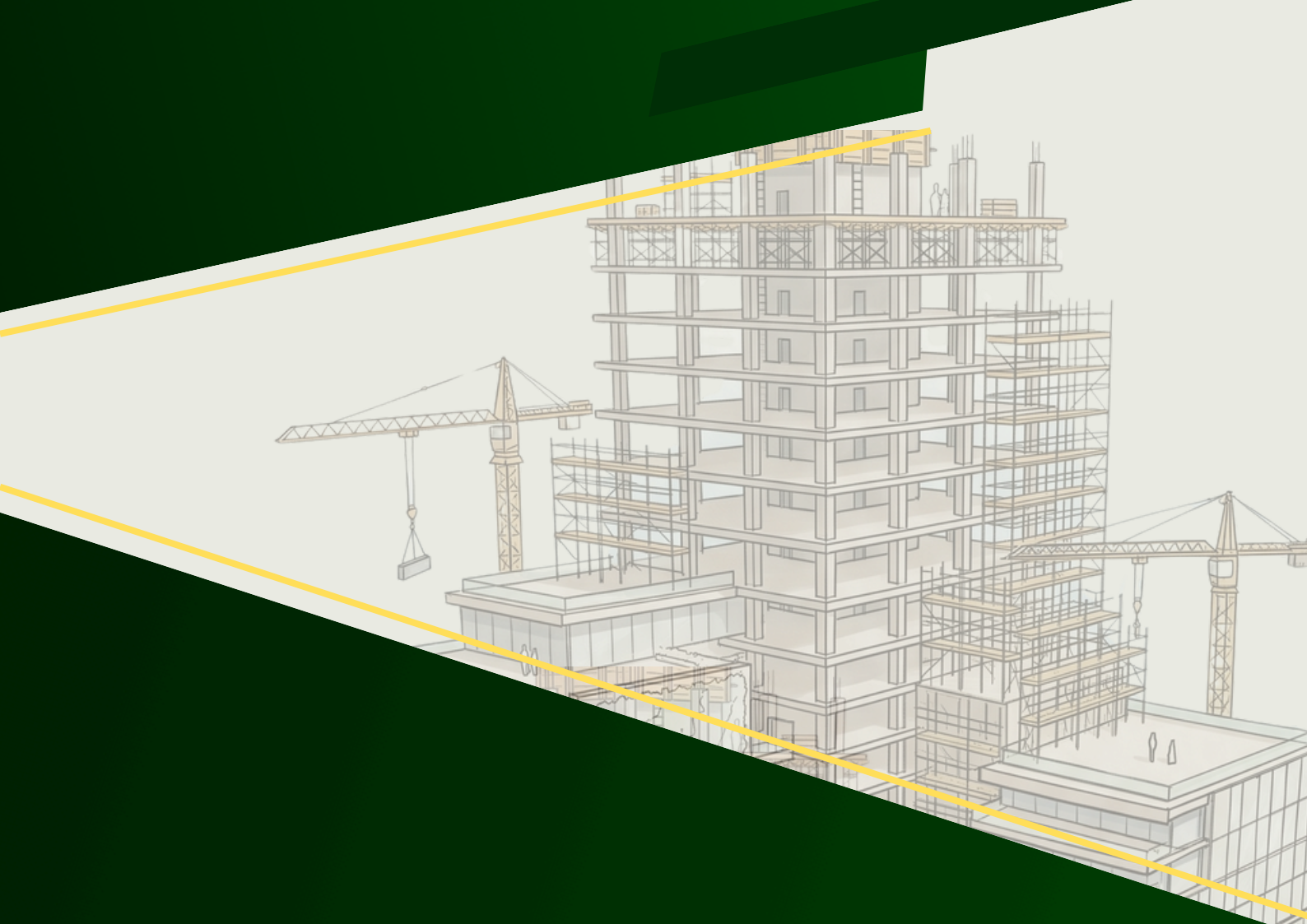




COLLABORATIVE PAPER: **LOW CARBON MATERIALS IN UAE**



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List of Abbreviations

Abbreviation	Meaning
A1–A5	Life-cycle assessment stages (A1–A3 product stage; A4 transport-to-site; A5 construction-installation)
AED	United Arab Emirates Dirham
ASTM	American Society for Testing and Materials (e.g., ASTM C595)
BF-BOF	Blast Furnace–Basic Oxygen Furnace (steelmaking route)
BREEAM	Building Research Establishment Environmental Assessment Method
BS / BS EN	British Standard / British Standard European Norm (e.g., BS 8500-1, BS EN 197-1)
BUA	Built-Up Area
CARES	Certification Authority for Reinforcing Steels (steel certification body)
CCUS	Carbon Capture, Utilization and Storage
CIBSE	Chartered Institution of Building Services Engineers
CO₂ / CO₂e	Carbon Dioxide / Carbon Dioxide equivalent

Abbreviation	Meaning
COP28	28th Conference of the Parties (UN Climate Change Conference)
DBC	Dubai Building Code
DEWA	Dubai Electricity and Water Authority
DIFC	Dubai International Financial Centre
DLF	Developers' Leaders' Forum
DRI	Direct Reduced Iron
DSCB	Dubai Sustainable Concrete Baseline
EAF	Electric Arc Furnace
EFG	Emirates Float Glass
EGA	Emirates Global Aluminium
EIF	Electric Induction Furnace
EmiratesGBC / EGBC	Emirates Green Building Council

Abbreviation	Meaning
EMSTEEL	Emirates Steel Arkan
EPD	Environmental Product Declaration
ESG	Environmental, Social, and Governance
FSC	Forest Stewardship Council
GEP	Green Economy Partnership
GFA	Gross Floor Area
GGBFS	Ground Granulated Blast-Furnace Slag
GHG	Greenhouse Gas
GPLFI	Global Property Linked Finance Initiative
GWP / GWP100	Global Warming Potential / GWP over a 100-year time horizon
IDDI	Industrial Deep Decarbonization Initiative

Abbreviation	Meaning
ISO	International Organization for Standardization (e.g., ISO 22095)
kgCO ₂ e/m ²	Kilograms of Carbon Dioxide equivalent per square metre
LCA	Life Cycle Assessment
LCI	Life-Cycle Inventory
LEED	Leadership in Energy and Environmental Design Certification Standard
MENA	Middle East and North Africa
MEP	Mechanical, Electrical, and Plumbing
MOCCAEC	Ministry of Climate Change and Environment
MoU	Memorandum of Understanding
MR	Materials and Resources (LEED credit category)
MRV	Measurement, Reporting and Verification

Abbreviation	Meaning
NDC	Nationally Determined Contribution
NGBR	National Green Building Regulation
OECD	Organisation for Economic Co-operation and Development
OPC	Ordinary Portland Cement
RIT	Rochester Institute of Technology
SCM	Supplementary Cementitious Materials
SCS	Sustainable Construction(al) Steel (CARES standard)
TM65	CIBSE Technical Memorandum 65 (embodied carbon in building services)
UAE	United Arab Emirates
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar

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1.Executive Summary

Every square metre the UAE builds carries a hidden ledger. Long before a tenant switches on a light, a building has already spent much of its carbon budget, locked into the cement, steel, aluminium, glass and other materials that hold it up. This is embodied carbon, and unlike operational emissions, which can be trimmed year after year, it is fixed at the time of construction and can never be clawed back.

Globally, embodied carbon emissions already account for roughly 11% of whole-life-cycle building-related emissions and will increase significantly by 2050 as the world adds floor area equivalent to a city the size of Paris almost every week. For a nation building at the UAE's pace, that should not be another footnote, but part of its headline towards decarbonisation.

Developed by EmiratesGBC with the support of Expo City Dubai and a coalition of the country's leading developers, manufacturers and technical experts, this paper does something the UAE market has never quite managed before. It puts the construction-related emissions for each newly constructed building on the table.

At its core sits a pioneering benchmarking exercise drawing on 39 developer-reported assessments, of which 33 buildings were analysed across residential and commercial typologies. The result is the market's first directional reference points that provide a value in kilograms of carbon dioxide equivalent per square meter of built-up area for residential and commercial buildings for material embodied carbon:

- Low-Rise Residential = average 612 (range: 445, 823) kgCO₂e/m²BUA
- Mid-Rise Residential = average 923 (range: 717, 923) kgCO₂e/m²BUA
- Mid-Rise Commercial Offices = average 1010 (range: 715, 1630) kgCO₂e/m²BUA
- Low-Rise Commercial Retail = average 638 (range: 542, 773) kgCO₂e/m²BUA

The report is upfront about its limits and differences in scope, and the data mean these are reference ranges. Including a comprehensive assessment boundary that accounts for full construction emissions, Mechanical, Electrical, and Plumbing (MEP) elements, and all materials could significantly increase reported figures. Specifically, this approach may elevate emissions estimates by up to circa 35% for commercial projects and 40% for residential projects.

The direction towards achieving decarbonisation by 2050 is unmistakable. The UAE must move from measuring selected materials to whole-building assessment. The most reassuring finding is that the UAE need not wait for a breakthrough. The first low-carbon solutions are already commercially mature and on the ground:

- Dubai Municipality Circular 225 has incorporated supplementary cementitious materials into mainstream mixes, delivering 30–40% reductions in embodied carbon, with the DEWA headquarters deploying low-carbon ready-mix at scale.
- Gas-based DRI-EAF steel production is far cleaner than the global blast-furnace norm. Separately, the Dubai Creek Harbour Mosque used AGSI's reinforcing steel produced from 100% locally sourced recycled raw materials through EIF technology to cut production-stage emissions by more than 90%.
- EGA's solar- and nuclear-powered aluminium production and recycled lines such as Hydro CIRCAL cut facade emissions by over 85% in projects like the Rashid & Latifa schools.
- Local glass manufacturing and rising cullet content point the way, even as the sector awaits its first fully quantified UAE case study.

Someone may therefore ask. If the materials exist, why hasn't the market moved faster, given that 95% of surveyed professionals report limited uptake of embodied-carbon modelling? It is unacknowledged that barriers exist that can be turned into opportunities. These include limited materials and UAE-specific lifecycle data; modest adoption of Environmental Product Declarations; different procurement signals by developers across the UAE market; and financing that rewards operational efficiency but barely recognises embodied carbon.

The report closes with a practical roadmap that assigns clear actions to developers, policymakers and suppliers, from embedding EPD thresholds in tenders to standardising measurement and scaling up low-carbon production.

Overall, the UAE's structural advantages, large, coordinated developers, strong institutions and vertically integrated supply chains, leave it unusually well-placed to lead in the MENA region.

The timing of this paper is deliberate. With Federal Decree-Law No. 11 of 2024 taking effect and the UAE's NDC 3.0 targeting a 79% cut in building-sector emissions by 2035, the scaffolding for performance-based carbon governance should now be erected.

Technologies are proven; the policy is maturing.

This is the moment the UAE can transform its real estate success into a blueprint for low-carbon construction across the region.

2.0 Introduction

Embodied carbon, defined as the total greenhouse gas emissions generated during the production, transport, construction, and disposal of building materials, is increasingly recognised as a critical focus area.¹ Unlike operational emissions, which occur throughout a building's life, embodied carbon is emitted at the time of construction and cannot be mitigated later, making early intervention essential¹. Current estimates indicate that embodied carbon accounts for around 11% of annual building-related emissions globally, potentially rising to 50% by 2050.² Materials such as cement and steel have particularly high carbon intensities, contributing approximately 7–9% of global CO₂ emissions, respectively.³ Globally, an estimated 12.7 million m² of new building floor area is added every day, roughly equivalent to the size of Paris nearly every week.⁴ Thus, failing to address embodied carbon will lock in significant upfront emissions.^{4, 5}

In its Third Nationally Determined Contribution (NDC 3.0), the UAE established sector-specific mitigation targets, including a 79% reduction in building-sector emissions by 2035 relative to 2019 levels, positioning the built environment as a central contributor to national decarbonization efforts.⁶ The NDC 3.0 also sets pathways across all major sectors, including energy, transport, buildings and heavy industry, recognising the need to address both operational emissions and emissions associated with industrial production⁶. Within the industrial pathway, measures include increasing demand for low- and near-zero-emission steel, cement and concrete, strengthening environmental product disclosure, and advancing industrial decarbonisation technologies.⁶ Together, these measures reinforce the need for immediate action to advance low- and near-zero-carbon construction approaches while supporting the UAE's longer-term Net Zero by 2050 ambition.^{6, 7}

3.0 The State of Embodied Carbon in UAE Construction

The UAE is transitioning from voluntary sustainability initiatives towards mandatory climate governance.⁸ This shift is formalised through the Federal Decree Law No. (11) of 2024 on the Reduction of Climate Change Effects, effective from May 2025, which embeds emissions accountability within national regulatory practice.⁹

The law establishes compulsory emissions Measurement, Reporting and Verification (MRV) requirements for specific key emitting sectors under the supervision of the Ministry of Climate and Environment (MOCCA), supporting progress toward the UAE's Net Zero 2050 objectives.^{10, 11, 12}

Although not explicitly regulating embodied carbon, the law has implications across the construction supply chain, as embodied carbon associated with significant construction materials such as steel, aluminium and concrete originates from emissions generated across their production and supply chains, involving industries that may be subject to the law's emissions measurement, reporting and reduction requirements.^{9, 13}

Furthermore, the law promotes low-carbon technologies and carbon accounting mechanisms, including the National Carbon Credit Registry, creating a regulatory foundation for emissions disclosure, material performance benchmarking, and carbon reduction strategies.^{9,14} These measures strengthen the institutional basis for understanding and managing carbon emissions in construction and provide the policy context for subsequent national decarbonization commitments and sectoral implementation pathways.⁹

Moreover, the UAE's NDC 3.0 provides a strengthened policy framework with direct implications for carbon emissions associated with operational activities as well as those arising from the manufacturing and supply of construction materials.⁶ While it does not yet introduce explicit embodied-carbon limits, it places strong emphasis on industrial decarbonization, low-carbon materials, and circular-economy principles, which are critical to upstream drivers of embodied emissions in construction.⁶ The NDC identifies cement, steel, aluminium, and other energy-intensive materials as priority sectors for emissions reduction, highlighting the need to scale material substitution and carbon capture technologies within local manufacturing.⁶ For example, a key enabling mechanism outlined in the NDC is the integration of green public procurement and low-carbon supply chains, particularly for the public sector and large-scale developments.^{9,15} Additionally, through its endorsement of the Industrial Deep Decarbonization Initiative (IDDI)* Green Public Procurement Statement of Intent, the UAE has signalled its intention to develop a time-bound approach for procuring low- and near-zero-emission steel, cement and concrete in public construction, alongside greater disclosure of embodied emissions and the use of whole-life-cycle assessment.^{16,17} This demand-side signal is expected to accelerate market adoption of materials with lower carbon footprints and increase the availability of Environmental Product Declarations (EPDs) and life cycle assessment (LCA) data for material selection and benchmarking.^{16,18}

In Abu Dhabi, the Estidama Pearl Rating System integrates material environmental performance, including recycled steel content and concrete metrics, with mandatory compliance for selected project categories.¹⁹ Similarly, in Dubai, the regulatory framework combines sustainability-oriented material requirements with mandatory structural requirements.²⁰ The Dubai Building Code (DBC) establishes mandatory minimum requirements for building design across the Emirate, including requirements governing concrete and steel structures, while the Dubai Sustainable Concrete Baseline (DSCB) provides a more specific sustainability-focused framework for assessing and benchmarking concrete.^{20,21}

While several of the solutions discussed herewith are voluntary or industry-led, industry engagement is advancing alongside the development of mandatory climate and building requirements, supported by the UAE's broader commitment to green public procurement and low-carbon construction supply chains, reinforcing market demand for low- and near-zero-emission steel, cement and concrete in construction projects.^{17,22}

**Industrial Deep Decarbonization Initiative (IDDI): A Clean Energy Ministerial initiative coordinated by UNIDO to accelerate demand for low- and near-zero-emission steel, cement and concrete. At COP28 in 2023, the UAE, Austria and Japan endorsed the IDDI Green Public Procurement Statement of Intent, while Canada, Germany, the UK and US announced commitments under the Green Public Procurement Pledge.*

3.1 Role of Leading Developers and their Decarbonisation Efforts

In the UAE, leading real estate developers are increasingly positioning decarbonisation as a core delivery mandate, moving beyond compliance-led sustainability towards market-shaping practices that influence supply chains, project specifications, and investor expectations.^{23, 24}

Building on the influential role developers play in shaping market practices, the Developers' Leaders' Forum (DLF), a key platform supporting voluntary industry engagement, organised by Emirates Green Building Council, has produced several collaborative industry initiatives. One of the first major outputs was the UAE Sustainable Built Environment Blueprint Report²⁵, which consolidates market insights and identifies priority enablers and intervention opportunities to accelerate climate action across the UAE's built environment.

A second major initiative is the DLF Sustainability Criteria, a unified set of advanced, implementable sustainability requirements designed to exceed existing regulatory baselines and help standardise market expectations.^{23, 26} The criteria cover several core built-environment themes, including energy, water, waste, environmental quality, and materials.²⁵ The Materials Criterion, specifically, plays a central role in translating collective industry ambition into consistent market signals by promoting low-carbon material selection and substitution, recycled content and circularity, prioritisation of third-party-verified materials, Environmental Product Declaration (EPD) transparency, and embodied carbon disclosure.^{25, 27, 28}

4.0 UAE Buildings Embodied Carbon baseline and benchmark

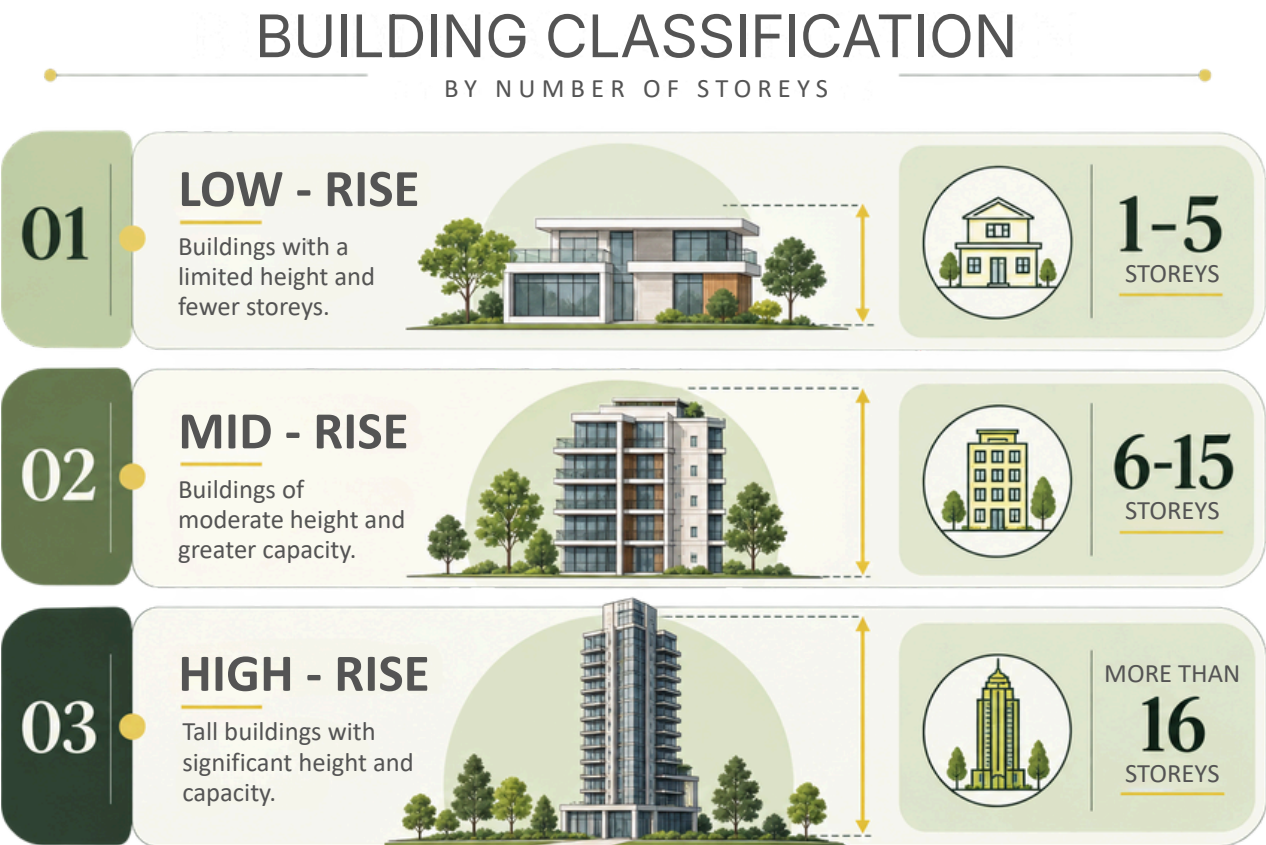
Aimed at establishing a directional reference point for residential and commercial buildings across low- and medium-rise typologies, this study includes a UAE-focused embodied carbon benchmarking exercise. The initial dataset comprised 39 developer-reported embodied carbon assessments submitted by several leading UAE developers, with a pre-agreement from all to remain anonymous. Of the datasets received, 33 buildings were included in the analysis. For example, a mosque was excluded due to differences in building function, material composition and construction approach, which must ensure large spans and empty central spaces for prayer. On the other hand, as shown in Chapter Five, another mosque was highlighted as a case study for low-carbon steel to showcase a successful example of sustainable material adoption. Furthermore, a set of commercial low-rise office buildings were excluded because the data could not be compared with other developers or with commercial retail due to differences in construction approach. The residential dataset includes villas, townhouses, and residential apartment buildings, while the commercial dataset comprises offices in mid-rise buildings and retail in low-rise buildings. Embodied carbon results were reported in **kgCO₂e/m²** and normalised using built-up area (BUA), as parking areas were included within the assessed building scope from developers who shared gross floor area (GFA) data. Global warming potential was reported as GWP-total over a 100-year time horizon (GWP100) for all datasets.

Furthermore, the datasets primarily cover A1–A5 upfront embodied carbon, including product-stage emissions, transport-to-site and construction-installation impacts. To harmonize the data sets, MEP systems were deducted from the core benchmark data, since not all developers had them included, while the completeness of enabling works and construction-stage data varies across projects. Based on Expo City Dubai’s analysis, expanding the assessment scope to include total construction emissions (including all materials, MEP, and full construction emissions) could materially increase the reported embodied carbon. For example, enabling works and construction activities may add around 10–20%, while building services may add 6–11% for commercial buildings and 11–16% for residential buildings. In addition, materials outside the selected key material categories could contribute an additional 4–6% for commercial buildings and 8–12% for residential buildings.

Overall, including all these construction elements could increase the reported material embodied carbon by approximately 37% for commercial projects and 42% for residential projects. These figures are indicative and depend on data completeness, but they highlight the importance of moving towards whole-building embodied carbon assessment rather than focusing only on selected key materials.

Additionally, to ensure consistency and comparability across the submitted dataset, projects were classified according to the number of storeys. This classification was adopted to support a more comprehensive and cohesive analysis of the submitted data, ensuring a more accurate benchmarking exercise across similar building categories. The classification used in this study is presented in **Table 1**.

TABLE 1 | BUILDING HEIGHT CLASSIFICATION



The tables below present results from the benchmarking exercise, highlighting the average, the best impact (calculated at the 25th percentile of the respective data pool for construction materials), and the worst impact (calculated at the 90th percentile of the respective data pool), considering the data that have been received and include mainly the A1–A5 of construction materials only. For benchmarking to be complete and accurate, the reader needs to account for and add construction emissions and include comprehensive lists of materials and MEP (mechanical, electrical, plumbing) emissions to obtain a complete understanding of the project's environmental impact.

It is inferred from **Table 2** that the indicative market range for low-rise residential buildings is approximately 445 to 823.45 kgCO₂e/m², with a median of 580.60 kgCO₂e/m². In comparison, mid-rise residential buildings range from approximately 717.65 to 1,310 kgCO₂e/m², with a median of 842 kgCO₂e/m².

Table 3 represents the market range for mid-rise commercial office buildings, which extends from approximately 715 to 1,630 kgCO₂e/m², with a median of 929 kgCO₂e/m².

Furthermore, **Table 4** represents the market range for low-rise commercial retail buildings, which extends from approximately 542 to 773.47 kgCO₂e/m², with a median of 546 kgCO₂e/m².

TABLE 2 | BUILDING TYPOLOGY: - RESIDENTIAL

 PERFORMANCE BAND	 LOW RISE – INDICATIVE RANGE (kgCO ₂ e/m ²)	 MID RISE – INDICATIVE RANGE (kgCO ₂ e/m ²)
BEST IMPACT	≤ 445	≤ 717.65
WORST IMPACT	> 823.45	> 1310
MEDIAN	580.60	842
AVERAGE	612.12	923.57

TABLE 3 | BUILDING TYPOLOGY: - COMMERCIAL (OFFICE)

Performance Band	Mid Rise -Indicative Range (kgCO ₂ e/m ²)
Best Impact	≤ 715
Worst Impact	> 1630
Median	929
Average	1010


TABLE 4 | BUILDING TYPOLOGY: - COMMERCIAL (RETAIL)

Performance Band	Low Rise -Indicative Range (kgCO ₂ e/m ²)
Best Impact	≤ 542
Worst Impact	> 773.47
Median	546
Average	638.11



The data indicates that the UAE built environment has great potential to deliver lower-carbon buildings. However, the challenges outlined in Chapter 5 continue to limit the pace and scale of the transition towards lower embodied-carbon outcomes. Furthermore, other challenges are identified in the market, including variations in area definitions in the bill of quantities, differences in the scope of carbon assessment across developers, the extent of GHG reporting practices, and inconsistencies in data sources and characterisation factors across submitted datasets. For example, projects may differ in the treatment of parking areas, completeness of A5 construction emissions, material coverage, and the use of product-specific EPDs versus generic environmental datasets. Comparability was also affected by the confidential nature of project data and the relative novelty of such an exercise in the UAE, with only a select number of developers having undertaken and shared this level of assessment to date.

These differences currently limit direct like-for-like comparison; however, the results provide a UAE market reference point, the first in the MENA region, helping to identify emerging performance ranges and areas where greater consistency is required. As a result, scope differences should therefore be considered when interpreting and comparing the benchmark results.

As datasets mature, EmiratesGBC can support a more rigorous benchmarking exercise by working with its members, the government and the industry to harmonise assessment boundaries, area definitions, reporting templates and data requirements, enabling progressively more consistent comparisons and strengthening the basis for future UAE embodied carbon benchmarks.

5.0

Low, Near and Net Zero Carbon Materials and Technological Innovations

Low-carbon materials are construction materials that exhibit lower embodied GHG emissions across their life cycle than conventional alternatives, typically assessed through LCA and product environmental data.²⁹ Net-zero carbon materials are those for which remaining life-cycle emissions, after all feasible reduction measures have been applied, are balanced through verified mitigation and carbon offsetting mechanisms in line with recognised whole-life carbon accounting frameworks.^{30, 31} For example, Holcim UAE utilised Carbon Capture, Utilization and Storage (CCUS), which is a technology mainly used in the Oil and Gas Sector, during a pilot project, capturing CO₂ from cement production for permanent underground mineralisation, as well as electrification of industrial processes powered by renewable energy, resulting in minimal residual embodied emissions across the production lifecycle.^{32, 33}

To highlight the actual use of low- and near-zero-carbon materials, case studies from several manufacturers were included.^{31, 34} The selected case studies are indicative of the current market. Not all of these buildings and materials have been included in the benchmark typology studies^{31, 34}, which try to provide an indicative current market baseline where there is sufficient population sample for a statistical assessment. These are presented to highlight relevant low-, near-, and net-zero-carbon material solutions emerging in the UAE context.³¹ The case study section outlines the materials' embodied-carbon performance using life-cycle-based indicators. It includes relevant UAE-based projects that demonstrate successful technical application, market readiness, and alignment with national industrial decarbonization and net-zero objectives^{31, 34}, thereby reducing the project's actual construction emissions against the baseline values presented in Chapter 4.

5.1

Cement & Concrete

In the UAE, the decarbonization of cement and concrete has transitioned from isolated pilot initiatives to standardised industry practice, underpinned by robust local regulations. The primary advancement lies in the institutionalisation of clinker reduction strategies using Supplementary Cementitious Materials (SCMs) and the adoption of blended cements.^{32, 35}

Dubai Municipality Circular 225^{36, 37} mandates SCM integration across multiple concrete grades in alignment with BS 8500-1, effectively embedding low-carbon mix designs into mainstream construction workflows.³⁷ Consequently, SCM-rich concrete incorporating fly ash and Ground Granulated Blast-Furnace Slag (GGBFS) is now routinely specified.³⁷ These mixes deliver embodied carbon reductions of approximately 30–40% compared to conventional Ordinary Portland Cement (OPC) mixes when measured using consistent life-cycle boundaries.³⁷

In parallel with mix-design requirements, locally manufactured blended cements that comply with ASTM C595 and BS EN 197-1 are widely available in the UAE market.³⁸ These products are low-carbon and typically incorporate 10–36% non-clinker constituents, such as limestone, natural pozzolana, and calcined clay, reducing the carbon intensity of cement while maintaining required performance standards.³⁹ Their environmental performance is transparently disclosed through EPDs, which facilitate credible whole-life carbon assessments and simplify regulatory reporting.²⁸ Further innovation is underway to systematically lower the clinker factor through advanced formulations using alternative raw materials, accelerating the market shift toward lower carbon construction.⁴⁰

Global research into emerging high-pozzolana and advanced binders has achieved verified cradle-to-gate values as low as 562–580 kg CO₂e per tonne, representing an embodied carbon reduction of roughly 40% compared to traditional OPC.^{41, 42, 43} Currently, locally available low-carbon cement produced by Holcim has a cradle-to-gate Global Warming Potential (GWP) of approximately 727 kg CO₂e per tonne, as verified through product-specific EPDs. This reflects a 10% reduction relative to pure OPC and up to a 25% reduction relative to broader market averages under equivalent system boundaries.^{44, 45}

Crucially, these advancements are commercially and technically mature. Low and near-net-zero cementitious materials are engineered to meet stringent UAE performance standards, enabling immediate deployment without requiring modifications to structural designs, construction methodologies, or project timelines. As a result, cement and concrete represent one of the most mature low-carbon material categories in the UAE, with significant potential for further optimisation as carbon-capture and alternative-fuel technologies scale.⁴⁴

This text was verified by Holcim.

CONCRETE CASE STUDY

Project Name: Al Sheera (DEWA Headquarters Building)

Location: Dubai, United Arab Emirates

Type: Government Building

Completion Date: 2025 – Ongoing

The AlSheera (DEWA Headquarters) project illustrates the large-scale application of strategies, including specifying low-carbon materials and integrating EPDs to enable transparent embodied-carbon accounting. The development incorporates approximately 104,000 m³ of concrete supported by third-party-verified EPD documentation to ensure transparent embodied-carbon accounting. Its structural system uses ECOPact low-carbon ready-mix concrete from Holcim, achieving the documented 30–60% reduction in CO₂ emissions per cubic meter. Structural optimisation is further supported by Perlite Lightweight Concrete supplied by Readymix Gulf, which reduces structural mass and the associated material-related emissions.



Al Sheera (DEWA Headquarters Building)

5.2

Steel

Steel decarbonization in the UAE benefits from a production structure that is intrinsically less carbon-intensive than conventional global benchmarks. Unlike many major steel-producing jurisdictions that rely heavily on blast furnace–basic oxygen furnace (BF-BOF) routes, typically emitting in the range of approximately 1.47–2.34 tCO₂ per ton of crude steel, domestic production in the UAE is dominated by natural gas–based direct reduced iron (DRI) combined with electric arc furnace (EAF) steelmaking, together with scrap-EAF pathways. This configuration materially reduces process emissions by avoiding coal-based coke production and enabling higher recycled content.^{46, 47}

In the UAE, more than 30% of Emirates Steel’s production is made using electric arc furnaces (EAFs), a method that melts scrap steel using electricity rather than blast furnaces. This method has been independently verified in accordance with the CARES Sustainable Construction Steel (SCS) standards.^{48, 49} The CARES SCS Certification scheme plays a crucial role by independently verifying environmental, social, and governance performance data. Through an Identity-Preserved Chain of Custody model aligned with ISO 22095,^{49, 50} CARES certification ensures traceability from mill to project site, strengthening procurement integrity and supporting compliance with rating systems such as Estidama, BREEAM, and LEED.⁴⁹

Within this production framework, Arabian Gulf Steel Industries (AGSI) is one of the UAE’s leading steel producers, manufacturing high-quality steel billets, reinforcement bars and structural steel sections for the construction and infrastructure sectors, manufacturing reinforcing steel primarily from 100% locally sourced recycled steel scrap through large-scale recycling-based production and steel melting operations.⁵¹ Depending on recycled content and electricity emissions factors, steel produced through electric-induction furnace EIF routes can achieve substantially lower embodied carbon per tonne compared with conventional blast furnace-basic oxygen furnace (BF-BOF) production, particularly where process optimisation and energy efficiency measures are implemented.⁵²

Steel Arkan (EMSTEEL) operates integrated DRI-EAF facilities that incorporate ferrous scrap, reducing the metallurgy input by around 30% of the metallic input, with stated ambitions to increase this share further, thereby lowering cradle-to-gate (A1–A3) emissions intensity.^{53, 54, 55} Complementing the commercially deployable solutions, the UAE is advancing longer-term deep decarbonization pathways, including pilot initiatives exploring hydrogen-based DRI steelmaking.⁵⁶ Substituting natural gas with green hydrogen has the potential to reduce direct process emissions significantly. However, these pathways remain at an early demonstration scale and are not yet available for routine construction procurement.^{57, 58}

The steel-related information is based on information shared by Cares, EMSTEEL, and AGSI for the Sustainable Building Case Studies in the UAE Booklet.⁵⁹

STEEL CASE STUDY

Project Name: Dubai Creek Harbour Mosque

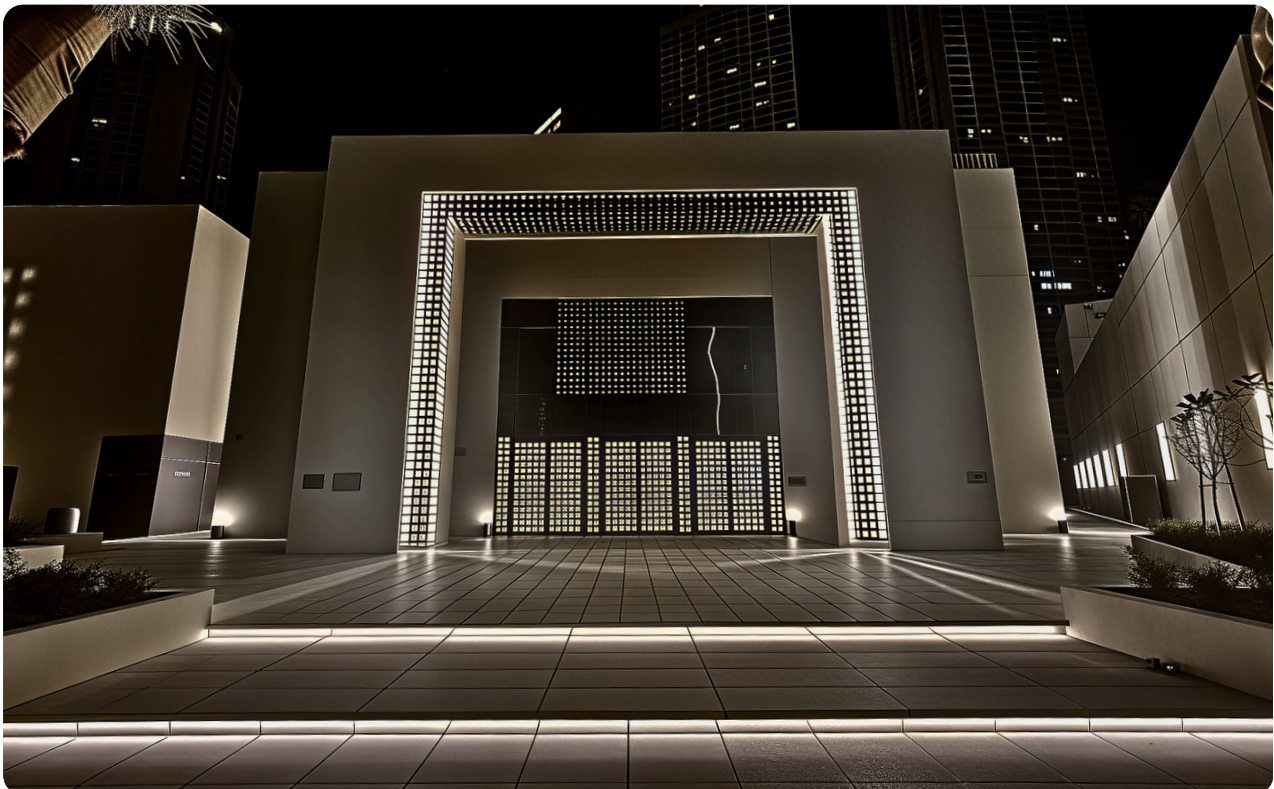
Location: Dubai, United Arab Emirates

Type: Religious Building

Completion Date: April, 2026

The Dubai Creek Harbour Mosque illustrates the application of steel decarbonization strategies at the project scale. The development uses ultra-low-carbon reinforcing steel manufactured using 100% recycled scrap via EIF technology, achieving emissions as low as 0.162 tCO₂e per tonne of crude steel. This compares with the global BF-BOF average of approximately 2.66 tCO₂e per tonne, representing a reduction of more than 94% in production-stage emissions intensity.

All reinforced steel used in the project is supported by third-party-verified EPDs validated by CARES, ensuring transparent environmental reporting and traceable embodied-carbon documentation. Material selection also supports circular resource management through extensive recycling of construction waste. These characteristics contribute to LEED v4/v4.1 Materials and Resources (MR) credits, including EPD use, recycled content, and responsible sourcing, enabling the project to achieve up to four MR points through material procurement strategies.



Dubai Creek Harbour Mosque

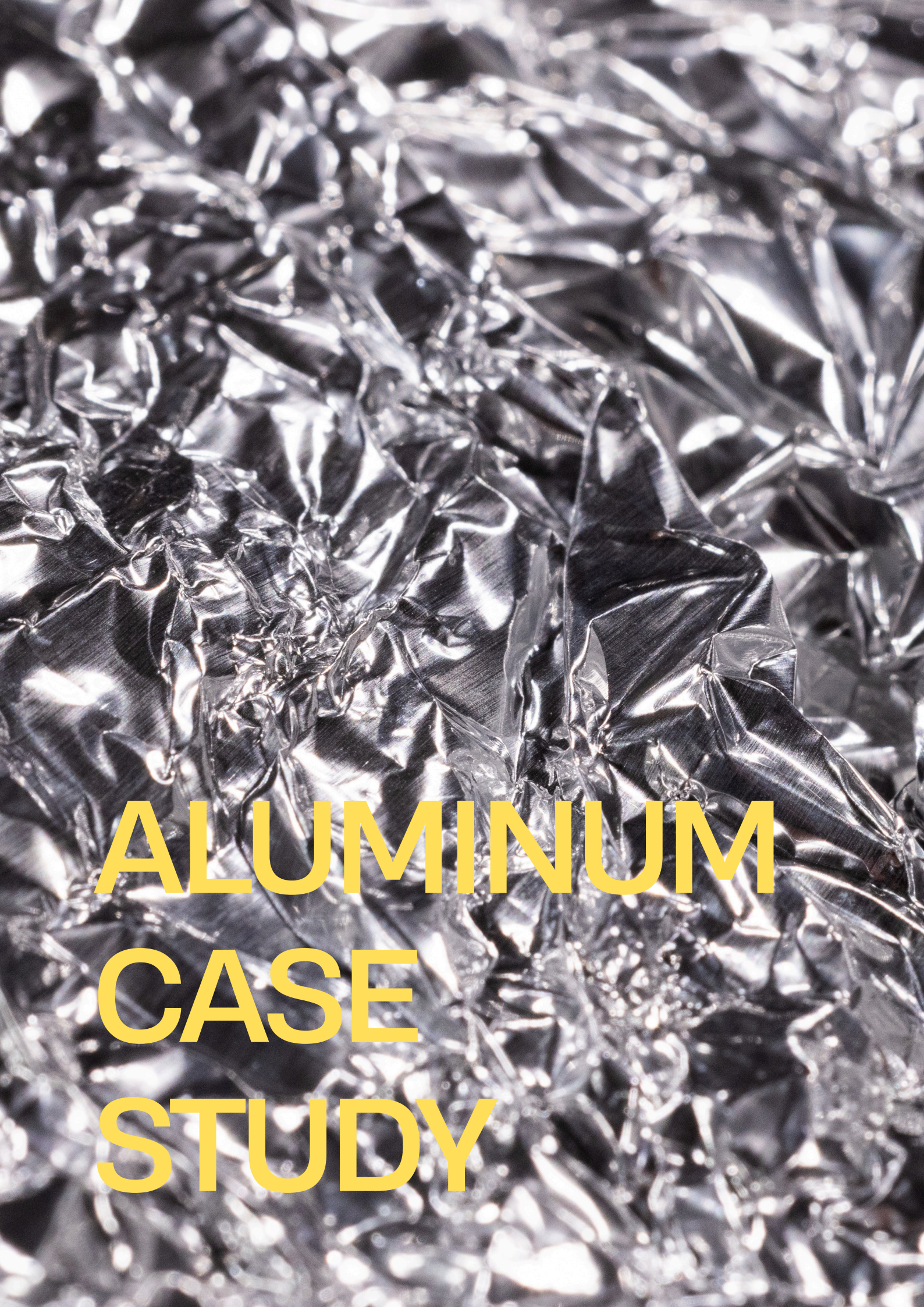
5.3 Aluminum

In the UAE, aluminium production has achieved a lower carbon footprint than the global average for primary aluminium. This reduction is driven through integrated low-carbon energy and increasing use of recycled feedstock.⁶⁰ Emirates Global Aluminium (EGA), the country's primary producer, operates at an industrial scale using solar and nuclear energy, producing approximately 2.69 million tonnes annually, while maintaining technical performance equivalent to conventional aluminium for construction and manufacturing applications.^{61, 62, 63}

Recycling is a major near-term decarbonization pathway.⁶⁴ Secondary aluminium requires roughly 95% less energy than primary production,^{65, 66} and the UAE is scaling domestic recycling capacity through EGA's facility, targeting 170,000 t/year to expand the availability of low-carbon, circular material streams.

Product lines such as CelestiAL-R and Minimal combine clean-energy inputs with recycled content, demonstrating immediate ability to be deployed in the built environment.^{67, 68}

Collectively, these initiatives make low-carbon aluminium a practical, performance-equivalent material for construction in the UAE, ready for integration into projects without changes to design or specification and increasingly supported by verification and emerging market demand.^{69, 70}



ALUMINUM CASE STUDY

Project Name: Rashid & Lateefa Boys & Girls School

Location: Dubai, United Arab Emirates

Type: Educational

Completion Date: July, 2026

The Rashid & Latifa Boys & Girls School project demonstrates the application of low-carbon facade strategies through the integration of high-recycled-content aluminium. The development incorporates approximately 10,000 kg of Hydro CIRCAL 75R aluminium, containing over 75% post-consumer scrap, enabling a transparent reduction in embodied carbon. Compared to conventional aluminium (~15.3 kg CO₂/kg), Hydro CIRCAL achieves ~1.86 kg CO₂/kg, delivering an emissions reduction of over 85% and total savings of approximately 134,400 kg CO₂ for the project. The facade systems, supplied through Technal, combine durability, lifecycle efficiency, and circular material sourcing. This approach highlights the role of recycled materials in achieving LEED Platinum targets while supporting circular economy principles in large-scale educational developments.



Rashid & Lateefa Boys & Girls School

5.4**Glass**

Glass production is energy intensive, with float-glass furnaces typically operating at temperatures of approximately 1,500–1,600°C. Carbon intensity varies considerably depending on furnace technology, energy source, recycled content, and the lifecycle assessment methodology applied.⁷¹

A key strategy for reducing emissions is increasing the use of cullet, recovered glass used as a substitute for virgin raw materials. Cullet may include pre-consumer glass from processing activities and post-consumer flat glass recovered from building renovation and demolition. Industry evidence indicates that each 10-percentage-point increase in cullet can reduce furnace energy consumption by approximately 2.5–3%. In general terms, using one tonne of cullet can avoid approximately 300 kg of CO₂ emissions while also reducing virgin raw material requirements.^{72, 73}

Increasing the use of post-consumer cullet in flat-glass production remains challenging because recovered architectural glass must be carefully dismantled, sorted, and treated to meet stringent quality and contamination requirements. This creates an opportunity to strengthen closed-loop recovery of glazing from construction and demolition activities.^{74, 75}

In the UAE, Emirates Float Glass (EFG) exemplifies local manufacturing capability and increasing environmental transparency. Its 2024 Environmental Product Declaration for its float-glass series reports 17.9% glass cullet by weight, including 5.6% post-consumer material. The EPD provides third-party-verified lifecycle environmental information based on manufacturing data from its Abu Dhabi facility. Such product-level disclosure can support more consistent assessment of embodied carbon and material selection in UAE projects.^{76, 77}

GLASS MARKET EXAMPLES

At the time of this research, no publicly documented UAE project case study was identified that quantifies embodied-carbon savings attributable specifically to the use of low-carbon glass. However, relevant international and UAE market examples demonstrate progress in reducing glass-related embodied carbon and strengthening environmental performance disclosure.

Saint-Gobain ORAÉ®

Saint-Gobain's ORAÉ® provides a quantified international example of lower-carbon architectural glass. Its verified EPD reports a carbon footprint of 6.64 kgCO₂e/m² for a 4 mm substrate across lifecycle stages A–C, representing a 42% reduction compared with Saint-Gobain's European standard clear-glass baseline. The product incorporates 64% recycled content and uses renewable electricity in production.⁷⁸

Emirates Float Glass

Emirates Float Glass operates a float-glass manufacturing facility in Abu Dhabi and produces architectural float, solar-control, and low-emissivity glazing, including its EmiCool® range. Its published EPDs and product documentation demonstrate the UAE's growing capability in high-performance glazing and product-level environmental disclosure.⁷⁹

These examples illustrate the technical potential for lower-carbon glass and the local availability of advanced glazing products, while highlighting an opportunity to strengthen product- and project-level reporting of embodied-carbon performance in the UAE.



6.0 Challenges and Opportunities in Decarbonising Construction

Decarbonising the real-estate industry, construction, and operation requires simultaneous progress on two fronts:

- A. Reducing embodied carbon from materials and construction processes, and
- B. Reducing operational carbon from building energy use.^{80, 81, 82}

While low- and near-zero-carbon material pathways are increasingly available (Chapter 4), scaling their adoption in the UAE depends on strengthening enabling conditions across the construction value chain, including data availability, standardisation, procurement mechanisms, industrial readiness, and verification capability.⁸³

This scaling challenge becomes crucial given the UAE's transition toward economy-wide climate accountability under Federal Decree-Law No. (11) of 2024 on the Reduction of Climate Change Effects, which establishes a national framework for climate action and anchors expectations around emissions measurement, reporting, and compliance mechanisms across sectors.^{9, 84, 85}

6.1 Technical Barriers and Market Opportunities

6.1.1 Data and benchmarking constraints

The shortage of consistent, UAE-representative life-cycle inventory (LCI) data at both project and product levels is one constraint. UAE-specific datasets have historically been unavailable; projects therefore default to international averages that may not reflect UAE conditions, particularly local manufacturing configurations, fuel and grid emission factors, transport distances, and region-specific supply chains. These factors affect calculated results and make benchmarks unreliable at scale.^{86, 87, 88, 89}

This constraint is compounded by the limited market penetration of EPDs in the UAE. Current UAE market assessments characterise EPD adoption as medium-to-low, which limits the availability of comparable, third-party-verified product data needed for supplier benchmarking and procurement governance.

Therefore, without sufficient transparency into the environmental impact of products, developers cannot credibly apply category-based procurement controls because they fall back on non-comparable data or generic assumptions.^{28, 89}

The UAE's shift towards economy-wide accountability through Federal Decree-Law No. 11 strengthens the rationale for standardised data pipelines, including measurement, reporting, and verification expectations for large emitters in coming years. At the same time, the UAE's NDC 3.0 direction and related industrial and procurement commitments increase the likelihood that product disclosure and benchmarkable datasets will become normal market infrastructure rather than a niche practice.^{6, 12, 85}

6.1.2 Standardisation constraints

Standardisation of life-cycle modelling and disclosure rules, which prevent like-for-like comparisons across materials, suppliers, and projects, is another issue.⁹⁰ Even when life-cycle assessments or EPDs exist, results are not technically comparable unless they are produced under aligned rules governing goal/scope definition, modelling choices, and data quality requirements.^{91, 92}

Without standardised comparability rules, embodied-carbon values cannot be treated as procurement-grade performance metrics. This limits developers' ability to set auditable requirements, for example, category thresholds, percentile-based selection, or "maximum A1–A3" global warming potential per unit, because projects cannot be evaluated consistently. This increases commercial dispute risk and discourages market investment in lower-carbon production and disclosure.^{93, 94, 95}

The gap can be reduced if the UAE market aligns on a focused set of procurement-relevant standardisation decisions, such as minimum modules with declared carbon emissions, which could ensure consistent alignment of product category rules, and adopts agreed default assumptions for currently non-comparable scenarios. Doing so would not only improve market transparency and comparability but also unlock and accelerate investment in lower-carbon production and sustainable materials, creating a robust foundation for the UAE's decarbonised construction sector.^{92, 90}

6.1.3 Procurement Methods

Scaling low- and near-zero-carbon materials requires clear, verifiable requirements that are enforced and integrated into project specifications and purchasing decisions.⁹⁶ When requirements such as carbon disclosure at the tender stage, specific carbon values per unit for key materials, and clear rules for approving alternate materials are missing or applied inconsistently across projects, demand remains unpredictable.⁹⁶ This unpredictability might discourage suppliers from investing in quality control, slowing the market adoption of low-carbon solutions.⁹⁶ The UAE's NDC 3.0 explicitly positions green procurement as an enabling lever and notes that the UAE has already endorsed the Industrial Deep Decarbonization Initiative (IDDI) "Green Public Procurement Pledge," requiring the procurement of low-emission cement/concrete and steel starting no later than 2030 under Level 3 of the framework.^{6, 17}

The immediate opportunity for the UAE market is to convert these high-level signals into repeatable tender and contract language.⁹⁶ Doing so would give manufacturers and suppliers the confidence and incentive to invest in production upgrades.⁹⁷ By establishing clear, enforceable procurement requirements, the market can accelerate the deployment of low- and near-zero-carbon materials, drive industrial innovation, and strengthen the UAE's leadership in sustainable construction.⁹⁸

6.1.4 Industrial transition constraints for hard-to-abate materials

The pace at which the UAE's highest-impact material value chains can transition while maintaining structural performance, durability, supply continuity, and cost certainty impacts decarbonization.⁹⁹ In practice, the limiting factor is not the existence of lower-carbon pathways, as mentioned in Chapter 4, but the industrial readiness and scalable availability of those pathways across priority materials.⁹⁹

Cement and concrete:

The largest obstacle is structural: a significant share of cement emissions is inherent to clinker production chemistry (calcination), meaning that reductions depend on scaling clinker substitution strategies, for example, supplementary cementitious materials, and deploying industrial decarbonization measures, not only efficiency improvements.^{100, 101}

Steel:

Deep reductions depend on scaling low-carbon primary production routes, for example, hydrogen-based direct reduction and carbon capture integration, both of which require substantial energy-system and infrastructure conditions, including clean electricity, hydrogen availability, CO₂ transport, and storage.¹⁰² The UAE's Al Reyadah project demonstrates the technical feasibility of industrial carbon capture integrated with steel operations but remains capital- and infrastructure-intensive.⁴⁷

Aluminium:

The key barrier is the electricity intensity of smelting: embodied-carbon outcomes are materially driven by the carbon intensity of power and the achievable recycled content at scale. UAE pathways such as solar-powered aluminium show credible potential for reduction, but wider adoption depends on consistent availability of low-carbon power and expanded circular feedstock systems.^{103, 104, 105}

Glass:

Flat-glass manufacturing is constrained by high-temperature furnace energy demand and limited short-term fuel-switching options. Reductions, therefore, depend on greater use of recycled cullet, stable quality control, and the phased adoption of lower-carbon heat-and-power configurations as industrial systems mature.¹⁰⁶

Because these impediments to the materials originate upstream in production and supply chains, the developers' most powerful lever is to translate decarbonization intent into repeatable, procurement-grade demand strong enough to justify supplier investment in low-carbon production and robust verification capacity.⁹⁶

The near-term opportunity for the UAE lies in leveraging its concentration of large procurers and major projects to generate sustained demand for lower-carbon materials. This approach can accelerate supplier readiness and stimulate innovation in sustainable production, all while remaining fully aligned with the national trajectory toward economy-wide emissions accountability.¹⁰⁶

6.2 Supply chain, a catalyst for innovation

Embodied-carbon reduction in the UAE is limited by the reliability of circular feedstocks at the procurement scale.¹⁰⁷ Circularity pathways require stable volumes, consistent quality, traceability, and predictable logistics to be treated as specification-grade inputs.⁹ Where those conditions are not met, project teams revert to primary materials to protect structural performance, program certainty, and warranty/liability outcomes, particularly under fast-track delivery models common in the UAE.¹⁰⁸ This limitation is structural and cross-cutting. It depends on collection and segregation performance, processing capacity, quality assurance, and standardised acceptance pathways that enable designers and contractors to specify circular inputs without project-by-project re-validation.^{9, 107, 108} The UAE's policy direction explicitly supports this transition through the UAE Circular Economy Policy 2021–2031, reinforced by national coordination under the Ministry of Climate Change and Environment to accelerate circular-economy implementation across sectors and enabling guidance for businesses to operationalise circular practices.^{109, 110, 111} In parallel, the UAE's updated NDC framework strengthens the broader enabling environment for material efficiency and circular economy measures as part of national mitigation planning.⁶

6.3 Financial Challenges and Opportunities

Consultations with industry representatives in the UAE built environment sector indicate that access to green finance may be a constraint.²⁵ Around 60% of stakeholders who took part in a relevant industry survey have identified lack of green finance as the most significant challenge to accessing funding for sustainable construction initiatives.^{112, 113} While capital availability is increasing within the financial system, barriers persist in translating this into sector-specific financing for low-carbon buildings and construction materials.¹¹³ Concurrently, the UAE has advanced financial and regulatory commitments; for example, at COP28, the UAE banking sector announced a target to deploy AED 1 trillion in sustainable finance by 2030, supporting decarbonization across sectors, including construction materials and low-carbon construction.^{114, 115}

The interplay of financial structures presents a unique environment that can both challenge and facilitate the decarbonization of the construction sector. The financial challenges that currently impede progress toward low-, near-, and net-zero-carbon materials are explored. Additionally, it highlights promising opportunities to unlock green finance and propel the industry forward.

6.3.1 Financial Considerations

While policy attention and market awareness around embodied-carbon reduction have increased significantly, there remains a substantial opportunity to further align financial structures within the construction sector with decarbonisation objectives. This is reflected in several key areas:



Cost of low carbon materials and technologies

In the UAE, despite investors allocating around 27% of their portfolios to sustainable investments, there is still a lack of direct funding for construction-sector decarbonisation initiatives.^{116, 117} A common misconception is that low-carbon materials inherently carry a cost premium.¹¹⁸ However, this assumption is not always accurate. Based on evidence, some low-carbon materials can be cost-neutral, depending on formulation, production scale, and supply chain maturity.¹¹⁸ For example, low-carbon cement or concrete products can range from cost-neutral to 25% higher than conventional alternatives, depending on the technology used, the project's location relative to the batching plant, and prevailing market conditions.^{116, 119}

Where additional costs do occur, they are often associated with specific production and verification requirements rather than the low-carbon characteristic itself.¹²⁰ Manufacturers may rely on advanced or capital-intensive production technologies, including digitally optimised manufacturing systems and process modifications designed to reduce emissions, thereby increasing initial production costs during early deployment.¹²⁰ In addition, low-carbon materials frequently incur verification and compliance expenses, including third-party certifications such as EPDs, lifecycle assessments, and regulatory verification.^{121, 122} While these processes are essential for ensuring transparency, comparability, and market credibility, they introduce additional administrative and transaction costs that can influence pricing and slow large-scale market adoption during early stages of industry transition.^{120, 122}



Knowledge and Communication

Sustainable construction financing may face barriers stemming from communication and understanding gaps, as well as unclear coordination among stakeholders.^{123, 124} Banks and financial institutions may encounter inconsistent definitions when evaluating sustainable projects.¹²⁴ Knowledge gaps within some financial institutions further compound the problem, as published research indicates that many financial professionals lack the specialised understanding of green building performance, sustainability metrics, and long-term benefits necessary to integrate these factors into investment frameworks, such as those focused on embodied carbon reduction.¹²⁵ As a result, even technically and economically viable sustainable construction projects may struggle to secure specialised sustainability-related financing.¹²³

These combined scarcities in workforce capacity, sustainable financial communication expertise, and coordination may limit the scaling of sustainable construction finance and hinder effective decarbonization in the sector.^{124, 126}



Finance Regulations

Local regulatory instruments that directly support the affordability and financial viability of low-carbon construction technologies are still evolving.^{128, 134} The National Green Building Regulation (NGBR) mandates minimum energy and water performance standards and has contributed positively to improving operational efficiency; however, it is primarily performance-oriented and is not yet consistently supported by complementary economic instruments addressing construction- and material-related emissions.^{128, 135} Globally, similar dynamics can be observed. According to the Organisation for Economic Co-operation and Development (OECD), 89% of countries have mandatory energy efficiency codes, and 86% offer financial incentives such as low-interest loans; only 18% mandate minimum energy performance for existing buildings, and just 7% address whole-life carbon in legislation. This indicates that regulatory systems worldwide are still in transition toward full lifecycle carbon governance.^{135, 128} Taken together, these conditions create a regulatory context that supports sustainability ambitions while highlighting the need for further financial clarity in emerging decarbonisation areas within real-estate construction. This ultimately shapes the scale and direction of low-carbon real-estate investment.¹²⁸



Limited Financial Recognition of Embodied Carbon

The Global Property Linked Finance Initiative (GPLFI) highlights that construction financing favours asset-level efficiency over material-level decarbonisation.^{128, 136} As a result, low-carbon materials and strategies rarely translate into measurable financial value, creating a financing gap that limits developers' ability to justify higher upfront investments for long-term climate benefits.¹³⁷

In the UAE, despite robust construction activity, embodied carbon still lacks financial recognition. Local green building codes do not mandate embodied carbon measurements, and lifecycle analysis is uncommon in project practice, with 95% of surveyed industry professionals reporting limited uptake of embodied carbon modelling.^{34, 138, 139}

6.3.2 Financial Opportunities

Amid accelerating net-zero commitments and the expansion of sustainable finance instruments, the UAE construction sector presents significant financial opportunities for scalable investment in low-carbon materials, as evident by:



The Availability of Sustainable Investments

At a larger scale, sustainable investment is rapidly scaling. For example, sustainability-linked bonds surpassed USD 310 billion globally in just the first half of 2023,^{115, 140, 141} and ESG assets under management are projected to account for over USD 53 trillion by 2025.¹⁴² These data are driven by net-zero commitments and the urgent need for roughly USD 50 trillion in low-carbon investment by 2050. The UAE is actively building such partnerships, with the Central Bank of the UAE leading the way, where the financial sector pledged to mobilise AED 1 trillion in sustainable finance by 2030.^{114, 143}



Optimising Capital Efficiency

Optimising environmental capital efficiency ensures that each dirham deployed achieves maximum combined environmental and financial impact.^{144, 145} Globally, ESG-linked bonds and sukuk have shown lower yields and narrower risk spreads, with sustainable bond funds drawing over USD 57 billion in inflows in 2025.^{144, 145}

Focusing on the MENA region, sustainable finance issuance expanded sevenfold since 2020. In the UAE, sustainable instruments now account for a significant share of regional markets, with ESG sukuk and bonds growing by 40–60% year on year. The country represents nearly 20% of global ESG bond issuance, leading to further optimisation opportunities, such as the UAE's scaling innovation in climate investment through vehicles such as the ALTERRA Opportunity Fund—a USD 1.2 billion co-investment climate vehicle launched to channel capital into energy transition and climate technology globally.^{143, 146}



Policy-Driven Financial Instruments

In the UAE, regulators, including the Central Bank of the UAE, and hubs like Dubai International Financial Centre (DIFC) have established sustainable finance frameworks; DIFC's Nasdaq Dubai accounts for roughly 64% of global dollar-denominated sustainable sukuk under its framework.^{143, 147} During 2023, issuances in the UAE's green and sustainability-linked bonds and sukuk reached about AED 15.45 billion, underscoring rising uptake.¹⁴⁸ This policy-backed growth opens significant capital-markets opportunities for the UAE, attracting long-term institutional investors.¹⁴⁷



Carbon Data-Enabled Finance

Today's carbon finance relies on advanced carbon data technologies, representing a structural transition from informational carbon data to finance-grade carbon data.¹⁴⁹ Thus, emissions performance can function as an investment qualifier rather than as a reporting metric alone, moving from traditional carbon calculators to enterprise-grade carbon accounting platforms that measure Scope 1, 2, and 3 emissions and produce finance-ready metrics aligned with GHG Protocol standards.¹⁴⁹ Tools like automated carbon accounting systems integrate data from operations and supply chains, making emissions transparent and compliant with international frameworks.^{150, 151}

Highlighting UAE efforts in this matter, the COP28 TechSprint, led by the Central Bank of the UAE in partnership with the Bank for International Settlements and the Emirates Institute of Finance,^{151, 152} funds and pilots AI, blockchain, and sensor-based solutions for sustainable finance. Furthermore, Hub71+ ClimateTech in Abu Dhabi is a specialised climate-tech ecosystem that supports start-ups developing carbon-reduction and sustainability technologies.^{153, 154} Another noteworthy initiative is The Green Economy Partnership (GEP), which uses proprietary AI to aggregate carbon data and support investor matching for decarbonisation projects, reflecting the emerging digital climate-finance infrastructure from the UAE.¹⁵⁵

6.4 Regulatory Alignment and Policy Implementation Opportunities

The policy and market mechanisms outlined in Chapter 3 demonstrate that the UAE already has multiple pathways supporting built-environment decarbonisation. As embodied-carbon practices mature, the key opportunity is not simply to introduce additional mechanisms, but to achieve greater consistency in how embodied carbon is defined, quantified, reported, and applied across the construction sector.^{156, 157}

One area requiring further alignment is embodied-carbon measurement and reporting. Current industry practices may vary in assessment boundaries, area definitions, lifecycle stages, material coverage, environmental datasets, calculation methodologies, and characterisation factors. These variations can limit like-for-like comparisons between projects and materials, reducing the reliability of aggregated benchmarking data.¹⁵⁸

A related opportunity is to strengthen the link between product-level environmental information and project-level carbon assessment. Greater availability, verification, and comparability of EPDs and lifecycle data would support more robust material selection, improve the consistency of project-level assessments, and provide a stronger evidence base for benchmarking and the future development of sector- and material-level performance indicators.^{90, 91, 159}

As the volume and quality of UAE-specific data increase, greater coordination among government, developers, manufacturers, and industry organisations can support the progressive harmonisation of assessment boundaries, methodologies, data requirements, and reporting conventions.⁹⁰ EmiratesGBC can support this process by convening stakeholders, facilitating methodological alignment, and expanding the body of comparable UAE embodied-carbon data. These areas provide the analytical basis for the stakeholder-specific actions presented in Chapter 7 – Policy Recommendations and Industry Roadmap.

7.0 Policy Recommendations and Industry Roadmap

Building on the analysis and outcomes of this study, the following recommendations and roadmap outline practical pathways to reduce embodied carbon and accelerate the adoption of sustainable construction materials.

7.1 Actionable Steps for Developers, Policymakers, and Material Suppliers

Table 5 below provides actionable steps that real-estate developers, policymakers, and construction material suppliers can adopt, progressing from one step to the next to achieve low-, near-, and net-zero carbon material adoption and reduce embodied carbon.

TABLE 5 | ACTIONABLE STEPS FOR STAKEHOLDERS IN THE BUILT ENVIRONMENT INDUSTRY

Real-Estate Developers	Policymakers	Construction Material Suppliers
Embed embodied-carbon thresholds and EPD requirements in all project briefs and tender specifications. ^{156, 88}	Formally integrate whole-life carbon into building codes and make embodied-carbon disclosure mandatory for major developments as a first step toward performance-based regulation. ¹⁵⁶	Enable a systematic transition of construction material manufacturing processes toward low- and near-zero-carbon pathways. ^{5, 84}
Establishing a consistent baseline through the measurement, verification, and disclosure of embodied carbon across key materials. ¹⁵⁶	Standardise embodied-carbon measurement and reporting methodologies to ensure consistency across the sector. ^{93, 160}	Produce third-party verified EPDs as a baseline market requirement and standardise lifecycle data reporting to enable participation in procurement and regulatory systems. ^{90, 121}
Embed measurable performance indicators in procurement systems to establish a consistent baseline for decision-making. ¹⁵⁶	Establish embodied-carbon performance thresholds for high-impact materials, including cement, steel, aluminium, and glass, within permitting and procurement processes, building on standardised measurement and disclosure frameworks. ^{156, 161}	Reconfigure product portfolios to deliver certified low-carbon material lines, treating carbon transparency as a core commercial attribute. ¹⁵⁶

Real Estate Developers	Policymakers	Construction Material Suppliers
Progressively standardise low-carbon specifications at portfolio level and establish long-term supply agreements to create stable demand signals. ¹⁵⁷	Reinforce regulatory requirements with enabling economic instruments, including fiscal incentives and the integration of verified carbon-performance criteria into procurement and tender evaluation processes. ⁸⁴	Integrate recycled and circular feedstocks as standard production inputs and align with national industrial decarbonisation strategies. ¹⁵⁸
Build and continuously update a local library of low-carbon materials and assess market availability to ground procurement decisions in current supply-chain reality. ¹²	Use public procurement as a market-shaping tool by embedding embodied-carbon targets in projects. ¹⁶⁰	Implement supply-chain traceability systems and circular sourcing frameworks to ensure compliance, verification, and auditability. ¹⁵⁶
Identify and map existing green financing mechanisms in the UAE and link them to verified low-carbon material procurement. ¹³	Leverage the UAE National Carbon Credit Registry to drive emissions reductions in industries that produce low-carbon materials and support their adoption. ⁸⁴	Progressively invest in low- and near-zero-carbon production capacity, recognising that achieving the 2050 net-zero embodied-carbon target for concrete, steel, aluminium, and glass requires early industrial decisions. ^{27, 84}

7.2

Integration of Environmental Product Declarations in construction regulations

The integration of Environmental Product Declarations (EPDs) into construction regulation in the United Arab Emirates (UAE) is emerging alongside broader efforts to advance low-carbon materials, lifecycle-based environmental assessment, and product transparency.^{120, 162}

However, EPDs are not currently established as a uniform regulatory requirement across the UAE.

The significance of EPDs lies in their ability to disaggregate environmental impacts across defined life-cycle stages, particularly cradle-to-gate modules (A1–A3), which account for the largest share of embodied carbon in construction materials.²⁸ In the UAE, where operational energy is tightly regulated, further emissions reductions increasingly depend on material selection, optimisation, and supply-chain interventions.¹⁵⁸

A closer look at the sector reveals growing private-sector readiness and practical EPD-aligned activity. My City Centre Masdar, developed by Majid Al Futtaim within Masdar City, demonstrates the application of embodied-carbon assessment and sustainable material procurement within Masdar City's wider sustainable development context, achieving 21% reductions in embodied carbon for major materials through sustainable design and sourcing, reflecting EPD-aligned decision-making.^{163, 164, 165} Expo City Dubai, with LEED Gold-certified buildings, embeds lifecycle carbon considerations and sustainable materials strategies at scale, operationalising environmental performance frameworks that mirror EPD principles even where formal EPDs are not mandated.^{166, 167} It also has clear embodied-carbon reduction targets for 2030 and onwards, requiring a reduction of 40% against its Decarbonisation Roadmap intensity-based carbon emissions baseline.

Industry initiatives further support EPD adoption.³¹ The Emirates Green Building Council's Net Zero Centre of Excellence, in partnership with One Click LCA, provides designers and manufacturers with capabilities to generate local LCA and EPD data.³¹ Moreover, standards such as CIBSE TM65 UAE provide robust methodologies for assessing embodied carbon in building services, supporting lifecycle-based regulation.¹⁶⁸ Together, these local efforts reveal a regulatory ecosystem already grounded in EPD principles.²⁸

Nonetheless, not all EPDs are directly comparable. Differences in system boundaries, methodological assumptions, data quality, and product category rules can influence reported results. Therefore, cross-comparison or material selection based solely on a single indicator, such as kgCO₂e, may lead to misleading conclusions if the methodologies used to obtain the EPD are not aligned. Careful review of the underlying EPD methodologies is essential to ensure that decisions accurately reflect true environmental performance.²⁸

8.0 Conclusion

Building on the analysis presented in this report, the UAE has established a strong institutional foundation for decarbonising its construction sector.⁹ Federal climate legislation and industrial decarbonisation strategies collectively signal a transition toward greater emissions accountability across the economy.⁸⁴ While existing policies may not yet impose explicit embodied-carbon limits on construction materials, they provide the regulatory infrastructure necessary to support future performance-based carbon governance in the built environment.⁸⁴ As a result, the integration of climate targets into national policy frameworks demonstrates a clear policy trajectory toward increased transparency, measurement, and regulation of emissions associated with construction development.

Equally important, this report demonstrates that the technological pathways required to reduce embodied carbon in construction materials are already present in the UAE's industrial landscape.^{16, 83} Moreover, significant progress has been made across the UAE's construction-material industries. Material production developments demonstrate that the technological capacity to reduce material-related emissions is already present throughout the construction supply chain, with broader deployment remaining the primary challenge.^{50, 158} Despite this progress, a key constraint is the lack of comprehensive, locally representative embodied-carbon data.¹⁵⁸

Traditional real-estate construction delivery is also a barrier beyond the identified data and methodology gaps. Procurement practices often fail to mandate and incentivise the use of low-carbon materials, thereby weakening market demand. These challenges are compounded by gaps in workforce knowledge, particularly in lifecycle-carbon assessment, sustainable specification, and low-carbon design.¹⁵⁸

Nevertheless, the UAE possesses several structural advantages that could enable rapid progress in overcoming these barriers. The country's highly coordinated development model, led by large-scale developers, strong regulatory institutions, and vertically integrated industrial supply chains, provides a foundation for coordinated sector-wide transformation.^{25, 158}

Industry initiatives have already begun aligning market expectations around material transparency and carbon disclosure, demonstrating the potential to create consistent demand signals that accelerate the adoption of low-carbon materials and support industrial investment in decarbonisation.^{83, 98}

Ultimately, the findings of this report underscore that the decarbonisation of construction materials will require a systemic approach that integrates local baselines and benchmarks, policy frameworks, market mechanisms, and industrial innovation.

In this context, the UAE stands at a pivotal moment in the evolution of sustainable construction in the MENA region. The next phase of progress will depend on translating this momentum into coherent governance mechanisms, standardised carbon data systems, and coordinated market signals that can scale low-carbon materials across the construction sector.^{84, 85}

Achieving this transformation will not only support the UAE's national climate commitments but also position the country as a regional leader in low-carbon construction and sustainable industrial development.¹⁵⁵

References

1. Embodied Carbon' (no date a) ACEEE | American Council for an Energy-Efficient Economy. Available at: <https://www.aceee.org/topic/embodied-carbon/>
2. Embodied Carbon' (no date b) World Green Building Council. Available at: <https://worldgbc.org/climate-action/embodied-carbon/>
3. Steelfacts-2024' (no date). Available at: World Steel in Figures 2024 - worldsteel.org
4. <https://www.unep.org/news-and-stories/press-release/buildings-and-construction-sector-grows-time-running-out-cut-energy>. As buildings and construction sector grows, time running out to cut energy use and meet Paris climate goals. November 12, 2017. Accessed August 20, 2026. <https://www.unep.org/news-and-stories/press-release/buildings-and-construction-sector-grows-time-running-out-cut-energy>
5. Zero-Carbon Buildings in Cities: A Whole Life-Cycle Approach. June 24, 2025. Accessed August 20, 2026. <https://www.oecd.org/en/events/2025/06/zero-carbon-buildings-in-cities-a-whole-life-cycle-approach.html>
6. UAE-NDC3.0.pdf. Accessed August 20, 2026. <https://unfccc.int/sites/default/files/2024-11/UAE-NDC3.0.pdf>
7. The UAE unveils new NDC and targets 47% GHG emissions reduction by 2035 | Enerdata (2024). Available at: <https://www.enerdata.net/publications/daily-energy-news/uae-unveils-new-ndc-and-targets-47-ghg-emissions-reduction-2035.html>
8. UAE ESG Risk Revolution: Mandatory Climate Reporting 2026 (no date). Available at: <https://ascglobal.ae/insight-details/uae-esg-risk-revolution-mandatory-climate-reporting-framework-for-2026-and-beyond>
9. United Arab Emirates Legislations | Federal Decree-Law on the Reduction of Climate Change Effects (no date). Available at: <https://uaelegislation.gov.ae/en/legislations/2558>
10. Internet, F. (2025) UAE launches National MRV System to support UAE's net zero goals, UAE Ministry of Climate Change and Environment. Available at: <https://www.moccae.gov.ae/en/media-center/news/16/10/2025/uae-launches-national-mrv-system-to-support-uaes-net-zero-goals>
11. Environment and government agenda | The Official Platform of the UAE Government (no date). Available at: <https://u.ae/en/information-and-services/environment-and-energy/environment-and-government-agenda>
12. United Arab Emirates: Climate Law Takes Effect, Supplementing National Emissions Strategy (no date a) Library of Congress, Washington, D.C. 20540 USA. Available at: <https://www.loc.gov/item/global-legal-monitor/2025-06-24/united-arab-emirates-climate-law-takes-effect-supplementing-national-emissions-strategy/>

13. United Arab Emirates: Climate Law Takes Effect, Supplementing National Emissions Strategy (no date a) Library of Congress, Washington, D.C. 20540 USA. Available at: <https://www.loc.gov/item/global-legal-monitor/2025-06-24/united-arab-emirates-climate-law-takes-effect-supplementing-national-emissions-strategy/>
14. uae-climate-law-article.pdf' (no date). Available at: <https://www.pwc.com/m1/en/media-centre/2025/docs/uae-climate-law-article.pdf>
15. خارطة طريق خفض الكربون في القطاع الصناعي. (No Date), 2026. <https://moiat.gov.ae/decarbonization-roadmap>
16. Industrial Deep Decarbonisation Initiative' (no date a) Clean Energy Ministerial. Available at: <https://www.cleanenergyministerial.org/initiatives-campaigns/industrial-deep-decarbonisation-initiative/>
17. Industrial Deep Decarbonisation Initiative (no date b) UNIDO. Available at: <https://www.unido.org/IDDI>
18. 'IDDI-GPP-Pledge-Announcement_v2_0.pdf' (no date). Available at: https://decarbonization.unido.org/wp-content/uploads/IDDI-GPP-Pledge-Announcement_v2_0.pdf
19. Ramani, A. and García de Soto, B. (2021) 'Estidama and the Pearl Rating System: A Comprehensive Review and Alignment with LCA', Sustainability, 13(9), p. 5041. Available at: <https://doi.org/10.3390/su13095041>.
20. UAE-Brief_NewTemplate_electronic_final.pdf' (no date). Available at: https://emiratesgbc.org/wp-content/uploads/2020/09/UAE-Brief_NewTemplate_electronic_final.pdf
21. Dubai Building Code. Dubai Municipality. Accessed August 20, 2026. <https://adm.dm.gov.ae/municipality-business/planning-and-construction/dubai-building-code-2/>
22. Ministry of Industry and Advanced Technology wraps up a successful participation in COP28 - MOIAT (no date). Available at: <https://moiat.gov.ae/en/media-center/news/2023/12/18/cop-28>
23. EmiratesGBC signs MoU with Expo City Dubai to accelerate sustainability in the building industry (no date). Available at: <https://menews.ae/news/emiratesgbc-signs-mou-with-expo-city-dubai-to-accelerate-sustainability-in-the-building-industry>
24. Razan Al Mubarak supports launch of new industry-led UAE 'Blueprint' for the Built Environment - Aletihad News Center (no date). Available at: <https://en.aletihad.ae/news/uae/4448572/razan-al-mubarak-supports-launch-of-new-industry-led-uae--bl>
25. 'UAE-Sustainable-Built-Environment-Blueprint.pdf' (no date). Available at: <https://emiratesgbc.org/wp-content/uploads/2025/03/UAE-Sustainable-Built-Environment-Blueprint.pdf>
26. 'VOLUME XV ISSUE 6 – EmiratesGBC' (no date). Available at: https://emiratesgbc.org/newsletter_category/volume-xv-issue-6/
27. 'Decarbonising through sustainable design' (no date) World Green Building Council. Available at: <https://worldgbc.org/article/decarbonising-through-sustainable-design/>
28. 'EPD UAE - Environmental Product Declaration (no date). Available at: <https://epd-uae.com/>

-
29. 'What is a net zero carbon building?' (no date) World Green Building Council. Available at: <https://worldgbc.org/climate-action/what-is-a-net-zero-carbon-building/>
30. 'Whole Life Carbon Vision' (no date) World Green Building Council. Available at: <https://worldgbc.org/climate-action/whole-life-carbon-vision/>
31. 'Net Zero Centre of Excellence – EmiratesGBC' (no date). Available at: <https://emiratesgbc.org/net-zero-centre-of-excellence/>
32. 'Industrial Decarbonization Roadmap - MOIAT' (no date a). Available at: <https://moiata.gov.ae/decarbonization-roadmap>
33. 'Industry - Energy System' (no date) IEA. Available at: <https://www.iea.org/energy-system/industry>
34. '210602-EGBC-Embodied-Carbon-Working-Group-Terms-of-Reference-FINAL-.pdf' (no date). Available at: <https://emiratesgbc.org/wp-content/uploads/2021/06/210602-EGBC-Embodied-Carbon-Working-Group-Terms-of-Reference-FINAL-.pdf>
35. 'EMSTEEL leads first industrial-scale use of decarbonised cement in the region - Construction Week Online' (2025), 2 June. Available at: <https://www.constructionweekonline.com/news/emsteel-industrial-scale-decarbonised-cement>
36. 'Green Cement Specifications DM Circular 225 | PDF | Concrete | Building Materials' (no date) Scribd. Available at: <https://www.scribd.com/document/503011930/Circular-225-Attachment>
37. 'Circulars of Constructions' (no date) Dubai Municipality. Available at: <https://adm.dm.gov.ae/municipality-business/circulars-of-constructions/>
38. 'Copy of CemPlus Datasheet' (no date). Available at: https://www.holcim.ae/sites/uae/files/docs/uae_cemplus-datasheet.pdf
39. 'CEMPlus – Low-carbon cement' (no date a). Available at: <https://www.holcim.ae/cemplus-low-carbon-cement>
40. 'PCA_EPD_BlendedHydraulic_Athena_Final_revised_Nov2023' (no date). Available at: https://www.cement.org/wpcontent/uploads/2024/07/pca_epd_blendedhydraulic_athena_final_revised_nov2023.pdf
41. 'cdp-climate-change-response-2023.pdf' (no date). Available at: <https://www.holcim.com/sites/holcim/files/2024-02/cdp-climate-change-response-2023.pdf>
42. 'Holcim publishes Climate Report 2023' (no date). Available at: <https://www.royalwhitecement.com/04/holcim-publishes-climate-report-2023/>
43. 'Low Carbon Cement Explained - Types, Materials, Embodied Carbon Reduction, Cost, Strength, And Use Cases In Sustainable Construction - Carbo Europe' (no date). Available at: <https://www.carboeurope.org/low-carbon-cement-explained/>
44. 'CEMPlus – Low-carbon cement' (no date a). Available at: <https://www.holcim.ae/cemplus-low-carbon-cement>
45. 'EPD: Portland limestone cement (HUB-1348)' (no date). Available at: <https://materials.oneclicklca.com/en/material/portland-limestone-cement/66ed88ad8696d056de098a7a>
-

46. Iron and Steel Technology Roadmap – Analysis (2020) IEA. Available at: <https://www.iea.org/reports/iron-and-steel-technology-roadmap>
47. Iron & steel (no date) IEA. Available at: <https://www.iea.org/energy-system/industry/iron-and-steel>
48. 'Emirates Steel to continue use of local scrap for steel production - Construction Week Online' (2020), 24 June. Available at: <https://www.constructionweekonline.com/products-services/266003-emirates-steel-to-continue-use-of-local-scrap-for-steel-production>
49. Sustainable Constructional Steel - Cares Steel Certification (no date). Available at: <https://www.carescertification.com/certification-schemes/sustainable-constructional-steel>
50. Supply Chain Management (no date). Available at: <https://www.constructionproducts.org.uk/our-expertise/sustainability/procurement-tool/supply-chain/supply-chain-management/>
51. 'About us' (no date) AGSI. Available at: <https://agsi.ae/about-us/>
52. Arabian Gulf Steel Industries Achieves Net Zero at its Facility in Abu Dhabi- AGSI (2024). Available at: <https://agsi.ae/arabian-gulf-steel-industries-achieves-net-zero-at-its-facility-in-abu-dhabi/>
53. EAF steelmakers produce less GHG emissions - Plant Engineering (no date). Available at: <https://www.plantengineering.com/eaf-steelmakers-produce-less-ghg-emissions/>
54. 'Emirates Steel Supports UAE Traders, Endorses Country's Sustainability Goals through Continuing to Purchase Local Scrap Material for Steel Production' (2020), 23 June. Available at: <https://www.emsteel.com/press/emirates-steel-supports-uae-traders-endorses-countrys-sustainability-goals-through-continuing-to-purchase-local-scrap-material-for-steel-production/>
55. Emsteel to continue buying local scrap for production (no date). Available at: <https://www.tradearabia.com/News/238952/Emsteel-to-continue-buying-local-scrap-for-production>
56. 'Emirates Steel to continue use of local scrap for steel production - Construction Week Online' (2020), 24 June. Available at: <https://www.constructionweekonline.com/products-services/266003-emirates-steel-to-continue-use-of-local-scrap-for-steel-production>
57. 'EMSTEEL and Masdar Announce Success of Pilot Project Using Green Hydrogen to Produce Green Steel' (2024), 28 October. Available at: <https://www.emsteel.com/press/emsteel-and-masdar-announce-success-of-pilot-project-using-green-hydrogen-to-produce-green-steel/>
58. Masdar and Emsteel complete pilot project to produce green steel using green hydrogen | ZAWYA (no date). Available at: <https://www.zawya.com/en/projects/industry/masdar-and-emsteel-complete-pilot-project-to-produce-green-steel-using-green-hydrogen-444937>
59. Sustainable-Buildings-Case-Studies-in-the-UAE (2025). Available at: <https://emiratesgbc.org/wp-content/uploads/2026/05/Sustainable-Buildings-Case-Studies-in-the-UAE.pdf>

60. 'Low carbon aluminium factsheet' (no date) International Aluminium Institute. Available at: <https://international-aluminium.org/landing/low-carbon-aluminium-factsheet/>
61. A leader in global aluminium production | EGA (no date). Available at: <https://www.ega.ae/en>
62. EGA delivers strong financial results and low-carbon growth in 2024 (no date) EGA delivers strong financial results and low-carbon growth in 2024. Available at: <https://media.ega.ae/ega-delivers-strong-financial-results-and-low-carbon-growth-in-2024/>
63. EGA sustainability report. (2024) Available at: [ega-2024-sustainability-report \(2\).pdf](#)
64. How aluminium producers are trying to square sky-high emissions with low-carbon future | Reuters (no date). Available at: <https://www.reuters.com/sustainability/decarbonizing-industries/how-aluminium-producers-are-trying-square-sky-high-emissions-with-role-net-zero-2025-05-14/>
65. RevivAL recycled aluminium | EGA (no date). Available at: <https://www.ega.ae/en/products/revival>
66. EGA begins construction of UAE's largest aluminium recycling plant (no date). Available at: <https://media.ega.ae/ega-begins-construction-of-uaes-largest-aluminium-recycling-plant/>
67. UAE's largest aluminium recycling plant on track for 2026 opening – EGA | ZAWYA (no date). Available at: <https://www.zawya.com/en/projects/industry/uaes-largest-aluminium-recycling-plant-on-track-for-2026-opening-ega-447814>
68. Construction milestone at EGA's UAE aluminium recycling plant as melting furnace charged for first time (no date) Construction milestone at EGA's UAE aluminium recycling plant as melting furnace charged for first time. Available at: <https://media.ega.ae/construction-milestone-at-egas-uae-aluminium-recycling-plant-as-melting-furnace-charged-for-first-time/>
69. Aluprof prioritises aluminium recycling – new products with up to 12 times lower CO₂ emissions - Aluprof (no date). Available at: <https://aluprof.com/en/company/news/aluprof-prioritises-aluminium-recycling-new-products-with-up-to-12-times-lower-co-emissions>
70. Recycled aluminium the new sought-after material in low-carbon construction | Hydro (no date). Available at: <https://www.hydro.com/en/global/media/news/2020/recycled-aluminium-the-new-sought-after-material-in-low-carbon-construction/>
71. Justin (2022) 'Continuous energy supply is essential for the flat glass industry', Glass for Europe, 15 March. Available at: <https://glassforeurope.com/continuous-energy-supply-is-essential-for-the-flat-glass-industry/>
72. 'GfE-Recycling-of-end-of-life-building-glass_2024.pdf' (no date). Available at: https://glassforeurope.com/wp-content/uploads/2025/05/GfE-Recycling-of-end-of-life-building-glass_2024.pdf
73. 'Deloitte proposal document A4' (no date). Available at: <https://glassforeurope.com/wp-content/uploads/2018/04/Economic-study-on-recycling-of-building-glass-in-Europe-Deloitte.pdf>

74. CIRCULARITY AND RECYCLING INITIATIVES (no date) Saint-Gobain Glass. Available at: <https://www.saint-gobain-glass.com/Circularity-and-recycling-initiatives%E2%80%8B>
75. Recycling Post-Consumer Glass: a Challenge and an Opportunity for the Flat Glass Industry | glassonweb.com (no date a). Available at: <http://www.glassonweb.com/article/recycling-post-c-onsumer-glass-challenge-and-opportunity-flat-glass-industry>
76. 'Emirates Float Glass reveals Carbon Management Program – Emirates Float Glass LLC' (no date). Available at: <https://www.efgme.com/emirates-float-glass-reveals-carbon-management-program/>
77. ISO 14025:2006 (no date) ISO. Available at: <https://www.iso.org/standard/38131.html>
78. CIRCULARITY AND RECYCLING INITIATIVES (no date) Saint-Gobain Glass. Available at: <https://www.saint-gobain-glass.com/Circularity-and-recycling-initiatives%E2%80%8B>
79. 'Emirates Float Glass LLC' (2025), 3 November. Available at: <https://www.efgme.com/>
80. What are embodied carbon and operational carbon? - Embodied carbon - Planning Portal (no date). Available at: <https://www.planningportal.co.uk/planning/sustainability-and-planning/embodied-carbon/what-are-embodied-carbon-and-operational-carbon>
81. Carbon: embodied and operational - The Institution of Structural Engineers (2019). Available at: <https://www.istructe.org/resources/guidance/carbon-embodied-operational/>
82. Google, A.U.O. (2023) Vitro Architectural Glass Lowers Embodied Carbon Further, Releases NEW Environmental Product Declarations, Building Design + Construction. Available at: <https://www.bdcnetwork.com/products-and-materials/glass-and-glazing/press-release/55171753/vitro-architectural-glass-lowers-embodied-carbon-further-releases-new-environmental-product-declarations>
83. Directory, S. (2025a) Embodied Carbon Metrics in Building Codes → Scenario, Prism → Sustainability Directory. Available at: <https://prism.sustainability-directory.com/scenario/embodied-carbon-metrics-in-building-codes/>
84. United Arab Emirates: Climate Law Takes Effect, Supplementing National Emissions Strategy (no date a) Library of Congress, Washington, D.C. 20540 USA. Available at: <https://www.loc.gov/item/global-legal-monitor/2025-06-24/united-arab-emirates-climate-law-takes-effect-supplementing-national-emissions-strategy/>
85. Services Leader | authorurl:https://www.ey.com/en_om/people/yasir-ahmad,
author salutation: | authorfirstname:Yasir | authorlastname:Ahmad | authorjobtitle:EY M.C.C. and S. and Services | authorurl:https://www.ey.com/en_om/people/saravanan-dhalavoi,
author salutation: | authorfirstname:Saravanan | authorlastname:Dhalavoi | authorjobtitle:Partner, EY MENA Climate Change and Sustainability (no date) How UAE is transforming the climate landscape through legislative action. Available at: https://www.ey.com/en_om/services/climate-change-sustainability-services/how-uae-is-transforming-the-climate-landscape-through-legislative-action

86. Team, E.S. (2021) 'Building Life Cycle Assessment', Envirolink.me, 15 February. Available at: <https://www.envirolink.me/building-life-cycle-assessment/>
87. Alzard, M., El-Hassan, H. and El Maaddawy, T. (2020) 'Development of a Life Cycle Inventory Dataset for Recycled Concrete Aggregates in the City of Abu Dhabi'. The 5th International Conference on Civil, Structural and Transportation Engineering. Available at: <https://doi.org/10.11159/iccste20.228>.
88. Alzard, M.H., El-Hassan, H. and El-Maaddawy, T. (2021) 'Environmental and Economic Life Cycle Assessment of Recycled Aggregates Concrete in the United Arab Emirates', Sustainability, 13(18), p. 10348. Available at: <https://doi.org/10.3390/su131810348>.
89. Directory, S. (2025b) How Accurate Are Lca Databases? → Question, Product → Sustainability Directory. Available at: <https://product.sustainability-directory.com/question/how-accurate-are-lca-databases/>
90. '2025-07-06_Challenges-EPD_final.pdf' (no date). Available at: https://www.zvei.org/fileadmin/user_upload/Themen/Industrie/Herausforderungen_EP/2025-07-06_Challenges-EPD_final.pdf
91. LCA FAQ: Life Cycle Assessment Questions Answered (no date) LCAi. Available at: <https://lcai.earth/faq>
92. Environmental Product Declaration | EPD International (no date b). Available at: <https://www.environdec.com/services/what-is-epd>
93. GREEN PUBLIC PROCUREMENT CASE STUDY: The Buy Clean California Act (2025). Available at: <https://climatecatalyst.org/wp-content/uploads/2025/09/Green-Public-Procurement-Case-Study-The-Buy-Clean-California-Act.pdf>
94. Confronting embodied carbon's data problem: How do we know where we stand? - GRESB (no date). Available at: <https://www.gresb.com/confronting-embodied-carbons-data-problem-how-do-we-know-where-we-stand/>
95. Environmental product declarations (EPD): Comparability. A Technical review - The Construction Information Service (no date). Available at: <https://cis.ihs.com/CIS/document/354988>
96. Kadefors, A., Lingegård, S., Uppenberg, S., Alkan-Olsson, J. and Balian, D. (2021) 'Designing and implementing procurement requirements for carbon reduction in infrastructure construction – international overview and experiences', Journal of Environmental Planning and Management, 64(4), pp. 611–634. Available at: <https://doi.org/10.1080/09640568.2020.1778453>.
97. Intelligence, G.L. (2024) 'Enhancing Sustainability in the UAE through Green Procurement Policies', Generis Global Legal Services, 3 November. Available at: <https://generisonline.com/enhancing-sustainability-in-the-uae-through-green-procurement-policies/>
98. Chain, T.B. (2023) 'Sustainable Procurement in Construction', The Build Chain, 8 August. Available at: <https://www.thebuildchain.co.uk/news/the-role-of-sustainable-procurement-in-construction/>
99. Chain, T.B. (2023) 'Sustainable Procurement in Construction', The Build Chain, 8 August. Available at: <https://www.thebuildchain.co.uk/news/the-role-of-sustainable-procurement-in-construction/>
100. Industrial Decarbonization Roadmap - MOIAT (no date a). Available at: <https://moiat.gov.ae/decarbonization-roadmap>
-

101. Industry - Energy System (no date) IEA. Available at: <https://www.iea.org/energy-system/industry>
102. 'Fact-sheet-hydrogen-H2-based-ironmaking.pdf' (no date). Available at: <https://worldsteel.org/wp-content/uploads/Fact-sheet-hydrogen-H2-based-ironmaking.pdf>
103. EGA supplies CelestiAL solar aluminium to Brembo (no date). Available at: <https://www.wam.ae/en/article/bkogrl0-ega-supplies-celestial-solar-aluminium-brembo>
104. Net-Zero Industry Tracker 2023 Edition (no date) Foro Económico Mundial. Available at: <https://es.weforum.org/publications/net-zero-industry-tracker-2023/in-full/aluminium-industry-net-zero-tracker/>
105. UAE collaboration delivers first low-carbon aluminium (2025) World Nuclear News. Available at: <https://world-nuclear-news.org/articles/uae-collaboration-delivers-first-low-carbon-aluminium>
106. Recycling Post-C onsumer Glass: a Challenge and an Opportunity for the Flat Glass Industry | glassonweb.com (no date a). Available at: <http://www.glassonweb.com/article/recycling-post-c-onsumer-glass-challenge-and-opportunity-flat-glass-industry>
107. Circular Economy (no date). Available at: <https://www.dewa.gov.ae/en/about-us/sustainability/circular-economy>
108. UAE Circular Economy Policy 2021 - 2031 (no date). Available at: <https://123dok.com/uae/docs/uae-circular-economy-policy-2021-2031.10653781>
109. Internet, F. (2024) UAE Circular Economy Council Holds First Meeting, UAE Ministry of Climate Change and Environment. Available at: <https://www.moccae.gov.ae/en/media-center/news/21/4/2021/uae-circular-economy-council-holds-first-meeting>
110. UAE approves 22 policies to accelerate transition to a circular economy | The National (no date). Available at: <https://www.thenationalnews.com/business/2022/07/03/uae-approves-22-policies-to-accelerate-transition-to-a-circular-economy/>
111. Minister of Climate Change and Environment: The transition to a... (no date). Available at: <https://www.moccae.gov.ae/en/media-center/news/26/1/2021/minister-of-climate-change-and-environment-the-transition-to-a-circular-economy-will-enable-the-uae->
112. UAE Sustainability Built Environment Blueprint – EmiratesGBC' (no date). Available at: <https://emiratesgbc.org/uae-sustainability-built-environment-blueprint/>
113. MENA Sustainable Finance Market Hits \$35.1 billion Led by Financials and Energy: Bloomberg Intelligence | Press | Bloomberg LP (no date). Available at: <https://www.bloomberg.com/company/press/mena-sustainable-finance-market-hits-35-1-billion-led-by-financials-and-energy-bloomberg-intelligence/>
114. uae-financial-sector-announces-to-mobilise-aed-1-trillion-in-sustainable-finance-by-2030-in-alignment-with-uae-hosting-cop-28. Available at: <https://centralbank.ae/media/2Inpgbrj/uae-financial-sector-announces-to-mobilise-aed-1-trillion-in-sustainable-finance-by-2030-in-alignment-with-uae-hosting-cop-28-en.pdf>
115. Eco-financing the future (no date) KPMG. Available at: <https://kpmg.com/ae/en/insights/esg/eco-financing-the-future.html>

116. Sustainable Banking Report_EN' (no date). Available at:
<https://www.sc.com/en/uploads/sites/66/content/docs/SC-WRB-Sustainable-Banking-Report-2025.pdf>
117. UAE millionaires allocate nearly 30% of portfolios to sustainable investments | ZAWYA (no date). Available at:
<https://www.zawya.com/en/business/investment/uae-millionaires-allocate-nearly-30-of-portfolios-to-sustainable-investments-371464>
118. Pathways to Commercial Liftoff: Low-Carbon Cement - Net Zero Action Accelerator (no date). Available at:
<https://netzeroaction.org/resource/pathways-to-commercial-liftoff-low-carbon-cement/>
119. Cooper, R. (2026) 'Global CO2-reduced Concrete Market 2026', 18 June. Available at:
<https://pmarketresearch.com/chemi/co2-reduced-concrete-market/>
120. Why Environmental Product Declarations (EPDs) Are Becoming Essential For Green Product Certification - Sigma Earth (no date). Available at: <https://sigmaearth.com/why-environmental-product-declarations-epds-are-becoming-essential-for-green-product-certification/>
121. Global EPD requirements by country | One Click LCA (no date). Available at: <https://oneclicklca.com/en-ee/resources/articles/guide-to-global-epd-requirements-by-country>
122. EPD Certification Consultancy - Environmental Product Declaration (no date). Available at: <https://epd-ksa.com/epd-certification/>
123. Green finance gap in green buildings: A scoping review and future research needs | Request PDF (no date). Available at:
https://www.researchgate.net/publication/355174274_Green_finance_gap_in_green_buildings_A_scoping_review_and_future_research_needs
124. Directory, S. (no date) Green Building Finance → Term, Sustainability Directory. Available at:
<https://sustainability-directory.com/term/green-building-finance/>
125. Green finance development and its origin, motives, and barriers: an exploratory study | Environment, Development and Sustainability | Springer Nature Link (no date). Available at:
<https://link.springer.com/article/10.1007/s10668-024-05570-w>
126. A Global Review of Sustainable Construction Project Financing: Policies, Practices, and Research Efforts (no date). Available at: <https://www.mdpi.com/2071-1050/9/12/2347>
127. Carbon value engineering: A framework for integrating embodied carbon and cost reduction strategies in building design | Request PDF (no date). Available at:
https://www.researchgate.net/publication/348624095_Carbon_value_engineering_A_framework_for_integrating_embodied_carbon_and_cost_reduction_strategies_in_building_design
128. Buildings - Energy System (no date) IEA. Available at: <https://www.iea.org/energy-system/buildings>

129. Net-Zero Embodied Carbon in Buildings with Today's Available Technologies - PMC (no date). Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10832066/>
130. Energy Efficiency 2023 – Analysis - IEA (no date). Available at: <https://www.iea.org/reports/energy-efficiency-2023>
131. Deep_Retrofit_Study_EN.pdf. (No date). Available at: https://emiratesgbc.org/wp-content/uploads/2020/10/Deep_Retrofit_Study_EN.pdf
132. Multiple Benefits of Energy Efficiency – Analysis (2025) IEA. Available at: <https://www.iea.org/reports/multiple-benefits-of-energy-efficiency>
133. Financing Clean Energy Transitions in Emerging and Developing Economies – Analysis - IEA (no date). Available at: <https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing-economies> .
134. Environment | OECD. <https://www.oecd.org/en/topics/environment.html>.
135. Environment - topics | OECD. <https://www.oecd.org/en/topics/environment.html>.
136. Global Property Linked Finance Initiative' (2022), 23 March. Available at: <https://www.propertylinkedfinance.com/>
137. Green Finance Institute (no date). Available at: <https://www.greenfinanceinstitute.com/insights/accelerating-the-decarbonisation-of-the-built-environment-through-property-linked-financing/>
138. UAE moves increasingly towards a low-carbon cement structure (no date). Available at: <https://www.cemnet.com/News/story/179297/uae-moves-increasingly-towards-a-low-carbon-cement-structure.html>
139. Revolutionary embodied carbon calculator launched at Light + Intelligent Building Middle East as UAE targets net zero by 2050 (no date). Available at: <https://light-middle-east.ae.messefrankfurt.com/dubai/en/press/2025/2025/15-01-202511.html>
140. The Rise of sustainable investing: Strategies, trends, and future impact (no date) Equiti Default. Available at: <https://www.equiti.com/sc-en/news/market-insights/the-rise-of-sustainable-investing-strategies-trends-and-future-impact/>
141. ESG investing projected to reach \$53 trillion by 2025 | Khaleej Times (no date). Available at: <https://www.khaleejtimes.com/business/esg-investing-projected-to-reach-53-trillion-by-2025>
142. Improved financing could save US\$50 trillion as the world decarbonizes | Deloitte Middle East (no date). Available at: <https://www.deloitte.com/middle-east/en/about/press-room/deloitte-report-improved-financing-could-save-usd50trillion-as-the-world-decarbonizes.html>
143. Sustainable Finance (no date). Available at: https://www.centralbank.ae/en/our-operations/sustainable-finance_

144. Green and Sustainable Bonds Can Help Portfolios and the Planet | Kiplinger (no date). Available at: <https://www.kiplinger.com/investing/bonds/how-green-and-sustainable-bonds-help-your-portfolio-and-planet>
145. ESG | LONG TERM FINANCIAL RETURN | HSBC UAE (no date). Available at: <https://www.hsbc.ae/wealth/insights/esg/why-esg-matters/investing-in-climate-change/>
146. UAE's ALTERRA and Spanish lender BBVA plan to launch \$1.2 billion climate fund | Reuters (no date). Available at: <https://www.reuters.com/sustainability/climate-energy/uaes-alterra-spanish-lender-bbva-plan-launch-12-billion-climate-fund-2026-01-15/>
147. DIFC – the first Global Financial Centre in the region to publish its Sustainable Finance Framework, continues to drive climate action and sustainable development. (no date). Available at: <https://www.difc.com/whats-on/news/difc-to-publish-its-sustainable-finance-framework>
148. Green bonds and Sukuk Issuances in UAE reach AED15 billion: SCA | ... (no date). Available at: <https://www.uaecma.gov.ae/en/media-center/news/11/12/2023/green-bonds-and-sukuk-issuances-in-uae-reach-aed15-billion-sca.aspx>
149. Financing | Carbon Accounting Platform | Carbonchain (no date). Available at: <https://www.carbonchain.com/solutions/financing>
150. Carbon emissions audits under ISO 14064 | Speeki (no date). Available at: <https://www.speeki.com/iso-14064-carbon-emissions-verification>
151. (2023) 'BIS, COP28 and Central Bank of United Arab Emirates announces winners of COP28 UAE TechSprint'. Available at: https://www.bis.org/hub/2023_cop28_techsprint.htm
152. COP28 UAE Techsprint - COP28 UAE (no date). Available at: <https://www.cop28.com/en/cop28-uae-techsprint>
153. Hub71 | ABU DHABI LAUNCHES 'HUB71+ CLIMATETECH' TO ADVANCE STARTUPS DEDICATED TO DECARBONIZATION (no date). Available at: <https://www.hub71.com/latest-news/press-release/abu-dhabi-launches-hub71-plus-climatetech-to-advance-startups-dedicated-to-decarbonization>
154. Abu Dhabi's Hub71 launches programme to support climate technology start-ups at Cop28 | The National (no date). Available at: <https://www.thenationalnews.com/business/start-ups/2023/12/05/abu-dhabis-hub71-launches-programme-to-support-climate-technology-start-ups/>
155. UAE-based climate platform structured its first Article 6 carbon finance transaction (2026) ZAWYA. Available at: <https://www.zawya.com/en/press-release/companies-news/uae-based-climate-platform-structured-its-first-article-6-carbon-finance-transaction-364824>
156. What is a net zero carbon building?' (no date) World Green Building Council. Available at: <https://worldgbc.org/climate-action/what-is-a-net-zero-carbon-building/>

157. خارطة طريق خفض الكربون في القطاع الصناعي (no date). Available at: <https://moiat.gov.ae/decarbonization-roadmap>
158. Bringing Embodied Carbon Upfront' (no date) World Green Building Council. Available at: <https://worldgbc.org/article/bringing-embodied-carbon-upfront/>
159. Environmental Product Declaration | EPD International (no date a). Available at: <https://www.environdec.com/services/what-is-epd>
160. Public procurement (no date) OECD. Available at: <https://www.oecd.org/en/topics/public-procurement.html>
161. Level(s) - Green Forum - European Commission (2026). Available at: https://green-forum.ec.europa.eu/green-business/levels_en
162. The UAE's Net Zero 2050 Strategy | The Official Platform of the UAE Government (no date). Available at: <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/environment-and-energy/the-uae-net-zero-2050-strategy>
163. Climate Catalyst (2025). Available at: <https://climatecatalyst.org/wp-content/uploads/2025/09/Green-Public-Procurement-Case-Study-The-Buy-Clean-California-Act.pdf>
164. Addressing Embodied Carbon (no date) Majid Al Futtaim. Available at: <https://www.majidalfuttaim.com/en/who-we-are/sustainability-and-esg/sustainability/case-studies/detail/2020/addressing-embodied-carbon>
166. Expo City decarbonisation roadmap: Raising the bar on responsible urban development and supporting UAE net zero goals (no date). Available at: <https://www.expocitydubai.com/en/media-centre/expo-city-decarbonisation-roadmap-raising-the-bar-on-responsible-urban/>
167. Expo 2020 Dubai Legacy: Facts & Figures | Expo City Dubai (no date). Available at: <https://www.expocitydubai.com/en/expo-2020/>
168. TM65UAE Embodied carbon in building services: a methodology for the UAE (pdf) (no date). Available at: <https://www.cibse.org/knowledge-research/knowledge-portal/tm65uae-embodied-carbon-in-building-services-a-methodology-for-the-uae-pdf/>



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