

APPENDIX H

Greenhouse Gas and Emissions Calculations

Apex Clean Energy Holdings, LLC
Big Bend Wind
Construction Emission Calculations

Summary of Potential Construction Emissions (tons)								
Description	Emissions							
	Criteria Pollutants					HAPs		
	NOx	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}	Formaldehyde	Total
TRANSMISSION LINE								
Off-Road Engines Emissions	7.82	1.51	0.57	0.00	0.27	0.26	0.07	0.10
Fugitive Dust from Unpaved Roads	--	--	--	--	0.38	0.04	--	--
Fugitive Dust from Earthmoving	--	--	--	--	6.64	0.70	--	--
Subtotal	7.82	1.51	0.57	0.00	7.28	1.00	0.07	0.10
SUBSTATIONS								
Off-Road Engines Emissions	20.25	3.92	1.45	0.01	0.71	0.70	0.17	0.26
Fugitive Dust from Unpaved Roads	--	--	--	--	0.05	0.00	--	--
Fugitive Dust from Earthmoving	--	--	--	--	1.25	0.13	--	--
Subtotal	20.25	3.92	1.45	0.01	2.01	0.83	0.17	0.26
TOTAL PROJECT								
Off-Road Engines Emissions	28.07	5.42	2.02	0.01	0.98	0.96	0.24	0.36
Fugitive Dust from Unpaved Roads	--	--	--	--	0.43	0.04	--	--
Fugitive Dust from Earthmoving	--	--	--	--	7.89	0.83	--	--
PROJECT TOTAL	28.07	5.42	2.02	0.01	9.29	1.83	0.24	0.36

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Emission Factors for Construction Engines														
Equipment	Quantity ^a	Total Hours Used	Max Power (HP)	Load Factor ^b	Loaded Power (HP)	Emission Factors ^{c,d} (g/hp-hr)								
						VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O
100 HP Tractor	1	700	100	0.21	100	0.338	0.867	4.1	0.18	0.18	0.002	188.262	0.008	0.002
2-inch Water Pump	0	0	5	0.69	3	0.438	2.161	4.44	0.267	0.259	0.002	188.262	0.008	0.002
4-inch Water Pump.	1	100	10	0.69	7	0.438	2.161	4.44	0.267	0.259	0.002	188.262	0.008	0.002
6-inch Water Pump	0	0	30	0.69	21	0.438	2.161	4.44	0.267	0.259	0.002	188.262	0.008	0.002
Air Compressor	1	100	80	1	80	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
ATV	0	0	20	0.5	10	0.438	2.161	4.440	0.267	0.267	0.002	188.262	0.008	0.002
Backhoe	1	200	75	0.8	60	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Boom Truck	8	10,200	450	0.7	315	0.309	0.748	4.000	0.132	0.128	0.002	188.262	0.008	0.002
Bulldozer	2	650	250	1	250	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Compactor	3	1,000	300	1	300	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Compactor, Vibratory	3	1,000	100	1	100	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Concrete Mixer Truck	5	1,020	325	1	325	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Concrete Pump	5	960	300	1	300	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Dump Truck	10	2,000	325	0.8	260	0.338	0.867	4.100	0.180	0.180	0.002	188.262	0.008	0.002
Excavator	1	150	138	1	138	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Fork Lift	1	200	120	1	120	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Front End Loader	1	150	196	1	196	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Fuel Truck	2	384	200	0.59	118	0.3085	0.7475	4.0	0.132	0.128	0.002	188.262	0.008	0.002
Generator	0	0	250	0.5	125	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Grader	1	150	35	0.8	28	0.438	2.161	4.44	0.267	0.259	0.002	188.262	0.008	0.002
Guided Bore Machine	0	0	150	0.8	120	0.637	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Hydrovac Truck	1	60	200	0.59	118	0.3085	0.7475	4.0	0.132	0.128	0.002	188.262	0.008	0.002
Large Crane	0	0	15	0.21	3	0.438	2.161	4.44	0.267	0.259	0.002	188.262	0.008	0.002
Light Tower	0	0	50	1	50	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Medium Crane	4	2,420	450	0.7	315	0.3085	0.7475	4.0	0.132	0.128	0.002	188.262	0.008	0.002
Pickup Truck	9	14,100	150	0.25	38	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Pile Driver	0	0	49	1	49	0.2789	1.5323	4.7279	0.3389	0.3389	0.002	188.262	0.008	0.002
Piping Truck	0	0	300	1	300	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Road Bore Machine	0	0	260	0.79	205	0.3085	0.7475	4.0	0.132	0.128	0.002	188.262	0.008	0.002
Semitruck/Trailer	3	484	500	0.59	500	0.167	0.843	4.335	0.132	0.132	0.002	188.262	0.008	0.002
Skid steer loader	1	160	50	1	50	0.309	0.748	4.000	0.132	0.132	0.002	188.262	0.008	0.002
Water truck	2	260	100	0.5	50	0.637	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002
Welding machine	0	0	35	0.8	28	0.367	2.366	4.700	0.240	0.240	0.002	188.262	0.008	0.002

^a Equipment counts include construction equipment for the transmission line, step-up substation, and interconnection substation construction.

^b Load Factors from Appendix A

^c EPA 420-P-04-009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression Ignition, USEPA, April 2004 - Tier 2 Engines.

^d GHG emission factors from EPA's 2024 GHG Emission Factors Hub. Available online at <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>.

Apex Clean Energy Holdings, LLC
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Equipment	Potential Emissions (tons)						Criteria Pollutant Emission Estimates from Construction Engines						Potential Emissions (tons)						Potential Emissions (ton)						
	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂	
100 HP Tractor	2.61E-02	0.067	0.316	0.014	0.014	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	2.61E-02	0.067	0.316	0.014	0.014	0.000	0.000
2-inch Water Pump	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
4-inch Water Pump	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	3.38E-04	0.002	0.003	0.000	0.000	0.000	3.38E-04	0.002	0.003	0.000	0.000	0.000	0.000
6-inch Water Pump	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Air Compressor	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	3.24E-03	0.021	0.041	0.002	0.002	0.000	3.24E-03	0.021	0.041	0.002	0.002	0.000	0.000
ATV	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Backhoe	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	4.86E-03	0.031	0.062	0.003	0.003	0.000	4.86E-03	0.031	0.062	0.003	0.003	0.000	0.000
Boom Truck	3.43E-01	0.831	4.445	0.147	0.142	0.002	7.39E-01	1.791	9.583	0.316	0.307	0.005	1.07E-02	0.026	0.139	0.005	0.004	0.000	1.09E+00	2.647	14.167	0.468	0.453	0.007	0.000
Bulldozer	0.00E+00	0.000	0.000	0.000	0.000	0.000	3.40E-02	0.062	0.441	0.015	0.015	0.000	2.13E-02	0.051	0.276	0.009	0.009	0.000	5.53E-02	0.134	0.717	0.024	0.024	0.000	0.000
Compactor	0.00E+00	0.000	0.000	0.000	0.000	0.000	4.42E-02	0.223	1.147	0.035	0.035	0.001	1.10E-02	0.056	0.287	0.009	0.009	0.000	5.52E-02	0.279	1.434	0.044	0.044	0.001	0.000
Compactor, Vibratory	0.00E+00	0.000	0.000	0.000	0.000	0.000	2.98E-02	0.076	0.362	0.016	0.016	0.000	7.48E-03	0.019	0.090	0.004	0.004	0.000	3.73E-02	0.096	0.452	0.020	0.020	0.000	0.000
Concrete Mixer Truck	3.64E-02	0.093	0.441	0.019	0.019	0.000	7.27E-02	0.186	0.881	0.039	0.039	0.000	1.45E-02	0.037	0.176	0.008	0.008	0.000	1.24E-01	0.317	1.498	0.066	0.066	0.001	0.000
Concrete Pump	3.36E-02	0.086	0.407	0.018	0.018	0.000	6.71E-02	0.172	0.814	0.036	0.036	0.000	6.71E-03	0.017	0.081	0.004	0.004	0.000	1.07E-01	0.275	1.302	0.057	0.057	0.001	0.000
Dump Truck	0.00E+00	0.000	0.000	0.000	0.000	0.000	1.94E-01	0.497	2.350	0.103	0.103	0.001	0.00E+00	0.000	0.000	0.000	0.000	0.000	1.94E-01	0.497	2.350	0.103	0.103	0.001	0.000
Excavator	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	7.94E-03	0.017	0.091	0.003	0.003	0.000	7.94E-03	0.017	0.091	0.003	0.003	0.000	0.000
Fork Lift	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	4.42E-03	0.022	0.115	0.003	0.003	0.000	4.42E-03	0.022	0.115	0.003	0.003	0.000	0.000
Front End Loader	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	1.00E-02	0.024	0.130	0.004	0.004	0.000	1.00E-02	0.024	0.130	0.004	0.004	0.000	0.000
Fuel Truck	7.70E-03	0.019	0.100	0.003	0.003	0.000	7.70E-03	0.019	0.100	0.003	0.003	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	1.54E-02	0.037	0.200	0.007	0.006	0.000	0.000
Generator	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Grader	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	2.03E-03	0.010	0.021	0.001	0.001	0.000	2.03E-03	0.010	0.021	0.001	0.001	0.000	0.000
Guided Bore Machine	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Hydrovac Truck	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	2.41E-03	0.006	0.031	0.001	0.001	0.000	2.41E-03	0.006	0.031	0.001	0.001	0.000	0.000
Large Crane	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Light Tower	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Medium Crane	7.50E-02	0.182	0.972	0.032	0.031	0.000	1.71E-01	0.415	2.222	0.073	0.071	0.001	1.29E-02	0.031	0.167	0.006	0.005	0.000	2.59E-01	0.628	3.361	0.111	0.108	0.002	0.000
Pickup Truck	2.52E-02	0.127	0.654	0.020	0.020	0.000	7.27E-02	0.367	1.889	0.057	0.057	0.001	6.99E-04	0.004	0.018	0.001	0.001	0.000	9.86E-02	0.498	2.560	0.078	0.078	0.001	0.000
File Driver	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Piping Truck	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Road Bore Machine	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
Semitruck/Trailer	1.77E-02	0.089	0.459	0.014	0.014	0.000	1.77E-02	0.089	0.459	0.014	0.014	0.000	9.20E-03	0.046	0.239	0.007	0.007	0.000	4.45E-02	0.225	1.156	0.035	0.035	0.001	0.000
Skid steer loader	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	2.72E-03	0.007	0.035	0.001	0.001	0.000	2.72E-03	0.007	0.035	0.001	0.001	0.000	0.000
Water truck	3.51E-03	0.013	0.026	0.001	0.001	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	5.62E-03	0.021	0.041	0.002	0.002	0.000	9.13E-03	0.034	0.067	0.003	0.003	0.000	0.000
Welding machine	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.00E+00	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL	0.57	1.51	7.82	0.27	0.26	0.00	1.45	3.92	20.25	0.71	0.70	0.01	0.14	0.45	2.04	0.07	0.07	0.00	2.16	5.87	30.11	1.05	1.03	0.01	0.00

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Fugitive Dust Emissions from Unpaved Roads								
Equipment	Quantity ^a	Total Days Used	VMT ^b	Emission Factor (lb/VMT) ^c			Project Total Emissions (ton)	
				W	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
100 HP Tractor	1	70	35	15	1.65	0.16	0.03	0.00
4-inch Water Pump.	1	10	5	30	2.25	0.23	0.00	0.00
Backhoe	1	20	10	15	1.65	0.16	0.00	0.00
Boom Truck	8	320	510	30	2.25	0.23	0.21	0.02
Bulldozer	2	65	33	24	2.04	0.20	0.00	0.00
Compactor	3	60	50	25	2.07	0.21	0.00	0.00
Concrete Mixer Truck	5	57	51	30	2.25	0.23	0.02	0.00
Dump Truck	10	20	100	25	2.07	0.21	0.00	0.00
Excavator	1	15	8	25	2.07	0.21	0.00	0.00
Fork Lift	1	20	10	25	2.07	0.21	0.00	0.00
Front End Loader	1	15	8	25	2.07	0.21	0.00	0.00
Fuel Truck	2	96	48	20	1.88	0.19	0.02	0.00
Grader	1	15	8	15	1.65	0.16	0.00	0.00
Hydrovac Truck	1	6	3	20	1.88	0.19	0.00	0.00
Medium Crane	4	162	121	20	1.88	0.19	0.03	0.00
Pickup Truck	9	360	705	2	0.67	0.07	0.08	0.01
Semitruck/Trailer	3	106	53	40	2.56	0.26	0.03	0.00
Skid steer loader	1	16	8	15	1.65	0.16	0.00	0.00
Water truck	2	26	13	30	2.25	0.23	0.01	0.00

^a Equipment counts are estimated based current construction plan.
^b Each vehicle is assumed to travel 0.5 mile per day on site.
^c AP-42 Section 13.2.2 Unpaved Roads, dated November 2006, Equations 1a and 2 TOTALS 11.19 1.12 Surface Silt content based on Table 13.2.2-1 - construction sites.

Eq 1a: $E = k * (s/12)^a * (W/3)^b$

Eq 2: $E_{ext} = E * [(365-P)/365]$

where:

VMT = Vehicle Miles Traveled

W = Mean Vehicle Weight, tons

S = Mean Vehicle Speed, mph

P = 100 days with at least 0.01 inches rain, EPA's AP-42 Figure 13.2.2-1

s = 8.5 surface material silt content (%) for construction sites, EPA's AP-42 Table 13.2.2-1

E = size-specific emission factor, lb/ VMT

E_{ext} = annual size-specific emission factor extrapolated for natural migration, lb/VMT

Constants	PM	PM ₁₀	PM _{2.5}
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

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Fugitive Dust Emissions From Earthmoving Activities							
Project Component / Construction Activity	Daily Material Handling		Average Exposed Area (acres)	Emission Factors ^{b-f} (lb/ton)		Emissions (ton)	
	Construction Rate ^a (ton/day)	Handling Time ^b (days)		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Transmission Line							
Topsoil removed by scraper ^g	1,949.9	80	---	0.058	0.0061	4.52	0.48
Topsoil replacement	1,949.9	80	---	0.012	0.0013	0.94	0.10
Wind erosion of exposed areas	--	80	77.35	0.38	0.03999	1.18	0.12
Transmission Line Subtotal						6.64	0.70
Substations							
Topsoil removed by scraper ^g	163.9	180	---	0.058	0.0061	0.86	0.09
Topsoil replacement	163.9	180	---	0.012	0.0013	0.18	0.02
Wind erosion of exposed areas	--	180	6.50	0.38	0.03999	0.22	0.02
Substations Subtotal						1.25	0.13
PROJECT TOTAL							
Topsoil removed by scraper ^g	2,113.7	88	---	0.058	0.0061	5.38	0.57
Topsoil replacement	2,113.7	88	---	0.012	0.0013	1.11	0.12
Wind erosion of exposed areas	--	88	83.85	0.38	0.03999	1.40	0.15
PROJECT TOTAL						7.89	0.83

Notes and Assumptions:

^a Soil density: 1.25 tons per yard

^b Conservatively assumes handling time is the maximum amount of days a construction equipment is used on the portion of the project.

^c Backfilling and topsoil replacement emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, overburden replacement

^d As worst case, PM₁₀ is set equal to Total Particulate Matter. PM_{2.5} is set to 0.105 times PM₁₀ per Table 11.9-1

^e Emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, topsoil removal by scraper

^f Wind Erosion Exposed Areas emission factor: AP-42 Section 11.9 Western Surface Coal Mining, Table 11.9-4, July 1998, wind erosion of exposed areas (ton/yr/acre)

^g Assumes the entire workspace is cleared to 1 foot deep, 1.25 tons per cubic yard.

Apex Clean Energy Holdings, LLC
Big Bend Wind
Construction Emission Calculations

Construction Schedule	
Transmission Line	
Work hours per day:	12
Work days per week:	5
Hours per week:	60
Weeks:	16
Total days:	80
Substations	
Work hours per day:	12
Work days per week:	5
Hours per week:	60
Weeks:	36
Total days:	180

Topsoil Removed by Scraper^a				
Project Component	Total (Acres)	Soil Volume (yd³)	Soil Weight (ton)	Daily Material Handling Rate (ton/day)
Transmission Line	77	124,791	155,989	1,950
Substations	6.5	10,487	13,108	164
TOTAL	83.9	135,278	169,098	2,114

^a Conservatively assumes that topsoil will be removed from the entire right-of-way. This is an overestimation, since topsoil will only be disturbed in areas requiring grading and where transmission line structures will be installed.

Apex Clean Energy Holdings, LLC
 Big Bend Wind
 Construction Emission Calculations

Greenhouse Gas Emissions Summary (tons)				
	CO ₂	CH ₄	N ₂ O	CO ₂ e ^a
TRANSMISSION LINE				
Off-Road Engine Emissions	362.43	0.01	0.00	363.62
Commuters and Delivery Vehicles	59.90	0.00	0.00	59.90
SUBTOTAL	422.33	0.01	0.00	423.52
SUBSTATIONS				
Off-Road Engine Emissions	1,027.46	0.04	0.01	1,030.83
Commuters and Delivery Vehicles	130.48	0.00	0.00	130.48
SUBTOTAL	1,157.93	0.04	0.01	1,161.31
PROJECT TOTAL				
Off-Road Engine Emissions	1,389.89	0.06	0.01	1,394.45
Commuters and Delivery Vehicles	190.37	0.00	0.00	190.37
PROJECT TOTAL	1,580.26	0.06	0.01	1,584.83

Global Warming Potentials		
CO ₂	CH ₄	N ₂ O
1	28	265

Apex Clean Energy Holdings, LLC
Big Bend Wind
Construction Emission Calculations

Greenhouse Gas Emission Factors for Construction Engines									
Equipment	Hours per Day	Quantity ^a	Total Hours Used	Max Power (HP)	Load Factor ^b	Loaded Power (HP)	Emission Factors ^{c,d} (g/hp-hr)		
							CO ₂	CH ₄	N ₂ O
100 HP Tractor	10	1	700	100	0.21	100	188.262	0.008	0.002
2-inch Water Pump	0	0	0	5	0.69	3	188.262	0.008	0.002
4-inch Water Pump.	0	1	100	10	0.69	7	188.262	0.008	0.002
6-inch Water Pump	0	0	0	30	0.69	21	188.262	0.008	0.002
Air Compressor	0	1	100	80	1	80	188.262	0.008	0.002
ATV	0	0	0	20	0.5	10	188.262	0.008	0.002
Backhoe	0	1	200	75	0.8	60	188.262	0.008	0.002
Boom Truck	10	8	10200	450	0.7	315	188.262	0.008	0.002
Bulldozer	0	2	650	250	1	250	188.262	0.008	0.002
Compactor	0	3	1000	300	1	300	188.262	0.008	0.002
Compactor, Vibratory	0	3	1000	100	1	100	188.262	0.008	0.002
Concrete Mixer Truck	10	5	1020	325	1	325	188.262	0.008	0.002
Concrete Pump	10	5	960	300	1	300	188.262	0.008	0.002
Dump Truck	0	10	2000	325	0.8	260	188.262	0.008	0.002
Excavator	0	1	150	138	1	138	188.262	0.008	0.002
Fork Lift	0	1	200	120	1	120	188.262	0.008	0.002
Front End Loader	#DIV/0!	1	150	196	1	196	188.262	0.008	0.002
Fuel Truck	4	2	384	200	0.59	118	188.262	0.008	0.002
Generator	0	0	0	250	0.5	125	188.262	0.008	0.002
Grader	0	1	150	35	0.8	28	188.262	0.008	0.002
Guided Bore Machine	0	0	0	150	0.8	120	188.262	0.008	0.002
Hydrovac Truck	0	1	60	200	0.59	118	188.262	0.008	0.002
Large Crane	0	0	0	15	0.21	3	188.262	0.008	0.002
Light Tower	0	0	0	50	1	50	188.262	0.008	0.002
Medium Crane	10	4	2420	450	0.7	315	188.262	0.008	0.002
Pickup Truck	10	9	14100	150	0.25	38	188.262	0.008	0.002
Pile Driver	0	0	0	49	1	49	188.262	0.008	0.002
Piping Truck	0	0	0	300	1	300	188.262	0.008	0.002
Road Bore Machine	0	0	0	260	0.79	205	188.262	0.008	0.002
Semitruck/Trailer	4	3	484	500	0.59	500	188.262	0.008	0.002
Skid steer loader	0	1	160	50	1	50	188.262	0.008	0.002
Water truck	10	2	260	100	0.5	50	188.262	0.008	0.002
Welding machine	0	0	0	35	0.8	28	188.262	0.008	0.002

^a Equipment counts include construction equipment for the transmission line and both substations.

^b Load Factors from Appendix A of EPA 420_P-04-005, Median Life, Annual Activity, and Load Factor Values for

^c EPA 420-P-04-009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression Ignition, USEPA, April 2004 - Tier 2 Engines.

^d GHG emission factors from EPA's 2024 GHG Emission Factors Hub. Available online at <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>.

Apex Clean Energy Holdings, LLC
Big Bend Wind
Construction Emission Calculations

Greenhouse Gas Emission Estimates from Construction Engines				
Equipment	Potential Emissions (ton)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e ^a
100 HP Tractor	14.53	0.00	0.00	14.57
2-inch Water Pump	0.00	0.00	0.00	0.00
4-inch Water Pump.	0.15	0.00	0.00	0.15
6-inch Water Pump	0.00	0.00	0.00	0.00
Air Compressor	1.66	0.00	0.00	1.67
ATV	0.00	0.00	0.00	0.00
Backhoe	2.49	0.00	0.00	2.50
Boom Truck	666.77	0.03	0.01	668.96
Bulldozer	33.72	0.00	0.00	33.83
Compactor	62.26	0.00	0.00	62.46
Compactor, Vibratory	20.75	0.00	0.00	20.82
Concrete Mixer Truck	68.79	0.00	0.00	69.02
Concrete Pump	59.77	0.00	0.00	59.96
Dump Truck	107.91	0.00	0.00	108.27
Excavator	4.30	0.00	0.00	4.31
Fork Lift	4.98	0.00	0.00	5.00
Front End Loader	6.10	0.00	0.00	6.12
Fuel Truck	9.40	0.00	0.00	9.43
Generator	0.00	0.00	0.00	0.00
Grader	0.87	0.00	0.00	0.87
Guided Bore Machine	0.00	0.00	0.00	0.00
Hydrovac Truck	1.47	0.00	0.00	1.47
Large Crane	0.00	0.00	0.00	0.00
Light Tower	0.00	0.00	0.00	0.00
Medium Crane	158.20	0.01	0.00	158.71
Pickup Truck	111.19	0.00	0.00	111.56
Pile Driver	0.00	0.00	0.00	0.00
Piping Truck	0.00	0.00	0.00	0.00
Road Bore Machine	0.00	0.00	0.00	0.00
Semitruck/Trailer	50.22	0.00	0.00	50.39
Skid steer loader	1.66	0.00	0.00	1.67
Water truck	2.70	0.00	0.00	2.71
Welding machine	0.00	0.00	0.00	0.00
TOTAL	1,389.89	0.06	0.01	1,394.45

^a Calculated using global warming potentials from EPA's 2024 GHG Emission Factors Hub.

Apex Clean Energy Holdings, LLC
Big Bend Wind
Construction Emission Calculations

Greenhouse Gas Emissions from On Road Construction Traffic					
	Vehicles per day	Miles per vehicle	Number of Days	Fuel Used (gallons)	CO ₂ Emissions ^a (tons)
Transmission Line					
Commuter Vehicles - Gasoline ^{b,c}	25	60	80	5,000	48.98
Delivery Trucks - Diesel ^d	1	60	48	443	4.97
Concrete Mixer Trucks - Diesel ^e	2	60	15	529	5.94
Transmission Line Subtotal					59.90
Substations					
Commuter Vehicles - Gasoline ^{b,c}	25	60	180	11,250	110.21
Delivery Trucks - Diesel ^d	2	60	29	535	6.01
Concrete Mixer Trucks - Diesel ^e	3	60	24	1,271	14.26
Substations Subtotal					130.48
Commuter Vehicles - Gasoline ^{b,c}	50	60	130	16,250	159.19
Delivery Trucks - Diesel ^d	3	60	35	978	10.98
Concrete Mixer Trucks - Diesel ^e	5	60	20	1,800	20.20
PROJECT TOTAL					190.37

^a Assumes 1 gallon of gasoline = 8,887 grams CO₂ and 1 gallon of diesel = 10,180 g CO₂, per US EPA's "Greenhouse Gas Emissions from a Typical Passenger Vehicle," available online at: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf>

^b Assumes commuters travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 24 miles per gallon, per US EPA and US Department of Energy Fuel Economy data for combined city and highway driving in 2023, available online at: <https://www.fueleconomy.gov/feg/download.shtml>.

^c Commuter counts include the transmission line and both substations.

^d Assumes delivery trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 6.5 miles per gallon, industry average.

^e Assumes concrete mixer trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 3.4 miles per gallon, industry average.
<http://ascpro0.ascweb.org/archives/cd/2012/paper/CPRT221002012.pdf#:~:text=The%20National%20Ready%20Mix%20Concrete%20Association%20%28NRMCA%29%20in,average%203.4%20miles%20per%20gallon%20of%20diesel%20fuel.>