

## HVAC CASE STUDY

# Historic building leaves energy waste and toxic air in the past

## Advanced performance DOAS and HEPA filters bring energy savings, resiliency, and wildfire smoke mitigation to classic Portland building

Immediately recognizing the opportunity to reposition the National Historic Registered 1910 office building as a premiere property, the Seattle-based real estate investment firm, Unico Properties, acquired the Galleria building in 2018. Guided by their commitment to energy efficiency, innovation, and tenant well-being, Unico conducted a major retrofit of the downtown Portland building to achieve Energy Trust of Oregon's Path to Net Zero status and LEED Platinum certification.

Before SERA Architects moved into the top floor, they worked with Unico to further the building's revitalization by incorporating proven building renewal technologies and approaches, including an advanced performance dedicated outside air system (DOAS) and high efficiency particulate air (HEPA) filtration. They knew that doing so would provide their staff with the very best in indoor comfort, efficiency, air quality, and wildfire resiliency.

## High-performance HVAC offers year-round efficiency and comfort.

Honoring the Galleria's historic architectural beauty, SERA preserved its century-old character while modernizing its systems to enhance comfort, efficiency, and indoor air quality. To provide staff with premium comfort in every season while also meeting ambitious efficiency goals, SERA embraced the HVAC equipment and design principles of advanced performance DOAS, including:

## Project Overview



Building type:  
**Office building**



Location:  
**Portland, OR**



Year built:  
**1910**



Project floor area:  
**40,000 sq. ft.**  
(top floor)



Energy utility/program:  
**Energy Trust of Oregon**



Reduction in whole-floor EUI: **62%<sup>1</sup>**

- **A DOAS approach** that separates heating and cooling from the ventilation equipment
- **High-performance electric heat pumps** that meet ENERGY STAR® performance standards
- **High-efficiency heat recovery ventilators (HRVs)** that recover more than 82% of the sensible heat from the stale indoor exhaust air, while delivering 100% fresh, filtered outdoor air at neutral temperatures to the building
- **Right-sized heating and cooling equipment**

## Strengthening indoor resilience during wildfire and severe air pollution events.

Equipped with active, passive, and outdoor air quality (OAQ) modes, Galleria's new HVAC system is able to adjust automatically to enhance efficiency and comfort – even during the most extreme weather events. With wildfires increasing in frequency throughout the Western U.S., this feature is all the more crucial to ensure the health, safety, and comfort of the Galleria's occupants.

The project team installed HEPA filters upstream of the HRV units to work in tandem with the system's OAQ mode, which engages temporary booster fans when outdoor sensors indicate poor air quality. Third-party measurement at the Galleria building confirmed that these mitigation strategies successfully reduced hazardous PM2.5 particulates by 85% in completed tenant spaces, while only adding an energy use intensity (EUI) of 0.06 kBtu/sq. ft./year to annual energy bills. The Galleria building's occupants can now rest easy knowing that their indoor air will remain clean, safe, and comfortable, regardless of what's happening outside.

## Robust third-party measurement confirms outstanding system performance

Upon system installation, the Northwest Energy Efficiency Alliance funded a living laboratory retro-commissioning study of the advanced performance DOAS. With 15-minute interval data provided by a wide range of sensors, including those tracking energy use, electrical demand, indoor air quality, and outdoor weather, the analysis team compiled and investigated a wealth of system performance and occupant comfort information.

In addition to contributing to the advanced performance DOAS's well-documented ability to deliver clean indoor air, comfort, and efficient operations, the study confirmed that combining the system's enhanced controls with HEPA filtration can provide significant protection from even the most extreme outside weather events.

## Conversion summary

|                                  |                                                                                                                                                                                                                                                                                      |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pre-existing HVAC system:</b> | <ul style="list-style-type: none"> <li>• 12x 10-ton constant-volume packaged gas RTUs</li> </ul>                                                                                                                                                                                     |
| <b>New HVAC system:</b>          | <ul style="list-style-type: none"> <li>• 96-ton VRF heat pumps with zonal control</li> <li>• Heat pump RTU serving the breakroom</li> <li>• 4x Ventacity VS 1200CMh HRV with central scheduling and onboard DCV controls</li> <li>• HEPA filtration upstream of HRV units</li> </ul> |



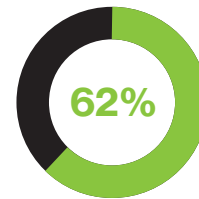
The Galleria building serves as a strong example of non-energy benefits offered by net-zero buildings. These strategic, comprehensive upgrades ensure the building will have significantly reduced energy use, while supporting occupants with a safer, healthier, and more comfortable indoor experience.”

— Shelly Carlton, Senior Program Manager – New Commercial Construction, Energy Trust of Oregon

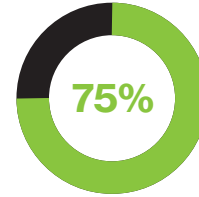
## Results

The new HVAC system provides a variety of benefits to employees, clients, owners, and operators, including:

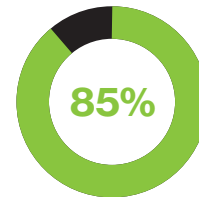
- **Enhanced indoor air quality** due to filtered 100% outside air coming into the space, with less recirculation between rooms than the pre-conversion system
- **Increased occupant comfort** through improved temperature stability and the ability to create zones with unique temperature controls
- **Reduced energy use** resulting in lower operating and energy costs
- **Achieved whole-building building certifications** including Energy Trust of Oregon Path to Net Zero status, LEED Platinum certification, and Fitwel 2-Star



Reduction in overall office space EUI<sup>2</sup>



Reduction in HVAC EUI<sup>3</sup>



Reduction in hazardous PM2.5 particulates in indoor spaces



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Project partners: **SERA Architects, Walen Construction, Fortis Construction, Ecotope**

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The Galleria building is now a paragon for energy efficiency. Upgrades including the advanced performance DOAS will deliver long-term value by reducing operational costs, enhancing tenant satisfaction, and supporting environmental goals. These benefits make this a resilient and attractive investment in any market condition.”

—Anita Jeerage, Vice President Sustainability & ESG, Unico

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<sup>1</sup>SERA Architects: Galleria Fifth Floor Field Study. Ecotope, December 2024.

<sup>2,3</sup>Compared to modelled pre-conversion system baseline (12x 10-ton constant volume packaged RTUs with gas heat and DX cooling).

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To learn more about advanced performance DOAS, visit [betterbricks.com/apdoas](https://betterbricks.com/apdoas).