

POLITECNICO DI TORINO  
SECOND SCHOOL OF ARCHITECTURE  
Master of Science in Architecture  
***Honors theses***

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**Assessing Environmental Sustainability in Architecture through Embodied Energy and the Ecological Footprint**

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The topic of environmental sustainability has been more and more developed in the last years, at the present time it is part of the global cultural system. Several products' categories have tried to reinvent themselves moulding by this concept. The fields of Architecture and Building construction were influenced, and they both have welcomed environmental sustainability. Nevertheless, like in every change, it is helpful to be picky in every single phase of changing, to prevent that the situation becomes more problematic than the real problem. This is the reason why a lot of environmental sustainability markers, able to monitor and to show the way to follow to go toward the process, were born. In the intricate view of the environmental sustainability markers, the two synthetic markers of Embodied Energy and Ecological Footprint have found the possibility to be employed in Architecture. In my thesis I tried to explain the potential and the limit of their working method. The main subjects are two, the first one is the comparison between two different typologies of buildings to understand which are the sustainability differences. The other one would like to show the advantages and disadvantages of using the two different markers, trying to value every combination, also using them together. Two study cases are developed and analyzed in this thesis with our marks. The first one approaches the ecological evaluation, using the Embodied Energy and the Ecological Footprint, on two different buildings: a) a single family residential dwelling, built with reinforced concrete and bricks, b) a single family residential dwelling, built with laminar wood system (X-lam). The analysis has tried to pick the difference of environmental impact of the construction out, estimating the consumption of energy and raw materials using in the production of every single piece of the dwelling shown.

In the second study case I have deeply analyzed the construction with X-lam using both marks. In this case I broke every fase and evaluated the ecological impact of every one of them. The result of this suggestion was compared with the results of my first study case, trying, in this way, to value the accuracy of the simplifications used at the building scale.

Through the direct investigation of these markers, it was easy to define more than one consideration of general remark, that underline the value of these results compared with other results coming from similar studies, picking the ability of building reading out.

At the end the remark about the future development of these markers tries to suppose in what kind of architectural or urban studies they could be applied. On top of that I tried to understand if one day we could use this study in the real world and not just in a simulation, and if it will change the way to build our houses and cities, becoming a fundamental tools in the hand of the designer.

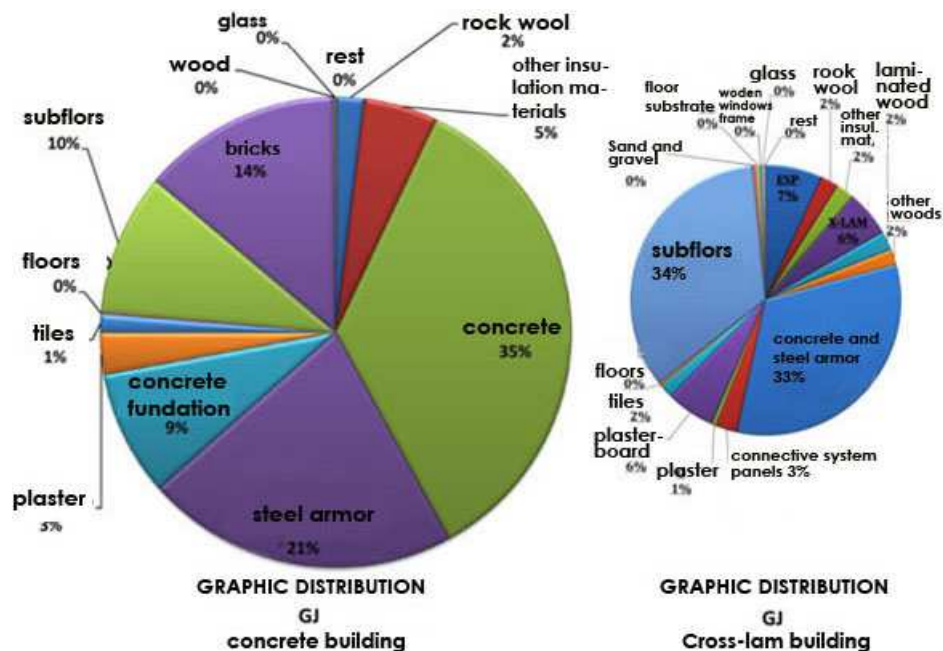


Fig 1: Comparison of results using the marker Embodied Energy

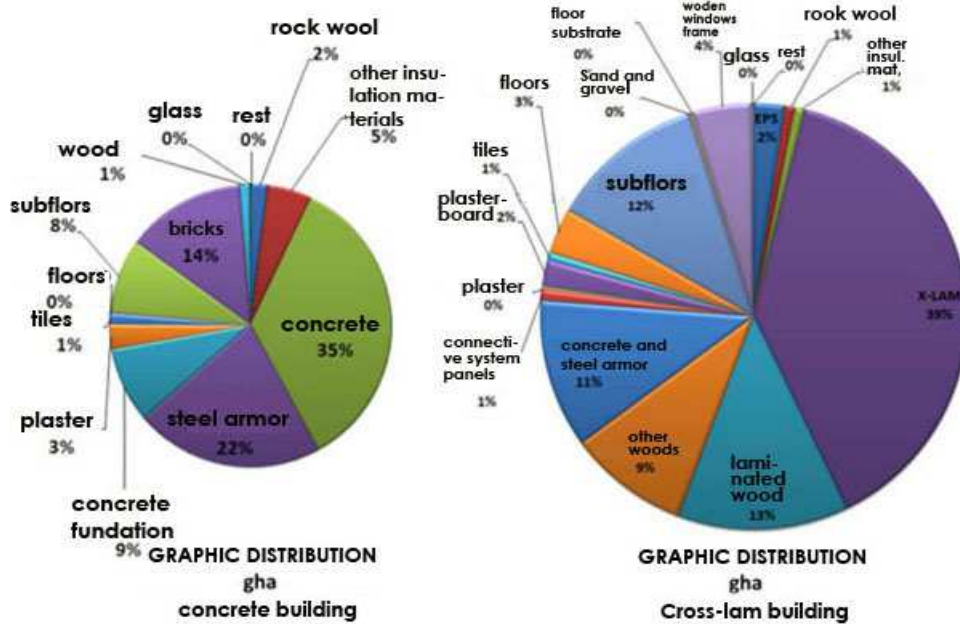


Fig 2: Comparison of results using the marker Ecological Footprint

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