

## Going super green

Dustin and Garrett Moon plan to build a house that's almost entirely self-sufficient. When done, it may be among the greenest urban dwellings in the U.S.

### Exterior



- 1. Green roof:** Reduces the urban heat island effect and will temper heating and cooling loads in the building. It will also slow storm water runoff.
- 2. Rain capture:** Water used in the house will be gathered from rain falling on the roof and stored in a cistern.
- 3. Translucent movable roof:** Allows light to filter through.
- 4. Movable wall:** Large glass roll-up doors on the greenhouse and sunspace will blur the boundary between indoors and out.
- 5. Exterior walls:** Concrete using Insulating Concrete Forms and clad in fiber cement paneling.
- 6. Energy source:** Solar photovoltaic modules convert sun into electricity.
- 7. Shop and garden:** A subterranean shop allows occupants to maintain backyard space for a garden and fruit trees.

### Interior floor plans

#### Upper level



#### Lower level



- 8. Appliances:** Super-insulated refrigerator, washing machine that spins most of the water out and a built-in central vacuum cleaner.
- 9. Toilet:** Waterless composting toilet lowers overall water requirements.
- 10. Sunspace and greenhouse:** Provide space to grow fruits and vegetables. Also store heat and offer space to lounge.
- 11. Interior walls:** Constructed from reused materials such as wood and glass from the previous building.
- 12. Floors:** High-traffic areas will be made of concrete. Areas where more time is spent standing will use reused wood.
- 13. Dual density:** Two main bedrooms to increase density and accommodate two families.
- 14. Courtyard:** Provides a transition between the home and backyard as well as a buffer between the two main bedrooms.



Stephanie Yao/The Oregonian

Dustin Moon, left, and brother Garrett Moon demolish interior walls of the SE Portland home they want to exceed national standards for sustainable buildings.

Friday, April 11, 2008

**GAIL KINSEY HILL**

**The Oregonian Staff**

The house sags, as if it knows what's coming.

"It's all wrong," says owner Dustin Moon, 30, rattling off a list: Long, narrow design. Cramped rooms. Leaky foundation.

And so, Dustin and his brother Garrett, 22, will tear it down to construct something they believe is absolutely essential. They'll install solar panels to generate electricity and collection systems to capture and purify water. They'll put in composting toilets to deal with waste.

When they're done, the super-efficient design, eco-friendly materials and clean energy technologies will offer up a structure that's almost entirely self-sufficient, or, in the today's parlance, sustainable.

Plenty of homes and businesses boast sustainable designs, especially in Portland where climate concerns and a green-building ethic run strong. But the Moon brothers are upping the ante. They say they will build the most efficient and low-impact home yet, all on a comparatively modest

This article appeared on the front page of The Oregonian  
the format but not the content has been altered

budget and a layman's plan.

They're not off-the-grid survivalists. They've got their city permits. They're young and idealistic and intent on creating what they believe can be a mainstream counterpoint to irrational consumption. The dirt floors in the bedrooms, for example, will be free.

"If we do this right, this house can survive on its own," says Dustin. "It's not a doomsday scenario; it just makes sense."

The Moons will measure their success against something called the Living Building Challenge, an initiative developed by Cascadia Region Green Building Council.

Cascadia, the Northwest chapter of the U.S. Green Building Council, developed the challenge to push buildings beyond the criteria outlined in the reigning architectural gold standard for homes and businesses, LEED (Leadership in Energy & Environmental Design). Cascadia's tougher benchmarks, unveiled 11/2 years ago, emphasize actual performance, not point-system ratings, and a comprehensive, all-or-nothing outcome.

"Either you do everything together, or it's not a living building," said Eden Brukman, Cascadia's research director, listing requirements that deal with siting, energy, materials, water and, finally, "beauty and inspiration."

The brothers hope their home will be the first residence in the country to meet the standards, though they're up against some sophisticated rivals, and at least one already is under construction.

If the Moons succeed, they'll do so in a decidedly grass-roots way.

"It's wonderful," said Brukman, who was surprised to see such a promising effort from designers outside the establishment green-building community. "You never know who can give you an answer or provide insight."

### **Low costs, high recycling**

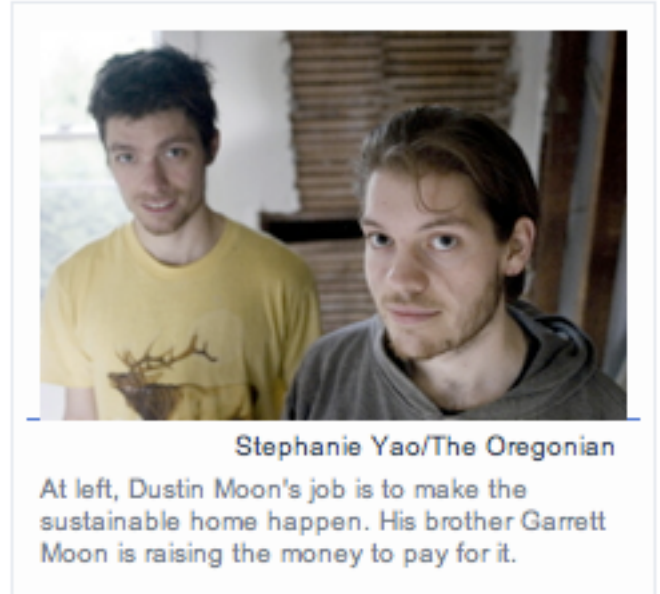
Dustin recently began tearing into the walls and floors of the dank-smelling interior. He's pulled up strips of kitchen linoleum and pried off powdery sheets of plaster.

He's gathered debris into neat piles, separating everything he can incorporate into the new structure. He's scavenged glass doors, wood pallets and other materials from around town, intent on keeping costs down and recycle factors high.

The brothers bought the house off Craigslist in February 2007 for \$195,000. They lived through two cold winters -- no heat -- and countless discussions about what they wanted to make of this property on a street of modest homes in Southeast Portland.

Initially, they settled on a remodel. Cheaper and quicker, they figured. But, they couldn't get past a fundamental design flaw. The building's 880 square feet cut through the lot in a thin rectangle, with the stubby ends pointed north and south.

"Exactly backwards," says Dustin of a layout that rejected solar like a grim summer rain.



If the Moons were to realize their dream house, they needed to begin with a passive solar design, one with a wide-open southern exposure. So the old building would have to go, beam, truss and floorboard.

The brothers recruited the help of their father, a retired high school teacher and assistant principal from Seattle. Bob, who had at times taught wood and metal shop, will help them build and finance the house. But Garrett -- the brother with a job as a computer programmer -- will provide most of the cash. Dustin will contribute most of the sweat equity, and he'll gather up all the necessary permits, materials and contractors .



Stephanie Yao/The Oregonian

Dustin Moon at work on the "living home."

"My job," says Dustin, "is to make sure it happens."

"My job," says Garrett, "is to fund the project."

They have about \$120,000 of the \$200,000 they figure they'll need to complete it.

### **Pushing the envelope**

Dustin has a degree in biology, his brother in computer science and sustainable design. Growing up, they helped their dad build a vacation cabin along the Stillaguamish River in northern Washington and fix up the family home north of Seattle.

Dustin admits he's no Bob Vila, but "I know how to swing a hammer."

If all goes well, they'll move in by summer or fall of next year.

Their bedrooms, on either side of a courtyard, will have dirt floors and a view to the south. A composting toilet will take care of the solid waste, an innovation that looks to the past as much as the future. They'll add worms -- red wigglers -- to speed the organic breakdown.

"If you do it right, there's no stink or pathogens," Dustin said.

He'd like to recycle the gray water, too, but by law, it must go into the sewer system.

A greenhouse and a sunroom will dominate the upper level's southern exposure, with a kitchen to the rear. The brothers hope their parents will one day move to Portland and make the guestroom their own.

Their Web site -- [www.rescommunis.org](http://www.rescommunis.org) -- includes sketches and structural details. They call their home "The Commons" because, says Dustin, "ideas need to be shared and common among us rather than something to be bought and sold."

The brothers admit they're pushing the envelope of sustainability. But, says Garrett, "if you don't try as hard as you can, it won't get done as fast as it should."

Gail Kinsey Hill: 503-221-8590, [gailhill@news.oregonian.com](mailto:gailhill@news.oregonian.com) for environment news, go to <http://blog.oregonlive.com/pdxgreen>