All the Way 04

Whole House Gut-Rehab

FACT:
A ground source heat pump tied to an energy-efficient furnace can reduce the energy footprint of a mid-century ranch home by about two-thirds.

FACT:
Ceramic tile over a concrete subfloor helps capture sunlight from properly placed windows, and contributes to the solar heating of a well-insulated home.

An outdated, energy-wasting home gets a complete makeover but retains its original character.

AFTER

It would be easy to say that Paolo Scardina didn't fall far from the family tree when he chose to become an architect.

After all, the Youngstown, Ohio, native's father, grandfather, and great grandfather were all in the building and construction trades.

But it is a grandmother that Scardina—designer of the gut-rehab that became Portland, Ore.'s first LEED Platinum home—considers the mentor of his "green" sensibility.

"She was probably the most frugal person who ever lived on the planet," he says, tracing the arc of his personal and professional life from Ohio to eight years in commercial design in San Francisco and ultimately to Portland, where he founded the Paolo Design Group in 1990.

"She was an Italian immigrant," he adds. "She lived through the Great Depression. And she was extremely practical minded. It's funny, the people who influence you early on in your life, that you identify with.

"She was a homemaker," he continues. "She didn't come from the world of architecture. She came from the world of life, and her philosophy was much bigger picture. It was all about living life and being frugal, growing your own food, and reclaiming everything that was around you in one form or another."

"I think that transfers quite well when you start to talk about architecture and dwellings and sustainable spaces, and that perspective is exactly the core reason we have green building—to reuse, reclaim and recycle ... and not waste," he says. "My focus, even though building is in the blood, is on design and getting it right and getting it designed to be sustainable. Then we partner with builders who create what we design."

Open Space, Sealed Envelope

Scardina says this particular project (which won a 2010 CotY NARI Green Award and an Outstanding Remodeling Achievement award from the Oregon Remodelers Association) found him at the Better Living Show in Oregon. "I met a gentleman, and after we spoke for a while, he says, 'I have this split-level ranch home that was built in 1957, and I want you to make it as green as you can possibly get it,'" Scardina recalls. "So I said, 'Well, how about LEED Platinum?'"

The client also wanted to make to make sure the house was marketable. "You know, mid-century ranch homes don't have master suites on the main floor, and they don't have open spaces for dining and living—they are kind of like chopped up tiny rooms. So he wanted us to reconfigure it to five it some market value.," Scardina says.

At first, some thought was given to adding an extension to the southern portion of the home but after studying the possibility, putting it on paper, and considering the costs, that option proved to be a nonstarter.

As it stood, the 2,700-square foot house had 2x4 walls, very poor insulation, windows that were leaking energy, and cold air "left and right," Scardina says.

After a six-month design process, the Paolo Design Group opted to stay with the building's original footprint, tear its interior down to the studs, and re-insulate the structure from the inside out.

But instead of keeping the 2x4 studs, Scardina actually created a 4" thick wall on the interior of the footprint and then wove the insulation between the old studs and the new.

"That created a very thick, very efficient envelope, and prevented the thermal transfer of heat through the off-setting of the studs," he says.

The first somewhat significant change to the home was claiming an unconditioned space adjacent to the garage in the lower level of the house. Previously, the space had served as a kind of combination cold storage space, wood shop, and closet.

Scardina realized that if he pulled the space into the thermal envelope, he would able to move a bedroom into the lower space and create the master suite with a bath on the upper level.

But a far more radical—and green-inspired—change was in the offing. In a traditional split-level ranch, the geography of the home is cut in two by a

PROJECT DETAILS

- **Location:** Portland, Ore.
- **Builder:** Green Hammer Construction www.greenhammer.com
- **Architect:** Paul "Paolo" Scardina; Paolo Design Group www.paolodesigngroup.com

BEFORE

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BEFORE

staircase that effectively divides the living space of the house from the sleeping space.

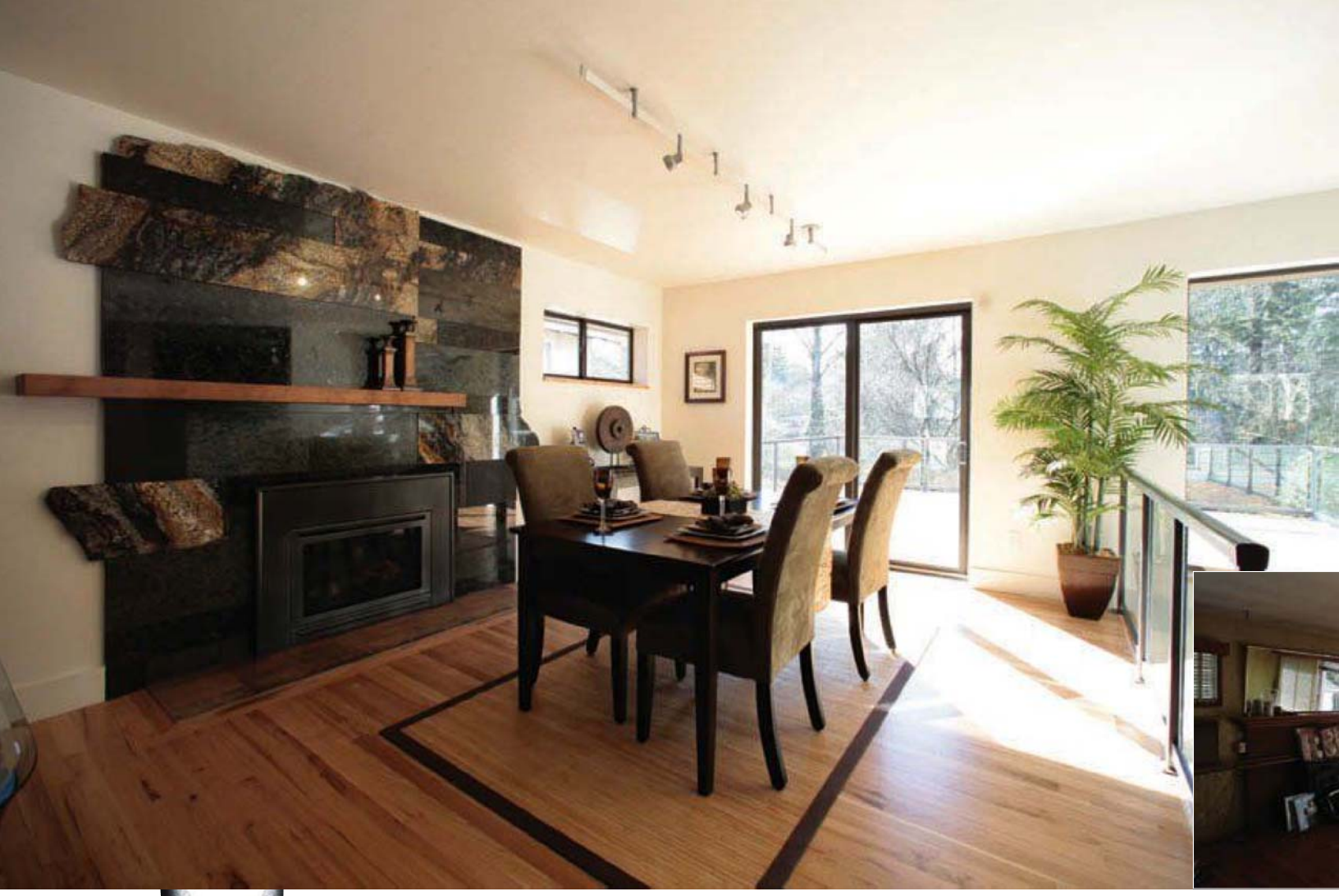
Scardina's idea was to move the staircase to the southern side of the structure, creating a large central space that would then serve as a blank canvas and give him the flexibility to transform a three-bedroom, two-bath home into a five-bedroom, three-bath new-century sustainable dwelling within the existing footprint.

"It was a remarkable transformation," Scardina said. "There were no more hallways, and it allowed us to open the kitchen into the dining room, and then we took the insulation up into the roof pitch, so we had this giant thermal envelop, including the attic, thereby optimizing the energy efficiency of the whole thing."

Once the envelope was right, the Paolo Design Group turned its attention to the window pattern of the house. The basic building had a long southern exposure, so Scardina enlarged the windows along the south wall—installing energy-efficient systems as he went—to create a passive solar heating system for the house.

A large window was placed adjacent to the stairwell, and the design incorporated porcelain ceramic tile directly inside

In the upgraded home, energy-efficient fiberglass windows replace outdated 1950s window technology. Conventional turf makes way for water-efficient landscaping. Locally furnished natural wood accents at the new entrance hint at the owner's sustainable consciousness.



AFTER

to capture heat that would then be radiated into the rest of the house.

"But it wasn't all about heat and taking advantage of the thermal mass property of the tile," Scardina says. "Having the space unobstructed by the old staircase allowed light to fill the upper level and also reach down into the basement space as well.

"Previously, because of the way the house was configured, the basement was basically the black hole of Calcutta," he says. "Now you actually want to be in and use that space."

Active Systems

Satisfied that a few architectural changes had made a huge difference in how the house performed, Scardina next turned his attention to its mechanical systems.

"As a practical matter, it's a case of doing everything passive that you can possibly do to boost the efficiency of the house and then looking at its more active systems," he says.

FASWALL WALL FORMS

Faswall Wall Forms are made from recycled wood fiber (typically from used pallets), mixed with a small quantity of cement as a binder to form sturdy blocks. When stacked, they form a wall, which is filled with cement. The surface can then be stuccoed inside and out or can accommodate a number of other exterior applications. http://faswall.com

JUNO LIGHTING UNDER-CABINET FIXTURES

Paolo Scardina used a wide variety of Juno Lighting products in this project. Shown here is the 9" 2-Lamp Pro-Series LED under-cabinet fixture. Easy to install and designed for maximum flexibility, it contains no harmful mercury and comes in a variety of colors, including black, brushed bronze, brushed silver, and designer white finishes. www.junolightinggroup.com

Scraps of granite from the "bone yards" of a granite fabricator form the fireplace surround. The original hardwood floors were refinished and sealed with water borne coatings.

BEFORE

LOWER LEVEL

MAIN LEVEL

The decision to relocate the staircase from the center to the south side of the home dramatically opened up the main level.

KEY GREEN FEATURES

- **Rain Capture System.** Rain chains capture rainwater coming off the roof, with the water ultimately being distributed to the yard through a series of French drains. An old garage on site was stripped of its walls, and the cement underneath the roof was broken to allow water to pass through semi-permeable pavers and create a "rain garden."
- **Low-VOC Paint.** The builder used Sherwin-Williams finishes throughout the home.
- **Energy-Efficient Light.** A wide range of Juno lighting was used in the home, including recessed, under cabinet, and decorative light. In some locations, the lights were attached to motion sensors.
- **Ground Source Heat Pump.** The Florida Heat Pump (FHP) installed by Specialty Heating and Cooling dramatically enhances indoor air heating and cooling efficiency.
- **Formaldehyde-Free Cabinets.** Sourced from FSC-certified wood products, these cabinets from Urban Timber Works are finished with water-based, low-VOC coatings.

SHERWIN-WILLIAMS DURATION

The company's signature line of low-VOC and low-odor coatings, Duration Home Interior Acrylic Latex offers long-lasting durability and is considered ideal for high-activity areas such as kitchens, hallways, and bathrooms. The line also incorporates an antimicrobial formula to resist mildew growth. www.sherwin-williams.com

BEFORE

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In the new kitchen, environmentally preferred materials include a tile backsplash made from 100% post-consumer glass, durable engineered quartz countertops, and FSC-certified wood for all the cabinetry. Appliances are Energy Star qualified.

Frameless shower and tub with contiguous dry off zone maximizes openness. Low-flow water consuming fixtures, engineered countertops containing recycled paper content, and FSC-certified wood showcase green features.

"In light of the great southern exposure we had, we placed a solar panel on the roof to bring some additional energy into it. Then we added a ground source heat pump system and tied that into a new energy-efficient furnace."

Although he acknowledged the expense involved—the solar panels alone ran approximately $25,000—Scardina says the benefits would more than pay for themselves and the initial costs would be more than compensated for over time.

He also installed a heat pump. "[In terms of the heat pump] once you get down below about 6', the temperature of the Earth is a steady 55 F to 60 F, year round" he says. "Now if you transfer that up to the ambient part of our world, and want your rooms to stay, say, a constant 70 F, you only need to correct your temperature by 15 degrees. That's a tremendous energy savings, especially when you consider Portland's climate where temperatures can range from the 90s to freezing over the course of a year, and the amount of energy it takes to heat or cool the air from those extremes."

Another energy-saving strategy employed in the home was locating the hot water distribution tank, the three bathrooms, and the kitchen near each other, thereby reducing the distance heated water needed to travel over insulated water lines and reducing the need to reheat the water.

All of the lighting in the house is either CFL or LED, and much of it is on motion sensors for ease of use and sure-fire energy savings.

Work on the inside of the house was rounded out by the installation of formaldehyde-free cabinets made of FSC-certified wood products. The backsplash in the kitchen was made of reclaimed glass, and a mantle around one of the home's fireplaces was made of reclaimed countertop parts from a local granite fabricator.

"We went to his shop and picked four or five really beautiful pieces and created a giant granite quilt, if you will, that is really quite eye-catching, really beautiful," Scardina says.

"In addition, the flooring is all refinished, and we even used some of the flooring material removed from the upstairs to create the bathroom and to patch the former location of the staircase," he says. "Also, we used low-VOC paint and water-based stains to prevent off-gassing, and added a heat recovery ventilator to bring fresh air in and expel bad air without expelling the heat as well."

Not content to stop there, Scardina and his staff next addressed water consumption, installing low-flow faucets and toilets inside the house as well as structures outside the house to capture rain water from the roof for irrigation.

The backyard landscaping is populated by

drought-resistant plants and pervious pavers that allow water to drain down to the aquifer.

Scardina says that during construction, 98% of all the construction material on site was diverted from the landfill, with the contractor and the subs sorting the material and making sure it was either reused in the project or sent "to some other eco-friendly place."

"I think I've always been a sustainable designer," Scardina says after talking about the project and all its details. "I know there was the period when people's consciousness was raised and we got on this slow curve to where we are today, but, like I said, thanks to my grandmother, I always had this approach as part of how I design.

"Everything I've done has been compact, space efficient, energy efficient, and motion efficient," he says. "I've always been there."

AFTER

IN THE WORKS

Paolo Design Group's latest green undertaking is a new custom home currently entering the final, landscaping phase of the project and also slated to earn LEED Platinum, according to firm principal Paul "Paolo" Scardina.

"I guess I'd describe the home, aesthetically speaking, as a 'new century Tuscan,'" Scardina says. "It's very modern but has a very natural Tuscan feel ... the roof is flat, and the detached garage has a vegetative roof on it to allow the homeowners to do some gardening."

"It also has an endless pool inside the house itself, and the entire structure is south facing, so there were lots of opportunity to take advantage of passive solar. In fact, it's got a solar heat gain room," he says.

The big difference between this project, known as the Eagle Creek Chocolate House, and the subject of the Scardina's first LEED Platinum project is the material used for the framing of the structure.

In this case, the house was built using a product called Faswall, an insulated concrete form wall system.

"It's made of reclaimed wood chips salvaged from old wood pallets, which are submerged in this kind of cementitious slurry that causes the wood to petrify yet preserves its insulative qualities," Scardina says.

The material is formed into blocks, that have partial insulated core holes running through them, making them light and easy to stack into place. The holes are then filled with cement and reinforced rebar.

"What you end up with is a thermal mass that's simply amazing, with window sills that are very deep. It's kind of like being in a modern adobe home," Scardina says.

The house sits on 20 acres, uphill from what had been the site of the homeowner's long time–and very traditional–manufactured home.

Scardina says they bought the home because of the property's beautiful mountain views.

"Their old home was very modest. And all the while they lived there, they looked at the land and its potential and dreamed of building the home of their dreams," he says.

The site of the spectacular house is barely 100 feet from their soon-to-be former residence. It was the perfect location. It also confronted them with a significant choice.

"At the top of the hill was a stand of very old fir trees that the homeowners had become attached to and even named 'Old Bob,'" Scardina says.

Because there was really no alternative site on the property that offered the views the client wanted, the trees were cut down. However, rather than discard them, Scardina had them milled, cured, and dried on-site and then used them to build the structural beams that run across the great room, the tongue-and-groove beams in the ceiling, and even some of the siding on the garage.

"As a result of using those trees, the lumber package for this project was actually very small," Scardina says.

Because the home was new construction, the architect installed radiant heat under the concrete floor. The project also incorporates solar power and a ground source heat pump into its design.

"It's got all kinds of loops feeding into one another, boosting its efficiencies," Scardina says.