Development of a User-friendly Carbon Assessment Tool for Building Lifecycle, "J-CAT® (Japan Carbon Assessment Tool)"

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ライフサイクルカーボンの枠組み （WBCSD, 2021）

Introduction

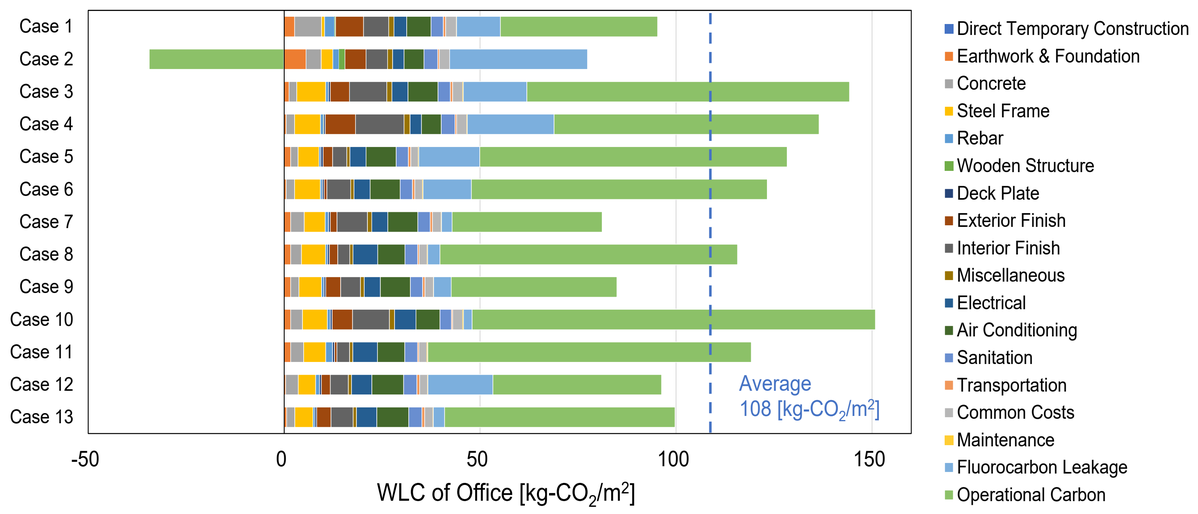
The Institute for Built Environment and Carbon Neutral for SDGs (IBECs), which conducts research, technological development, and dissemination related to housing, buildings and cities, has established the "Zero Carbon Building ($LCCO_2$ Net Zero) Promotion Committee" in December 2022. The "Japan Carbon Assessment Tool for Building Lifecycle (J-CAT)" is a tool (including calculation software and manuals, hereinafter the same) developed under this promotion council to calculate the emissions of CO_2 and other greenhouse gases (GHG) throughout the entire lifecycle of buildings.

1. Features of J-CAT

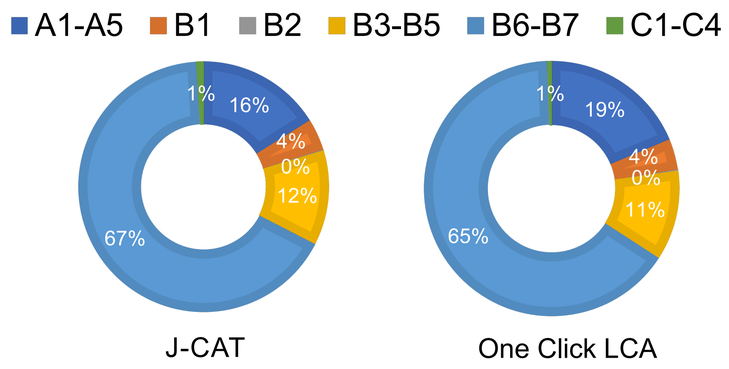
It adheres to the inventory analysis-based Life Cycle Assessment (LCA) method for buildings, which is widely used in Japan and based on the guidelines of the Architectural Institute of Japan.

1. Three Calculation Methods Tailored to the Purpose of Use.
2. Calculation of Whole Life Carbon (WLC)
3. Able to Calculate Based on Quantity
4. Enhanced Library of Updated Default Values
5. Enhanced Calculation Result Information

3. Case Study

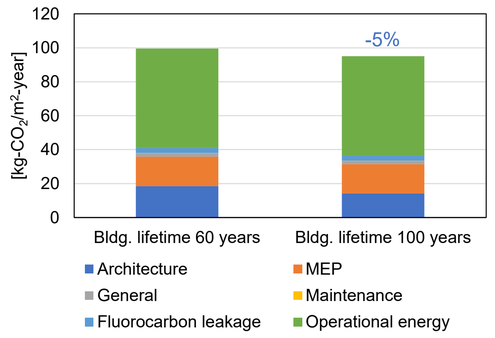


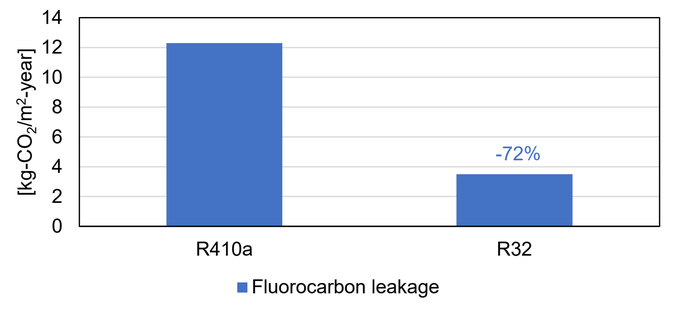
Using J-CAT, the upfront carbon and whole life carbon of various types of buildings were calculated and analyzed. Additionally, the calculation results was compared with existing calculation tools using a model building.

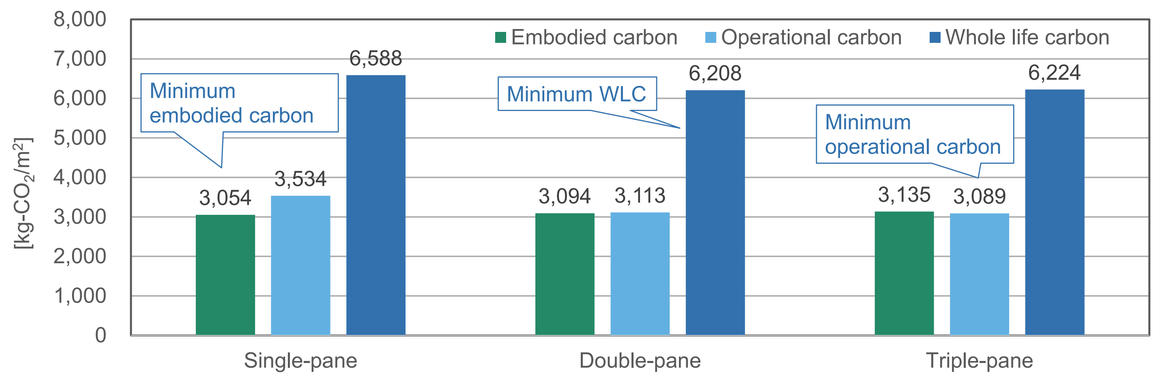


4. Adaptation to GHG Reduction

J-CAT can accommodate various GHG emission reduction methods, such as reducing material quantities, adopting low-carbon materials, utilizing EPDs, utilizing timber, construction efforts, extending building lifespan, reducing fluorocarbons, and balancing operational and embodied emissions.







2. Structure of the GHG intensity Database

In the calculation of environmental impacts in LCA, the GHG intensity database, which is crucial, can be derived from two calculation methods: the input-output analysis method and the process analysis method. In J-CAT, while primarily utilizing the input-output analysis method database, which is widely used in Japan during the dissemination phase of LCA, it also allows partial use of the process analysis method database, Environmental Product Declaration (EPD), with adjustments. Moving forward, towards the maturity phase, efforts will be made to promote and develop EPDs and PCRs for building materials and equipment, gradually improving accuracy through operation.