
APS1012 Management of Innovation – Final Team Projects, Spring 2013 (online class)**Innovation in Sustainable Buildings**

Increasing awareness about the environmental impacts of human population growth and expanding economies has revealed opportunities to reduce the environmental footprint of many industries. As building planning, construction and operations is a globally significant industry highly reliant on materials, fossil fuels, energy and resources, innovative building solutions have emerged to reduce environmental impacts.

The following paper identifies four sustainable building trends – green roofs, solar photovoltaics, sustainable concrete, and glass/glazing – that have been encouraged by the LEED building rating system. In order for these trends to provide sustainable solutions to their true potential, it's important to identify the positive and negative environmental impacts of these industries. To identify these impacts, the following four environmental criteria are applied to the production and application of each sustainable building trend: impact on natural environmental impact/biodiversity; use of energy / greenhouse gases; waste generation; and durability/longevity.

Although these sustainable building trends provide significant environmental attributes, they do have negative environmental impacts, and opportunities/solutions are explored to identify innovations to make impacts as positive as possible. The construction of green roofs and use of sustainable concrete can be improved to provide the best environmental attributes, and the energy efficiency of solar photovoltaics and glass needs to be advanced to lessen the energy footprint of these trends. Life cycle reuse of concrete and glass will ensure the longevity of the products and reduce of these items.

If these innovative solutions are applied to green roofs, solar photovoltaics, sustainable concrete, and glass/glazing, these trends will continue to experience growth, delivering high quality projects with sustainable attributes.

Conclusions

Four leading, innovative trends in sustainable building practice have been reviewed and critiqued based on their overall environmental impacts. In order for the development and implementation of green roofs, solar photovoltaics, sustainable concrete and glass/glazing to continue with optimal quality and lasting environmental attributes, considerations have been proposed as ways of improving these innovations. For example, project specialization with sustainable concrete and green roofs needs improvement. Although the innovations are growing, there is still a general lack of understanding and proper training to ensure the features are implemented affordably, with a high degree of quality and have the greatest amount of environmental attributes. With green roofs, for example, a shift to less synthetic roofing materials and consistent, high quality construction will deliver green roofs with outstanding environmental attributes to buildings and local communities.

In areas of energy efficiency, solar photovoltaic panels and glass/glazing will require technical improvements to gain a market advantage. If the solar PV sector can continue to improve its efficiency of producing energy and reduce its costs, it will become a viable energy source with significant environmental attributes. In addition to market demand, government investment in solar research has proven successful, and should continue to build stronger solar panel sectors. With glass/glazing technologies, additional efforts are required such that it can be manufactured using less energy and delivered at competitive costs.

Life cycles need to be improved for glass/glazing and sustainable concrete; otherwise, the development of the technologies will remain costly and continue having significant negative environmental impacts. If the reuse of glasses and sustainable concrete can be integrated back into future materials and practiced widely, the materials' environmental impacts will be improved positively.

It is acknowledged that robust building features, although sustainable, will have some negative environmental impacts. For example, the production of sustainable concrete, high efficiency windows and solar PV panels is energy intensive; however, it is expected that their full life cycles of providing reliable sustainable attributes are a “greater good”. With highly glazed buildings, bird fatalities can occur as birds fly into windows, but buildings’ sustainable features should provide an environmental good for a large number of people over many years.

If the considerations and critiques aforementioned are applied to each sustainable building trend, and developed and implemented to their greatest potential, these four sustainable building trends will continue to experience outstanding growth to continue delivering high quality project features with sustainable attributes.