



Condair EcoPro Report

Hospital - Michigan, USA

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Project Context

Hospital - Michigan, USA

An energy analysis was conducted on a Hospital in Detroit to compare the operating costs of adiabatic versus electric isothermal humidification systems. The goal was to evaluate whether the annual savings from adiabatic technology could offset the lower upfront cost of isothermal units.

The analysis compared the DL (Dual) and HP (High Pressure) adiabatic systems with the RS (Resistive) electric isothermal unit. While the adiabatic systems required a higher initial investment, the RS unit consumed roughly twice as much energy due to the facility's high humidification load and the demands of resistive humidification. This resulted in projected annual utility costs for the RS system being nearly double those of the adiabatic alternatives.

Overall, the analysis concluded that both adiabatic systems were more cost-effective over time, providing acceptable payback periods in addition to significant reductions in energy consumption.

Initial and installation costs are based on typical values for humidification capacity and air volume. For project-specific energy analysis, contact na.applications@condair.com. If the details are unknown, this analysis can be adapted to your location and utility prices.

Input Information

Utility Rate Information

Utility Type	Rate
Electricity Rate	0.1 \$/kWh
Electricity Demand Charge	5 \$/kW/month
Natural Gas Rate	0.03 \$/kWh
Propane Rate	0.04 \$/kWh
Central Steam Rate	0.0075 \$/lb
District Heating Rate	0.08 \$/kWh
Water Rate	0.058 \$/ft³
Sewer Rate	0.05 \$/ft³

Analysis Setup

Building	
Project Location WMO	997293
Climate Zone	5
Building Type	Healthcare
Total Floor Area	148000 sq.ft
Window to Wall Ratio	30 %
Height Calculation	Ceiling Height
Ceiling Height	12 ft
Number of Floors	2
Envelope Performance	ASHRAE 90.1-2019
Infiltration	Airtight Building

Building Density	Peak	Off-Peak
Lighting	1.04 W/ft²	0.21 W/ft²
Sensible Equipment	1 W/ft²	0.2 W/ft²
Latent Equipment	0 W/ft²	0 W/ft²
Average Occupancy	53.82 ft²/person	269.1 ft²/person

Building Setpoints	Setpoint	Setback
Cooling	72 °F	81 °F
Heating	72 °F	64 °F
Humidification	40 %	20 %
Dehumidification	60 %	85 %

Operational Schedule - Peak Hours	Begins	Ends
Sunday	00:00	24:00
Monday	00:00	24:00
Tuesday	00:00	24:00
Wednesday	00:00	24:00
Thursday	00:00	24:00
Friday	00:00	24:00
Saturday	00:00	24:00

Air System	
HVAC Air System Type	VAV
HVAC Cooling Type	DX
HVAC Heating Type	Heat Pump
Total Air Volume	55799 CFM
Minimum Outside Air	default
Fan Efficiency	70
Preheat Energy Source	Electricity
Preheat System COP	2
Cooling System COP	3
Include Economizer	Yes
Maximum Humidifier Size	N/A

Energy Recovery (optional)		
Recovery System Present	No	
Recovery Type	N/A	
	Summer	Winter

Energy Recovery (optional)		
Sensible Effectiveness	0 %	0 %
Latent Effectiveness	0 %	0 %

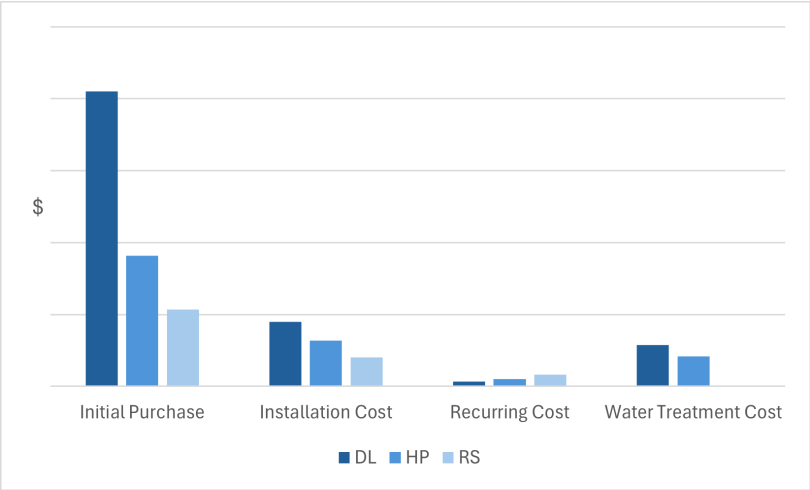
Product Comparison

Parameters	Product 1	Product 2	Product 3
System Type	In-Duct	In-Duct	In-Duct
Technology	DL-A	HP VFD	RS
Bypass Dampers	No	No	No
Initial Purchase (\$)	X	X (-) 55%	X (-) 74%
Installation Cost (\$)	X	X (-) 29%	X (-) 56%
One-Time Cost	0 \$	0 \$	0 \$
Recurring Costs (yearly \$)	X	X (+) 56%	X (+) 150%
Water Type	Reverse Osmosis	Reverse Osmosis	Potable
Water Efficiency	90 %	70 %	73 %
Water Treatment System			
Water Treatment System	MLRO	RO by Others	-- Select --
Water Treatment System Water Efficiency	75 %	75 %	0 %
Water Treatment System Purchase (\$)	X	X (-) 28%	0 \$
Steam Generation			
Facility Boiler Type	None	None	None
Facility Boiler Efficiency	0 %	0 %	0 %
Steam Distribution Losses	0 %	0 %	0 %

Financial Analysis

Financial Analysis	
Time Period	10 yrs
Utility Inflation Rate	5 %
Non-utility Inflation Rate	2 %
Discount Rate	10 %
Benefit	N/A

Initial Product Comparison



Comparison Summary

Condair Model	 DL-A Series	 HP VFD Series	 RS Series
System Type	In-Duct	In-Duct	In-Duct
Technology	DL-A	HP VFD	RS
Water Type	Reverse Osmosis	Reverse Osmosis	Potable
Water Treatment System	MLRO	RO by Others	N/A
Facility Boiler Type	None	None	None

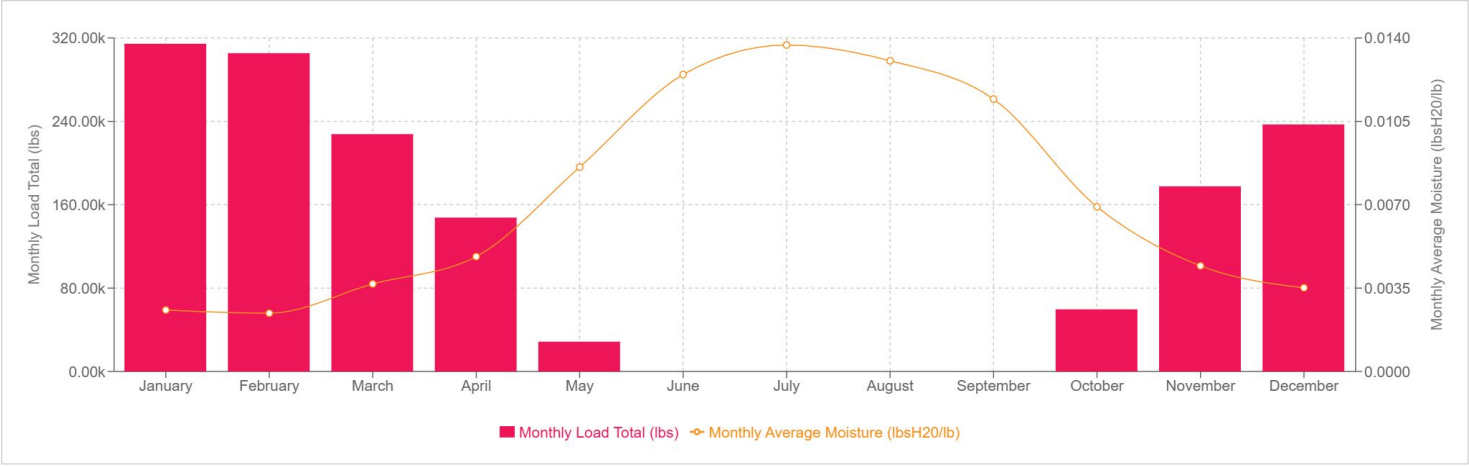
Energy and Water Usage Summary

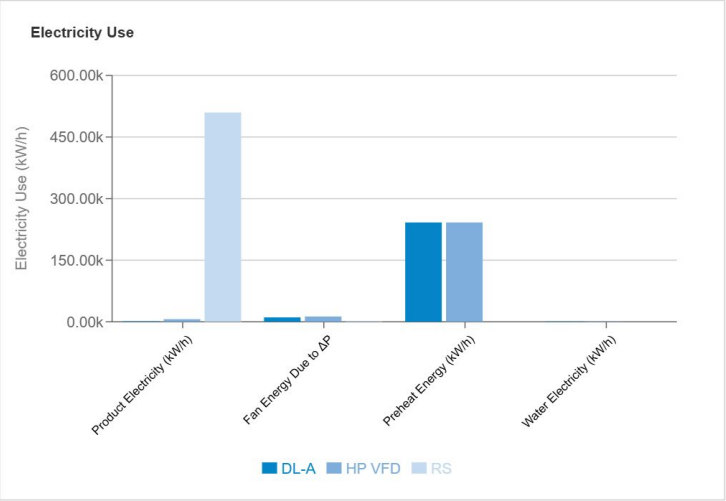
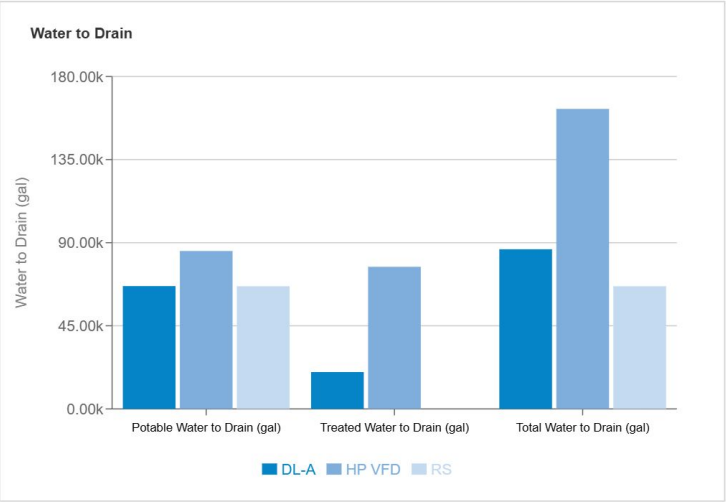
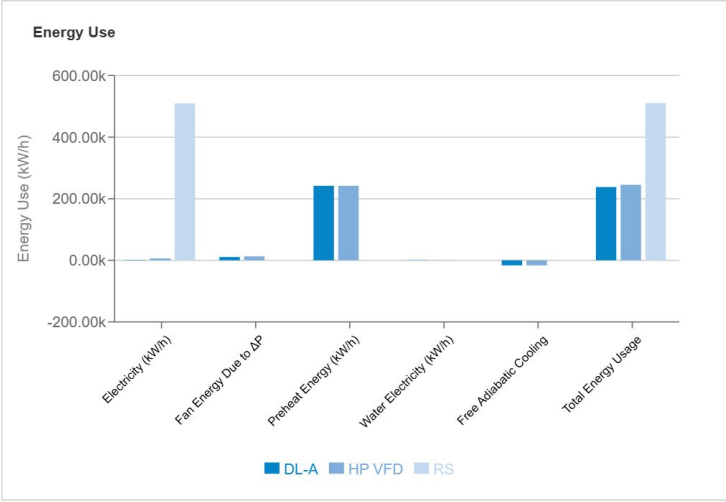
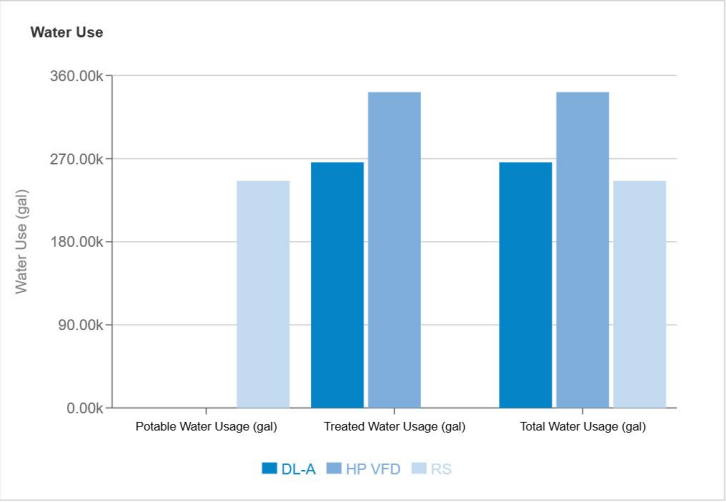
Condair Model	 DL-A Series	 HP VFD Series	 RS Series
Product Electricity Usage (kWh)	1,097	6,227	509,508
Fan Energy due to Pressure Change (kWh)	10,716	12,859	1,072
Preheat Energy (kWh)	241,889	241,889	0
Water Electricity Usage (kWh)	704	704	0
Boiler Electricity Use (kWh)	0	0	0
Product Gas Usage (kWh)	0	0	0
Gas Preheat Energy (kWh)	0	0	0
Boiler Gas Usage (kWh)	0	0	0
Adiabatic Cooling (kWh)	(16,467)	(16,467)	0
Total Energy Usage incl. Adiabatic Cooling (kWh)	 237,938	245,212	510,580
Potable Water Usage (gal)	0	0	245,966
Treated Water Usage (gal)	266,008	342,010	0
Total Water Usage (gal)	266,008	342,010	 245,966
Potable Water to Drain (gal)	66,502	85,502	66,411
Treated Water to Drain (gal)	19,951	76,952	0
Total Water to Drain (gal)	86,452	162,455	66,411

Energy and Water Analysis

Maximum Humidification Load	627.29 lbs / hr
Annual Humidification Hours	4,540 hrs

Monthly Load Total & Monthly Average Moisture



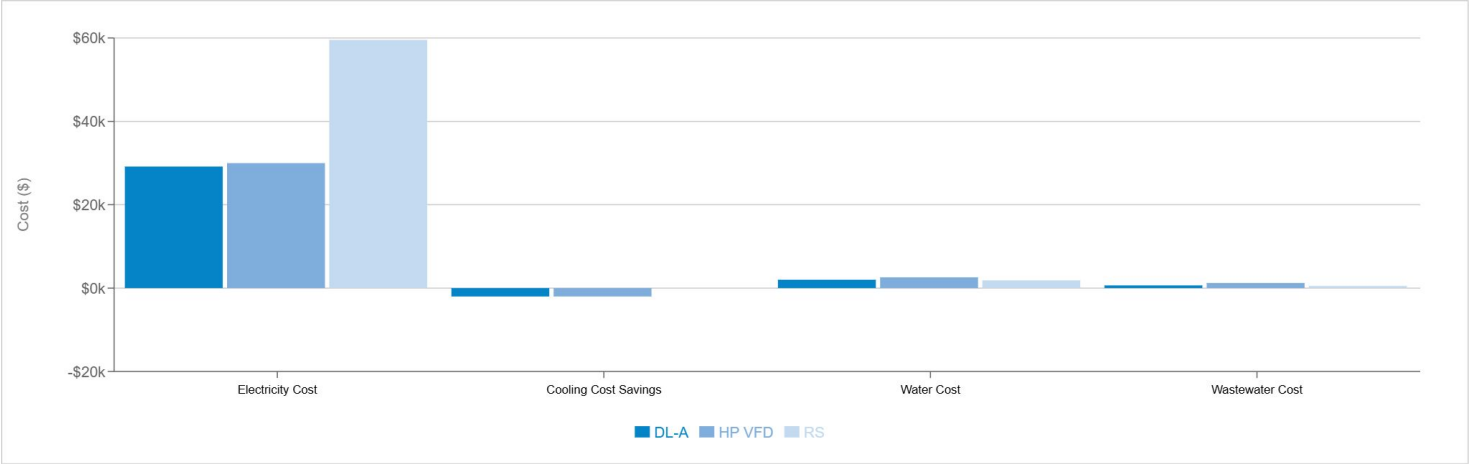


Financial Summary

Condair Model	 DL-A Series	 HP VFD Series	 RS Series
First Cost (\$)	X	X (-) 48%	X (-) 74%
Recurring Costs (\$)	X	X (+) 56%	X (+) 150%
Electricity Cost	\$29,162	\$29,980	\$59,532
Gas Cost	\$0	\$0	\$0
Cooling Cost Savings	(\$2,010)	(\$2,010)	\$0

Condair Model	 DL-A Series	 HP VFD Series	 RS Series
Water Cost	\$2,014	\$2,589	\$1,862
Wastewater Cost	\$654	\$1,230	\$503
District Steam Cost	\$0	\$0	\$0
Total Utility Cost incl. Cooling Savings	 \$29,820	\$31,789	\$61,897

Yearly Cost Summary



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