



Bond Program Building Our Future

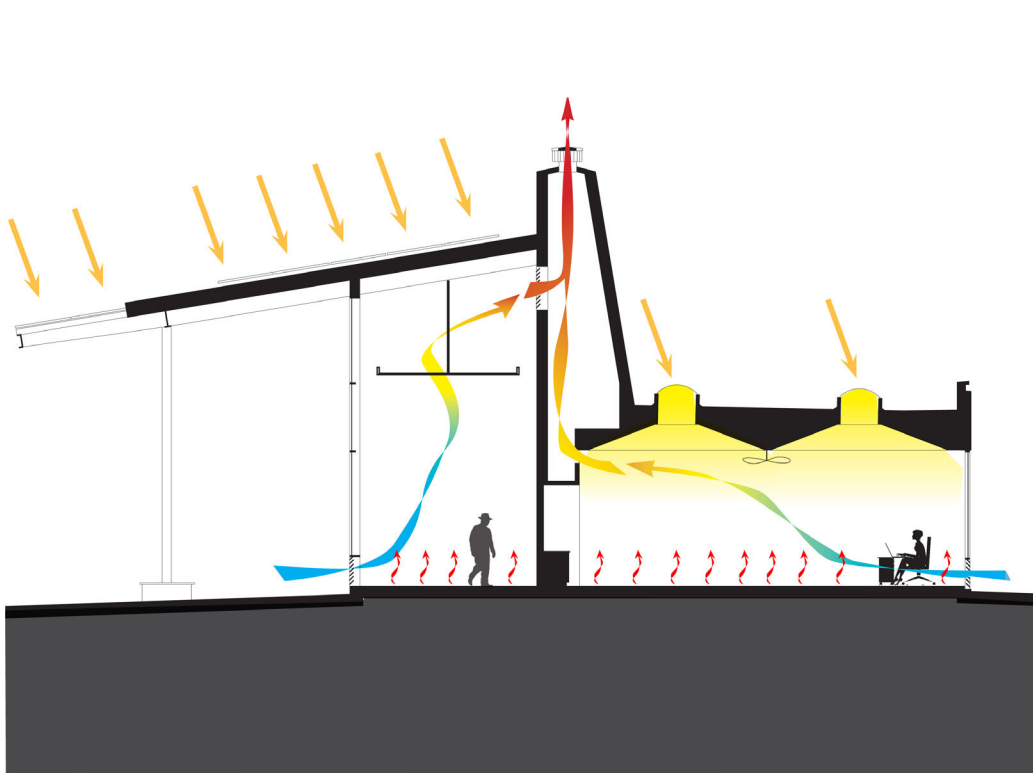
The Portland Community College Newberg Center has been designed to be the first Net-Zero higher education building in Oregon and the second in the United States. To achieve Net-Zero (defined as generating as much energy as it consumes over the course of a year), the building was designed to reduce overall energy consumption by 80% compared to standard higher education academic buildings in the United States. The remaining energy needs are met with a 100kW, rooftop-mounted, solar panel array.



DAYLIGHTING -
To reduce the building's energy use by over 15%, skylights in the classrooms and administrative area are integrated into a sloped ceiling system designed to provide even and diffused light without the need for electric lights. Skylight louvers track the lighting level in the room and open and close as necessary to maintain comfortable light levels. In the large Commons area, tall glass walls allow daylight deep into the building.



NATURAL VENTILATION AND COOLING -
Fresh air is provided through louvers located on the exterior walls of the building. When fresh air is needed, the louvers automatically open. With the help of roof-mounted ventilation turbines, cool outside air is drawn in through the louvers while hot air is released through the five stacks along the building's central spine in what is known as the "Stack Effect" - the tendency for hot air to rise. The ventilation turbines encourage the "Stack Effect" by spinning at very small wind speeds. This motion creates a vacuum on their leading edge that helps pull hot air out of the building.



SUPER INSULATED ENVELOPE -
The building's roof and walls were built using Structurally Insulated Panels (SIPs) - thick sections of foam insulation sandwiched between two layers of oriented strand board. The panels provide high R-values for insulating the building, reduce thermal bridging, and create a tight building to prevent heat loss through air infiltration. The patterning of solid and glass in the building's glass walls help maximize daylight while maintaining appropriate levels of insulation.



FANS -
In addition to creating an efficient building, energy savings has been achieved by expanding the thermal comfort range 1 degree in each direction. PCC's standard temperature range is 69 degrees F for heating and 77 degrees F for cooling. At the Newberg Center, the range has been set to 68 degrees F for heating and 78 degrees F for cooling. Fans in the classrooms, offices, and Commons help keep the building comfortable on hot days by making the building feel 3 degrees cooler through air movement.



RADIANT HEAT -
Heat is provided through a radiant slab system - plastic tubing embedded in the concrete floor. Warm water circulating through the tubes warms the concrete floor to provide a consistent even indoor temperature. During colder months, 90 degree water in the tubing will provide an ambient temperature of 68 degrees. Radiant systems are efficient because they heat the people instead of the air while avoiding uncomfortable drafts like forced air.



SOLAR PANELS -
Through sustainable design, the building uses 55.5% less energy than allowed by the Oregon Energy Code. The remaining energy needs are generated through a 100kW rooftop photovoltaic system - a 25kW bi-facial solar panel array that covers an outdoor courtyard and a 75kW array mounted on the standing seam roof. To be truly "Net-Zero" the building systems and equipment were selected to use only electricity for power - no natural gas.



THERMAL MASS AND NIGHT FLUSH -
The lower system, in conjunction with the exposed concrete floor and concrete shear walls, also helps keep the building cool. During the warmer months of the year, the exposed concrete walls and floor act as thermal mass, absorbing heat from the surrounding air during the day to keep the indoor temperature cool. At night, the lower system opens to allow the cool night air to move through the building, expelling hot air out through the stacks and removing the built-up heat from the concrete.



PLUG LOADS -
Critical to creating a Net-Zero building was keeping the building's overall energy use low. Strategies that were employed include:

- Laptops in place of desktop computers in the Computer Lab and throughout the Center
- High-efficiency vending machines and reduction of total number of vending machines
- Non-refrigerated drinking fountain



The Newberg Center was made possible through a 2008 voter-approved bond measure
Website: bond.pcc.edu