

## David I. Harris

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**From:** Patrick Thompson <pthompson@eco-pas.com>  
**Sent:** Monday, January 8, 2018 12:35 PM  
**To:** David I. Harris  
**Subject:** Re: Cost Data  
**Attachments:** EcoPas Cost Effectiveness Calculations.xlsx

Hi David,

Attached please find the cost estimates as requested. Let us know if you have any questions whatsoever.

Best,

-PT

On Fri, Jan 5, 2018 at 3:59 PM, David I. Harris <[HarrisD@sbcapcd.org](mailto:HarrisD@sbcapcd.org)> wrote:

Hi Patrick,

Early next week will be fine.

I hope you have a great weekend.

Sincerely,

David Harris

Santa Barbara County APCD

[\(805\) 961-8824](tel:(805)961-8824)

**From:** Patrick Thompson [mailto:[pthompson@eco-pas.com](mailto:pthompson@eco-pas.com)]  
**Sent:** Friday, January 5, 2018 12:29 PM  
**To:** David I. Harris <[HarrisD@sbcapcd.org](mailto:HarrisD@sbcapcd.org)>  
**Subject:** Re: Cost Data

Hi David-

We are hoping to get this back to you early next week. Will this work?

Best,

-PT

On Tue, Jan 2, 2018 at 10:48 AM, David I. Harris <[HarrisD@sbcapcd.org](mailto:HarrisD@sbcapcd.org)> wrote:

Hi Patrick,

I hope you had a great holiday season! I am sending you a revised cost effectiveness spreadsheet, with the cost information we need highlighted in green. Specifically, we are looking for site specific cost data for the CCWS Series 400 tank project. When sizing the PAS control system, please assume a maximum of 8 tank turnovers per year.

If an equipment lifespan greater than 10 years is proposed, please provide a detailed basis for the proposed lifespan.

Please don't worry about filling in the rest of the spreadsheet, as we will finish the capital recovery and cost effectiveness calculations on our end.

Happy New Year!

David Harris

Engineering Supervisor

Santa Barbara County Air Pollution Control District

[\(805\) 961-8824](tel:8059618824)

[OurAir.org](http://OurAir.org)

[twitter.com/OurAirSBC](https://twitter.com/OurAirSBC)

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

## CAPITAL COSTS

<i>Purchased Equipment Costs</i>	<i>Cost (\$) <sup>1,2</sup></i>	<i>Input Information / Notes</i>
EcoPAS Unit(s)	\$270,000	PAS-100 system price at time of initial acquisition (2015)
Instrumentation	\$1,850	Site specific data: Glycol temperature sensor, pressure sensor in manifold pre-PRV, and self-powered logger
Sales Taxes	\$8,100	Estimate of 3% of EcoPAS unit cost. Possible that exempt as "Pollution Control Facility"
Freight	\$1,500	Site specific data
<b>Total of Purchased Equipment Cost (PEC)</b>	<b>\$281,450</b>	Total of previous Purchased Equipment Costs inputs

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

<i>Other Direct Costs</i>	<i>Cost (\$) <sup>1,2</sup></i>	<i>Input Information / Notes</i>
Site Preparation	\$0	No site preparation was required
Buildings	\$0	No new buildings were required
<b>Total of Other Direct Costs</b>	<b>\$0</b>	Total of previous Other Direct Costs inputs

<i>Indirect Costs (IC)</i>	<i>Cost (\$) <sup>1,2</sup></i>	<i>Input Information / Notes</i>
Engineering	\$2,400	Site specific data for engineering of system.
Construction and Field Expenses	\$14,073	Site specific data was zero, as EcoPAS provided. However, 5% of PEC is used here.
Contractor Fees	\$28,145	Site specific data was zero, as EcoPAS is a licensed contractor. However, 10% of PEC is used here.
Start-Up	\$0	Site specific data was zero, as EcoPAS provides start-up as part of purchase.
Performance Test	\$0	Site specific data was zero with mass balance performance tests incl. in operating labor.
Contingencies	\$8,444	Site specific data reflects actual costs incurred in other categories. However, 3% of PEC is used here.
<b>Total Indirect Costs</b>	<b>\$53,061</b>	Total of previous Total Indirect Costs inputs

<b>TOTAL CAPITAL INVESTMENT (TCI)</b>	<b>\$563,663</b>	Total of Purchased Equipment Costs, Direct Installation Costs, Other Direct Installation Costs, and Indirect Costs
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## ANNUAL COSTS

<i>Direct Annual Costs</i>	<i>Cost (\$) <sup>1,2</sup></i>	<i>Input Information / Notes</i>
Operating Labor	\$2,700	Site specific data (0.5 hrs of operating labor/shift cellar crew, 0.5 hrs. lab crew @ \$30/hr.)
Operating Labor Supervisor	\$405	Site specific data or 15% of Operator based on EPA Cost Control Manual
Maintenance Labor	\$1,500	Site specific data (50 man hours annual maintenance cleaning valves, etc.)
Maintenance Material	\$120	Site specific data (cleaning supplies: citric acid, etc.)
Chiller (Glycol System)	\$650	Site specific data (energy input into house chiller system)
Electricity	\$75	Low current sensors, etc.
<b>Total Direct Annual Costs</b>	<b>\$5,450</b>	Total of previous Direct Annual Costs inputs

<i>Indirect Annual Costs</i>	<i>Cost (\$) <sup>1,2</sup></i>	<i>Input Information / Notes</i>
Overhead	\$2,835	60% of Labor and Maintenance Costs <sup>5</sup>
Administrative Charge	\$11,273	Site specific data would imply zero, but 2% of TCI used here.
Property Taxes	\$484	Site specific data (As assessed in 2017).
Insurance	\$845	Winery PP&E insurance averages 15 basis points per \$100 asset value
Annual Source Test(s)	\$0	Mass balance testing and reporting included in operating labor
<b>Total Indirect Annual Costs</b>	<b>\$15,438</b>	Total of previous Indirect Annual Costs inputs

<i>Annual Recovery Credits</i>	<i>Product Value (\$) <sup>1,4</sup></i>	<i>Input Information / Notes</i>
Recovered ROCs	\$0	We have demonstrated value, but are leaving at zero for this analysis

<i>Capitol Recovery</i>	<i>Inputs <sup>1,2,5</sup></i>	<i>Input Information / Notes</i>
Equipment Life (years)	15	Site specific data
Benchmark Interest Rate (%)	2.750	Department of the Treasury daily treasury yield curve rates for the specified equipment life <sup>6</sup>
Incremental Risk (%)	2.000	SBCAPCD P&P 6100.064, Section 7.1 <sup>7</sup>
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
<b>Annualized Capital Recovery</b>	<b>\$54,305</b>	<b>TCI * Capitol Recovery Factor</b>

## COST EFFECTIVENESS

<i>Capitol Recovery</i>	<i>Inputs <sup>1,2</sup></i>	<i>Input Information / Notes</i>
Total Annual Cost	\$75,192	Calculated Value: Total Direct Annual Costs + Total Indirect Annual Costs + Annualized Capitol Recovery - Annual Recovery Credits

Annual Tons Controlled	0.00	Annual Tons of ROC Controlled, see SBCAPCD Winery Calculation Spreadsheet <sup>8</sup>
Cost Effectiveness (\$/ton)	#DIV/0!	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>.
8. SBCAPCD Winery Calculation Spreadsheet can be found online at: <https://www.ourair.org/wineries/>.

**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.