We must act now to ensure buildings are both net zero carbon and adaptable to a changing climate

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To ensure that the built environment is equipped to withstand climate change, integrated frameworks are needed at the design phase to enable

net zero adaptation, say researchers.

A review of recently updated building sustainability assessment tools, BREEAM (UK), Green Star (Australia) and LEED (U.S.), found that significantly less weighting is given towards the integration of climate change adaptation—tools which investors use to reduce their exposure to climate risks within their developments. Although these assessment tools are not official standards, they may be specified or mandated by clients and local planning departments, as they are reflective of best practice measures adopted by the industry. The findings are reported in the journal *Environmental Research: Infrastructure and Sustainability*.

The review, carried out by Ph.D. student Amie Shuttleworth and Dr. Kristen MacAskill, comes at a critical time ahead of the United Nations COP26 Climate Change Summit, which takes place in Glasgow, from 31 October to 12 November, providing an opportunity to ensure that adaptation considerations increasingly become a part of the climate change action agenda.

"Currently, there is no widely adopted system for assessing building adaptation in design, and clearer guidance is needed," said Amie. "There has been plenty of focus on climate mitigation efforts through research and policy, but less so on climate change adaptation, even though they are clearly related concerns. If adaptation is not adequately considered, we will remain in a situation where buildings designed today will likely need upgrades within their lifetime, leading to a range of ramifications, including retrofit costs and performance-related issues, which could, in extreme cases, deem some buildings unsafe."

A review of BREEAM, Green Star and LEED revealed that emphasis on action pertaining to climate issues are heavily weighted towards mitigation, whereas the integration of adaptation considerations is much lower and in most cases are not mandatory.

"This makes it challenging for investors to know whether climate risks have been assessed and acted upon within the development, even if the highest 'sustainability' rating is awarded," said Amie.

Of the three assessment tools, BREEAM (UK) was found to have the most advanced integration of both mitigation and adaptation considerations, with future climate change integrated into a number of key credits (asset score points), such as thermal comfort and water use. It also has a standalone credit recognizing the multifaceted impact climate change has on the core design process. However, future climate change is not stipulated to be included as part of the 'reduction of energy use and carbon emissions' credit, nor is it mandatory to conduct a future climate change impact scenario review.

"This is an important aspect to consider when designing a net zero carbon building, particularly with regards to the impact of temperature increases on a building's performance," said Amie.

In comparison, the researchers found that a minimum requirement of Green Star (Australia) rated buildings is to have a pre-screening assessment to identify climate-related risks facing that building, in order for it to be determined 'sustainable'.

"This push on adaptation, alongside mitigation of emissions, is an important step forward for the industry," said Amie. "However, there is still the possibility that climate change adaptation will not be integrated into the design, as a developer can choose not to act on the results of the risk assessment. This is an area that BREEAM is more prescriptive in requiring throughout."

A review of LEED (U.S.) meanwhile, found just one aspect that directly relates to climate adaptation—whether the development is in an area at high risk of flooding.

Summing up, Amie said that in order to achieve the ultimate desired outcome to ensure buildings are both net zero carbon and adaptable to a changing climate, greater transparency is needed to show how climate change has been considered.

"In order for adaptation considerations to be operationalised within the engineering and construction industry, better mechanisms for achieving the integration of mitigation and adaptation is required. As our perspective paper has demonstrated, there is still some way to go. What is needed is further development in standards, moving from voluntary to mandatory, at a time when climate change is already happening, and negatively impacting the built environment, and those that use it."

More information: Amie Shuttleworth et al, Net zero adaptation—a review of built environment sustainability assessment tools *, *Environmental Research: Infrastructure and Sustainability* (2021). DOI: 10.1088/2634-4505/ac1c5e

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