

The Path to Sustainability:

Analyzing the US Construction Industry's Progress

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Foreword

“The construction industry is facing unprecedented challenges. With global population set to drive a doubling of building floor space by 2060—equivalent to adding a New York City every month for the next 40 years—the issue of embodied carbon has come into sharp focus.

Embodied carbon, which encompasses the emissions from producing and assembling building materials, is a critical factor in the battle against climate change, responsible for half of the total carbon footprint of new construction. This report sheds light on the challenges and opportunities in tackling the increasing urgency of embodied carbon in the US construction sector.

At the Carbon Leadership Forum, our mission is to eliminate embodied carbon of buildings, materials, and infrastructure to create a just and thriving future. By uniting architects, engineers, contractors, and policymakers, we work to foster innovation and collective action to decarbonize the industry. Through collaboration and shared commitment, we can shape a more sustainable future, building resilient, low-carbon cities that benefit both people and the planet.”

Andrew Himes

Director of Collective Impact at the Carbon Leadership Forum

“The path towards a sustainable future is one of the most critical journeys the US construction industry will take. As the CEO of Qflow, I am privileged to witness and contribute to the transformation of our industry—an industry that plays a pivotal role in **building a sustainable future**.

This report, *The Path to Sustainability*, offers an in-depth analysis of the current state of sustainable practices in the US construction sector. It highlights the progress made so far, the technological innovations that are driving change, and the challenges that remain. From carbon tracking becoming a necessity, to the increasing demand for Environmental Product Declarations (EPDs), we are seeing a shift in how sustainability is viewed—not just as an optional consideration but as an essential component of construction projects.

At Qflow, we believe that technology is a powerful enabler of this shift. Our commitment to helping the industry reduce waste, manage resources more efficiently, and minimize carbon footprints aligns closely with the trends and opportunities outlined in this report. We see first-hand how data-driven solutions are transforming job sites, enabling more informed decision-making, and ultimately contributing to a more efficient and sustainable construction process.

However, there is still much work to be done. The report identifies significant regional disparities, inconsistent waste management practices, and the ongoing challenge of integrating sustainability into existing processes. Yet within these challenges lie opportunities—opportunities for innovation, efficiency, and collaboration.

It is through these collaborative efforts that we can accelerate the adoption of sustainable practices across the industry. I encourage you to delve into the findings of this report, reflect on the insights it offers, and consider how you can contribute to a more sustainable future.

Together, we have the potential to create lasting, positive change for our industry, our communities, and our planet.”

Brittany Harris

CEO, Qualis Flow

Executive Summary

The US construction industry stands at a critical juncture in its journey towards sustainability. This report examines the current landscape, and where the tracking of material deliveries, waste management, and real-time carbon footprint analysis are becoming increasingly integral to construction processes.

The findings reveal a sector in transition, with significant variations across regions and project types:

1. Carbon tracking is transitioning from an optional practice to a necessity for several industry players.
2. Adoption of sustainable practices and targets varies widely, with certain regions significantly ahead of others.
3. For a long time, the focus has been on operational carbon, it is gradually shifting towards embodied carbon.
4. Client requirements are a much stronger driver of adoption of sustainable construction measures than regulatory changes in the US.
5. Technology based solutions are becoming essential tools in construction project management and are on the way to being 'a part of the job site team'.
6. Sectors such as data centers and higher education are at the forefront of sustainable practices.
7. The demand for Environmental Product Declarations (EPDs) in construction is skyrocketing, especially from leading clients including tech companies and data center operators.
8. Waste management practices remain inconsistent across different jurisdictions.
9. There is a growing demand for solutions that seamlessly integrate sustainability into existing processes and deliver wider benefits to the job site and/or project.
10. Green building organizations, policy makers, thought leaders and sustainable construction conferences promote more collaboration between the industry and accelerate the process.

The research indicates that companies capable of effectively measuring, managing, and reducing their carbon footprint are likely to gain a competitive advantage in the evolving market.

Introduction

The US construction industry faces a complex challenge as it strives to build a sustainable future. This report aims to provide a comprehensive analysis of this evolving landscape, offering insights into the obstacles and opportunities that lie ahead.

The methodology employed in creating this report was rigorous and multifaceted:

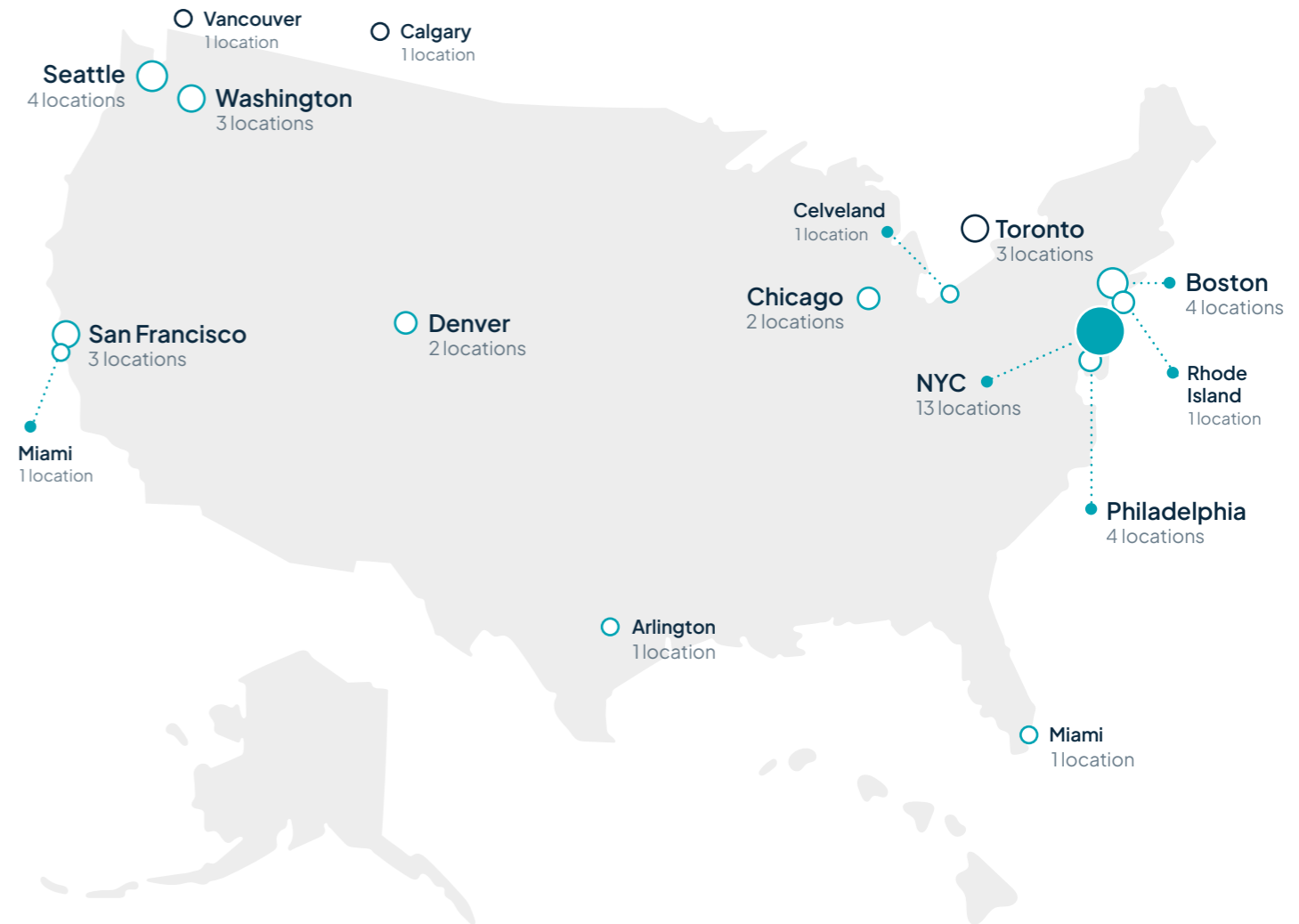
- Over 50 in-depth interviews were conducted with industry leaders, including architects, developers, construction project managers, and sustainability leaders.
- The research team attended major industry events, including New York Build and the Advancing Construction Decarbonization Conference, World

Green Building Council Webinars and RICS (Royal Institution of Chartered Surveyors) Annual General Meeting, gathering firsthand insights from key stakeholders and collected information from industry reports.

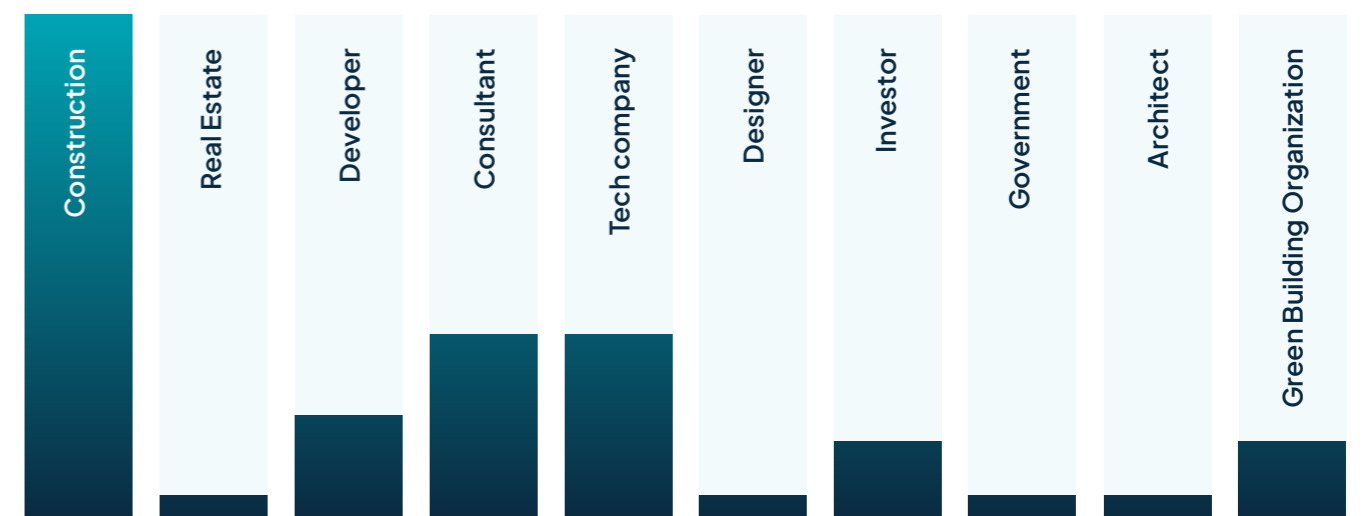
- In total, the perspectives of more than 200 sustainability experts in the construction sector were incorporated, ensuring a broad and diverse range of insights.

This report serves as a guide for industry professionals, policymakers, and stakeholders, providing a detailed examination of the challenges, opportunities, and innovations shaping the future of sustainable construction in the United States.

North America Locations



North America Segments



Whole life carbon assessment (WLCA) for the built environment

Whole life carbon (WLC) is defined as the entire amount of carbon produced by any built asset. It is composed of two main sources of emissions: operational and embodied. (World Economic Forum)

Embodied Carbon + Operational Carbon = Whole Life Carbon

Operational carbon refers to carbon that is produced by the built asset's day-to-day occupancy and use, such as heating and cooling, lights, and equipment. Embodied carbon refers to the carbon emissions associated with the extraction, manufacturing, transportation, installation, maintenance, and disposal of building materials. (World Economic Forum)

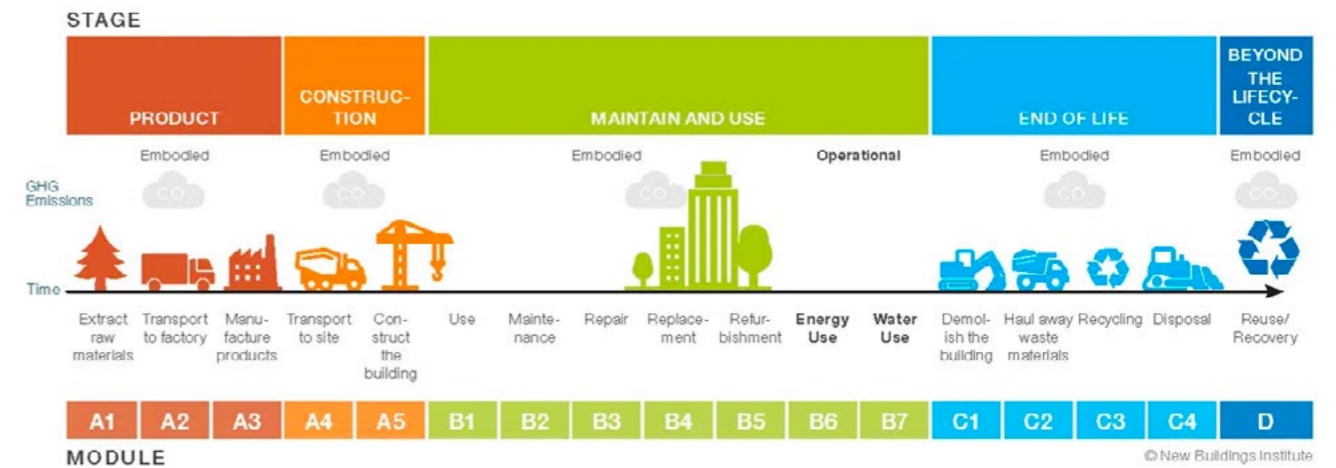
The World Building Council for Sustainable Development (WBCSD) and Arup report that embodied emissions account for approximately 50% of an average building's whole life emissions, and most of them occur before anyone even sets foot in the building¹.

Why Whole Life Carbon (WLC) Assessment Matters:

- The built environment is responsible for nearly 40% of the world's carbon emissions.²
- The U.S. industrial sector is linked to nearly a third of annual U.S. greenhouse (GHG) emissions, and the manufacturing of construction materials and products accounts for 11% of annual global GHG emissions.³
- With the US's evolving zero-emissions guidelines, reducing emissions in construction is critical.⁴
- WLC assessment includes all emissions from material sourcing to demolition, ensuring minimal lifetime emissions and maximum resource efficiency.⁵

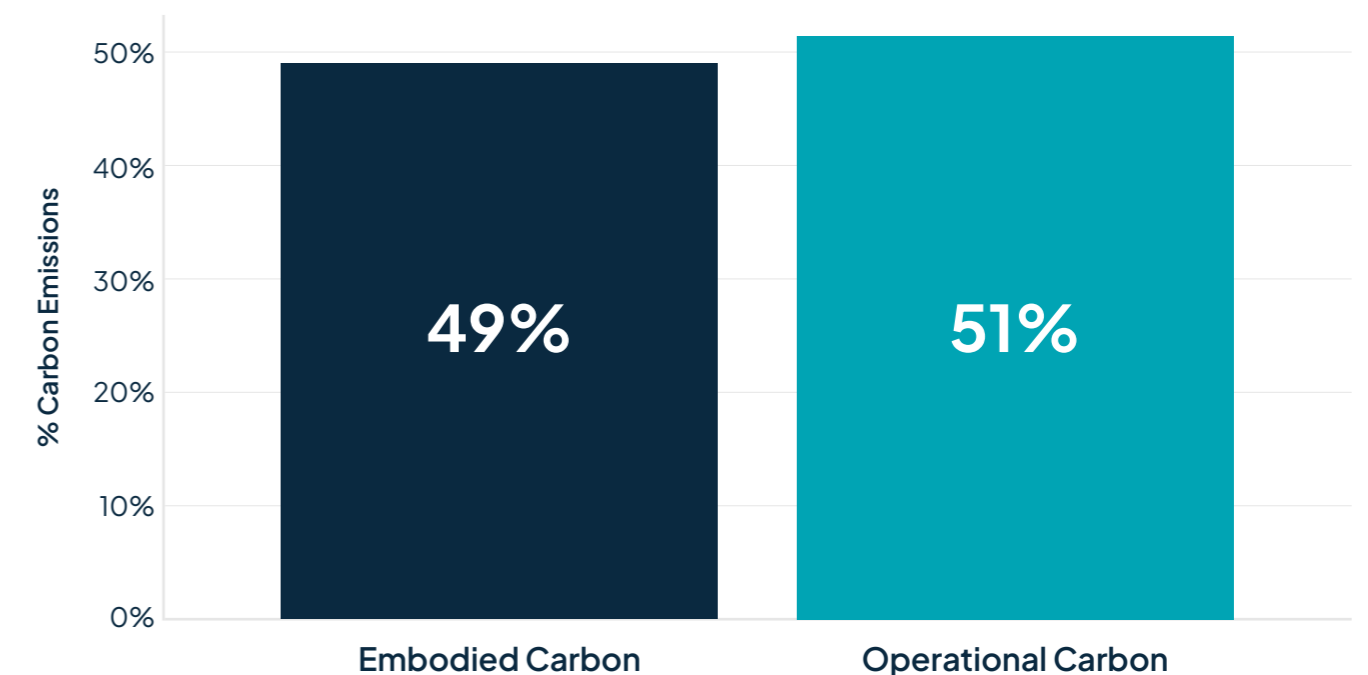
Figure 1: Lifecycle Stages

Data source: BS EN 15978:2011



Total Carbon Emissions of Global New Construction from 2020-2050

Business as usual projection



Source: Carbon Leadership Forum 2022.

01 Carbon Awareness and Literacy: The Evolution of Industry Knowledge

The concept of carbon footprint is rapidly gaining prominence in the US construction industry. However, the level of understanding and implementation varies significantly across different regions and project types.

In progressive areas such as California, discussions about Scope 3 emissions and embodied carbon are becoming commonplace. In contrast, smaller residential projects in other regions may still be in the early stages of adopting basic sustainability practices.

“Carbon reduction is very limited in the US. There’s pushback across the supply chain because we don’t have great data, so it’s difficult to clearly define who’s responsible for scope 3 emissions.”

Fernando Arias, formerly Director of Sustainability at Clark Construction.

The demand for Environmental Product Declarations (EPDs) is increasing, particularly from technology companies and data center operators. These organizations are seeking detailed information about the carbon impact of construction materials and processes.

The iMasons Climate Accord, a coalition dedicated to carbon reduction in digital infrastructure, has issued an open letter from its Governing Body and selected members, underscoring the imperative of Environmental Product Declarations (EPDs) to mitigate climate change by lowering the greenhouse gas (GHG) footprint of data centers worldwide⁶. Leading industry players, including AWS, Digital Realty, Google, Meta, Microsoft, and Schneider Electric, have endorsed this letter, highlighting a significant industry challenge: the scarcity of vendors producing and providing EPDs for data center owners and operators. You can find their Open Letter on EPD Adoption here.

“The industry is still moving very slowly when it comes to EPDs and data set rules.”

Real Estate and Workspace Services at Global Technology Company

To address this, it is crucial that supply chain vendors enhance transparency regarding the embodied emissions of materials used to construct our digital infrastructure, support GHG estimation and reporting, and facilitate the industry’s progress towards its ambitious climate objectives through informed green procurement practices.

From our expert interviews and market research, a key message emerged: effective carbon management requires accurate measurement. This principle is driving changes in how the industry approaches sustainability.

While progress in carbon literacy is evident, it remains uneven across the sector. Some regions and companies are advancing rapidly, while others are still in the initial stages of this transition.

Which states and regions are leading the way?

CALIFORNIA

California was consistently identified as the most progressive state in terms of sustainability practices and regulations.

“Waste policy is better in California, it is the most progressive state, but it is still not enough. There are good policies in San Francisco, with a more eager social climate and people are more willing to engage in decarbonization or lowering waste stream.”

Jim Coyle, Construction Manager from Equity Community Builders

This sentiment was echoed by several other interviewees, emphasizing California’s role as a trendsetter in the industry.

NEW YORK AND MASSACHUSETTS

New York City and Boston were frequently mentioned alongside California as hubs of progressive practices.

“Massachusetts, NYC and California are more progressive at the state level, they are the 3 states at the forefront of waste and the circular economy with more progress for implementing processes and standards, as well as addressing scope 3.”

Michael Daschle, Senior VP from Brookfield

In New York, the New York City Economic Development Corporation (NYC EDC) recently released their [Circular Design & Construction Guidelines](#) focused on reducing embodied carbon and enhancing circularity in New York City’s built environment. Key points include:

1. Embodied Carbon Reduction: NYC aims to cut embodied carbon emissions by 50% by 2033, targeting the significant carbon footprint associated with building materials from extraction to disposal. Embodied carbon accounts for a large portion of NYC’s overall emissions, especially in construction.
2. A Circular Economy Approach: The guidelines advocate for a shift from the traditional “take-make-waste” model to a circular economy. This approach emphasizes reusing, recycling, and planning for longevity in construction to minimize waste and maintain materials at their highest value.
3. Implementation Strategies: The guidelines provide clear strategies and deliverables for project teams to follow throughout a building’s lifecycle. These are designed to ensure that circular principles are integrated into design and construction, thereby supporting NYC’s broader sustainability goals.⁷

These efforts are part of NYC’s broader push towards a green economy, aligned with the city’s strategic climate plans like PlaNYC, aiming to make the construction industry more sustainable while fostering economic growth.

Regional Disparities and Comparison with Europe

Despite the leadership shown by these states, interviewees noted significant disparities across

the country. Many viewed Europe as more advanced in sustainability practices.,

“Europe is 5 to 10 years ahead of the (United) States”

Marcelo Alvarado, Assistant VP from Marand Builders stating

This perspective underscores the potential for the US construction industry to ‘see into the future’ and get ahead by observing European practices and taking onboard the parts that work best.

Implications for Industry Leaders

The regional differences highlighted in our interviews suggest that industry leaders should:

1. Look to California, New York, and Massachusetts as potential models for sustainable practices and regulatory compliance.
2. Anticipate that regulations and practices in other states may eventually align with these leading regions.
3. Consider European practices as a possible indicator of future trends in the US market.
4. Be prepared for varying levels of sustainability requirements and carbon literacy when operating across different states.

02 Technology Adoption: The Digital Transformation of Sustainability Practices

The construction industry is undergoing a significant digital transformation, particularly in the realm of sustainability data management. This shift is moving the sector from manual, paper-based processes to more sophisticated digital solutions.

However, the adoption of these technologies is not uniform across the industry. Whilst most experts mentioned their company is leveraging digital tools, most don't have something in place for site data capture. This reflects the current state of many construction companies, which are at various stages of technological adoption.

A common theme throughout this study was a growing need for technological solutions for automating data collection, verifying as-built conditions against design specifications, and linking product EPDs with actual on-site usage. The goal is to create a more streamlined and accurate approach to sustainability management

Integration has emerged as a key priority. Tools such as EC3 (Embodied Carbon in Construction Calculator) and Procore are becoming industry standards. These integrations are very positive steps forward for our industry, as highlighted by Michael Swenson from Suffolk, "having Open Space linked to Procore was helpful and there is a lot of value with Procore integrations." This highlighted the importance of integrating sustainability tools into existing systems.

The ideal scenario envisioned by many in the industry involves real-time updates of carbon calculations based on material deliveries, seamless integration of waste management data into sustainability reports, and fluent communication between project management software and carbon tracking tools.

Increasing Adoption of AI and Automation

The future of construction technology is clearly moving towards integrated, intelligent, and user-friendly solutions that make sustainability an integral part of the construction process, rather than an additional consideration.

"Drone deployment is big in the digital transformation space."

Camilo Garcia, DS BIM LLC

"There is an increase in the use of 3D video job site."

Marcelo Alvarado, Marand Builders

"AI is big at the moment."

Kathryn Dreitzler, ARCO Murray

It is important to note, however, that AI relies heavily on good quality, digital data to deliver its full potential. Data collection and management at scale are the foundational building blocks needed today to enable the industry to leverage AI in the future.

Growing Importance of Data Management and Integration

Many interviewees highlighted the challenges and opportunities surrounding data management in the construction industry.

"Effectively managing sustainability data is a challenge for the construction industry today and represents a significant opportunity for data-driven solutions."

Sean Casey, Decarbonization Technical Leader from AECOM

There is a distinct need for better data management solutions in the industry, especially given that most industry experts highlighted how the construction industry is still paper based. This is a key limiting factor towards leveraging AI in construction.

03 Market Trends: Sector-Specific Advances in Sustainable Construction

The adoption of sustainable practices in US construction is progressing at varying rates across different sectors and regions, creating a diverse landscape of innovation and implementation.

Data centers are emerging as leaders in sustainable construction, driven by the stringent environmental requirements of major technology companies. The higher education sector is also making significant strides, with institutions such as Harvard and MIT setting ambitious sustainability targets.

"Higher education is a key market in the US and their sustainability goals are more progressive. In the last 5 years, they refined to net zero by 2050 or earlier for Harvard and MIT."

Michael Swenson, Sustainability Director from Suffolk

The retrofit and renovation sector, particularly in urban centers like New York, is experiencing a surge in sustainable practices. This trend is driven by the need to upgrade existing building stock to meet modern environmental standards.

Interestingly, even in regions with less stringent environmental regulations, market forces are driving a shift towards sustainable construction. Texas, for instance, is witnessing an increase in sustainable building practices, primarily due to client demands and economic incentives rather than regulatory pressures.

The Federal Government recently introduced The Buy Clean Task Force, creating policies to reduce embodied carbon emissions in federal projects by prioritizing construction materials with high carbon concerns, increasing transparency through supplier reporting of Environmental Product Declarations, and launching pilot programs to promote the use of cleaner materials.⁸

Material selection is evolving, with a growing emphasis on environmentally friendly options. As previously noted, major clients require greater transparency and accountability across their supply chain. The iMasons Accord and Buy Clean act are just the beginning.

"Mass timber is booming and a lot of that started in the Pacific Northwest and now southeast and California."

Evan Riley from Skanska

These sector-specific advancements, such as in Data Centers, are creating models of sustainable construction that can influence practices across the broader industry. These lessons learned are being picked up and disseminated across the industry through events and institution-led best practice guidance documents.

1. The U.S. Green Building Council, which promotes sustainable and resilient communities through green building practices.
2. The UN Environment Programme's Global Alliance for Buildings and Construction which mobilizes global stakeholders toward a zero-emission, efficient, and resilient construction sector.
3. The U.S. Inflation Reduction Act and the Bipartisan Infrastructure Law, the US's largest reinvestment in the country's infrastructure in generations, promoting reducing carbon emissions and climate resilience.

04 Challenges: Obstacles in Implementing Sustainable Practices

The implementation of sustainable practices in the construction industry faces several significant challenges, ranging from waste management issues to data collection difficulties.

Waste management remains a critical issue. A lack of standardized practices and infrastructure for sustainable waste management across different states was consistently highlighted as a key barrier to progress in this space.

“Most C&D waste goes directly to the landfill. There are third party verified processing facilities but they are few and far between, and most are in California.”

Isaiah Walston, Sustainability and Decarbonization Expert

This statement underscores the lack of standardized practices and infrastructure for sustainable waste management across different states.

Data collection presents another major hurdle. Obtaining accurate information from subcontractors and suppliers is often a complex process.

Janis Piterwas, Construction Technology Expert, elaborates on this challenge:

“The biggest challenge is to make sure the material we considered is handled that way on the job side. This includes all these small bits and pieces like how many people, travel and supply chain impacts on their jobs.”

The tracking and management of Scope 3 emissions remains particularly challenging due to their complexity and the extensive supply chain involved in construction projects.

Financial considerations add another layer of complexity. Sustainability solutions need to

demonstrate a clear return on investment to gain widespread adoption in an industry where profit margins can be tight.

There is often a discrepancy between sustainable design intentions and the realities of construction. What is specified in project plans may not always align with what is feasible or available during the construction phase.

05 Opportunities: Potential for Growth and Innovation in Sustainable Construction

Despite the challenges, the US construction industry presents numerous opportunities for advancing sustainable practices and improving environmental performance.

There is a growing demand from technology clients and large corporations for more robust sustainability practices and reporting.

“The sustainability goals and targets are getting more stringent with clients. Some government projects have those targets, and they are seeing laws increasing.”

Arash-Zarmehr, WSP

This trend creates a market for advanced sustainability solutions.

The North American engineering services market reached around \$410.4 billion USD and is projected to expand at 16.8% CAGR, is poised for significant expansion, particularly in transportation and energy sectors, driven by over \$2.3T in federal spending through to 2028.⁹ This will drive new construction and highlights the urgent need for better sustainable construction practices. Key growth areas include rail infrastructure, expected to triple in investment, and energy, with a 12% annual growth rate focused on renewables and grid hardening. Increased federal funding with the Bipartisan Infrastructure Deal present major opportunities, especially in large-scale infrastructure projects like roads, airports, and ports.

Moreover, the rise of AI is going to lead to more investments and construction in the global data center space, especially in the US. The US data center construction market size is estimated at USD 13.24 billion in 2024, and is expected to reach USD 19.78 billion by 2029, growing at a CAGR of 8.36% during the forecast period (2024-2029)¹⁰. With data center construction leading the way in the adoption of Whole Life Carbon assessment and reporting, this will likely accelerate the development of skills and adoption of similar practices across the wider industry.

With new regulations on the horizon, there is significant potential for solutions that simplify compliance processes. Tools that can streamline regulatory adherence while providing actionable insights are likely to find a receptive market.

The demand for integrated solutions is growing. The industry is seeking comprehensive ecosystems of tools that can communicate seamlessly, sharing data and providing holistic insights into sustainability performance.

Progressive regions are setting examples in circularity and waste reduction, creating opportunities for innovative solutions to be developed, tested, and scaled.

The findings indicate promising opportunities in the higher education and healthcare sectors. These institutions often have long-term perspectives and are willing to invest in sustainable solutions that offer lasting benefits.

Tom Warner from Haskell expresses enthusiasm for new solutions:

“From my standpoint, I am very interested in tools like Qflow to address scope 3 emissions. Scope 3 is a really new territory for US contractors to report emissions and smaller contractors do not have the huge projects with clients requiring it. In our case, we do a lot of industrial projects where clients have their own climate action plans and may require evidence that we are tracking those construction-related emissions.”

Tom Warner, Sustainability Manager from Haskell

This sentiment reflects a broader industry eagerness for tools that can transform sustainability from a challenge into a competitive advantage.

The US construction industry is poised for significant advancements in sustainable practices, presenting ample opportunities for innovation and leadership in this crucial area.

Conclusion

The US construction industry is at a pivotal point in its evolution towards sustainability. The path forward, while challenging, offers significant opportunities for innovation and leadership.

Carbon awareness in the industry is growing, though at varying rates. Enhancing carbon literacy across all sectors of the industry remains a crucial task, with the goal of making it as fundamental to construction processes as traditional building skills.

Technological solutions are playing an increasingly vital role in this transformation. From advanced data management systems to real-time carbon calculators, these tools are reshaping how the industry approaches sustainability. The companies that effectively leverage these technologies are likely to lead the industry's sustainable future.

Certain sectors, such as data centers, higher education, and urban development in progressive cities, are setting new standards for sustainable construction. These sectors are demonstrating the feasibility and benefits of prioritizing sustainability in construction projects.

While challenges persist, particularly in areas such as waste management, data collection, and Scope 3 emissions tracking, these difficulties also present opportunities for innovation. The growing demand for sustainable solutions, coupled with tightening regulations and increasing client awareness, creates fertile ground for companies that can provide clear, data-driven, and actionable sustainability strategies.

The construction industry of tomorrow is being shaped today. Every week, an area the size of Paris is being built. It's an industry that will need to balance environmental considerations with economic viability, prioritize transparency alongside efficiency, and view sustainability not as an added cost, but as a long-term investment and competitive advantage.

The transition to a more sustainable construction industry is not just an environmental imperative; it's a business opportunity. Companies that can navigate this transition effectively will be well-positioned to lead the industry into a new era of responsible and sustainable construction practices.

If you are interested in exploring our findings further or would like to contribute your perspectives to future research, we warmly invite you to connect with our team at

info@qualisflow.com

We hope this report serves as a catalyst for meaningful discussions and drives more stakeholders within the construction industry to embrace and implement sustainable practices. Together, by fostering innovation and collaboration, we can create transformative change that builds a more sustainable future for our planet and society.

A massive thank you to all the contributors of this report!

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