World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:16, No:08, 2022

Furniture Embodied Carbon Calculator for Interior Design Projects

Authors : Javkhlan Nyamjav, Simona Fischer, Lauren Garner, Veronica McCracken

Abstract : Current whole building life cycle assessments (LCA) primarily focus on structural and major architectural elements to measure building embodied carbon. Most of the interior finishes and fixtures are available on digital tools (such as Tally); however, furniture is still left unaccounted for. Due to its repeated refreshments and its complexity, furniture embodied carbon can accumulate over time, becoming comparable to structure and envelope numbers. This paper presents a method to calculate the Global Warming Potential (GWP) of furniture elements in commercial buildings. The calculator uses the quantity takeoff method with GWP averages gathered from environmental product declarations (EPD). The data was collected from EPD databases and furniture manufacturers from North America to Europe. A total of 48 GWP numbers were collected, with 16 GWP coming from alternative EPD. The finalized calculator shows the average GWP of typical commercial furniture and helps the decision-making process to reduce embodied carbon. The calculator was tested on MSR Design projects and showed furniture can account for more than half of the interior embodied carbon. The calculator highlights the importance of adding furniture to the overall conversation. However, the data collection process showed a) acquiring furniture EPD is not straightforward as other building materials; b) there are very limited furniture EPD, which can be explained from many perspectives, including the EPD price; c) the EPD themselves vary in terms of units, LCA scopes, and timeframes, which makes it hard to compare the products. Even though there are current limitations, the emerging focus on interior embodied carbon will create more demand for furniture EPD. It will allow manufacturers to represent all their efforts on reducing embodied carbon. In addition, the study concludes with recommendations on how designers can reduce furniture-embodied carbon through reuse and closed-loop systems.

Keywords : furniture, embodied carbon, calculator, tenant improvement, interior design
Conference Title : ICCMR 2022 : International Conference on Carbon Management and Reduction
Conference Location : New York, United States
Conference Dates : August 08-09, 2022