ESSAI

Volume 8 Article 35

4-1-2011

Construction for a Healthier Home - The Earth

Zach Porlier
College of DuPage

Construction for a Healthier Home – The Earth

by Zach Porlier

(Biology 1110)

ABSTRACT

A growing global population will bring a demand for new homes and buildings. And with the growing awareness of the effect of humans on our ecosystem, the demand for more environmentally sound construction procedures arises. How should constructing a building be approached with the Earth in mind? Can construction facilities be held accountable to ensure swift and accurate procedures? Will this necessarily cost more to the consumer? Instead of simply disposing of those buildings that are not up to the environmental standards of recent construction, why not take those buildings and recycle their pieces for a newer facility? By reusing materials from outdated buildings to create modern facilities and using more environmentally friendly practices, construction companies can follow guidelines set by green building certification groups, such as LEED, to create usable buildings with a lesser impact on the Earth. But in today's society of economics and politics, sometimes doing the right thing is not the easiest.

WHY DOES IT MATTER?

With the world assessing ways to combat the growing amount of carbon being released into the atmosphere, the greening of construction practices is a necessary change. With already constructed buildings lending one-third of the world's CO2 emissions, simply constructing buildings by traditional methods will not help the calls for a reduction in global carbon emissions (Li and Colombier 2008). And with 85% of the energy used by a building being used post-construction, the need for not only environmentally friendly construction practices, but also the creation of environmentally sound buildings is evident. The rise in urban development comes at the consequence of replacing the plant life in those areas with buildings and roads, all of which attract heat (Oberndorker et al 2007). With these areas attracting more heat, the use of more energy for cooling the facilities is necessary. This makes not only the sustainability of the initial building process the only factor to keep in mind, as the long-term sustainability is another piece to look at. Even if a facility is constructed with environmentally friendly building practices, heating, cooling, and lighting appliances can still cause the building to have a large carbon footprint if the energy efficiency of those pieces is not considered during construction.

GREEN CERTIFICATION AND LEED

The earliest rating system for building sustainability was created by the British Research Establishment in 1990, and it was called the Building Research Establishment Environmental Assessment Method, or the BREEAM (Gowri 2004). This idea of rating building sustainability led to the creation of the Leadership in Energy and Environmental Design system (LEED), and this is the process currently used in the United States and Canada. A building under the LEED system can be certified at a basic certification, silver, gold, or platinum all based on a point system. These points can be earned based on the building's water efficiency, the use of energy and atmosphere protection, indoor environmental quality, the material and resources used, the design process, and the sustainability of the site as a whole. Points for the design process are awarded based on innovation and the use of procedures and development ideas not addressed by the LEED team (Gowri 2004). Some of the criteria have set prerequisites for obtaining points, such as the necessity of a recycling

collection and storage area for those using the building. This has been a successful rating program, and has led to a greater demand for sustainable construction in the United States and Canada, with "green" buildings accounting for about 15% of public construction.

THINKING ABOUT IT NOW BEFORE IT'S TOO LATE

With about 85% of the energy use of a building taking place post-construction, planning for sustainability must not only take into account the construction period, but long-term use as well (Li and Colombier 2008). Energy consumption of buildings has more than doubled since 1980, and 52% of the energy used by a building is for space heating. While some believe that using sustainable building procedures can raise the cost of construction by as much as 17%, that increase can be brought down to 5% or less when taking into consideration long-term savings by implementing more energy-efficient technology during construction, so as to avoid costs due to inefficient design and equipment. China has already begun to improve the energy efficiency of buildings being constructed, as well as retrofitting existing buildings, and seeks to decrease the country's CO2 emissions some 2.54 Mt by 2010. While this may be impressive, the average energy consumption of a building in China is almost twice as much as some European countries, such as Sweden and Denmark. Some buildings are implementing a green roof system in urban environments to deal with the issues of energy use as well as storm water retention (Oberndorker et al 2007).

With many urban environments consisting of dark colored roads and roofs, these areas are generally much warmer than the surrounding areas, and thus need use more energy for cooling purposes. A study in Ottawa, Japan found that the annual heat gain of a building could be reduced by up to 95% by switching from a regular roof to a green roof. These green roofs reduce the heat gain from the building by reducing the amount of heat transferred from the roof to the building itself, and a study in Singapore found that the typical heat transfer from a green roof was less than 10% of the total from a regular roof. Implementing ideas and design such as this during construction can have positive effects not only on the cost of energy use during a building's life span, but also on the Earth's environment, as well.

USING WHAT'S THERE TO SAVE WHAT'S LEFT

A three-bedroom home creates four to seven tons of leftover debris upon completion, at least 60% of which can be recycled or used for the new building (Segelken 1997). And while some facilities may not accept the refuse, there are ways to reuse the pieces, such as leftover wood. It can be reused to make furniture or be chipped and used as mulch for landscaping. Wood has one of the largest environmental impacts of resources used for buildings, and it is also one of the easiest ones to reuse and recycle (Bohne et al 2008). For steel buildings, reusing the steel from previous buildings takes 47% less oil and releases 86% less emissions than if the constructors had created new steel (Gorgolewski 2006). The Mountain Equipment Co-op building in Ottawa, Canada has steel components from a building previously on that site, and has earned an LEED certification rating of gold.

European legislation has begun to make the producers of a building responsible for the refuse material after a construction project, so it makes recycling and reuse favorable to the producers of a building. But reuse of material does not always have to mean the individual resources of a building. In the Gulf of Mexico, rather than destroy the 4000 decommissioned oil rigs, the Morris Architects design company has created a plan that turns these rigs into a series of high-end hotels, getting power from wind turbines and wave energy generators (Birkett 2009). Rather than simply reusing the steel and other materials, they are reusing the entire structures, with minor modifications.

CONCLUSION

The construction of a building is not a small procedure, and the environmental impacts can be quite large, as well. But by innovative planning and design, sustainable building practices are simple, affordable, and good for the environment. Thinking about the energy use of a building prior to construction and assessing how one can use building materials already in place to cut down on the need for new materials are just two ways to increase the sustainability of a construction project, and new certifications and legislative standards continue to develop and improve. A beautiful and comfortable home no longer has to take a large toll on human's first home, the Earth.

Works Cited

Birkett D. 2009. The global engineer. *Engineering and Technology* 4: 85.

Bohne R, Brattebo H, Bergsdal H. 2008. Dynamic eco-efficiency projections for construction and demolition waste recycling strategies at the city level. *Journal of Industrial Ecology* 12: 52-68.

Gorgolewski M. 2006. The implications of reuse and recycling for the design of steel buildings. Canadian *Journal of Civil Engineering* 33: 489-496.

Gowri K. 2004. Green Building Rating Systems: An Overview. *ASHRAE Journal* 46: 56-60.

Li J, Colombier, M. 2009. Managing carbon emissions in China through building efficiency. *Journal of Environmental Management* 90: 2436-2447.

Oberndorfer E, Lundholm J, Bass B, Coffman R, Doshi H, Dunnett N, Gaffin S, Kohler M, Liu K, Rowe B. 2007. Green Roofs as Urban Ecosystems: Ecological Structures, Functions, and Services. *Bioscience* 57: 823-833.

Segelken R. 1997. Scientists weigh trash to reduce waste, save landfill space. *Human Ecology* 25: 2.