

2009

Volume 7, Issue 1



The Green Structural Materials Gap Analysis Project: preliminary research findings

Authors: Chris Knowles, OSU, Christine Theodoropoulos, UO, Jennifer Allen, PSU, Corey Griffin, UO, Brian Lockyear, UO

Description: Overview of how design professionals make decisions about structural building products

Methods: Individual and group interviews

Data Source: Architects, engineers, contractors, and developers in Oregon

Key Findings: (1) Oregon design professionals generally have positive views about wood. (2) The structural system of a building is selected primarily based on building code and cost. (3) FSC is viewed as the most unbiased forest certification scheme.

Introduction

Researchers at Oregon State University, University of Oregon and Portland State University recently completed the green structural materials gap analysis project. The project was funded by the Oregon Built Environment and Sustainable Technologies (BEST) signature research center and the Oregon Forest Resources Institute (OFRI). The purpose of this research was to discover what limits the ability of building design and construction professionals to use environmentally responsible materials in the structural systems of buildings. This research identified gaps in information as well as gaps in access to or availability of green materials for structural use that will:

1. help Oregon-based material producers better understand the needs of designers regarding green materials.
2. inform curriculum development for graduate level courses and professional continuing education.
3. identify future research opportunities related to the development and evaluation of green structural materials.

Data was collected through four group interviews (two in Portland and two in Eugene) where expert opinions were used to assess information gaps in the evaluation of green materials. Over thirty professionals in architecture, engineering, construction and development participated in the interviews.

Results

The following is a summary of the results from the four group interviews and only includes the themes that were discussed in more than one interview.

Material selection

Interview participants were asked a series of questions about what drives the selection of the structural system for a building. In all four group interviews, code and cost were indicated as the primary criteria used for the selection of a building's structural system. This point is emphasized by a Portland structural engineer,

"The system for a building is usually determined by the function of the building, code and budget."

Building height, size, and form were mentioned as criteria in three of the interviews and the size of the structural bay was mentioned in two interviews. Once the structural system has been selected, the design team attempts to improve the green aspects of the chosen material and system by maximizing the material efficiency within the structural system, using less materials, considering the materials' carbon footprint, using FSC wood, using steel with a high recycled content, and using a high percentage of fly ash in concrete. One other important point is that design professionals often use the structural system to serve multiple functions. Some examples include consideration of a material's ability to contribute thermal mass, ability to expose the structure to reduce interior finishes and reduce the amount of material used, acoustic properties of a material, systems integration, system synergies, and durability/longevity of a material. As was pointed out by a Portland architect,

"... we are trying to get multiple kinds of performance out of every material choice that we make."

Role of LEED

Meeting a LEED standard had very little impact on the selection of the structural system. As one Portland structural engineer said,

"I think one of the problems with LEED is that as far as structural system selection goes you know it's pretty much just a side note."

LEED does drive design teams to emphasize recycled content and use of FSC certified wood. Other green building programs, such as the Living Building Challenge (<http://ilbi.org/the-standard/lbc-v1.3.pdf>) were thought to have a

larger impact on the selection of structural materials. As part of the Living Building Challenge, several materials and chemicals have been excluded from use through a materials red list. Of particular importance to the wood products industry is the inclusion of added formaldehyde, limiting the ability to use many structural engineered wood products in projects seeking certification under this program. This point is illustrated by a Eugene contractor,

“And when you get into composite lumber then it brings up the whole VOC issue and there is a disconnect between the FSC - you know what people are calling green. It might be FSC, but it might still off gas”.

There is a common perception in the wood products industry that design professionals view the LEED green building program as the be all, end all green building program. An interesting result of this research was the finding that this is not the case. In fact, in all four interviews there were discussions about problems with the LEED system. This point was illustrated by one Portland architect,

“I realize they are trying to write a standard that applies to lots of conditions but I think there is still room for improvement.”

Information about green products

The market is being flooded with new “green” products. Consequently, design professionals are always looking for reliable and unbiased sources of information. One Portland architect summed up the challenge of evaluating information about green products,

“It’s really hard to compare products and figure out... I mean there is a lot of greenwashing that goes on.”

Environmental Building News was identified as the most reliable and unbiased source of information regarding green products. Other sources frequently used are the internet/Google, consultants, and canvassing or collaborating with other design professionals. Design professionals determine the credibility or reliability of information about green materials through several channels including asking local vendors, superintendents, subcontractors, and other professionals about their experience, and through third-party certification. Product representatives or literature are generally seen as biased and are not trusted sources of information.

Themes relevant to wood products

First, with regard to forest certification Oregon design professionals generally prefer the FSC system over the SFI system. This preference is largely based on perceptions that the SFI system was created by the forest industry and therefore is a biased system. This point is illustrated by a Portland contractor

when discussing the Green Globes program, which provides credit for SFI certified wood.

“Green Globes is a good example. I mean to me it’s an industry based standard. People complain saying LEED prohibits most Oregon trees and yet their Green Globe standard allows most Oregon lumber. With FSC almost nobody meets it. So there is this raging debate in USGBC about whether the LEED standard of FSC is even a reasonable measure and did they go too far. Clearly the thought was that the Green Globes standard didn’t go near far enough.”

The LEED system only provides credit to certified wood if it is FSC certified. While the criteria for certified wood under the LEED system is currently under review, it is unlikely that the criteria will be more inclusive in the near future. It was the opinion of all interview participants that the demand for FSC certified products will continue to grow.

Second, as mentioned above, design professionals are very concerned about indoor air quality and specifically discussed structural wood products with formaldehyde in the adhesives in three of the four group interviews. Interview participants believed that the demand for no added formaldehyde products will only continue to grow in the future.

Third, many design professionals believe that life cycle analysis (LCA) is a good tool for evaluation of the environmental impacts of a product. The Consortium for Research on Renewable Industrial Materials (CORRIM, <http://www.corrim.org/>) has a wealth of information comparing wood, steel, and concrete using internationally recognized LCA techniques. Material available on the CORRIM website can be useful in helping to communicate the environmental advantages of wood over concrete and steel.

Fourth, many Oregon design professionals view wood as the building material of choice. They often point to the lower levels of embodied energy, low carbon footprint, low cost, and local availability as wood’s strongest selling points. As one Portland architect said,

“I always assumed that homogenous lumber was by far more sustainable than concrete or steel”.

Summary

This research shows that when code allows wood is generally the building material of choice in Oregon. Additionally, many design professionals are interested in using more wood, particularly locally sourced wood products. Many opportunities exist for wood to expand market share in both structural and non structural applications.



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119 Richardson Hall, Corvallis, OR 97330, USA
Phone: 1-541-737-4240 Fax: 1-541-737-3385

E-mail: Eric.Hansen2@oregonstate.edu
<http://woodscience.oregonstate.edu/faculty/hansen/index.htm>
<http://owic.oregonstate.edu/>