CASE STUDY
LEGAL FIRM OBJECTS TO OLDER BUILDING’S INEFFICIENCIES AND DISCOMFORT

OLD BUILDING COMES WITH AGE-OLD INDOOR COMFORT PROBLEMS

Local law firm Immix Law Group purchased the upper floor of a 1909, two-story historic building in the once-industrial area of Northwest Portland. Vacant for nearly three years, the 12,000-square-foot space presented many comfort challenges. Air leaked between floors, the fresh air dampers were all closed shut, and the oversized existing HVAC system was aging and inefficient.

Before they moved in, the law firm was committed to providing year-round indoor comfort for their team and their clients. To get there, they chose an HVAC configuration that would provide consistent temperatures and high indoor air quality across their approximately 30 office spaces, five conference rooms, lunch room, exercise room, two sets of restrooms, and open common and utility spaces.

PROJECT OVERVIEW

BUILDING TYPE
OFFICE

YEAR BUILT
1909

FLOOR AREA
12,000 sq. ft.

ENERGY UTILITY/PROGRAMS
Energy Trust of Oregon

TOTAL PROJECT COST
$15.61 per sq. ft.

REDUCTION IN ENERGY USE
61%
HIGH-PERFORMANCE HVAC BRINGS EFFICIENCY, TEMPERATURE CONTROL AND IMPROVED AIR QUALITY

The owners decided to update their space with efficient equipment that would not only safeguard occupant comfort, but also reflect the firm’s commitment to sustainability and energy efficiency. “We want to be good stewards,” said Emily Wooton, COO of Immix Law Group. “Being a Certified B Corp, energy efficiency is very important to us.”

After looking into their options, the firm discovered that a very high efficiency dedicated outside air system (also referred to as VHE DOAS) was an ideal HVAC solution to meet their needs. DOAS applies the concept of separating heating and cooling from the ventilation system, which allows for optimal control of each of these critical building functions. The system installed for Immix Law Group improves this concept by focusing on efficiency and pairing a high efficiency heating and cooling system with a very high efficiency heat recovery ventilator (HRV). This combination results in:

- Improved indoor air quality due to 100% outside air being brought into the space
- Lower energy bills because the very high efficiency HRV allows for a smaller heating and cooling system that runs less often
- Precise temperature and humidity control

RESULTS

Immix combined their HVAC upgrades with additional energy efficiency improvements by working with Energy Trust of Oregon. Energy Trust helps Oregon businesses and residents benefit from energy-saving solutions by providing cash incentives and technical assistance. Together they identified an incentive package best suited to meet the building’s needs, that included the VRF and HRVs as well as LED lighting, windows and insulation.

Thanks to the very high efficiency DOAS upgrade, the firm is enjoying significantly reduced heating and cooling costs, improved comfort and better air quality. “One of the best benefits has been the quality of air,” said Wooton. “It’s just superior. If you’re to walk in the hallways, you won’t see particulates flying. When the sun shines in, the air is clear and it’s light and it’s crisp and it’s fresh.”

“Our bills range from $300 to $700 for 12,000 square feet, no matter if it’s 100 degrees outside or it’s a snowpocalypse.”

— Emily Wooton
COO, Immix Law Group

To learn more about this and other efficient commercial HVAC solutions, visit BetterBricks at betterbricks.com/solutions/hvac.
ADVANCES IN HVAC IMPROVE INDOOR AIR QUALITY AND REDUCE ENERGY USE

Dedicated outside air systems (DOAS) apply the concept of separating heating and cooling from the ventilation system, which allows for optimal control of each of these critical building functions. A very high efficiency DOAS (also referred to as VHE DOAS) improves this concept by focusing on efficiency and pairing a high-performance heating and cooling system, such as a heat pump or VRF, with a very high efficiency heat recovery ventilator (HRV) or energy recovery ventilator (ERV).

The HRV/ERV provides ventilation to occupied spaces independently from heating and cooling, and pre-conditions incoming fresh air by recapturing heat (or rejecting it when in cooling mode) from the outgoing air stream. This configuration significantly reduces commercial building energy use, allows for a more compact system and smaller ducts, and improves the building's indoor air quality with 100-percent fresh, outside air for ventilation.
ENERGY SAVINGS POTENTIAL IN THE PACIFIC NORTHWEST

Preliminary analysis of eight pilot projects conducted in the Pacific Northwest shows an average of 41 percent whole building energy savings and 63 percent HVAC savings over code minimum replacement of the existing equipment. For modeled prototypes with electric heat using the same baseline comparison case, whole-building savings averaged 22 percent, with HVAC savings averaging 53 percent.

THE MANY WAYS HIGH-PERFORMANCE DOAS SAVES ENERGY

Because it is coupled with an HRV/ERV, very high efficiency DOAS achieves its most substantial savings from right-sized (or down-sized) high-efficiency heating and cooling equipment. And by separating ventilation from heating and cooling, there's additional energy savings from reductions in fan energy for heating and cooling and ventilation.

The reduced volume of air running through the heating and cooling equipment requires less energy to meet the combined space load and reduced load of the ventilation air, which is delivered a few degrees from room temperature. There are also significant potential peak-demand reductions depending on the existing system type and climate.

IDEAL BUILDING APPLICATIONS

Very high efficiency DOAS is ideal for most small-to-medium commercial new construction buildings, major renovations, and in retrofit applications. Packaged rooftop unit (RTU) replacements in small and medium commercial buildings are an ideal application for this high-performance HVAC concept. In existing buildings, this system replaces conventional, simple HVAC equipment, like RTUs, through a system conversion. In new construction, it is included in the planning and design process from the outset. Some building uses such as restaurants, hospitals and warehouses are less ideal for this application and require careful analysis and design to be effective.

BENEFITS

- Lowers energy bills by decoupling the ventilation from the heating and cooling system, allowing for smaller equipment

- Utilizes the highest efficiency HRV/ERV technology available

- Improves indoor air quality due to 100 percent outside air with no recirculation

- Maintains verifiable control of ventilation supply, while minimizing contaminant spread

- Enables demand control ventilation (DCV) to ensure rates reflect occupancy patterns and rely less on pre-programmed schedules

- Fewer components combined with advanced controls help simplify or reduce system maintenance and operation

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CASE STUDY
OREGON DEPARTMENT OF FISH & WILDLIFE REELS IN ENERGY SAVINGS AND INDOOR COMFORT

AGING HVAC SYSTEM AND POOR VENTILATION SPURS COMFORT UPGRADES

The aging HVAC system at the Oregon Department of Fish & Wildlife's district office complex in Corvallis resulted in high energy costs and limited comfort control for tenants. The HVAC system struggled to provide consistent temperatures across 13,200 square feet of conditioned floor area, made up of four separate buildings sharing concrete walls and the various zones within the buildings. The building managers knew any retrofit project would be difficult due to the complex's unconventional arrangement.

“We needed to replace the heating and cooling system because it was old,” said Ryan McCormick, chief engineer at Oregon Fish & Wildlife. “Looking into it, we realized there was a better way to do it, with energy savings that would help cover long-term costs.”

Installation of the Ventacity HRV
SEPARATING VENTILATION TO IMPROVE AIR QUALITY AND EFFICIENCY

Due to the complex's size and the zonal layout of the combined buildings, building management resolved to do a partial replacement of their HVAC equipment, using the very high efficiency dedicated outside air system (also referred to as VHE DOAS) approach. They started with the replacement of one RTU with plans to upgrade their second RTU servicing additional areas of the building if the new, high-performance HVAC system proved successful.

DOAS applies the concept of separating heating and cooling from the ventilation system, which allows for optimal control of each of these critical building functions. The new system improves this concept by focusing on efficiency and pairing a high efficiency heating and cooling system with a very high efficiency heat recovery ventilator (HRV). This combination results in:

- Improved indoor air quality due to filtered 100% outside air being brought into the space
- Lower energy bills because the very high efficiency HRV allows for a smaller heating and cooling system that runs less often
- Precise temperature and humidity control

“"This project helps the facility reduce the cost of heating and cooling, and it contributed to the State of Oregon meeting energy reduction goals.”

- Ryan McCormick, P.E., M.S.C.E.
  Chief Engineer, Oregon
  Department of Fish & Wildlife

CONVERSION SUMMARY

<table>
<thead>
<tr>
<th>Existing HVAC system:</th>
<th>2 RTUs</th>
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<tbody>
<tr>
<td>New HVAC system:</td>
<td>1 Mitsubishi multi-zone heat pump</td>
</tr>
<tr>
<td></td>
<td>1 Ventacity VS1000RT HRV</td>
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| reduction in HVAC energy use | 72% |
| reduction in correlated building energy use | 39% |

Note: The HVAC upgrade was limited to two of the five zones, and saved 8% in whole building energy use and 15% in HVAC energy use. The results in the graphs above are extrapolated and represent whole-building impacts if all systems were converted in the same manner for a more accurate illustration of total HVAC and whole-building outcomes.

RESULTS

After experiencing heating and fan energy savings, along with a significant reduction in monthly peak demand, the building management team immediately began to plan further HVAC upgrades, including replacing the remaining RTU, across the complex. And while building management enjoyed the savings on monthly energy bills, the building's tenants appreciated their daily experience of improved indoor air quality.

"After the installation, everyone said 'wow, this air actually feels fresher',“ said McCormick. "There was definitely a noticeable difference—this was a much more comfortable environment. Other people in areas that hadn't yet been converted kept asking 'when are we getting our air fixed?'"

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