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NW 14th & Everett, US

Case Study 116

NW 14th & Everett is a historic building in Portland that was renovated into a modern and resource efficient commercial building that was certified to Leadership in Energy and Environmental Design (LEED) Platinum.

Aspects of Sustainability

This project highlights the following:

Green Aspects

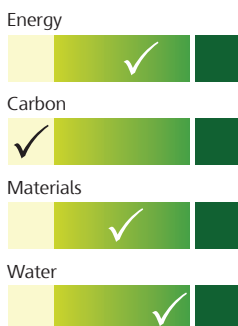
Energy
Carbon
Materials
Water
Local Impacts

Social Aspects

Human Resources
Corporate Community Involvement
Business Ethics
Health and Safety



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“One of our core philosophies is implementing as much sustainability in every project that we can. Why push sustainability on a historic renovation? Beyond the simple fact that it’s right thing to do, we think there’s a good business case for sustainability in buildings whether they are new or retrofitted.”

Patrick Wilde, VP of Development,
Gerding Edlen Development

Project Sustainability Highlights

Green Certification

- LEED Platinum

Economic

- US\$ 130 million in direct, indirect and induced economic impacts
- US\$ 9.7 million in federal and state tax revenue
- 69% operational savings
- 7.5 year Green investment payback period

Green

- 60% **Energy** savings
- 93.5% of construction **Waste** diverted from landfill
- 80% **Water** savings

Social

- Zero accidents
- Healthy indoor environments

Project Introduction

NW 14th & Everett is a newly refurbished commercial property situated in Portland's Pearl District. The building dates from 1927 and was previously used as a warehouse for a nearby furniture department store. The refurbished building is occupied by Gerding Edlen Development and Vestas Wind Systems, which has its North American headquarters in the building.

Skanska USA Building constructed the US\$ 27 million refurbishment for Gerding Edlen Development and the project was completed in April 2012. A new fifth floor was added to the building as part of the refurbishment, which increased the building's total floor space to 17,090 m², including the second floor parking garage. The project also added a large glazed atrium, which allows natural light into the core of the building. The building has the capacity to accommodate around 600 office workers.

NW 14th & Everett is certified according to LEED Platinum certified (LEED NC v2.2). LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to encourage and guide the construction of more sustainable and energy efficient buildings. The building is listed on the National Register of Historic Places, which required that the renovation's design conform to regulations regarding the preservation of its historic character. For example, wind turbines could not be used and the solar panels had to lie relatively flat on the roof in accordance with the regulations.

Contributing Toward Sustainable Development

The redeveloped 14th & Everett building is designed to use 60 percent less energy than the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standard and a roof-mounted solar array meets around 10 percent of the building's electricity needs. The project team implemented a comprehensive waste management plan during construction and environmentally responsible materials were incorporated into the project. The building is designed to use 80 percent less water than the US baseline and is designed to reduce stormwater runoff. In addition, the building promotes healthy working environments for occupants, is partially covered with a green roof, contributes toward a reduced heat island effect and has promoted sustainable urban development by reusing a previously developed site in downtown Portland. During construction, there were no Lost Time Accidents on site and the project team worked to raise public awareness of more sustainable buildings. The refurbishment project benefitted the regional economy by utilizing regional construction employment, materials and contractors. The energy and water efficiency measures reduce the building's annual operating costs by 69 percent and ensure that the building's Green investments will be repaid in an estimated 7.5 years.



Green Aspects

Energy

Energy efficiency

The 14th & Everett building is designed to annually use 283 kWh/m² in total, which is over 60 percent less energy than the ASHRAE 90.1-2004 standard demands, and 50 percent less than a similar building built to the Oregon energy code.

A Variable Refrigerant Volume (VRV) HVAC (Heating Ventilation and Air Conditioning) system with a series of heat pumps and intelligent monitoring capabilities was installed in the perimeter areas of the building. The VRV system provides efficient HVAC by “moving” heating or cooling around the building’s perimeter, for example to allow the sunny side of the building to transfer heat to the shaded side. The ventilation system is also equipped with heat recovery units to reduce heating demands, and operable windows allow occupants to use natural ventilation. Under floor ventilation systems on floors 3-5 allow air to be introduced at lower speeds, which reduces the fan power required compared with conventional ventilation systems. Under floor air distribution systems and displacement ventilation systems consume between 15 and 30 percent less energy than conventional ventilation systems by reducing operating pressures, fan power and the level of cooling required.

Supplementary insulation was added to the building’s envelope to give the roof a U-value of 0.029, and new windows were installed with a U-value of 0.39, compared with a typical value of 0.45 for a newly built office building in the US. The building is equipped with a high efficiency condensing boiler and over 90 percent efficient hot water heaters. The lighting system includes daylight dimming controls and occupancy sensors, and the atrium allows natural light into the building, which reduces the need for artificial lighting. The lighting power in the office space is 5.81 W/m² and 1.18 W/m², which are both half that of typical US office buildings.

Other energy efficiency measures include the building’s high thermal mass due to its extensive exposed concrete floors and ceilings, which help to retain heat, and low-flow water fixtures that reduce hot water use by around 10 percent.

Renewable energy

A 125 kW solar array was installed on the roof of the building. The array annually generates around 112 MWh, which is approximately 10 percent of the building’s total annual electricity use, equivalent to the consumption of around

12 average US homes. The building’s owner has also purchased Renewable Certificates (RECs) equivalent to 67 percent of the predicted annual electrical consumption over an initial 2-year period.

Materials

Environmentally responsible materials

The project team gave preference to materials that were environmentally responsible. For example, only low VOC (Volatile Organic Compound) emitting paints, adhesives, carpets and wood glues were used and 80 percent of wood based construction materials were FSC (Forest Stewardship Council) certified. Around 20 percent of construction materials contained recycled content, such as the carpets, light fittings and partition panels. Ceilings were left as exposed concrete to avoid the need for interior cladding materials and existing workstations/furniture were reused as much as possible.

Waste management during construction

During construction, over 95 percent or 3,838 tons of the total construction waste was diverted from landfill. The team worked to minimize packaging, reused pallets and implemented comprehensive waste management processes. 77 percent of the existing envelope, interior structural wall, floor and roof elements were retained and incorporated into the refurbishment project.

Office waste management

The building has comprehensive office waste collection and storage facilities, including provision for cardboard, paper, plastic, glass and metals. There are also facilities to collect food waste for composting.

Water

Water efficiency

The building is designed to use 80 percent less water than the US baseline for the building, which is equivalent to 730 m³ of water savings per year. Low-flow water fixtures and dual flush toilets were fitted throughout the building. A 613 m³ rainwater collection system was installed, which meets the building’s entire toilet flushing and landscape irrigation needs. Native plants have been used to landscape the site in order to minimize the amount of irrigation required.

Stormwater management

The rainwater collection system and landscaping are designed to reduce the site stormwater runoff by 33 percent, both in terms of rate and quantity. Stormwater runoff from 90 percent of the average annual rainfall is captured and treated on site,



and approximately 80 percent of the annual post development Total Suspended Solids (TSS) is removed. As required by the municipality, bioswales were incorporated into the streetscape surrounding the building to reduce the quantity and improve the quality of stormwater runoff into the municipal stormwater system. Bioswales are landscape elements designed to remove silt and pollutants from surface runoff water. They also provide greenery at the streetscape level.

Other Green Aspects

Green roofing

Green roofing covers around 1,390 m² of the building's roof, which is equivalent to 27 percent of the site's total area. Green roofs provide additional thermal insulation and extend the roof's lifespan by protecting it from weathering and ultraviolet light. Roof vegetation can also provide habitats for birds and insects, filter airborne pollution and reduce stormwater runoff.

Reducing the heat island effect

The site's landscaping, green roofing and indoor parking contribute to a reduced urban heat island effect in Portland by minimizing the extent of dark and paved surfaces on the site.

Raising awareness of more sustainable buildings

The project team implemented a Public Education Program aimed at raising public awareness of the building's green aspects and its specific solutions. As part of the program, comprehensive signage was posted around the building to inform occupants and visitors of specific green solutions, and public tours were provided of the building.

Skanska is using the building as a case study for its participation in the Portland Development Commission's We Build Green Cities in order to raise awareness of green building successes in Portland. The program is intended to influence other US cities to build green buildings by providing tools and lessons learned.

Social Aspects

Occupational health and safety

There were no Lost Time Accidents on site during construction. Skanska followed its standard health and safety practices and procedures.

Healthy working environments

The building is designed to promote healthy working environments for occupants. Operable windows provide natural ventilation and the under floor air ventilation system is low-noise and avoids blowing dust and pollutants around the room compared with conventional ceiling ventilation systems. The ventilation system provides 30 percent more fresh air ventilation than ASHRAE standards require. Prior to initial occupancy, the building was flushed out with over 1,000 m³ of fresh air per 1 m² of floor area. The building is also equipped with a CO₂ monitoring system, which alerts building managers when CO₂ concentrations vary by 10 percent or more from the predetermined set point, so as to maintain a healthy indoor air quality. All indoor adhesive and sealant products comply with LEED VOC (Volatile Organic Compounds) requirements, and the building's total VOC budget is within the allowed LEED level. All indoor wood

and agrifiber materials used on the project contain no urea-formaldehyde.

The large windows and glazed atrium allow plenty of natural light to penetrate the building. 98 percent of all regularly occupied areas have a direct line of sight to views through exterior windows. The rooftop patio offers panoramic views, and provides opportunities for occupants to relax. Individual workstations have lighting and thermal controls to allow all building occupants to make adjustments to suit individual task needs and preferences.

The project team developed and implemented a comprehensive Green Housekeeping Plan, which includes contractual obligations and processes to ensure that cleaning contractors comply with LEED requirements regarding procedures and chemicals.

Contributing toward sustainable urban development

The project contributed to urban redevelopment by renovating the district's largest remaining vacant warehouse. NW 14th & Everett is situated in a dense urban neighborhood and is within walking distance of shops, restaurants and other urban amenities. The project also helped to encourage Vestas to remain in Portland, which is economically important for the city.

Promoting more sustainable modes of transport

The building has bicycle storage for 17 percent of building occupants, shower and changing facilities, and a bicycle route runs adjacent to the building. There are four electric vehicle charging stations in the parking garage, which equates to 5 percent of the building's total vehicle parking capacity. 5 percent of the parking is also exclusively designated for car pool parking. Two bus lines, a streetcar line and a light rail line run close to the building.

Economic Impacts

Regional construction employment, materials and contractors

Approximately 125 craft people worked on the project at the peak of construction. An economic study estimated that around 650 construction-related jobs in total were created as a result of the project. None of the jobs were permanent, but most were full-time and a direct result of the project. The study also calculated that the project led to around US\$ 130 million in direct, indirect and induced economic impacts, and that



it generated around US\$ 9.7 million in federal and state tax revenue.

Efficiency savings

The energy and water efficiency measures reduce the building's annual operating costs by 69 percent. The savings ensure that the building's green investments will be repaid in around 7.5 years.

Financial incentives

The project and Vestas received several financial incentives, including Green Investment Funding, support from the Energy Trust of Oregon, Business Energy Tax Credits, Solar Investment Tax Credits and an EPACT (Energy Policy Act) Deduction.

Learning From Good Practice

Skanska and other project partners have used the NW 14th & Everett project to demonstrate that the extensive redevelopment and green retrofit of an existing building makes good financial and business sense.