



## **Calculate the carbon substitutions and economic benefits of wooden building and forestry in Taiwan**

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Buildings contribute to the Greenhouse gas emission a lot, because of the high-energy consumption and the material produced. By finding out the way to reduce the Greenhouse gas (GHGs) emission of building, we can slow down the climate change. On the other way, the carbon substitution of wooden products can store GHGs in the wood, and let the land be released for planting new sapling to absorb more carbon. This research will calculate the carbon substitutions and economic benefits of wooden building in Taiwan by life-cycle assessment (LCA) and systems simulation model.

At first, we choose one Cross-Laminated-Timber building (CLT-building), WoodTek HQ, which locates in the middle of Taiwan and calculate the LCA of this CLT-building. After comparing the GHGs emissions of a CLT-building and a reinforced concrete structural frame building (RC-building) having the same thermal resistance (RSI) values and thermal mass as the CLT-building, we will make a model including the Land Use, Land-Use Change and Forestry (LULUCF) calculation and Forestry ecological niche to connect the product LCA with the manage of materials. Final, we establish a systems simulation model, which can calculate the environmental impact and GHGs emission of wooden building. Considering the economic benefit of wooden buildings is the next step. On this step, we use Certified Emission Reductions (CERs) to estimate the benefit of wooden buildings on Clean Development Mechanism (CDM).

Using the steps mentioned above, we could calculate the carbon substitutions and economic benefits of wooden building with a Standard Operating Procedures (SOP) by LCA and our model.

**Keywords:** carbon substitution, cross-laminated-timber (CLT), life-cycle assessment (LCA), systems simulation model, Certified Emission Reductions (CERs), Taiwan