Photograph courtesy of Michael Mathers

CREATING THE FUTURE OF THE BUILDING INDUSTRY

OREGON BUILDING OWNERS TAKE THE PATH TO NET ZERO

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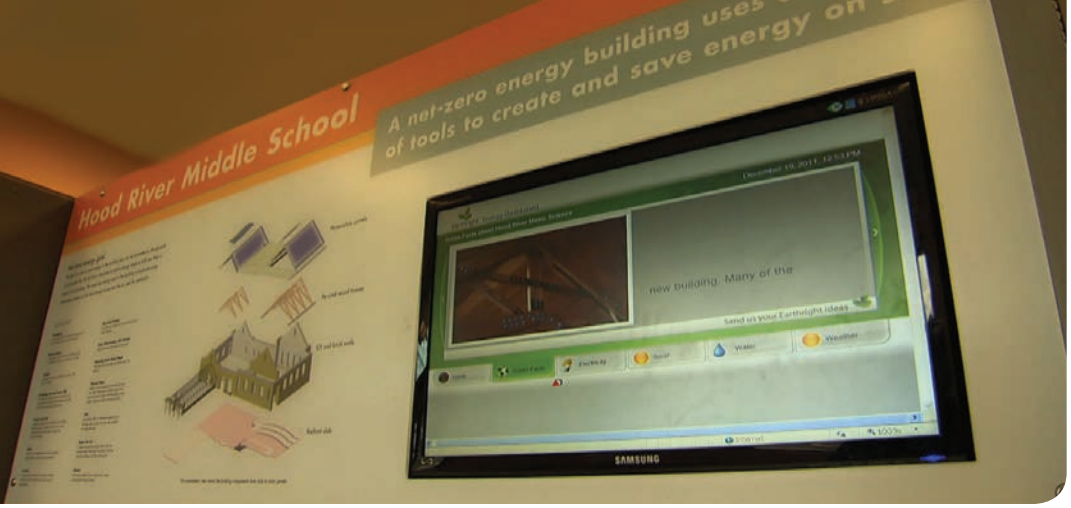
Jean-Pierre Veillet,
developer/owner, ecoFLATS

Net-zero energy use is a critical step toward dramatically lowering the energy and carbon footprints of buildings; however, limited project experience and resource constraints have hindered widespread development of net-zero buildings. To help overcome these barriers, Energy Trust of Oregon launched the Path to Net Zero pilot in 2009. One of the first of its kind in the country, the pilot offered cash incentives and enhanced technical assistance to help project teams develop innovative, high-performance design strategies.

Oregon design teams responded enthusiastically to the challenge, exceeding expectations and revealing the increasing level of interest in and need for net-zero buildings—not only in the design community, but also among building owners and developers. The 13 projects enrolled in the pilot explored design strategies in great detail with a wide range of building types and technologies. As a result, the projects were able to test strategies and ultimately create a new platform to advance design practices in Oregon.

The following are some of the first completed pilot projects. These buildings are in the process of meeting—and in some cases surpassing—their commitment to save 60 percent more energy than Oregon's already stringent code through a combination of 50 percent energy efficiency and 10 percent renewable power.

Energy Trust of Oregon



HOOD RIVER MIDDLE SCHOOL

DESIGNING A LIVING LABORATORY FOR STUDENTS

A growing student body led Hood River Middle School down the path to net zero. Needing more classroom space, the community passed a construction bond in 2009 to build new music and science classrooms. The school's curriculum already included sustainability concepts, and the staff lobbied for a building that could be incorporated directly into their lesson plans.

"Since the very start, the project's focus has not been just the cool building, but having a program that instructs, that teaches while it houses kids," said Brent Emmons, principal.

The Hood River School Board backed the idea of constructing a net-zero building when they realized it could be an inspiring educational tool, significantly reduce energy bills and receive cash incentives from Energy Trust. They selected Portland's Opsis Architecture to design the building to Leadership in Energy and Environmental Design® (LEED) Platinum standards with net-zero energy use. Opsis then led an eco-charrette open to the community and the students, during which the entire project team came together to collaborate on the design.

The eco-charrette inspired the design team to employ numerous techniques to save and generate energy, including displacement ventilation and a 35-kilowatt solar array. It also included a hydronic heating and cooling system with geothermal heat pumps and a radiant slab that "borrows" free cooling from a nearby stream during warm months.

Today, Hood River students continuously interact with the building through lesson plans created by science teacher Michael Becker and a classroom monitoring display that provides actionable energy use information.

"The monitoring system is really crucial because every day the kids are able to look at what our building's using. If the energy use is high, they're excited to figure out how we can use less," said Becker. "They're asking really brilliant questions about the system so they can understand how to use it better."

After one year of operation, the building uses 92 percent less energy than a building of similar type and size built to Oregon code. The building initially used more energy than expected—likely the result of a malfunctioning outside air damper and an unusually cold winter—but the project engineers fixed the damper and the school is now on track to reach its net-zero goal.

HOOD RIVER MIDDLE SCHOOL AT-A-GLANCE

OVERVIEW

- 5,600 square feet
- Science and music building
- Located in Hood River, Oregon

PROJECT TEAM

- Project owner–Hood River School Board
- Architect–Opsis Architecture
- Civil, structural engineers–KPFF Consulting Engineers
- Mechanical, electrical, plumbing engineers–Interface Engineering
- Acoustical engineers–Listen Acoustics
- Signage consultant–Anderson/ Krygier, Inc.
- General Contractor–Kirby Nagelhout Construction Company

ENERGY FEATURES

- Radiant floor system with geothermal heat pumps
- 35 kW solar electric array
- Daylighting
- Heat recovery and natural ventilation

FINANCIAL ANALYSIS

- $10,000 cash incentive for technical assistance
- $6,066 cash incentive for commissioning assistance
- $8,314 cash incentive for equipment installations
- $60,999 cash incentive for solar installation
- $3,121 estimated annual energy cost savings

ENERGY SAVINGS

- 41,571 estimated annual kWh saved
- 41,151 annual kWh generated on site

UTILITY

- Pacific Power

ecoFLATS

MEETING COMMUNITY DEMAND THROUGH SUSTAINABILITY

Jean-Pierre Veillet, owner of design/build firm Siteworks, and his partner Doug Shapiro were inspired by the idea of creating a highly sustainable mixed-use building. With a site chosen along Portland's North Williams bike corridor they needed design and cash resources to make their vision of a net-zero building a reality. Energy Trust stepped in to provide that support, and the result is ecoFLATS, a highly-sustainable 18-unit apartment building with ground-floor retail space.

"I saw the opportunity, when the economy slowed down, that we could change directions and take a new course," said Veillet. "With more limited resources we could focus on what people really needed—on what would benefit the greatest amount of people—and what popped up was the Path to Net Zero. I thought, this is perfect, this makes sense."

The project team decided to focus its goal of achieving net-zero energy use on the residential portion of the building. Early design assistance from Energy Trust paid for an energy-focused eco-charrette to identify building goals and ensure all parties involved—from owners to architects to contractors—shared the zero-energy vision and collaborated throughout the design and construction process.

"Energy Trust made ecoFLATS possible," said Veillet. "Their participation validated our project and streamlined the process by offering one central place to go for technical assistance, design advice and cash incentives."

> "People of the community of Portland want to be a part of what we're providing here at ecoFLATS. That's what is amazing."
>
> Jean-Pierre Veillet, developer/owner, ecoFLATS

Today, ecoFLATS features energy-saving and power-generating technologies such as a common hydronic heating system, an energy-efficient building envelope, ample daylighting, a 20-kilowatt solar electric array and a solar water heating system. To avoid the heating and cooling costs that are typical in internal hallways and common spaces, the apartments are accessible from exterior hallways.

The building is a model of sustainability, but occupant behavior was the big variable in moving toward net zero. The project team opted to install a visual energy monitoring system in the building's entryway to leverage the power of peer pressure and encourage residents to operate as a community to get on the path to net zero. The system monitors each dwelling unit against a baseline energy goal and then displays each unit's usage in real-time. Veillet and his team are exploring a range of other motivational tactics, such as an incentive system to reward residents who use the least amount of energy and individual energy consultations for residents who want to slash their energy use but aren't sure how.

The 18 units at ecoFLATS have been fully occupied since the summer of 2011 and are proving to be approximately 55 percent more efficient than Oregon code—a remarkable achievement for a multifamily building. Veillet and his team are exploring ways to bump up these savings even more with the help of the building's residents. "People of the community of Portland want to be a part of what we're providing here at ecoFLATS. That's what is amazing," said Veillet.

ecoFLATS AT-A-GLANCE

OVERVIEW

- 17,000 square feet
- Four-story multifamily building with ground-floor retail space
- Located along Portland's North Williams bike corridor

PROJECT TEAM

- Project owner/builder–Siteworks
- Architect–Works Partnership Architecture
- Structural engineer–DCI Consulting Engineers
- Mechanical engineer–Hunter-Davisson
- Energy consultant and engineer–BEA Consulting, LLC

ENERGY FEATURES

- Exterior corridors
- 20 kW solar electric array
- Central radiant baseboard heating system with gas boiler
- Central domestic water heating system with solar thermal collectors

FINANCIAL ANALYSIS

- $2,500 cash incentive for early design assistance
- $8,400 cash incentive for technical assistance
- $8,523 cash incentive for commissioning assistance
- $9,271 cash incentive for equipment installations
- $4,390 cash incentive for solar water heating installation
- $20,160 cash incentive for solar electric installation
- $5,336 estimated annual energy cost savings

ENERGY SAVINGS

- 29,405 estimated annual kW saved
- 18,000 annual kWh generated on site
- 730 annual therms generated from solar hot water

UTILITIES

- NW Natural
- Pacific Power

JUNE KEY DELTA COMMUNITY CENTER

TAKING A GRASS-ROOTS APPROACH TO HIGH-PERFORMANCE DESIGN

The Portland Alumnae Chapter of Delta Sigma Theta Sorority, a professional sorority of African-American women, has been operating out of a former service station in North Portland's Humboldt community for more than a decade. The Chapter provides highly-valued public services such as tutoring and scholarships for African-American women. As these programs expanded, the nonprofit outgrew its space and began considering major renovations. From the very beginning, the organization wanted its new space to be a gathering place and a model of sustainability for the community. Mark Nye, principal of Nye Architecture, steered the chapter toward the Living Building Challenge, a certification program from the International Living Future Institute that defines the most advanced measure of sustainable building in the areas of site, water, energy, health, materials, equity and beauty.

"We wanted to be responsible and create a highly sustainable building that would be a gathering place for community involvement and enrichment," said Chris Poole-Jones, project coordinator, June Key Delta Community Center. "We wanted this to be a small-scale demonstration project. We always wanted to be different and outstanding. The neighborhood deserves that."

To achieve net-zero energy use, the team first aggressively pursued energy-efficiency strategies. After all, energy saved is energy that the building does not have to produce or purchase. Design and technical assistance from Energy Trust helped the team select efficiency options that were affordable and effective. The completed building includes a geothermal heat pump for heating and cooling, a high-performance envelope, energy-efficient lighting and abundant daylighting.

A year into operation, the June Key Delta renovation is using 59 percent less energy than a building of the same type and size built to Oregon code. Once funds are raised to install an 18 kWh solar electric array, the Chapter anticipates the building will hit the net-zero energy goal. This is a significant achievement for grass-roots labor of love, which was made possible by tireless fundraising on the part of the Chapter. The building is a bright spot in the neighborhood and the Chapter uses it to educate the whole community by providing classes on sustainable living and efficient energy use. The June Key Delta Community Center shows that net zero is for everyone, and that you don't need a big budget to implement big ideas.

JUNE KEY DELTA AT-A-GLANCE

OVERVIEW

- 2,700 square feet
- Public assembly building
- Located in North Portland's Humboldt community

PROJECT TEAM

- Project owner–Portland Alumnae Chapter of Delta Sigma Theta Sorority
- Architect–Nye Architecture, LLC
- Construction–Colas Construction
- Electrical contractor–Affordable Electric, Inc.
- Landscaping–Verde Landscaping

ENERGY FEATURES

- Geothermal heat pump
- Energy-efficient lighting
- Daylighting controls
- Airside economizers

FINANCIAL ANALYSIS

- $10,000 cash incentive for technical assistance
- $10,000 cash incentive for early design assistance
- $5,000 cash incentive for commissioning assistance
- $6,257 cash incentive for equipment installations
- $1,962 estimated annual energy cost savings

ENERGY SAVINGS

- 25,547 estimated annual kWh saved

UTILITY

- Pacific Power

“We have created a space where people can see sustainability up front—touch it, see it, see the ramifications of what it can do.”

Chris Poole-Jones, project coordinator
June Key Delta Community Center

These projects demonstrate that net zero is within reach. Based on these successes, Energy Trust continues to support buildings owners who set net-zero goals by providing incentives for:

- Early design
- Energy modeling
- Additional energy-related design studies
- Energy-efficient equipment and solar technologies
- Commissioning

Ready to take the path to net zero? Energy Trust can help. To learn more, call **1.866.368.7878** or visit **www.energytrust.org**.

Energy Trust of Oregon 421 SW Oak St, Suite 300, Portland, Oregon 97204 1.866.368.7878 503.546.6862 *fax* **energytrust.org**