Engines				
Item	**Description**	**Units**	**2019**	**2019-2023**
Estimated Total Methane Emissions	Amount of methane emissions that would have escaped to the atmosphere in the absence of the Project and calculated by the volume of methane sent to the Project engines.	Cubic feet of methane	**256,073,342**	**1,280,366,712**
Estimated Total Methane Emissions	Amount of methane emissions that would have escaped to the atmosphere in the absence of the Project and calculated by the volume of methane sent to the Project engines.	Metric tons of methane	**4,918**	**24,588**

Estimated Baseline Emissions[1,2]	Calculated emissions that would have been emitted to the atmosphere in the absence of the Project.	Metric tons of carbon dioxide equivalent	**413,085**	**2,065,427**
Estimated Project Emissions[1,2]	Calculated emissions that escaped while the Project was operating. Emissions are a result of: 1) Carbon dioxide emissions resulting from the combustion of methane in the Project engines and, 2) Methane emissions resulting from the incomplete combustion of the mine gas in the Project engines.	Metric tons of carbon dioxide equivalent	**54,533**	**272,664**
Estimated Emission Reductions[1,2]	Calculated emission reductions (baseline emissions minus project emissions).	Metric tons of carbon dioxide equivalent	**358,553**	**1,792,763**
Daily Amount of Automobiles Emitting Same Amount of Emissions Avoided[3]			**77,946**	
Daily Amount of Forest Acres to Sequester Same Amount of Daily Emissions Avoided[4]			**1,276**	

Carbon Neutrality	Is the project carbon neutral (are project emissions less than baseline emissions)?	N/A	**Yes**	**Yes**

Note 1: These emission estimations are based on calculated total methane values and the Colorado greenhouse gas neutrality calculator. The calculator template can be provided by request from the Colorado Energy Office.
https://www.colorado.gov/energyoffice
Note 2: These emission estimations are based on the Intergovernmental Panel on Climate Change (IPCC) fifth assessment report 20-year global warming potential of methane.
https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf
Note 3: One passenger vehicle emits about 0.013 tons of CO2 per day.
https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F-,A%20typical%20passenger%20vehicle%20emits%20about%204.6%20metric%20tons%20of,8%2C887%20grams%20of%20CO2.
Note 4: 0.002 metric ton CO2/acre/day sequestered by one acre of average U.S. forest
https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references#pineforests

2019 methane captured from abandoned coal mine

This workbook is a summary calculation providing evidence that an active or abandoned coal mine methane destruction project is carbon neutral. If the emission reduction number is positive, this means that the volume of greenhouse gases emitted into the atmosphere from the conversion of fuel to electricity is no greater than the volume of greenhouse gases that would have been emitted into the atmosphere over the next five years, beginning with the planned date of operation of the facility, if the fuel had not been converted to electricity.

Inputs	Parameter	Value	Unit	
Emission Reduction (carbon dioxide equivalents)	Total ERs	1,792,763	MT CO_2e	
Baseline Emissions over 5 years	BE	2,065,427	MT CO_2e	
Project Emissions over 5 years	PE	272,664	MT CO_2e	
Uncertainty Deduction	UD	1.0		
Baseline CH4 emitted to atmosphere	BE_{MR}	2,065,427	MT CO_2e	
CH4 from decline curve	AMM_{DC}	35,320	MT CH_4	
MCF of methane	MCF_{CH4}	366,770	Mcf / year	
Methane liberation rate when active	$LR_{AMM, MCF}$	5,944	Mcf / day	
Mine sealed or venting (click in cell)	Status	Venting		
Methane drainage (**click in cell**)	Drainage	yes	yes / no	
Date of closure	Date of Closure	2/1/2016		
Degree of sealing	S	1.0		
Hyperbolic exponent	b	1.88658		
Initial Decline Rate, 1/day	D_i	0.003519	1/day	
Elapsed time of closure	t	1,562	days	
Days in reporting period	Rp_{days}	365	days	
Project Emissions	PE	272,664	MT CO_2e	
Energy consumed	PE_{EC}	0	MT CO_2e	
Electricity production per year	$PROD_{Elec}$	28,207	MWhr / year	
Avoided grid emissions (**click in cell**)	Claiming	no		
Destruction device (**click in cell**)	Device		type	
Additional electricity	$CONS_{ELEC}$	3	MWhr	
Additional fossil fuel	$CONS_{FF}$	-	gallons	
Fossil fuel (**click in cell**)	CEF_{FF}		type	
CO2e from CH4 destruction	PE_{MD}	66,121	MT CO_2e	
CH4 destroyed by device	$MD_{P,i}$	24,097	MT CH_4	
CH4 sent to devices	$MM_{P,i}$	24,588	MT CH_4	
Abandoned mine well(s) flow	$PGW_{P,i}$	256,073	mcf / year	
Post-mining gob well flow methane content	$PGW_{P,i}$ C_{CH4}	100%	% CH_4	
Emissions from uncombusted CH4	PE_{UM}	206,543	MT CO_2e	
Methane sent to devices	$MM_{P,i}$	24,588	MT CH_4	
Destruction efficiency	De_i	98.00%	EF by device	Note: 93.6% is default destruction efficinecy under ARB, but actual engine destruction efficiency is around 98%.
Constant	lb. CH_4/scf CH_4	4.23E-02		
Constant	MT CH_4/lb. CH_4	4.54E-04		
CO2 from destruction of CH4	CEF_{CH4}	2.744		
Constant	kg / MT	1,000		
Constant (CEF)	CEF_{ELEC}	0.58	tonnes CO_2 / MWhr	
Constant	GWP_{CH4}	84		
Choose an IPCC Assessment Report	IPCC Report	AR5 (20 year GWP)	AR Report	