

EcoPAS Cost Effectiveness Per EPA Cost Control Manual for Nonpackaged (Custom) Refrigerated Condenser Systems

CAPITAL COSTS

Purchased Equipment Costs	Cost (\$) ^{1,2}	Input Information / Notes
EcoPAS Unit(s)	\$270,000	Vendor quote PAS-100 system price at time of initial acquisition
Instrumentation	\$1,850	Site specific data: Glycol temperature sensor, pressure sensor in manifold pre-PRV, and self-powered logger
Sales Taxes	\$8,971	Estimate of 3.3% of EcoPAS unit and instrumentation costs.
Freight	\$1,500	Vendor quote site specific data
Total of Purchased Equipment Cost (PEC)	\$282,321	Total of previous Purchased Equipment Costs inputs

Direct Installation Costs	Cost (\$) ^{1,2,4}	Input Information / Notes
Foundations and Support	\$10,200	Vendor quote site specific data
Handling and Erection	\$21,093	Vendor quote site specific data
Electrical	\$4,743	Vendor quote site specific data
Piping	\$193,116	Vendor quote site specific data
Insulation	\$0	Included as part of EcoPAS unit cost
Painting	\$0	Not applicable
Total of Direct Costs	\$229,152	Total of previous Direct Installation Costs inputs

Other Direct Costs	Cost (\$) ^{1,2}	Input Information / Notes
Site Preparation	\$0	No site preparation was required
Buildings	\$0	No new buildings were required
Total of Other Direct Costs	\$0	Total of previous Other Direct Costs inputs

Indirect Costs (IC)	Cost (\$) ^{1,2}	Input Information / Notes
Engineering	\$2,400	Vendor quote site specific data
Construction and Field Expenses	\$14,116	0.05 PEC per vendor
Contractor Fees	\$28,232	0.10 PEC per vendor
Start-Up	\$0	Vendor provides start-up as part of purchase.
Performance Test	\$0	Not applicable
Contingencies	\$8,470	0.03 PEC per vendor
Total Indirect Costs	\$53,218	Total of previous Total Indirect Costs inputs

TOTAL CAPITAL INVESTMENT (TCI)	\$564,691	Total of Purchased Equipment Costs, Direct Installation Costs, Other Direct Installation Costs, and Indirect Costs
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ANNUAL COSTS

Direct Annual Costs	Cost (\$/yr) ^{1,2}	Input Information / Notes
Operating Labor	\$2,700	Vendor quote site specific data (0.5 hrs of operating labor/day cellar crew, 0.5 hrs. lab crew @ \$30/hr.)
Operating Labor Supervisor	\$405	0.15 of Operating Labor based on EPA Cost Control Manual
Maintenance Labor	\$1,500	Vendor quote site specific data (50 man hours annual maintenance cleaning valves, etc. @ \$30/hr)
Maintenance Material	\$120	Vendor quote site specific data (cleaning supplies: citric acid, etc.)
Chiller (Glycol System)	\$650	Vendor quote site specific data (energy input into house chiller system)
Electricity	\$75	Vendor quote site specific data (Low current sensors, etc.)
Ethanol Disposal	\$14,992	\$1.00/lb per Greenbelt quote provided by MF Strange
Total Direct Annual Costs	\$20,442	Total of previous Direct Annual Costs inputs

Indirect Annual Costs	Cost (\$/yr) ^{1,2}	Input Information / Notes
Overhead	\$2,835	0.60 Labor and Maintenance Costs per EPA Control Cost Manual, Section 3, Chapter 2, Table 2.4
Administrative Charge	\$11,294	0.02 TCI per vendor
Property Taxes	\$484	Vendor quote site specific data (As assessed in 2017).
Insurance	\$847	Vendor quote winery PP&E insurance averages 15 basis points per \$100 asset value
Annual Source Test(s)	\$0	Not applicable
Total Indirect Annual Costs	\$15,460	Total of previous Indirect Annual Costs inputs

Annual Recovery Credits	Product Value (\$/yr) ^{1,4}	Input Information / Notes
Recovered ROCs	\$0	zero for this analysis

Capitol Recovery	Inputs ^{1,2,5}	Input Information / Notes
Equipment Life (years)	15	Per EPA Cost Control Manual Section 3, Chapter 2, For Refrigerated Condensers
Benchmark Interest Rate (%)	2.750	Department of the Treasury daily treasury yield curve rates for the specified equipment life ⁶
Incremental Risk (%)	2.000	SBCAPCD P&P 6100.064, Section 7.1 ⁷
Interest Rate- Rounded Up (%)	5.000	Calculated value per SBCAPCD P&P 6100.064, Section 7.1
Capital Recovery Factor	0.09634	Calculated value, see EPA Cost Control Manual for Annualized Cash Flow equation
Annualized Capital Recovery	\$54,404	TCI * Capitol Recovery Factor

COST EFFECTIVENESS

Capitol Recovery	Inputs ^{1,2}	Input Information / Notes
Total Annual Cost	\$90,306	Calculated Value: Total Direct Annual Costs + Total Indirect Annual Costs + Annualized Capitol Recovery - Annual Recovery Credits
Annual Tons Controlled	7.50	Annual Tons of ROC Controlled, see Emission Calculations tab.
Cost Effectiveness (\$/ton)	\$12,047	Calculated Value: Total Annual Cost / Tons Controlled

District Notes:

1. Red values denotes user inputs.
2. Use site specific data where able.
3. Percentages found in the "Purchased Equipment Costs", "Direct Installation Costs", "Other District Costs", and "Indirect Costs" are from Table 2.3 in the EPA Cost Control Manual (Link: <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#costmanual>).
4. If able, do not include "Direct Installation Costs" as part of the "EcoPAS Unit(s)" PEC cost.
5. Percentages found in the "Direct Annual Costs" and "Indirect Annual Costs" are from Table 2.4 in the EPA Cost Control Manual (Link: <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#costmanual>).
6. Daily Yield Curve Rates from the U.S. Department of the Treasury can be found online at: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>.
7. SBCAPCD Best Available Policy and Procedure 6100.064 can be found online at: <https://www.ourair.org/wp-content/uploads/6100-071-1.pdf>.

EcoPAS Notes:

1. Cost estimates reflect site specific data for the capture system currently installed at CCWS, with minor adjustments made to exclusively include all 400-series tanks.
2. The PAS-100 system has been sized as per District instructions of 8 turns/tank/season, and based on based on fermentation load balancing in the range historically observed (as constrained by harvest timing and daily crush capacity limitations).
3. System as installed is designed for resale of condensate, so all materials are food grade. If applicant were instead to plan on destruction or non-food-grade utilization of condensate, material savings could be realized.
4. Value of condensate/byproduct has been demonstrated as high as \$60/liter (when sold as an aromatic Wine Spirits Addition), which would equate to ~\$30K+/ton of VOC. Condensate value would eliminate or sharply reduce annual costs if processed for sale as a wine blending agent or spirit. However, we are not calculating any byproduct value for this estimate.
5. The EPA Cost Control Manual (Sixth Edition, Section 3.1, Chapter 2, "Refrigerated Condensers," p. 2-24) uses 15 years as the useful life term. The PAS condensation is system comprised primarily of stainless steel, with very few moving parts, is used only ~90 days/year, at very low pressures (less than 0.2 psi), with relatively narrow thermal cycles. For all of these reasons, the actual useful life is estimated to be 20-25 years. However, for the purposes of this modeling, we have left the 15-year assumption in place.

Annual Wine Fermentation Emission Calculations

Annual Wine Inputs

<u>Information</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Wine Tank Capacity.....	563,930	gallon	Permit Application
Percent Red Wine Usage.....	100	%	Reasonable Worst-Case
Red Wine Tank % Fill.....	80	%	SBCAPCD Default
White Wine Tank % Fill.....	90	%	SBCAPCD Default
Annual Red Wine Tank Turns.....	8	turns/yr	Reasonable Worst-Case
Annual White Wine Tank Turns.....	4	turns/yr	Reasonable Worst-Case
Emission Capture & Control Efficiency.....	67	%	Permit Application

Emission Factors

<u>Emission Source</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Red Wine Fermentation	6.20	lb/1000 gal	CARB March 2005
White Wine Fermentation	2.50	lb/1000 gal	CARB March 2005

Wine Production

<u>Information</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>	<u>Reference</u>
Red Wine Fermentation Capacity.....	451,144	gallon	Calculated	
White Wine Fermentation Capacity.....	0	gallon	Calculated	
Annual Red Wine Fermentation.....	3,609,152	gal/yr	Calculated	
Annual White Wine Fermentation.....	0	gal/yr	Calculated	

Wine Fermentation ROC Potential to Emit

	TPY
Red Wine Fermentation Emissions	11.19
White Wine Fermentation Emissions	0.00
Total Emissions	11.19
Controlled Emissions	7.50