

Creating the world's largest Living Building

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The PAE Living Building will be the first Living Building in Portland. (ZGF Architects)

By the end of 2019 a Portland-based project team will break ground on perhaps the most important building the city has seen this century, and potentially usher into Oregon a new era of environmental and technological responsibility.

ZGF Architects and **PAE** are leading the effort to bring to fruition the first Living Building in Portland. The five-story, 58,000-square-foot mixed-use structure, when built, will be the world's largest Living Building, according to PAE project lead Marc Brune. **Gerding Edlen** is serving as the developer of the project, which will be built by **Walsh Construction**.

The **PAE Living Building** will have four stories of office space (the top three occupied by PAE) above ground-floor retail space. It's set to rise on a quarter-block parcel at the corner of Southwest Pine Street and First Avenue, in the **Skidmore/Old Town Historic District**.

Portland's **Historic Landmarks Commission** last month voted unanimously to approve project plans, which call for achieving the **International Living Future Institute's Living Building Challenge**. Its exceptionally high standards are intended to inspire a built environment without negative ecological impacts.

But this isn't PAE's first Living Building project. The company provided mechanical, electrical and plumbing engineering for Seattle's **Bullitt Center**, which Brune said is currently the world's largest Living Building at 55,000 square feet. That building houses PAE's Seattle office.

"The PAE Living Building is a logical next step for a company that has already helped show the world what's possible in several high-profile projects," ILFI Vice President Kathleen Smith said. "When people look for examples of companies really stepping out front to lead on climate change, the PAE Living Building should be top of mind."

One of the most daunting elements of the Living Building Challenge is the "red list" of prohibited materials because of the toxins they contain. The banned chemicals pollute the environment and are harmful to construction workers and building occupants, according to the ILFI's website.

But the project team is using a number of tools to avoid red-list products, Brune said. For instance, Red2Green, a database of materials information, makes location of products outside the red list quick and easy. The project team will also call major manufacturers and ask for applicable products free from toxins – and if one doesn't exist for the needed purpose, the ILFI will make exceptions.

As Living Buildings increase in popularity, Brune said, manufacturers will eventually be forced to make more products free from the red list. He believes competitors will then emerge, and costs will drop.

Incidentally, PAE and ZGF are using an innovative investment model – one not used before – to finance the building, Brooks and Brune said. While neither one was willing to explain the model any further, they said it gives investors a return and could prove replicable for other Living Buildings in the future.

Of course, such an environmentally-friendly project comes with a cost premium – about 10 percent greater than a typical building's cost, Brune said. As a result, tenants' leases will cost 5-10 percent higher than market rate, he added. However, the team is confident that PAE Living Building occupants' productivity will be better than average. Research has proven that natural daylighting and ventilation can increase employee productivity from anywhere between 2 and 14 percent, he said.

"If we get a 1 percent productivity increase, that makes it totally cost-neutral for us," he said. "We're likely to get more than that."



Features such as natural daylighting and ventilation in the PAE Living Building are expected to improve occupants' productivity. (ZGF Architects)

Similar boosts in efficiency are evident throughout the project, thanks to the design team's line of thinking that optimizes solutions over the bottom line, according to ZGF project lead Justin Brooks.

For example, the building's roof will feature an array of solar panels as well as a cistern to collect drinking water. That left no room for an eco-roof, which ordinarily would be required under city code. But the requirement's intent will be fulfilled anyway, Brune said, because part of the Living Building Challenge requires the team to purchase an acre of land off-site, and that land will be dedicated to natural green space.

Those solar panels are intended to give back to the city too. The building will use a 500 kilowatt-hour battery to store power, Brune said, and PAE has partnered with a low-income housing complex nearby to share some of that power below market rate.

Another example of solution-oriented thinking can be found in the building's concrete core and wood structure. It's intended to ensure the building will be able to not only withstand a sizable earthquake, but continue to operate thereafter.

Most buildings require a minimum amount of buffer, because in a large earthquake they will likely rock back and forth. But because the PAE Living Building will meet a higher degree of safety, regulations allow it to stand a bit closer to its neighbors. This has allowed two sides of the building to each grow by six inches, Brune said. That means more leasable space, and subsequently greater rents, which in the end will help cover the greater costs associated with seismic safety.

"The return is the same, and now we have a building that will be standing for the next hundred years," Brune said.

"Those sorts of creative, collective thinking are what make these projects work," Brooks added. "You have to be that much more collaborative, which for me as a designer is a pleasure because I learn something every time."

PAE learned a lot from its work on the Bullitt Center. The foam-flush toilets in that building are each connected to a composter, Brune said. The problem is that when one toilet receives more use than the others, its composter

becomes clogged. For the PAE Living Building, the project team plans to use a valve so that composters are alternated each time a toilet is used. That will prevent clogging, and reduce the number of composters required. This is the first time a five-story building will use vacuum-flush toilets connected to basement composters, Brune said.

Brune and Brooks both said they hope this kind of learning provides a road map for other firms looking to take on the Living Building Challenge in Portland. They each said the experience has been incredibly valuable for the firm, and future projects will be easier as more companies become involved.

"The next person behind is going to have a little more of a path," Brooks said. "I hope that in such a forward-thinking city as Portland, we'll just see people following in that wake."

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