

Ecological costs behind every square foot of construction

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Last Updated: 25th November 2016 11:06 PM | A+ A A- | 

How much per square foot?” Not a day passes by in our architectural practice that this question is asked multiple times! With up to 60% of the cost of buildings going towards materials, it is no wonder that the choices architects make while specifying materials have a large impact on costs. A building material is defined as anything that can be used to construct — these can be natural, like clay, rock, sand and wood or produced through a manufacturing process like steel and glass.



Brick laying

Historically, there has been a trend in these materials from being natural to becoming more processed and composite; biodegradable to imperishable; indigenous (local) to being transported globally; repairable to disposable. These trends tend to increase the initial and long term economic, ecological, energy, and social costs of building materials. In today’s world it is impossible to focus only on the economic cost per square foot as this criterion alone doesn’t do justice to the overall specification? We have to consider ‘other costs’ as well.

The initial economic cost of building materials is the purchase price and is the biggest driver to choose a particular material for building.

Consumers who are sensitive and aware consider the energy savings or durability of the materials. They see value in paying a higher initial cost in return for a lower lifetime cost. A life-cycle analysis includes the total cost of reuse, recycle, and disposal. Green Building Ratings and principles of sustainable development take into account the ecological economics of building materials and are tools that keep these impacts under check. The total greenhouse gas emissions produced through its life have to be understood.

Ecological costs consider how polluting a material is at macro and micro scales. At a macro level, manufacturing processes environmentally impact at source - like mining natural ore, pumping crude, or logging wood. Raw materials require fuel to be moved to factories for production, as products they are transported to retailers and then to the final destination for installation. Transportation at every stage adds to the ecological cost and is an important component when computing the carbon footprint of a material. On a micro level, the material could be off gassing, thus contributing to indoor air pollution.

The long-term energy cost of any material includes the economic and ecological costs of producing and delivering energy to a building using, maintaining and eventually wasting it. Social costs considers the health of people during production and transport of materials associated with the product during all the stages of production till installation, and potential health problems caused to buildings’ occupants using them. Even the opening and closing down of manufacturing facilities in terms of job creation and losses are included in calculating the social cost of a material.

The total energy depends on how materials and design help minimize the lifetime energy consumption of a building or structure. ‘How much per square foot?’ is not such a simple answer anymore, it depends on how comprehensively we are willing to look at it!