Commercial's Carbon Conundrum

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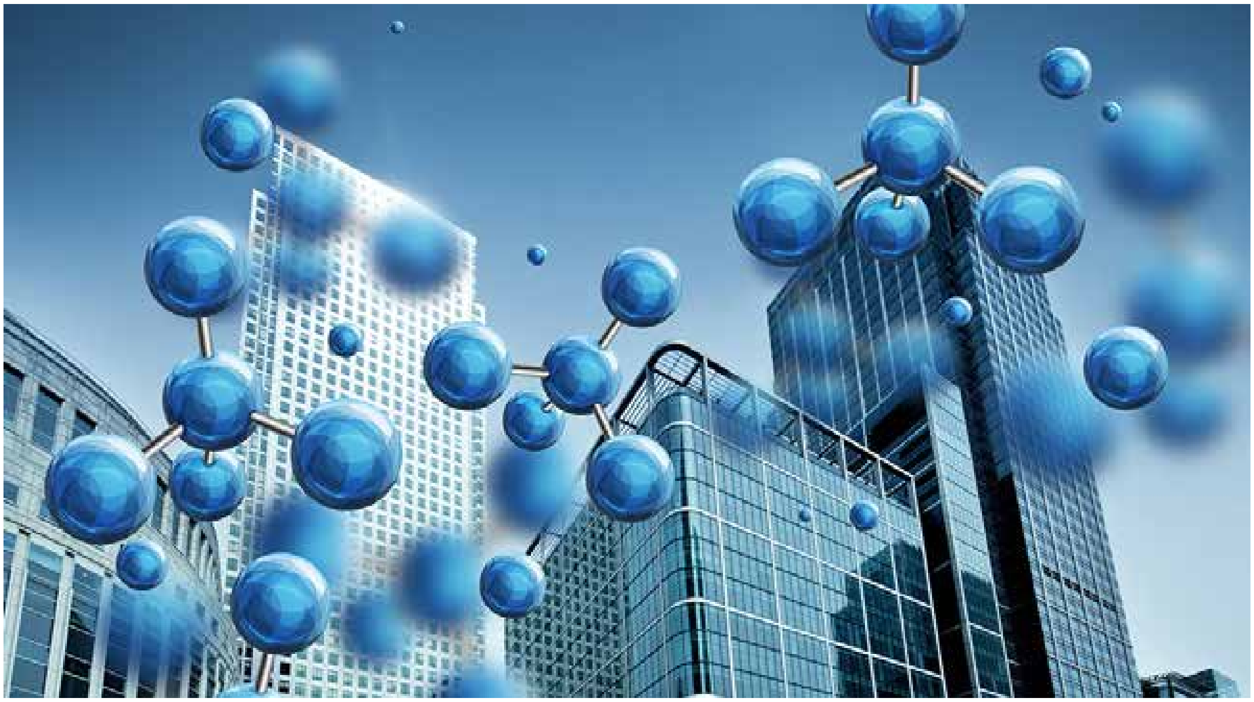

The global movement to address environmental, social, and governance (ESG) concerns continues to accelerate. Government regulations are becoming more stringent in an attempt to protect the environment. Businesses large and small are also increasingly sensitive to their impact on energy usage, resource conservation, and the climate.

In real estate, the environmental impact of a decision to either refurbish or demolish and rebuild an existing commercial property is a perfect example of pressures on the horizon that will force more attention on this subject. The Carbon Leadership Forum reports that approximately 30 percent of all global carbon emissions are attributed to the building sector.

When attempting to quantify the environmental impact of decisions regarding existing properties, one of the challenges commercial property owners may soon face will be minimizing "embodied carbon." According to the U.S. Green Building Council (USGBC), eight states already have policies in place addressing the issue: Washington, Oregon, California, Colorado, Minnesota, Connecticut, New York, and New Jersey.

Takeaway

The U.S. Green Building Council estimates that buildings and construction account for at least 31 percent of energy-related CO_2 emissions globally. Although no strict timeline has been established, commercial building owners in Texas may have to one day consider the level of emissions created throughout the life of their properties when deciding what to do with aging structures.

Life Cycle of Commercial Buildings

Embodied carbon is defined as the greenhouse gas emissions produced by the manufacture, transportation, installation, maintenance, and disposal of building materials. All of these factors combine to make up the life of a commercial building. Numerous publications separate a building's cradle-to-grave life cycle into four discrete stages:

1. Product stage: Involves the extraction, transportation, and manufacture of the materials needed to construct a building.

2. Construction stage: Involves the transportation to and installation of material components at the site to erect the building.
3. Use stage: Involves the operation, maintenance, repair, and possible refurbishment of the finished building.
4. End-of-life stage: Involves the deconstruction, transportation, waste processing, and disposal of building materials.

The embodied carbon in a commercial building comprises all greenhouse gases (GHGs) produced in every life cycle stage except the use stage. GHGs produced in the use stage are defined as "operational" carbon that can be heavily impacted by the building's energy efficiency. Historically, much more attention has been paid to the level of operational carbon in commercial buildings than levels of embodied carbon. The formula used to calculate embodied carbon is typically:

Embodied carbon = quantity of each material or product × a carbon factor for the product

According to the Institution of Structural Engineers (ISE), approximately 55 percent of the carbon embodied across a building's life cycle occurs before a building is even occupied. The highest levels of embodied carbon will be produced in the production stage followed by the construction stage.

A quick online search reveals several available software products for estimating embodied carbon in new construction. ISE also provides a detailed analysis and discussion of the subject in its 2020 publication *How to Calculate Embodied Carbon*.

These numbers can provide a reasonable estimate for a proposed building's environmental impact from construction to demolition, so long as the exact materials and quantities or volumes are known. However, the availability of embodied carbon statistics for the materials being used in construction is a limiting factor.

The USGBC reports that levels of embodied carbon in building materials and products can be identified through a reporting system known as Environmental Product Declarations (EPDs). The system can assess a material's environmental impact throughout every life cycle stage. Although EPDs are largely voluntary in the U.S., their use is on the rise.

The USGBC's LEED rating system does offer "materials and resources" credits to reduce embodied carbon. However, they also note that changes to the LEED requirements and credits are ongoing as new information, strategies, and policies become available.

The Inflation Reduction Act (IRA) is a recent attempt at the federal level to decrease embodied carbon. The legislation aims to reduce total carbon emissions by 40 percent by 2030. Approximately $5 billion will be allocated to low-carbon spending to improve physical infrastructure. The distribution of funds will include money for developing and standardizing EPDs as well as labeling and using low-embodied carbon materials, technologies, and products.

Regulatory Response and Developer Dilemmas

Real estate professionals should expect more legislation at all levels of government addressing the environmental impact of commercial development and redevelopment. The USGBC, EPA, and the Urban Land Institute (ULI) are all advocating and adopting increasingly stringent standards for limiting GHG emissions through improved designs and materials.

While the cost of altering or removing dated properties may prove beneficial to the environment, it can simultaneously lower the return on a property owner's investment. How landlords respond will have a significant impact on the future of commercial real estate development. If a meaningful shift in demand or supply for commercial space occurs along with GHG restrictions, many properties may have trouble maintaining positive cash flow, thus reducing any financial benefits from a renovation. Destruction of property value and a loss of appeal for new development will follow.

A newly constructed building using superior materials can produce a property that is more energy efficient and lower in embodied carbon. However, developers will also factor in the tradeoff in extra cost for constructing such a property. Furthermore, calculating the amount of embodied carbon in older existing buildings is a much more complex task. Again, cost will play an important role in the decision to refurbish or demolish an existing building.

Cost benchmarking data for determining acceptable embodied carbon in a commercial retrofit project is another limiting factor in the process. Due to a lack of building-level data, no consensus has formed around any benchmark for embodied carbon levels in a building.

To quantify GHGs and their potential effects on climate change, a method known as a life cycle assessment

(LCA) is used to track the emissions produced over the full life cycle of a material or construction process. The emissions are then converted into specific metrics that reflect their potential effects on the environment.

LCA tools are becoming more popular for deciding whether to refurbish or demolish and rebuild commercial properties. However, users should be aware that different LCA tools will generate different results. Unfortunately, some underlying databases are not regularly maintained, while documentation of some data sources and methodologies are not always easily available. Furthermore, most LCA tools have been primarily focused on specific material characteristics and not whole buildings. Data collection and reporting guidelines are needed for data standardization and transparency. Material manufacturers must increase participation in this process as well.

Users should also remember that embodied carbon calculations in LCAs are only estimates. Many variables and assumptions are included in the calculations. For example, estimates of the embodied carbon generated can vary widely based on the location where materials are produced, the transportation distance from production to final destination, and the method of production. Uncertainty in results can increase even further when estimating embodied carbon in older buildings.

Refurbish or Demolish? That is the Question

The decision to refurbish an older commercial building or demolish it for new construction will generally be based on which choice produces the highest return on investment. The answer may often be in favor of demolishing and redeveloping the property. Unexpected problems can always arise when the choice is refurbishment. Newly constructed buildings have the advantage of newer, possibly higher quality materials that abide by more stringent energy codes that many cities have put in place.

The result of implementing such products should be an improved tenant experience and higher rents, a win-win for both developers and tenants. Practically speaking, owners should be committed to supporting the refurbishment of an existing building if there is tenant demand. However, most owners will remain committed to maintaining the attractiveness and energy efficiency of a property only if it supports improved cash flow growth. Although studies have shown that refurbishing buildings has only half the embodied carbon impact of new construction, energy efficiency does not necessarily guarantee a building will command superior rents. Building owners have little reason to support any costly renovation that does not increase tenant demand or utility.

The current, post-COVID economic environment has initiated the conversation between building owners, developers, and municipalities regarding what to do about existing commercial buildings, especially office properties. As a result, expect refurbishment or demolition to make way for new construction to be a higher priority for many office buildings.

Before the pandemic, trophy-class office properties were often assumed to be insulated from near-term market forces. Such properties are no longer shielded by the perception of continued strong demand for office space in the years ahead. This trend appears to be entrenched, and the negative value shift may provide property owners with an incentive to seek returns through alternative uses. Such a decision will invariably result in a greater release of GHGs.

As more older commercial buildings of every type become increasingly inefficient or obsolete, the concern over the environmental impact of any type of change or removal of the structures will only grow.

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