberg and breaking ground in 2025, this development in the Sickla district of Stockholm is the world's largest wooden urban construction project, covering 250,000 square metres (Atrium Ljungberg 2024; Savage 2025).

The project shifts the debate from "can we build a wooden tower?" to "we can build a wooden city". It comprises 7,000 office spaces and 2,000 homes, all integrated into a 15-minute city urban plan.

- **Strategic Carbon Reduction:** By substituting timber for steel and concrete, the project aims to reduce the climate impact by 50% compared to traditional urban developments.
- **The project manager as Innovation Broker:** The project leadership team had to navigate complex risk landscapes, managing fire safety and insurance concerns that typically stall timber projects of this magnitude. They achieved this by proving that engineered timber (like CLT) offers predictable charring rates and structural integrity that rivals steel.
- **Supply Chain as Strategy:** The project utilises locally sourced Swedish timber, significantly reducing transport emissions and insulating the project from volatile global steel prices — a prime example of the "local resilience" argument discussed in our January 2026 article on *Local Prosperity* (Minney 2026).

Houses of the future: longevity vs flexibility

There's an assumption that building with brick and concrete to last 200 years is the pinnacle of sustainability. Masonry suggests permanence (and castles and cathedrals exemplify this), but masonry also represents inflexibility; when needs change, these structures are difficult to modify, and there's a cost to the environment from the lack of foresight. Stone can be recycled (to some extent), but brick and/or concrete create vast amounts of non-recyclable building rubble waste (Minney 2025e).

The shift in residential construction

Commercial buildings have already largely shifted from steel-reinforced concrete to steel frames and composite floors for speed and flexibility, and are moving to timber frames. But residential construction has been slower to adapt. In the UK, brick still dominates, accounting for approximately 70-80% of new homes (NHBC 2024). However, timber frame construction is gaining market share due to its speed — reducing build times by up to 30% — and superior thermal performance, which is essential for meeting the Future Homes Standard (STA 2022).

The project manager must weigh the trade-offs. Masonry offers perceived solidity and lower material costs but higher labour costs and slower build times. Timber frame offers speed, precision, and sustainability but requires earlier design commitment and different supply chain management.

We see a shift toward timber-framed or prefabricated buildings that offer superior adaptive capacity. These modular designs with integral structure allow for windows to be relocated and internal walls moved/ extensions added without generating the waste associated with traditional demolition and new build (Minney 2025e).

The project for the initial build is important, but a project manager should include an understanding of the costs (in every sense) of managing an asset that can evolve. By prioritising flexible, low-embodied carbon materials like timber, we ensure that the built environment can respond to the needs of future generations without the heavy environmental toll of the current demolition-and-rebuild cycle.

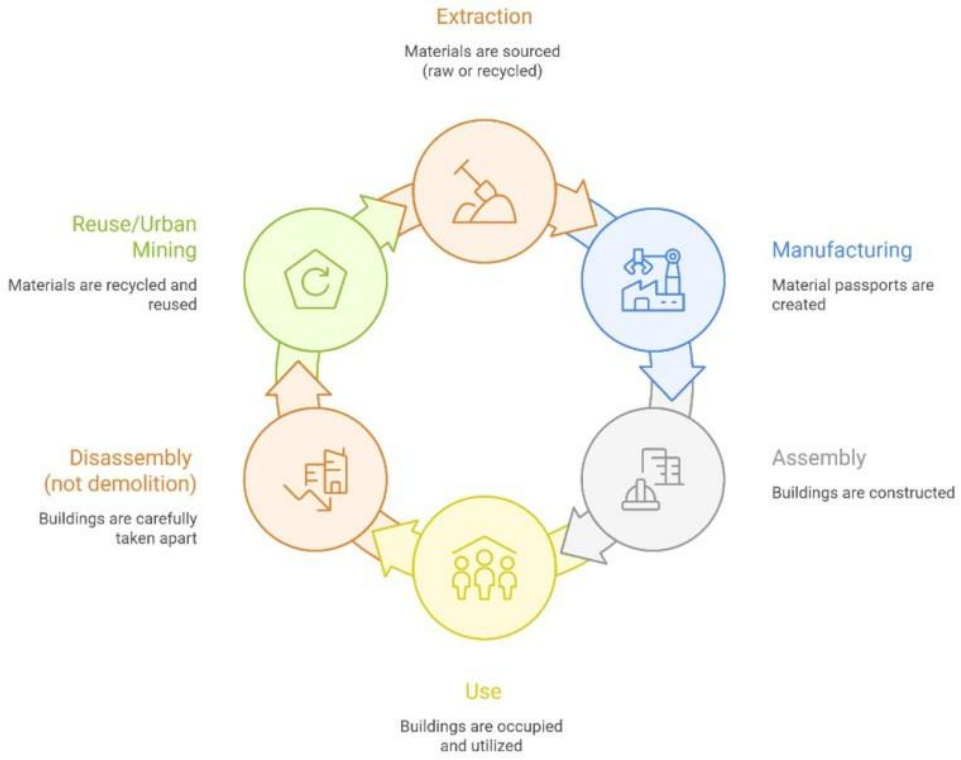

Figure 5 The Regenerative Loop: Using Material Passports to turn today's buildings into tomorrow's material banks.

Case Study: The Sellafield concrete solution

In complex, high-hazard environments like **Sellafield Ltd**, project requirements often dictate highly specialised buildings with operational lifespans of 15–20 years. Historically, this has led to a cycle of construction, use, and then decommissioning and demolition. To break this cycle, we utilise **digital twins** not merely as reporting tools, but as **4-dimensional planning tools** that incorporate the element of time into the design logic.

By mapping the entire life of the site through a 4D lens, project managers can identify "common-denominator" infrastructure — such as roads, ducts, and utility corridors — that can be shared across multiple building generations. This strategy reduces the total volume of demolition and construction, reducing the cost, time taken at changeover, and amount of low level waste that needs to be managed.

Incidentally, although safety is the overriding consideration, Sellafield has used Slag concrete (Ground Granulated Blast-furnace Slag – GGBS) for a number of years because of its cooling properties on large pours. It turns out that GGBS also embeds considerably less carbon during construction, and there is no question about its strength – it is a staggering irony that in 2026, we find superior structural wisdom in Roman volcanic ash than in our modern, carbon-heavy 'shortcuts'. If they could build sea walls to last millennia, we have no excuse for structures that crumble before their first major refurbishment.

Sellafield Ltd notes that this thermal property (and 30% reduced embedded carbon) is also available from Jabroc 'N' which allows us to diversify the supply chain and reduce risk.

We need to share tried-and-tested practice and experience: sustainability is achieved when the project manager facilitates the sharing of assets between projects, shifting the focus from individual building delivery to long-term site stewardship. Sustainability thinking often leads to better approaches to project delivery (the Porter hypothesis)

Timber Innovation: The Pre-Inception Control List

We have learned that timber innovation often fails not on technical grounds, but on assumptions which impact governance and risk. This checklist serves as a control tool for the project manager to use during the initiation and planning phases:

- **Whole-life carbon (WLC) baseline:** Establish a carbon baseline using RICS or PAS 2080 guidance against which timber benefits are measured.
- **Early insurance engagement:** Consult a specialist timber insurer during the early design stages to avoid late-stage viability risks.
- **4D integration:** Map the timber fabrication schedule into a 4D (incorporating time) plan to manage parallel site-prep and manufacturing workstreams. Include change-of-use planning to prepare for future legislation.
- **Chain of custody verification:** Ensure the procurement plan includes mandatory FSC/PEFC evidence at every tier of the supply chain.
- **End-of-life material passport:** Tag each mass-timber element for a digital material passport to enable future reuse or "urban mining."

Conclusion: construction leadership

The transition to a sustainable and regenerative built environment is not just for engineers – project managers have considerable impact. We can move the agenda beyond "Green Building" compliance by embracing innovations like Cross-laminated timber (CLT), pre-fabrication and careful attention to in-use flexibility and efficiency. We will achieve more than just lower emissions — by planning in this way we reshape the economic and social value of our projects, and likely their ROI to investors.

Sustainability and regeneration are a direct result of decisions made in the "pre-carbon" (planning and design of the project) stages of a project lifecycle. It is this stage where our mandate comes to fruition – that we act as stewards of the future. The infrastructure of 2026 (perhaps exemplified by the "houses of the future" schemes) will be defined not by the permanence of their bricks, but by the wisdom of their project management.

AI usage in researching and writing this paper – statement by the author

This article, "From green building to timber innovation", was prepared with the assistance of an Artificial Intelligence (AI) large language model (LLM). Under direction and control of the author, the AI LLM was used to facilitate the drafting, research, and refinement process of the article. For example, AI was guided to refine the language to ensure it aligned with British English conventions, maintained a professional yet accessible tone, and avoided common AI-generated phrasing. An AI tool was also used to assist in the generation of illustrations. The author maintained full control at all times and assumes full responsibility for the completed work.

About the Author

Dr Hugo Minney

London, UK

Dr. Hugo Minney is a Fellow of APM (Association for Project Management), a Member of PMI and PMI UK, Lead of APM's Benefits and Value IN (Interest Network) and Sustainability IN, founder of APM's Nuclear Industries IN and AI & Data Analytics IN, committee member of PMI UK's Sustainability Community of Action and Board Member of the Non-Profit PM4theWorld (none of which are paid). Minney is also chair of the British Standards Institute's working group on Benefits Management, which publishes and maintains BS 202002 (Applying benefits management on portfolios, programmes and projects) (also unpaid).

Minney is a business consultant. He analyses the benefits of change, and weighs them up against the need for effective operations to keep the lights on; he has built business cases of all types and is acutely aware of the pressures to make a single project a success at the expense of the organisation's objectives and the need to resist this; as a former executive board director in National Health Service he can take a portfolio overview and prioritise the individual benefits of projects to ensure the success of the whole organisation. Minney is now a project management consultant with a sideline chairing a charity restoring the sense of community for young people.

Minney specialises in putting a number on difficult benefits (such as sustainability and regeneration), motivating team members by reporting what they are achieving together and motivating teams to build the communities and companies we want to be part of – together. He believes in standards and is accredited as a Social Value practitioner and Chartered Project Professional.

Dr. Minney can be contacted at hugo.minney@thesocialreturnco.org

Documents Cited

Anthesis. 2021. "PPN 06/20: Social Impact Guidance." In *Insights*. Anthesis. https://www.anthesisgroup.com/insights/ppn-06-20-social-impact-guidance/.

Atrium Ljungberg. 2024. "Stockholm Wood City - Sickla." In.: Atrium Ljungberg,. https://www.al.se/en/sickla/.

BREEAM. 2024. 'BREEAM', Building Research Establishment. https://breeam.com/.

BSI. 2023. "Carbon Management in Buildings and Infrastructure - PAS 2080." In, 68. British Standards Institute; Construction Leadership Council; The Green Construction Board; ICE - Institute of Civil Engineering. https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/.

CIH. 2022. "Value Toolkit Overview." In, 30. Construction Innovation Hub. https://constructioninnovationhub.org.uk/media/c0wftr01/20220927_hub_valuetoolkit_overview_interactive.pdf.

CLC-Green. 2016. "Guidance document for PAS 2080." In, 82. Construction Leadership Council. https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2019/06/Guidance-Document-for-PAS2080_vFinal.pdf.

CO. 2024. "PPN 02/23 - Tackling Modern Slavery in Government Supply Chains - Guidance." In.: Cabinet Office. https://www.gov.uk/government/publications/ppn-0223-tackling-modern-slavery-in-government-supply-chains/ppn-0223-tackling-modern-slavery-in-government-supply-chains-guidance-html.

DESNZ, and BEIS. 2024. "UK Emissions Trading Scheme markets." In.: Department for Energy, Security & Net Zero; Department for Business, Energy & Industrial Strategy. https://www.gov.uk/government/publications/uk-emissions-trading-scheme-markets/uk-emissions-trading-scheme-markets.

DfE. 2023. "Sustainability and climate change: a strategy for the education and children's services systems." In *Policy Paper*. Department for Education. https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems.

EC. 2023. "About the EU ETS - EU Emissions Trading System." In.: European Commission. https://climate.ec.europa.eu/eu-action/carbon-markets/about-eu-ets_en.

———. 2024. "Ecodesign for Sustainable Products Regulation (ESPR)." In.: European Commission. https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en.

EDF Energy, HPC, and CGN. 2019. "Realising the socio-economic benefits of Hinkley Point C." In. https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about/realising-socio-economic-benefits.

EEA. 2025. 'Europe's environment and climate: knowledge for resilience, prosperity and sustainability', European Environment Agency. https://www.eea.europa.eu/en/europe-environment-2025/main-report.

GCF. 2022. "Modern Methods of Construction." In *Construction Playbook; Policy Guidance*, 22. Government Commercial Function. https://assets.publishing.service.gov.uk/media/631222468fa8f5423fb0c7c0/20220901-MMC-Guidance-Note.pdf.

Grand View Research. 2025. "Modular Construction Market (2026 - 2033)." In.: Grand View Research. https://www.grandviewresearch.com/industry-analysis/modular-construction-market.

———. 2026. "UK Modular Construction Market Size & Outlook, 2026-2033." In.: Grand View Research. https://www.grandviewresearch.com/horizon/outlook/modular-construction-market/uk.

Greenly Institute. 2024. 'LEED certification: meaning and requirements', Greenly.Institute. https://greenly.earth/en-gb/blog/company-guide/leed-certification-meaning-and-requirements.

HMT. 2013. "Infrastructure Carbon Review." In, 40. HM Treasury. https://www.gov.uk/government/publications/infrastructure-carbon-review.

LETI. 2020. "LETI Climate Emergency Design Guide: How new buildings can meet UK climate change targets." In, 158. Low Energy Transformation Initiative CIC. https://www.leti.uk/cedg.

Minney, Hugo. 2024. 'Benefits Maps - the foundation of benefits management, Implementing BS202002: Benefits management on portfolios, programmes and projects', *PM World Journal*, XIII:IX (Sep) 17. https://pmworldlibrary.net/article/benefits-maps-the-foundation-of-benefits-management/.

———. 2025a. 'Integrating Sustainability and Regeneration into Benefits Management: A Holistic Approach for Project Success, Implementing BS202002: Benefits management on portfolios, programmes and projects, series article', *PM World Journal*, XIV:149:II (Feb) 8. https://pmworldlibrary.net/article/integrating-sustainability-and-regeneration-into-benefits-management-a-holistic-approach-for-project-success/.

———. 2025b. 'Structured Documentation and Tools for Implementing Benefits Management, Implementing BS202002: Benefits management on portfolios, programmes and projects, series article', *PM World Journal*, XIV:152:V (May) 26. https://pmworldlibrary.net/article/structured-documentation-and-tools-for-implementing-benefits-management/.

———. 2025c. 'The Project Manager's Mandate: Leading Sustainability and Regeneration in Projects', *PM World Journal*, XIV:154:VII (Jul) 33. https://pmworldlibrary.net/article/the-project-managers-mandate-leading-sustainability-and-regeneration-in-projects/.

———. 2025d. 'Integrating sustainability pillars: a holistic approach to project management', *PM World Journal*, XIV:155:VIII (Aug). https://pmworldlibrary.net/article/integrating-sustainability-pillars-a-holistic-approach-to-project-management/.

———. 2025e. 'The Elephant in the Room: Questioning Continuous Growth, Donut Economics, and the Service Economy Transition, Leading Sustainability and Regeneration in Projects, series article', *PM World Journal*, XIV:156:IX (Sep). https://pmworldlibrary.net/article/the-elephant-in-the-room-questioning-continuous-growth-donut-economics-and-the-service-economy-transition/.

———. 2025f. 'The Impact of Environmental Regulations on Economic Growth, Leading Sustainability and Regeneration in Projects, series article', *PM World Journal*, XIV:157:X (Oct). https://pmworldlibrary.net/article/the-impact-of-environmental-regulations-on-economic-growth-debunking-myths-and-exploring-opportunities/.

———. 2025g. 'Wellbeing in project teams: Boosting productivity and profitability through humancentric approaches, Leading Sustainability and Regeneration in Projects', *PM World Journal*, XIV:XI 16. https://pmworldlibrary.net/article/wellbeing-in-project-teams-boosting-productivity-and-profitability-through-human-centric-approaches/;https://pmworldlibrary.net/wp-content/uploads/2025/11/pmwj158-Nov2025-Minney-Wellbeing-in-Project-Teams-sustainability-series-article-5.pdf.

———. 2025h. 'Building Stronger Communities Through Projects: Social Value as a Strategic Driver of Organisational Success, Leading Sustainability and Regeneration in Projects', *PM World Journal*, XIV:XII (Dec) 27. https://pmworldlibrary.net/article/building-stronger-communities-through-projects-social-value-as-a-strategic-driver-of-organisational-success/.

———. 2026. 'Projects as Catalysts for Local Economies: Leveraging Social Value and Economic Benefits, Leading Sustainability and Regeneration in Projects', *PM World Journal*, XV:I (Jan) 28.

Mohamed, Sara, Richard Smith, Lucelia Rodrigues, Siddig Omer, and John Calautit. 2021. 'The correlation of energy performance and building age in UK schools', *Journal of Building Engineering*, 43 103141. https://www.sciencedirect.com/science/article/pii/S2352710221009992.

MottMacDonald. N.D. "GenZero Schools." In.: Mott MacDonald. https://www.mottmac.com/en/projects/genzero-schools/.

MPA. 2020. "Roadmap to Beyond Net Zero Launched " In, 9. Mineral Products Association. https://www.mineralproducts.org/News/2020/20-release34.aspx.

Nguyen, Anh. 2023. "What is PAS 2080:2023 - carbon management in infrastructure?" In.: ICE - Institute of Civil Engineering. https://www.ice.org.uk/news-insight/news-and-blogs/latest-news/news/what-is-pas-2080-2023-version.

NHBC. 2024. "Annual new home statistics review 2024." In, 9. National House Building Council. https://www.nhbc.co.uk/kontentdocuments/809c2405-ddd0-4a43-852a-af21ac2a6c73/New%20Home%20Statistics%20annual%20report-2024.pdf.

Porter, Michael E., and Mark R. Kramer. 2011. "Creating Shared Value: How to reinvent capitalism—and unleash a wave of innovation and growth." In *Corporate Social Responsibiilty*. https://hbr.org/2011/01/the-big-idea-creating-shared-value.

Provis, John L. 2014. 'Geopolymers and other alkali activated materials: why, how, and what?', *Materials and Structures*, 47:1 11–25. https://doi.org/10.1617/s11527-013-0211-5 https://link.springer.com/article/10.1617/s11527-013-0211-5.

RICS. 2024. "Whole life carbon assessment (WLCA) for the built environment." In, 221. RICS - Royal Institute of Chartered Surveyors. https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment.html.

Savage, Maddy. 2025. "Sweden is Building the World's Largest City Made Entirely From Timber." In.: Time Magazine. https://time.com/7207873/sweden-stockholm-wood-city-sustainability/.

SITRA. 2025. "The circular economy." In.: SITRA - the Finnish Innovation Fund. https://www.sitra.fi/en/a-circular-economy/.

Social Enterprise UK. 2013. "Public Services (Social Value) Act 2012: a brief guide." In, 14. Social Enterprise UK. https://www.siaassociation.org/uploads/files/2012/03/public_services_act_2012_a_brief_guide_web_version_final.pdf.

Spear, Morwenna, Callum Hill, Andrew Norton, and Prof Colin Price. 2019. "Wood in Construction in the UK: An Analysis of Carbon Abatement Potential." In, 28. BioComposites Centre, Bangor; Climate Change, Committee. https://www.theccc.org.uk/publication/wood-in-construction-in-the-uk-an-analysis-of-carbon-abatement-potential-biocomposites-centre/.

STA. 2022. "Structural timber market research: residential sector." In, 48. Structural Timber Association Ltd. https://streif.co.uk/wp-content/uploads/2024/02/stamarketresearchresidentialsectoroct2022251022.pdf.

Transforming Timber. 2025. "GenZero prototype could be a 'game-changer' for ultra low carbon schools." In.: Transforming Timber. https://www.transformingtimber.co.uk/news-4/blog-post-title-two-x75ya.

UKGBC. 2019. "Net Zero Carbon Buildings: a Framework Definition." In, 48. UK Green Building Council. https://ukgbc.org/resources/net-zero-carbon-buildings-framework/.

UNEP. 2025. "Global Status Report for Buildings and Construction 2024/2025 - not just another brick in the wall." In.: United Nations Environment Programme. https://www.unep.org/resources/report/global-status-report-buildings-and-construction-20242025.

WTA. 2018. "100 Projects UK CLT (The most relevant cross-laminated timber projects in UK 2005-2018." In, 324. Waugh Thistleton Architects. https://waughthistleton.com/100-projects-uk-clt/.