PROJECT BRIEF

Chemeketa Community College Variable Refrigerant Flow

June 2012

Project Description

The new 59,000 square foot Chemeketa Community College building in McMinnville, Oregon, includes classrooms, offices and laboratory spaces. This three-story building will showcase energy-efficient design with its high performance envelope and Heating, Ventilation, and Air Conditioning (HVAC) system.

Choosing a VRF System

A Variable Refrigerant Flow (VRF) system was chosen to heat and cool this Yamhill Campus facility. The VRF system with a dedicated outside air system serves most of the building, with the exception of the lab classrooms on the third floor. This VRF system has an integrated energy efficiency ratio (IEER) of 16, which is much higher than the code minimum energy efficiency ratio of 11. With the high IEER and the ability to transfer heat between zones, this is a very efficient system.

The VRF system has:

- 9 outdoor units totaling 120 tons and
- 57 indoor units totaling about 140 tons.

Energy Savings

The Chemeketa Community College building is part of the Oregon's State Energy Efficient Design Program (SEED), which requires 20% less energy use than an identical building meeting code. Building design began with energy modeling of the code baseline building, which was assumed to have a variable air volume (VAV) system with electric re-heat; then improvements were modeled.

Chemeketa Community College

The owner's goal was to be 40 percent more efficient than an identical building meeting code, and modeling indicated the new facility should come very close to meeting this goal. The building energy efficiency features include:

- A high performance envelope with increased insulation, better windows, and reduced infiltration to reduce the heating and cooling requirements;
- Room occupancy sensors, which adjust thermostat temperatures.
- Daylight sensors which automatically adjust electrical lighting levels;
- Energy recovery ventilators (ERVs) to preheat fresh air and
- An efficient Variable Refrigerant Flow (VRF) system to optimize heating and cooling.

VRF System Cost

The VRF system cost was estimated at $20.00 per square foot and the VAV system was estimated at $13.00 per square foot. The actual cost for the VRF system after incentives was $16.50 per square foot, so the VRF system incremental cost was $3.50 per square foot, resulting in a 5-year payback. with unitary single-zone RTUs in good condition and over 5 tons of cooling capacity.

Utility Incentives

Chemeketa received a $147,608 check from McMinnville Water & Light for all of the energy-saving improvements. McMinnville Water & Light also helped find energy savings opportunities beyond what was included in the original design. The building is expected to use 500,000 fewer kilowatt hours per year, representing annual cost savings of $25,000.

Chemeketa documented energy saving features, costs and modeled savings to McMinnville Water and Light to receive the incentives. The project may also qualify for Oregon Business Energy Tax Credits, using the pass-through option.

Feedback

Owner:

"It's really outstanding to become recognized for something that has become part of our regular practice at the college, which is to be a good steward of our resources, not just today, but in the future."
—Cheryl Roberts, Chemeketa Community College President

Owner:

"Having the ability to monitor and make changes remotely, using the VRF system software has provided a comfortable environment."
—Jerry Vessello, Chemeketa Community College Capital Project Manager

Architect:

"We selected the VRF system for two primary reasons: space savings and building efficiency. The space savings comes from the elimination of a significant amount of ductwork, freeing up ceiling space for other utilities."
—Mr. Fred Harris, Carlson Veit Architects, Salem, Oregon

Engineer:

"The design used the manufacturer's 'design tool,' to ensure proper refrigerant charge, pipe lengths and refrigeration quantities."
—Rick Hartung, Glumac