

Red List challenges Living Building architects

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Published: September 14th, 2009



Project manager Chris Poole-Jones, left, and architect Mark Nye of Nye Architecture stand in front of the future site of the June Key Delta Community Center Living Building project

To meet the **Living Building Challenge**, designers must do more than simply meet **net-zero energy** and water use requirements. They also must do so without using materials on the Red List, which includes chemicals and materials considered harmful to humans and the environment.

Mark Nye of **Nye Architecture** needed a roof membrane for the Living Building design of the **June Key Delta Community Center**. But after deciding to use Perlite tapered insulation, Nye found that the membrane used formaldehyde, a chemical on the Red List. Nye then switched to rigid, tapered foam insulation in order to meet the requirement.

"We had to do a fair amount of back-and-forth research," Nye said. "It's called the Living Building Challenge for a reason. They are trying to set ... a higher standard."

The Living Building Challenge tasks architects, engineers and builders with creating a building in the most sustainable manner possible, ensuring that all energy required to operate the structure is created on-site. Guidelines for Living Building projects are incorporated into six categories: beauty and inspiration, site, water, indoor quality, energy and materials. Unlike LEED projects, a Living Building must be operational for one year before it can be evaluated and certified.

Materials and chemicals listed on the Living Building Challenge's Red List include polyvinyl chloride (PVC), chemically treated wood and halogenated flame retardants. There are few alternatives for each of those, which are all building industry standards.

"Materials are probably the most complicated aspect of the Living Building Challenge," said Eden Brukman, research director for the **Cascadia Green Building Council**. "They depend on manufacturing, and some things we just don't have currently. Manufacturers don't want to make something people don't want to buy."

Brukman says that 75 percent of all PVC is used by the building industry, mostly for irrigation piping and as covering for electrical wires. Finding a suitable alternative for PVC can be trying.

"It's never a simple switch," said Caroline Forsythe, senior associate architect at **Ankrom Moisan Associated Architects**. "You can bring in copper piping at an incredible environmental and manufacturing cost. You can bring in steel, which has performance liabilities. It's going to take a lot of careful product development to make something as viable as PVC."

"Romex wiring is coated in vinyl," said Mike O'Brien, a consultant with the city of Portland's Bureau of Planning and Sustainability. "If you're not going to have that jacket, you need to have a metal jacket, which doubles the cost of electric wiring. Vinyl wiring is what our market

is set up for.”

The **BNIM Architects**-designed **Omega Center for Sustainable Living** in Rhinebeck, N.Y., completed in July, is anticipated to be the first certified Living Building in the U.S. But the design team did not find a non-PVC alternative for certain parts of the structure’s wastewater treatment system, BNIM principal Laura Lesniewski said.

“We worked with Cascadia to understand if we could find alternatives, or if there just wasn’t something available,” Lesniewski said. “There are specialty pieces where you can’t get away from using PVC.”

Until more alternatives exist, the Living Building Challenge allows design teams to use red-listed materials as a last resort. But only if they write a letter to the manufacturer stating that purchasing the product is not an endorsement, and that a more sustainable product needs to be developed.

“I haven’t started that letter-writing process,” Nye said. “But there are going to be some things that we will write those letters for, one of which is shear board. You can’t get that without formaldehyde.”

Finding building insulation that doesn’t contain halogenated flame retardants and formaldehyde can be a dilemma. Some designers turn to fiberglass insulation, which doesn’t have any red-listed materials, but doesn’t insulate as well in extreme heat and cold, according to a report by the Living Building Institute titled Code, Regulatory and Systemic Barriers Affecting Living Building Projects. The report also says that alternatives such as Nye’s choice of foam insulation, when improperly installed, can lead to trapped moisture within the building.

“Insulation is the next product people will be evaluating,” said Forsythe. “It’s critical to energy performance, and there needs to be a lot more research done to make a suitable alternative.”

Lesniewski’s advice for architects pursuing the Living Building Challenge is to focus on materials selection early in the design process to avoid having to go back to the drawing board.

“We were not paying as much attention at the beginning,” Lesniewski said. “Architects should pay attention to what they are hoping their building systems and materials will be early on in the design process and check them against those systems and materials the Living Building Challenge lists.”