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Climate Insights

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AEGON **INSIGHTS**

Decarbonising real estate

Buildings are where the economy happens, and buildings are where life happens. We spend over 90% of our lives inside so its unsurprising that buildings account for 34% of global energy consumption and 26% of energy-related emissions, according to the International Energy Agency (IEA).[1] When we include the emissions from manufacturing and transporting construction materials, the built environment is nearly 40% of global emissions. Decarbonising this sector is therefore crucial to mitigating climate change.

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Ritchie is responsible for analyzing and monitoring key climate change issues facing companies and industry sectors. He is also involved in building the firm's climate transition research approach. Prior to his current role, Ritchie was part of the firm's investment solutions team, where he delivered investment solutions and strategic asset allocation advice, with a strong focus on client liabilities and financial regulation. Before joining the firm, he worked for UK-based actuarial consultancy firms Hymans Robertson and LCP. Ritchie has been in the industry since 2010 and joined the firm in 2019. He joined the responsible investment team in 2022. He holds a Master's degree in mathematical finance from York University. Ritchie also holds the CFA UK Certificate in Climate and Investing.

What are the issues?

There is no 'one-size-fits-all' decarbonisation pathway for real estate. Although the catch-all term "buildings" might suggest uniformity, the sector is exceptionally diverse. Even identical buildings, constructed simultaneously, with the same materials and in the same location, develop distinct emissions profiles based on occupant behaviour and how they use their space. This diversification means decarbonisation pathways will vary based on factors like type of property, geographic location and climate, building age, building condition, local energy mix, local infrastructure, and regulatory environment. The net zero journey for an office park in India will look fundamentally different from that of a residential block in Scandinavia.

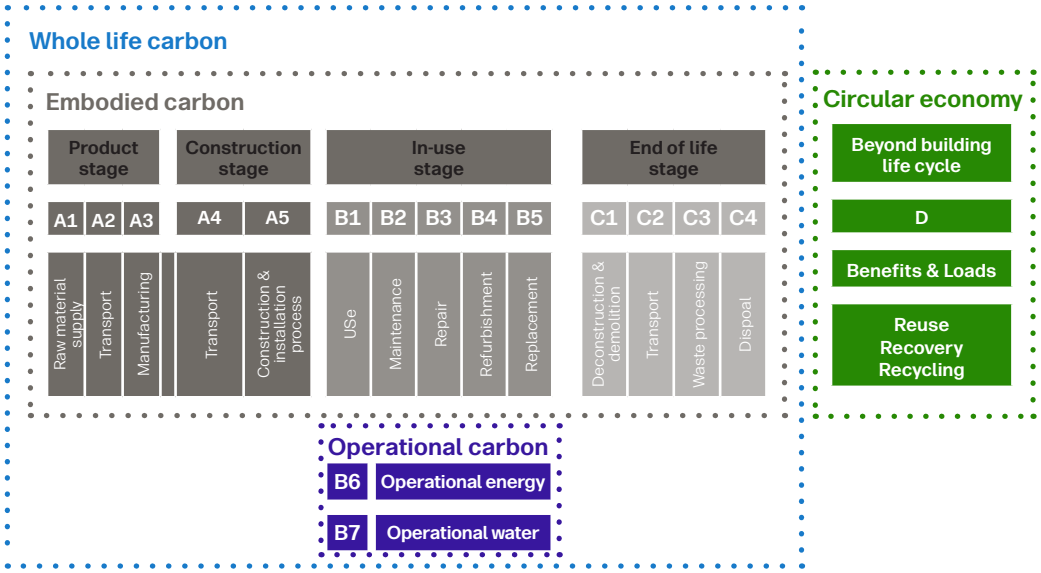
Reducing emissions in use phase is key...
Reducing emissions during a building's operational phase presents the greatest immediate opportunity. The IEA predicts that 80% of buildings that will exist in 2050 have already been built[1]. However, the increasing 'financialisaton' of real estate over the last 50 years, has created a complex ownership landscape where most commercial buildings are not owned by the people or companies that occupy them. This gives rise to the "split incentive" challenge where the financial cost of implementing emissions savings technologies is borne by landlords/owners, while tenants receive the financial benefits in the form of lower energy costs.

Depending on lease structure, real estate companies may only have operational control over the common areas and shared facilities in their buildings. For these companies, operational emissions can fall into all three scopes of their emissions inventory. For example, emissions from gas used to heat a building would be Scope 1, electricity-related emissions from common area lighting and elevators would be Scope 2, and the emissions from tenant activities would be Scope 3, Category 13: downstream leased assets.

As a result of the different boundaries of control, decarbonisation strategies and targets of real estate companies must take a "whole building approach" - that is, efforts must cover emissions from both landlord-controlled spaces and tenant-controlled spaces.

...but embodied carbon is also important

Embodied carbon refers to the emissions generated during material extraction, manufacturing, transport, construction, repair and refurbishment, and building decommissioning. This can add up to 20-50% of a building's total carbon emissions over its lifetime, depending on property type, materials used, and design. These emissions are largely determined before a building is even occupied, with most occurring during initial construction. Although operational emissions form most of the built environment's total emissions, the emissions from construction are significant and require attention. Real estate companies must therefore take a "whole life carbon" approach, considering both embodied and operational carbon in their decarbonisation strategies.



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What are the solutions?

Operational/In use emissions

Decarbonising building operations has become largely a technology implementation challenge. Three primary levers drive operational emissions reductions:

Improve energy efficiency

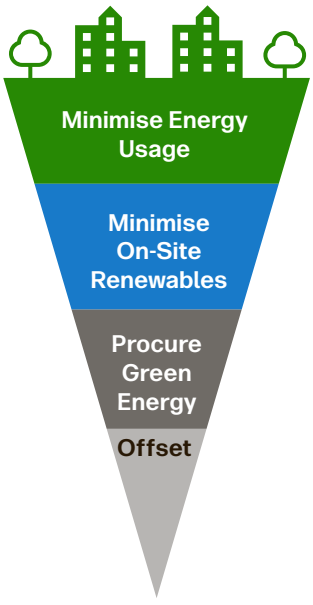
First, energy efficiency forms the foundation. To **reduce the demand** on the electricity grid (which is struggling to deploy renewable generation at sufficient speed), companies should make their buildings as efficient as possible. Think of a buildings energy system like filling a sieve with water. Patching the holes with energy efficiency solutions means it takes less water (energy) to fill that sieve (heat or power the building). Regulation, such as the EU's Revised Energy Performance of Buildings Directive, can play a key role here, particularly, when it comes to making existing buildings more energy efficient.

Energy use within buildings is categorised into "regulated", landlord-controlled facilities and services (e.g. lighting, air conditioning, building envelope), and "unregulated", what tenants use (e.g. computers, screens).

Smart building technologies from LED lighting with occupancy sensors to advanced building management systems (BMS), can reduce energy consumption by 15-35% while improving occupant comfort[2].

On the unregulated side, options are more limited: engaging tenants for behavioural change, for example, by requiring submetering of tenant spaces so they pay for the energy they directly use, setting out terms in a 'green lease' to share the costs of 'greening' projects to address the split incentives, and requiring energy efficient fit-outs of tenant space.

Energy hierarchy



Source: www.inrev.org/

Electrification

Second, electrification offers a clear path to decarbonisation. Building heating systems, hot water, cooking, and power generation have historically been powered with natural gas (in some markets, oil). Building owners should also aim to **remove any fossil fuel energy sources and replace them with electric alternatives**. How quickly these changes are implemented in practice will depend on several factors including cost, remaining useful life of the current system and regulation. The recent SBTi Buildings Sector guidance requires the real estate sector must not install new fossil fuel equipment from 2030 at the latest to be validated as having 1.5°C aligned targets. The replacement of fossil fuels is dependent on the market a building is in – for example, in regions like Nova Scotia, Canada, where the grid remains coal-dependent. Immediate electrification might temporarily increase emissions[4]. However, as grids decarbonise, electrified buildings become increasingly climate friendly.

The aim of energy efficiency and electrification efforts should be to create "net zero-ready" buildings. These are buildings that have achieved the highest energy efficiency class in their country and either use renewable energy directly or a supply that will be fully decarbonised by 2050. For example, in Japan, a zero energy-ready building will have reduced energy consumption by at least 50%.

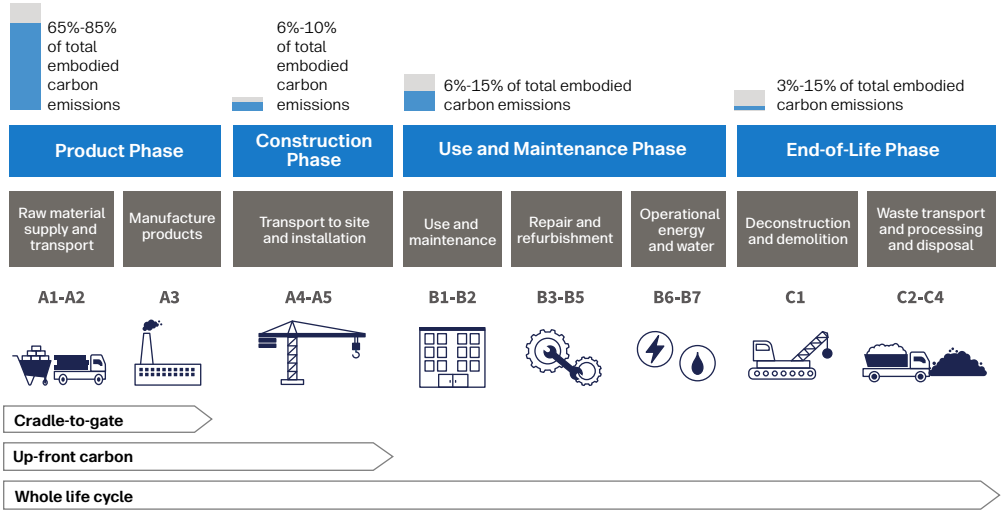
Renewable energy installation/procurement

Third, renewable energy integration completes the operational transformation. Buildings should utilise on-site **renewable energy sources** to decarbonise energy consumption where feasible. The ability of buildings to match their energy needs with on-site renewables is determined by the type of property – for example, a high-rise office building in the central business district will not have the space needed to deploy enough solar panels to meet the entire energy demand. On the other hand, light industrial properties have plenty of roof space and relatively low energy demands and so, in some cases, have excess clean energy available to return to the grid. Renewable energy sources can be paired with on-site storage to alleviate some of the concerns around temporal availability of renewable energy. Where on-site generation falls short, Power Purchase Agreements and Renewable Energy Certificates can bridge the gap.

Embodied carbon

Moving away from operational carbon, solutions for upfront embodied carbon are much less forthcoming. Challenges exist around embodied carbon measurement, the availability of low-carbon materials, cost premiums for such materials, and the need for innovative design approaches to reduce materials use. These issues again vary in intensity by geography and property type. Notably, the availability of provably low carbon materials (i.e. those with environmental product disclosures or lifecycle analysis) is region dependent.

Life cycle assessment phases



Source: RMI

Flexible demand management

This optimises building energy use based on real-time data on renewable energy, grid demand, weather, and cost. This reduces strain on renewable networks costs, and supports decarbonisation by aligning demand with clean power[4]. However, it requires real-time data grid operators.

However, the real estate sector can take the below broad approaches to reduce embodied carbon:

- **Build nothing:** repurpose existing buildings and extending their lifespan through maintenance and repairs. Building nothing will result in de minimis upfront embodied carbon (A1-A5 on Figure 1).
- **Design for less material use:** optimising structural designs to use less material and optimising lean construction methods to reduce waste can reduce the demand for materials, reducing the need for materials manufacturing in the first place. This includes prefabricated/modular construction techniques which result in less waste and fewer transport-related emissions.
- **Use low-carbon materials:** use timber structure, low carbon steel and concrete, and bio-based insulation materials in the construction of buildings.
- **Design for circularity:** designing buildings for disassembly and materials reuse in the future can help reduce long-term embodied carbon. Using standardised components, avoiding composite materials that cannot be separated, and implementing material passports can all enable future construction projects to use recycled materials and reduce future demand for virgin materials.
- **Design for future:** design buildings with increased durability, and for flexibility and adaptability in use, to reduce the need for big refurbishment projects down the line.

Building design is key to reducing both embodied and operational carbon. New buildings should meet high energy efficiency standards, be fully electrified and use on-site renewables. These impacts are now integrated into green building ratings systems like Leadership in Energy and Environmental Design (LEED).

Conclusion

The journey to decarbonised real estate won't be linear. Different markets, building types and ownership structures require tailored approaches, and this has impacted progress to date. However, companies that act decisively now will gain competitive advantages while contributing to climate mitigation. The technology exists – success depends on strategic implementation and sustained commitment to change.

Case study

Unite Group Plc is the UK's largest owner, manager and developer of purpose-built student accommodation. The company has a well-developed climate strategy which takes a whole-life carbon approach, covering both operational and embodied carbon impacts.

From an operational carbon perspective, Unite has set a target to reduce its scope 1 and 2 emissions (essentially the energy related emissions from their properties) by 56% by 2030 (relative to 2019 levels). This target has been validated by SBTi as 1.5°C aligned, however the SBTi building validation is missing. For overarching strategy, Unite is a member of RE100 and is thus committed to sourcing 100% renewable electricity by 2030 and makes use of on-site renewables such as solar panels. The company also aims to remove natural gas from its buildings by 2030 and only use heat pumps or district heating systems in their new developments. From an energy efficiency standpoint, Unite has set targets to reduce the energy intensity of its portfolio and achievement of EPC A ratings for all new developments.

For embodied carbon, the company measures this for both new developments as well as in-use (for example, emissions impacts from maintenance or refurbishments) and has set targets to reduce embodied carbon for new developments which are aligned to industry benchmarks.

1 www.iea.org/reports/net-zero-by-2050

2 www.eonenergy.com/business/building-and-energy-management/building-management-system.html#:~:text=Failure%20to%20maintain%20a%20BMS,optimal%20control%20of%20building%20services

3 www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-nova-scotia.html

4 https://ukgbc.org/news/time-matching-and-location-based-energy-procurement-reduces-emissions-while-improving-scope-2-reporting/

Disclosures

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