

# Tank Vapor Recovery Unit

## Abatement Cost Tool



### About this Tool

This abatement cost tool has been developed by Clean Air Task Force. The tool allows the user to adjust a number of key parameters and Vapor Recovery Unit replacement thresholds.

### Navigation in this Tool

[Cost Comparison](#)

Here the user can see the annualized costs of installing a vapor recovery unit as presented in the Colorado and California rules. The user can also adjust interest rate and amortization period to recalculate costs using common assumptions.

[Costs at Various Thresholds](#)

Here the user can see the abatement costs associated with various thresholds for replacing a vapor recovery unit, for both the Colorado and California annualized costs and ignoring or accounting for the value of saved gas. The user can also adjust other parameters: the percent of gas recovered, the methane content of gas, and the price of gas.

VRU Costs as presented:	CARB		Colorado **
	Economic Analysis Table B-7		Economic Impact Analysis Table 17
	25 mscf/d VRU	50 mscf/d VRU	single size
Capital Costs	20,421	26,327	90,000
Non recurring one time costs	15,316	19,745	12,802
Capital Recovery Factor	0.13	0.130	0.14
Annualized Capital Costs	4,628	5,989	16,315
Ongoing Cost	7,367	8,419	9,396
	11,995	14,408	25,711
Annualized Total Cost (without value of saved gas)	11,995	14,408	25,711
\$Year	\$2006	\$2006	\$2013
Source:	CARB Economic Analysis: <a href="https://www.arb.ca.gov/cc/oil-gas/Oil%20and%20Gas%20Appx%20B%20Economic%20Analysis.pdf">https://www.arb.ca.gov/cc/oil-gas/Oil%20and%20Gas%20Appx%20B%20Economic%20Analysis.pdf</a>		CDPHE Cost-Benefit Analysis: <a href="https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-7573">https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-7573</a>
	Based on Gas Star document: <a href="https://www.epa.gov/sites/production/files/2016-06/documents/ll_final_vap.pdf">https://www.epa.gov/sites/production/files/2016-06/documents/ll_final_vap.pdf</a>		These costs were also used in EPA OOOO

Flare Costs as presented: Colorado	
	Economic Impact Analysis Table 1
Capital Costs	19817
Non recurring one time costs	8628
Capital Recovery Factor	0.14
Annualized Capital Costs	3,322
Ongoing Cost	2,965
Annualized Total Cost (without value of saved gas)	6,287
	CDPHE Cost-Benefit Analysis: <a href="https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-7573">https://www.regulations.gov/document?D=EPA-HQ-OAR-2010-0505-7573</a>

0.07

Different cost estimates use different assumptions for amortization period and interest rate. Below, we recalculate costs using common assumptions:

Amortization Period 10  
Interest Rate 5%  
Capital Recovery Factor 0.13 [https://en.wikipedia.org/wiki/Capital\\_recovery\\_factor](https://en.wikipedia.org/wiki/Capital_recovery_factor)

Colorado	Capital Costs (one time)	Non-Recurring Costs (one time)	O&M Costs (recurring)	Annualized Total Costs
VRU	\$ 90,000			
Freight/Engineering		\$ 1,648		
Installation		\$ 11,154		
Maintenance			\$ 9,396	
Subtotal Costs	\$ 90,000	\$ 12,802	\$ 9,396	
Capital Recovery Factor	0.130	0.130		
Annualized Costs without value of saved gas	\$ 11,655	\$ 1,658	\$ 9,396	\$ 22,709

	Capital Costs (one time)	Non-Recurring Costs (one time)	O&M Costs (recurring)	Annualized Total Costs
Flare	\$ 18,169			
Freight/Engineering		\$ 1,648		
Flare Installation		\$ 6,980		
Auto Igniter	\$ 1,648			
Pilot Fuel			\$ 768	
Maintenance			\$ 2,197	
Subtotal Costs	\$ 19,817	\$ 8,628	\$ 2,965	
Capital Recovery Factor	0.13	0.13		
Annualized Costs without value	\$ 2,566	\$ 1,117	\$ 2,965	\$ 6,649

CARB: 25 mscf/day	Capital Costs (one time)	Non-Recurring Costs (one time)	O&M Costs (recurring)	Annualized Total Costs
VRU	\$ 20,421			
Installation		\$ 15,316		
Maintenance			\$ 7,367	
Subtotal Costs	\$ 20,421	\$ 15,316	\$ 7,367	
Capital Recovery Factor	0.130	0.130		
Annualized Costs without value of saved gas	\$ 2,645	\$ 1,983	\$ 7,367	\$ 11,995

CARB: 50 mscf/day	Capital Costs (one time)	Non-Recurring Costs (one time)	O&M Costs (recurring)	Annualized Total Costs
VRU	\$ 26,327			
Installation		\$ 19,745		
Maintenance			\$ 8,419	
Subtotal Costs	\$ 26,327	\$ 19,745	\$ 8,419	
Capital Recovery Factor	0.130	0.130		
Annualized Costs without value of saved gas	\$ 3,409	\$ 2,557	\$ 8,419	\$ 14,386

BC tank vent threshold:		
Adjust threshold in orange cell	9,000	m3/month
	300	m3/day
	10,594	ft3/day
	10.59	mcf/day

From Cost Comparison Tab:		
CARB VRU annualized cost:	Colorado VRU annualized cost:	Colorado Flare annualized cost:
\$ 11,995	\$ 22,709	\$ 6,649

Threshold to require VRU		Gas			Value of saved gas (\$)	Abatement Cost (\$/metric ton)				Flare
Metric tons per year	Mcf/day controlled	m3/month	recovered (metric tons)	mcf/year saved		VRU		VRU		no saved gas
						Low Estimate (CARB)	High Estimate (Colorado)	Low Estimate (CARB)	High Estimate (Colorado)	
						ignoring value of saved gas	accounting for value of saved gas	ignoring value of saved gas	accounting for value of saved gas	
5	1	999	4.90	421	\$ 1,262	\$ 2,448	\$ 2,190	\$ 4,635	\$ 4,377	\$ 1,357
6	1	1,199	5.88	505	\$ 1,514	\$ 2,040	\$ 1,782	\$ 3,862	\$ 3,605	\$ 1,131
7	2	1,399	6.86	589	\$ 1,767	\$ 1,749	\$ 1,491	\$ 3,310	\$ 3,053	\$ 969
8	2	1,598	7.84	673	\$ 2,019	\$ 1,530	\$ 1,272	\$ 2,897	\$ 2,639	\$ 848
9	2	1,798	8.82	757	\$ 2,271	\$ 1,360	\$ 1,102	\$ 2,575	\$ 2,317	\$ 754
10	2	1,998	9.80	841	\$ 2,524	\$ 1,224	\$ 966	\$ 2,317	\$ 2,060	\$ 678
15	4	2,997	14.70	1,262	\$ 3,786	\$ 816	\$ 558	\$ 1,545	\$ 1,287	\$ 452
20	5	3,996	19.60	1,683	\$ 5,048	\$ 612	\$ 354	\$ 1,159	\$ 901	\$ 339
30	7	5,994	29.40	2,524	\$ 7,571	\$ 408	\$ 150	\$ 772	\$ 515	\$ 226
40	9	7,992	39.20	3,365	\$ 10,095	\$ 306	\$ 48	\$ 579	\$ 322	\$ 170
50	12	9,990	49.00	4,206	\$ 12,619	\$ 245	\$ (13)	\$ 463	\$ 206	\$ 136
60	14	11,987	58.80	5,048	\$ 15,143	\$ 204	\$ (54)	\$ 386	\$ 129	\$ 113
70	16	13,985	68.60	5,889	\$ 17,666	\$ 175	\$ (83)	\$ 331	\$ 74	\$ 97
80	19	15,983	78.40	6,730	\$ 20,190	\$ 153	\$ (105)	\$ 290	\$ 32	\$ 85
45	11	9,000	44.15	3,790	\$ 11,369	\$ 272	\$ 14	\$ 514	\$ 257	\$ 151

Parameters to Adjust	Mcf per metric ton	% recovered	Percent methane by volume	Gas Value
	85.84	98%	60%	\$3.00

Social Cost of Methane, 3% discount rate, 2020
\$ 1,200