

4. Business Case for High-Performance Reconstructed Buildings

By Jerry Yudelson, PE, LEED Fellow

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1 "The Greenest Building: Quantifying the Environmental Value of Building Reuse," National Trust for Historic Preservation, <http://www.preservationnation.org/information-center/sustainable-communities/sustainability/green-lab/valuing-building-reuse.html>, accessed March 18, 2012.

2 Ground-source heat pumps were also ruled out, according to the GSA's Patrick Brunner, because 1) the cost of drilling test wells to verify the volume of water needed from the lower aquifer was beyond the budget, and 2) discharging any water into the upper aquifer would have risked further damage to the upper aquifer, which was already suspected of being contaminated. In tight urban reconstruction projects there is often insufficient exterior space to drill the holes necessary for the employment of ground-source heat pumps.

The business case for super-green restoration of older buildings ought to be simple. They already exist, so it's generally cheaper to restore them; they are often situated in prime real estate locations; and, in the case of historic renovations, there are often tax benefits and other incentives to sweeten the investment. On the other hand, older buildings are generally harder to work with, since the building envelope, orientation, and much of the floor layout are fixed; in historic renovations, there are often significant constraints on modernizing both the envelope and the interior. From the standpoint of sustainability, of course, it's better not to throw away the embodied energy of all the building materials or to down-cycle them for other uses.

Nonetheless, the business and sustainability case for saving older buildings is more relevant than ever, according to Ralph DiNola, Assoc. AIA, LEED AP, a principal with Green Building Services, Portland, Ore. His firm was on the team that completed the recent "Greenest Building" study for the National Trust for Historic Preservation that quantified the environmental value of the more than 328 billion sf of existing buildings in the U.S.¹ According to DiNola, "The study demonstrates that given a choice between demolishing an existing building and building a new one versus renovating the existing building, in almost all cases, renovating an existing building has a better environmental outcome. The unfortunate thing is that the developer's pro forma does not include many of the advantages or benefits associated with the better environmental performance of reuse."

To get to the bottom of this issue, we looked at five projects in Portland, Ore., a city noted for its commitment to sustainability, on the assumption that if super-green renovation and restoration practices could happen here, they could be applied to the rest of the country. We looked at the following buildings:

1. Edith Green–Wendell Wyatt Federal Building
2. Jean Vollum Natural Capital Center ("The Ecotrust Building")
3. Mercy Corps Global Headquarters
4. Meier & Frank Building (Vestas America Headquarters)
5. Marriott Courtyard Portland City Center

The first is a public building, the next two are for NGOs, and the last two are commercial buildings. Each

is successful on its own terms. Each meets the needs of its respective owners and stakeholders. Yet each has different business case elements driving the green restoration.

EDITH GREEN–WENDELL WYATT FEDERAL BUILDING—ELEVATING INTEGRATED DELIVERY

Named in honor of two former Oregon Members of Congress, the Edith Green–Wendell Wyatt Federal Building is in the midst of a \$126 million renovation funded by the American Recovery and Reinvestment Act. Built in 1975, the 18-story tower was deemed to no longer meet federal energy efficiency requirements, so it is being completely renovated—down to its bare steel bones—under the direction of the General Services Administration. A 170,000-gallon tank will harvest rainwater, treat it, and supply the building's nonpotable uses; water use will be 60% less than under comparable code requirements. Daylighting, smart lighting systems, regenerative elevators, and energy-saving façade treatments are all part of a strategy that is expected to yield a 40% reduction in electricity use compared to current code requirements. It will also have a floor layout and amenities appropriate to an increasingly mobile and wired federal workforce. A 180-kW rooftop photovoltaic array will offset about 3% of the building's energy consumption. The project should be completed next year. LEED Platinum certification is anticipated.

Portland-based SERA Architects and general contractor Howard S. Wright (a Balfour Beatty company) accepted the GSA's challenge of creating a modern super-green building inside an old skeleton. But according to Patrick Brunner, GSA Supervisory Project Executive, the Building Team had to give up some innovative strategies, notably the use of natural ventilation. Brunner says that, while the GSA has new mandates that favor geographic-specific/geosensitive design—which, given Portland's moderate climate, would have made the project an obvious test bed for natural ventilation—the building's orientation and the narrowness of its footprint made natural ventilation simply infeasible.²

The team was undeterred in its efforts to develop energy-conservation measures (with supporting life cycle cost analysis) that scored at a LEED Platinum level. "The business case is money—reduced energy cost and payback based on life cycle cost analysis—but

it's also about productivity," says Brunner. "For this project, we've changed from cooling the building with air, to cooling with water [radiant panels]. Our radiant approach combines with a 100% dedicated outside air system, so the building should be more comfortable and healthier and provide a work environment that increases tenant satisfaction and productivity."

Lisa Petterson, AIA, LEED AP, NCARB, a project architect and associate principal with SERA Architects, described how the Building Team's integrated approach contributed to that solution. "The radiant heating and cooling system is really the biggest energy saver in the building. What is key in being able to incorporate that type of mechanical system was really taking a hard look at the building envelope. Often, we don't see teams taking that long view of looking at the overall energy performance and asking how the building as a whole can work with a much lower energy footprint. In this case, the design of the building façade was intended to reduce solar gain, which then allowed the radiant cooling system to be able to overcome the large solar load on the building. That system wouldn't have been possible if we hadn't mitigated it through [external] shading devices."

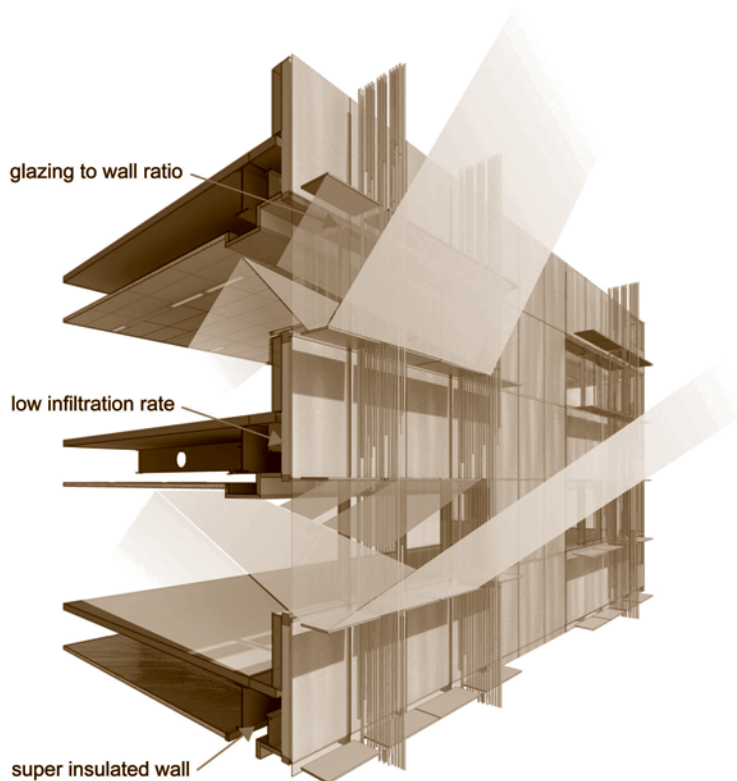
Much of the success of the project can be attributed to its innovative delivery approach, says the GSA's Brunner. In a typical integrated delivery scenario, he says, the owner selects the architect and the contractor, then acts as integrator, working with the architect and contractor to build out both of their teams. However, in this case, Brunner says, "Because we already had SERA Architects under contract, we bought the entire SERA team. And because we had a very compressed amount of time under ARRA to get the construction dollars obligated, we issued a solicitation that allowed the prime contractors [bidding for the project] to propose upwards of five first-tier subcontractors with them." The winning contractor, Howard S. Wright, had selected five subcontractors—curtain wall, mechanical, electrical, demolition, and vertical lift—that represented 60-70% of the dollar value of the total contract.

The GSA took further steps toward team integration. "We basically co-located the design and build teams and converted the technical documents from a P100 convention to a more commercial approach," says Brunner. "As far as I'm concerned, this project is as close to integrated delivery as I've gotten with GSA so far."

HIGH PERFORMANCE DESIGN RESULTS ENVELOPE & DAYLIGHTING



summer mid-day sun
(high angle)



equinox morning sun
(lower angle)

Daylighting model for the Edith Green–Wendell Wyatt Federal Building, named in honor of Rep. Edith Green, a Democrat who served Oregon's 3rd Congressional District from 1955 to 1974, and Rep. Wendell Wyatt, a Republican who served the Beaver State's 1st Congressional District from 1964 to 1975. The renovation of the 18-story structure, which was built in 1975, is seeking LEED Platinum certification.

Edith Green–Wendell Wyatt Federal Building

Owner: U.S. General Services Administration
Lead architect/Interior designer: SERA Architects
Design architect: Cutler Anderson Architects
Mechanical engineer: Stantec
Electrical engineer: PAE Consulting Engineer
Plumbing engineer: Interface Engineers
Commissioning agent: Glumac
Structural/civil engineer: KPFF Consulting Engineers
Construction manager: Howard S. Wright
Gross area: 526,596 sf
Construction cost: \$126 million
Anticipated completion: May 2013
LEED Platinum (targeted)

COURTESY SERA ARCHITECTS

**JEAN VOLLUM NATURAL CAPITAL CENTER—
A PIONEERING GAMBLE**

Originally constructed as a warehouse in 1895, the 70,000-sf Jean Vollum Natural Capital Center was the first historic structure in the U.S. to receive a LEED-NC Gold certification (2001). Ecotrust, a nonprofit conservation organization, purchased the building in 1998. The renovation reflects the original 1895 brick exterior and interior character, while incorporating high-performance features. An aggressive recycling program during construction diverted 98% of project waste from landfill. The building consumes 22% less energy than the Oregon code requirements in effect at the time, owing to energy-efficient windows and lighting fixtures, building and lighting controls, and a high-efficiency ventilation system. The 5,000-sf vegetated roof, along with a bioswale adjacent to the surface parking lot, filters and absorbs stormwater before it runs off into Portland's combined sewer system. Low-flow plumbing fixtures help reduce water use by 16%. The building houses a mix of public, private, nonprofit, and for-profit tenants.

Seeking LEED Gold certification in 2001 was a bold move, according to Sydney Mead, the building manager at Ecotrust. "When we were in the remodel process, we weren't actually going for LEED certification. We really wanted to follow our own checklist," she says. "At that time, we talked a lot about how the building should be a physical manifestation of our mission statement as a nonprofit environmental conservation organization. The other

key piece for us is that the building is owner-occupied, so with the energy and stormwater efficiencies, you get that lovely payback in a relatively short time. And by using low- and no-VOC materials, the [improved] indoor air quality enabled us to feel really comfortable in our home."

As the first significant green building in Portland, perhaps the strongest expression of the Vollum Center's economic viability is that Ecotrust has been able to keep the building almost fully leased over the past decade. "The marketing and goodwill PR piece of it is huge," says Mead. "Having that third-party certification was necessary because if we had done the building without certifying it, it would just be our good word."

**MERCY CORPS GLOBAL HEADQUARTERS—
STRENGTHENING THE MISSION**

As with the Ecotrust project, the Mercy Corps initiative represents an effort to renovate a century-old building in a historic but downtrodden neighborhood. Mercy Corps, a global aid agency, not only wanted a building that would reflect its sustainability values but also chose to relocate to Old Town Chinatown, an economically challenged area along the Willamette River, in an effort to spur revitalization there. The project restored the historic Packer-Scott building (1892), a 42,000-sf grocery warehouse, and added nearly the same amount of office space. The addition features a glazed curtain wall that brings natural light into the space and offers views to the river. The red terra cotta of the addition complements the existing brick structure. The LEED Platinum building achieves 51% energy savings over a new building built to code owing in part to new windows, a well-insulated skin, the daylit atrium, and a heat-exchange ventilation system. The project earned all of the LEED Energy and Atmosphere credits, an astounding feat for an old building. An on-site photovoltaic array offsets

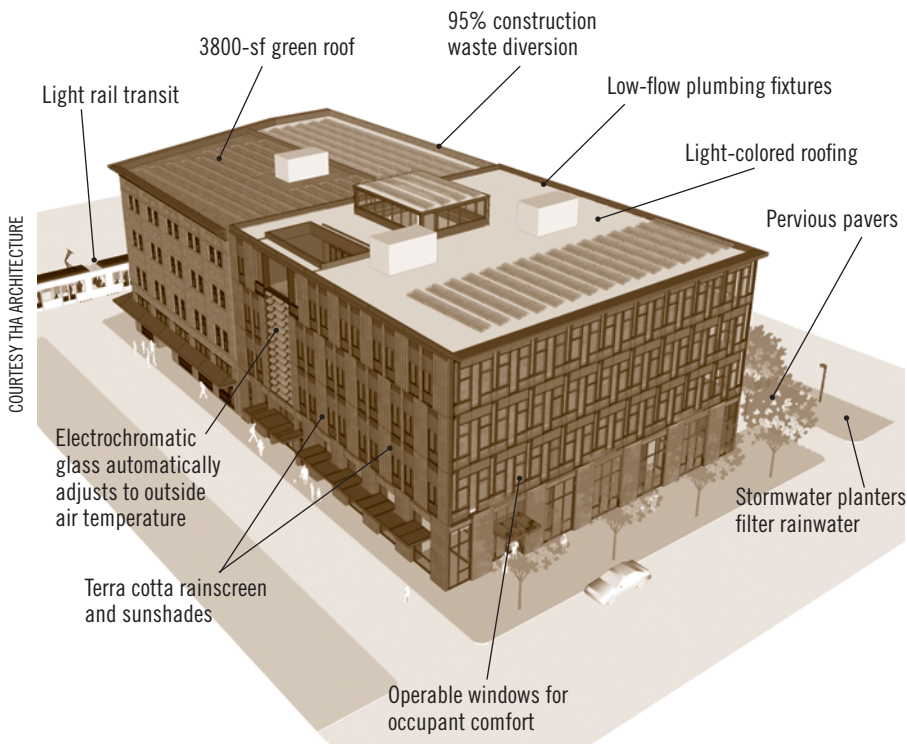


COURTESY ECOTRUST

The Jean Vollum Natural Capital Center was the first historic structure to attain LEED-NC Gold status, more than a decade ago. It is considered to be the first significant green building in Portland, Ore., and consumes 22% less energy than state code required.

**Jean Vollum Natural Capital Center
("The Ecotrust Building")**

- Owner: Ecotrust Properties, LLC
- Architect: Holst Architecture
- Interior designer: Edelman Soljaga
- Structural/civil engineer: KPFF Consulting Engineers
- MEP engineer: Interface Engineering
- Contractor: Walsh Construction Company
- Gross area: 70,000 sf
- Construction cost: \$12.4 million
- Completed: 2001
- LEED Gold



Mercy Corps Global Headquarters

Owner: Mercy Corps
 Owner's representative: ShielsObletzJohnsen
 Architect: THA Architecture
 Interior design: DECA Inc.
 Structural: ABHT Structural Engineers
 Contractor: Walsh Construction Company
 Commissioning/MEP: Glumac
 LEED consultant: Green Building Services
 Landscape architect: Walker Macy
 Gross area: 84,700 sf
 Construction cost: \$21.3 million
 Completed: October 2009
 LEED Platinum

Schematic of Mercy Corps Global Headquarters showing a selection of its numerous sustainability attributes. In April, the project won a 2012 AIA COTE Top 10 Award from the American Institute of Architects' Committee on the Environment.

7.5% of the building's energy use.

"When we were looking for a space, many people in Portland considered this existing building marginally rehabable," says Mercy Corps' Amy Kohnstamm. There were others who thought the building should have been condemned. "From a business perspective, we had some financial incentives from the City of Portland and particularly from the Portland Development Commission to locate in this part of town and make use of this existing structure."³

Will Dann, of Portland's THA Architecture, the principal-in-charge, says the client placed "a huge emphasis on being sustainable" but there was also a great concern about being frugal. "They were very concerned that they were raising money for infrastructure and having that compete potentially with their programs in the 33 countries in which they work," says Dann. "From the very beginning, the idea was that we were going to do sensible things that were sustainable but we were going to spend the 20% necessary to get the 80% bang out of the buck." The initial plan was to seek LEED Gold, but the Lemelson Foundation stepped in with a \$2.5 million investment to become "co-op owner" of its portion of the building. "This paid for those things that were beyond the original relatively modest budget, but that would have long-term operating and sustainable benefits," says Dann. The infusion of funds allowed the Building Team to take the project from a mid-Gold range to LEED Platinum certification.

THA Architects' David Keltner, the lead designer, noted that the project had to go through a complete

seismic upgrade, which had an unexpected benefit.

"When we stiffened the existing building with a lot of concrete and steel, it became so stiff that we were able to use [it] to hold up the new addition. The new building didn't have to have as much structure or as many solid walls, which reinforced the ability to have big open spaces in the new building," he says. "There's a great symbiotic relationship between restoration and flexibility of the new space." Thus, a costly seismic upgrade had the hidden payoff of allowing a more open, large office addition effectively to lean on the older building, almost the opposite of what would have been expected.

MEIER & FRANK BUILDING— FROM WAREHOUSE TO GREEN OFFICE SPACE

Located in Portland's Central East Side, the Meier & Frank Depot Building (1928) served as a warehouse for the nearby Meier & Frank department store. In 2001, Gerding Edlen Development purchased the building, which is listed on the National Register of Historic Places, and began renovation in 2010. The Danish company Vestas Wind Systems will occupy the entire building for its North American headquarters. The addition of a new fifth floor will bring the total area up to 184,000 sf, including a parking garage. A central atrium will draw natural light into the center of the large floorplates. A rainwater harvesting system will supply more 60% of the building's nonpotable water needs. Although historic preservation restrictions and other regulations prevent Vestas from installing windmills atop the structure, plans are in place for 112-kW rooftop solar array. The project

³ The project generated nearly \$15 million in public loans and subsidies, including \$3.5 million from the Portland Development Commission for the building itself (plus a \$750,000 grant from the same commission), \$6.2 million in New Market Tax Credits, and \$3.2 million for a Historic Tax Credit.



COURTESY GERDING EDLEN DEVELOPMENT

The original Meier & Frank Depot Building (left) was built in 1928 and served as a warehouse for the nearby department store in Portland's Central East Side. Renovation on the building (rendering, right), which is listed on the National Register of Historic Places, started two years ago. Upon completion, the 184,000-sf structure, with the addition of a new fifth floor, will become the North American headquarters of Danish manufacturer Vestas Wind Systems.

is targeting LEED Platinum certification and 50% less energy use than a same size building built to code.

Patrick Wilde, vice president of development for Portland-based Gerding Edlen, arguably the country's most experienced LEED project developer, says the project was originally meant to be a multi-tenant speculative commercial office building. "We had leases for about 75% of the building done with our funding in place and were waiting on our historic approvals, when the downturn happened," recalled Wilde. "A few years later, we circled back and Vestas decided that they wanted to be in a very high-performing, historic building. They are a renewable-energy company, so being in a highly sustainable building was a big key for them."

Wilde makes the case for a high level of sustainability in a historic building. "We think there's a good business case for sustainability, first, because for an office user, certainly it reduces operating costs; second, we think it helps makes the building more attractive to a wide variety of tenants because it offers a work environment that helps tenants attract employees. It helps workforce performance and general happiness in the workspace, and a wide variety of tenants are looking for that."

MARRIOTT COURTYARD PORTLAND CITY CENTER—WHEN DOING THE RIGHT THING PAYS OFF

Once a vacant bank building that had sat empty for 17 years, the Marriott Courtyard Portland City Center went on to achieve LEED Gold certification with a renovation completed in 2009. The 1980s-era former office building and adjacent site now contain 256 guest rooms, meeting and convention space, a fitness center, and a restaurant. The renovation included a new shell, three additional floors, and new mechanical systems.

**Meier & Frank Building
Vestas America Headquarters**

- Owner: 14th & Everett RPO, LLC
- Developer: Gerding Edlen Development
- Architect: GBD Architects
- Structural/civil engineer: KPFF Consulting Engineers
- MEP engineer: Glumac
- Contractor: Skanska USA
- Gross area: 184,000 sf
- Construction cost: \$64 million
- Completion date: April 2012
- LEED Platinum (targeted)

The hotel uses 28% less energy than a property of comparable size due to daylighting, efficient air-handling systems, and heat pumps in guest rooms and meeting spaces. According to the designers, SERA Architects, the construction cost premium to build the hotel to the LEED Gold standard was 1.2%. Factoring in state and local incentives reduced the premium to 0.25%. Dual-flush toilets contribute to an estimated 26% less water use. The estimated payback from water and energy cost savings is 18 months, and the hotel will save about \$600,000 in operating costs over 10 years.

SERA project architect and associate Gary Golla, LEED AP, NCARB, an expert in hospitality design, says there usually four key stakeholders in hotel projects: the developer, the owner, the hotel brand, and the operating company, each with a potentially different set of goals for the project. That makes it essential for the Building Team to articulate the business case in different ways for each stakeholder's frame of reference.

“Often developers may not be interested in the energy savings if they’re going to flip the building,” says Golla. “But if they’re going to be part of the ownership or management group, then they become interested in saving operating costs, and the biggest part of that is usually from energy savings. That’s where it makes sense to put additional money in up front, because you can show that it pays back over time. The other place where they have shown interest is in available incentives,” which in Oregon at the time of the Marriott project were considerable for projects that attained at least LEED Silver certification.

Golla noted that it is important to understand how to engage developers in such projects. “If you lead with energy savings and making a better building and how it can help their investment, they really listen,” says Golla. “But if you go in and say, ‘You should do a sustainable building because it’s really great for the environment,’ and you give them all the ‘right’ reasons to do it, they often don’t pay attention. [When] you can prove there’s a financial reason to do it, then they can be convinced.”

TO MAKE THE BUSINESS CASE, MEET THE OWNER’S NEEDS

From these examples, the chief conclusion that can be drawn about the business case for high-performance reconstructed building is that it depends primarily on the needs of the owner. For a federal agency, there are Presidential directives to achieve at least LEED Silver, but each project has to meet at minimum 6% return on investment, limiting overall costs for green. For nonprofit organizations, client needs are often mission-driven, with the added desire to provide an excellent workspace to employees who may not be paid as well as those in the private sector. For the for-profit owner, the most important selling point may be employee recruitment and retention.

Building Teams seeking to attain LEED Gold and Platinum certifications for their reconstruction projects need to be creative to keep cost premiums to a minimum.

The biggest hurdle can be optimizing daylighting and thermal performance, but even this can be overcome through well-conceived planning and design. “I would make the bold statement that doing a [reconstructed] LEED-certified building doesn’t cost you a nickel more than what it would be to do a standard building, *if* you are smart about what you are doing,” says THA Architects’ Keltner. “Furthermore, if you want to go to high levels of LEED certification, you can get really far with an added 5%.”

THA Architecture’s Will Dann points out that renovating older buildings not only aids in revitalizing downtown neighborhoods but also takes advantage of existing infrastructure, rather than building on greenfields outside of the city where infrastructure has to be added, at great cost.

Patrick Wilde, Vice President of Development of Gerding Edlen Development, puts it this way: “We think greening existing buildings is important not only from the standpoint of just being responsible [developers] but also from the standpoint that it can definitely help performance on a financial basis and also on an employee retention and attraction basis. And it’s not just renewable energy companies that are interested. It’s law firms, banks, and the traditional core companies that would be leasing typical office space that are now paying more attention to those building attributes and saying, ‘That’s the kind of space we want to be in.’”

That sentiment is echoed by Ralph DiNola, of Green Building Services. “One of the greatest financial incentives [in reconstruction] is improving the outcomes that benefit the occupants of that facility—better health, productivity, less turnover. Focusing on the occupants has the most significant financial return to an organization,” he says.

DiNola goes on to put reconstruction in a larger context. “Reusing existing buildings is the closest thing to a silver bullet in terms of affecting climate change with one sector,” he says. “If the building sector is going to really be the linchpin of addressing climate change, building reuse is a big part of the answer.” +



MICHAEL MATHERS

The Marriott Courtyard Portland City Center, which was brought up to LEED Gold standards for a construction cost premium of 1.2%. The 1980s-era office building was converted into a 256-room hotel with convention space, a restaurant, and a fitness center. Reconstruction included a new shell and new mechanical systems, and three new floors were added. Energy savings of 28% were achieved.

Marriott Courtyard Portland City Center

Owner: Cornerstone
Developer: Sage Hospitality Resources
Architect/Interior designer: SERA Architects
MEP engineer: PMC Mechanical & Oregon Electric
Structural/civil engineer: KPFF Consulting Engineers
LEED consultant: Brightworks
Contractor: Hoffman Construction
Gross area: 199,200 sf
Construction cost: \$44 million
Completed: September 2009
LEED Gold