

CASE STUDY

IT'S A NEW DAY FOR EFFICIENCY AND COMFORT AT PORTLAND PRESCHOOL

PRESCHOOL MATCHES EFFICIENT BUILDING PRACTICES WITH NET-ZERO AMBITIONS

In operation for more than 40 years, New Day School is a longstanding Portland, Oregon, preschool with a deep commitment to environmentally friendly and sustainable practices. When New Day School's Kishalay building required a renovation, the preschool's leadership team quickly committed to adopting advanced practices and products to ensure the renovations would result in a net-zero energy building.

In addition to applying passive building principles that optimize heat gains and losses throughout the building, the building operators added a 45.5 kW solar photovoltaic (PV) system that provides enough annual energy for two buildings at the preschool.

With these decisions in place, the preschool needed a highly efficient HVAC system to reduce HVAC energy use while improving the indoor air quality and maintaining a high level of comfort for students, teachers and staff. Following guidance from their contractor, Green Hammer, the preschool found the ideal HVAC solution with a very high efficiency dedicated outside air system (very high efficiency DOAS).



PROJECT OVERVIEW



BUILDING TYPE

Urban preschool



PROJECT FLOOR AREA

2,900 sq. ft.



TOTAL PROJECT COST

\$22.80 per sq. ft.



REDUCTION IN BUILDING ENERGY USE

50%



ENERGY UTILITY

Portland General Electric

HIGH-PERFORMANCE HVAC PUTS ENERGY WASTE IN TIME-OUT

Representing the next step in the ongoing evolution of HVAC design, very high efficiency DOAS utilizes the most efficient HVAC systems and design principles to provide better indoor air, while reducing commercial building HVAC energy use by an average of 65%.

Very high efficiency DOAS combines high-efficiency HVAC equipment with the dedicated outside air system (DOAS) approach that separates heating and cooling from the ventilation. This separation allows for optimal and efficient control of each of these critical building functions. The system utilizes heat recovery ventilation (HRV) to extract/reject heat from the stale indoor air, and brings in 100% fresh, filtered outdoor air throughout the building.

The result is a healthy and efficient HVAC solution that reduces overall commercial building energy use by an average of 36%. And, by significantly reducing or eliminating the recirculation of air between spaces, very high efficiency DOAS reduces the recirculation of pollutants and contaminated air to improve occupant health, comfort and overall satisfaction.

The school's new HVAC system benefits the students, teachers, staff and building operators by providing:

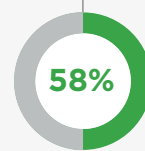
- Better indoor air quality due to 100% filtered outside air being brought into the space, with little recirculation
- Increased occupant comfort through improved temperature stability and the ability to create zones with unique temperature controls
- Improved occupant productivity by improving indoor air quality and comfort
- Lower energy bills

"I think very high efficiency DOAS is a great choice for preschools to ensure high air quality at the developmental phase of a child's growth when their bodies are developing, their lungs are growing, and fresh air is so vital to their health. Teachers and staff feel safer in a building with a high standard of air filtration and flow. Knowing that stagnant air is moved out of the building and the incoming air is fresh and filtered makes everyone feel much safer."

— Didi Anandakrsnapriya,
New Day School Director

CONVERSION SUMMARY

Existing HVAC system:	Constant volume 5-ton packaged heat pump rooftop unit
New HVAC system:	2x 1.5-ton ductless heat pumps 1x 2-ton ducted mini-split heat pump 1 Ventacity VS1000RT HRV



reduction in total HVAC energy use



reduction in building energy use

HEALTHIER AIR WITHOUT THE ENERGY WASTE

By providing 100% filtered outside air, the very high efficiency DOAS system decreases contaminant spread. This healthy upgrade to enhanced ventilation helps dilute the concentration of virus-containing aerosols that can remain suspended in stagnant building air. In this way, very high efficiency DOAS could reduce the spread of infectious diseases like COVID-19.¹

However, unlike competing high-ventilation HVAC systems, very high efficiency DOAS does not increase energy costs despite providing 100% filtered outside air. Very high efficiency DOAS combines high-efficiency design principles and with high-efficiency products, such as an HRV with heat recovery and ultra high-efficiency fans, to keep energy use down.

For example, the Ventacity VS1000RT HRV installed at New Day School constantly changes ventilation rates by monitoring CO2 levels to know when buildings are unoccupied. By reducing ventilation rates when children and staff are outside, the HRV helps the building efficiently provide excellent indoor air quality, instead of unnecessarily running at full speed regardless of occupancy.



“The drastic difference in air quality is amazing! Before the renovation, our building was hot, stuffy and humid, and we had lots of odor issues in the classroom. Now the classroom air is fresh and odor-free. The air really does feel fresh and clean. With air quality such a major topic of discussion during the pandemic, it has been comforting to know we are having a constant exchange of fresh air in our buildings at all times.”

— Didi Jayagiita,
New Day School Teacher

RESULTS

These upgrades helped the New Day School become Oregon’s first net-zero-energy preschool. Their new HVAC system cut the building’s overall energy use in half, while enhancing the indoor air quality for students, teachers and staff. Building operators confirm that the new equipment has been operating reliably for the past year and a half, and the thermal comfort and indoor air quality have been consistently excellent. Recent measurements verify that the space temperature remains aligned with the 70F setpoint throughout the week, and the classroom CO2 levels maintained consistently safe levels.

¹ Based on findings from NEEA’s 2021 Covid-19 Risk Reduction Strategies and HVAC System Energy Impact Report: betterbricks.com/resources/covid-19-hvac-risk-reduction-strategies.



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