

**Windsor Substation
Summary of Construction Phase Emissions**

Emissions	CO ₂ ¹	CO ₂ ¹ with APM ³	CH ₄ ²
Peak Daily (lb/day)			
Access Road and Substation Construction - May 2011 - June 2011	2537	2157	0.019
GC Tower - July 2011 - March 2012	5286	4493	0.084
GC Line - July 2011 - March 2012	1582	1344	0.021
Distribution Overhead - January 2012 - May 2012	3508	2982	0.083
Distribution Underground - January 2012 - May 2012	4373	3717	0.017
Max Daily	14749	12537	0.205
Average Daily 2011	7464	6345	0.094
Average Daily 2012	10744	9133	0.149
Tons per Phase			
Access Road and Substation Construction - May 2011 - June 2011	46.0	39.1	0.0003
GC Tower - July 2011 - March 2012	6.0	5.1	0.0001
GC Line - July 2011 - March 2012	4.4	3.7	0.0001
Distribution Overhead - January 2012 - May 2012	38.6	32.8	0.0008
Distribution Underground - January 2012 - May 2012	44.7	38.0	0.0003
Total tons per year 2011	53.0	45.0	0.0004
Total tons per year 2012	86.8	73.8	0.0011

1. Metric tons
2. Methane emissions from truck use only (metric tons).
3. Implementation of APM was assumed to reduce construction equipment, construction vehicles, and worker commutes by approximately 15 percent.

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Emissions calcs for Construction equipment

Emissions factors, approximate HP ratings, and load defaults are from URBEMIS 2007, Ver 9.2.4.

Equipment lists and construction schedule supplied by PG&E, March 2010.

Access Road and Substation Construction - May 2011 - June 2011

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Man Lift	Diesel	2	40	120	0.46	8	261.653	509.5577	9.2453
Forklift	Diesel	1	40	175	0.3	8	170.643	158.0325	2.8673
Crawler Backhoe	Diesel	1	40	175	0.55	8	312.846	531.1656	9.6373
D-3 Bulldozer	Diesel	1	40	50	0.55	8	312.846	151.7616	2.7535
Water Truck	Diesel	1	40	250	0.5	8	324.222	714.9095	12.9711
Total								2065.4269	37.4745

GC Tower - July 2011 - March 2012

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Excavator	Diesel	1	2	175	0.57	12	324.222	855.7467	0.7763
Crane	Diesel	1	1	250	0.43	4	244.589	231.9071	0.1052
Air Compressor	Diesel	1	2	250	0.48	2	273.029	144.4869	0.1311
Backhoe	Diesel	1	2	175	0.55	7	312.846	464.7699	0.4216
Water Truck	Diesel	1	5	250	0.5	12	324.222	1072.3643	2.4321
Total								2769.2748	3.8663

GC Line - July 2011 - March 2012

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	8	250	0.5	8	324.222	714.9	2.59
Puller	Diesel	1	2	25	0.51	2	290.093	16.3	0.01
Crane	Diesel	1	1	250	0.43	6	244.589	347.9	0.16
Total								1079.1	2.77

Distribution Overhead - January 2012 - May 2012

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	50	250	0.5	8	324.222	714.9	16.21
Puller	Diesel	1	5	25	0.51	8	290.093	65.2	0.15
Total								780.2	16.36

Distribution Underground - January 2012 - May 2012

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	32	250	0.5	8	324.222	714.9	10.38
Crawler Backhoe	Diesel	1	32	175	0.55	8	312.846	531.2	7.71
Excavator	Diesel	1	8	175	0.57	8	324.222	570.5	2.07
HDD Rig	Diesel	1	20	175	0.75	8	426.608	987.7	8.96
Bore Rig	Diesel	1	16	175	0.75	8	426.608	987.7	7.17
Total								3792.0	36.29

* metric tons.

** Calculated based on the PG&E estimates.

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Emissions calcs for on-site and commute truck miles

Equipment lists and usage percents supplied by PG&E, March 2010.

Truck	Fuel	Number	Days Operating	Average VMT Per day	Total VMT per day	Total VMT per phase	Emissions Factors (lb/mile) ²		Emissions, tons/phase		Emissions, lb/day	
							CO2	CH4	CO2 ⁴	CH4 ⁴	CO2 ⁴	CH4 ⁴
Access Road and Substation Construction - May 2011 - June 2011												
Pickup	Gasoline	3	40	30	90	3600	1.02352	0.00008	1.67133358	0.00012538	92.11639	0.00691
1 - ton Truck	Diesel	1	40	30	30	1200	4.22046	0.00013	2.29724313	7.0271E-05	126.6137	0.003873
Truck -mounted Digger	Diesel	1	40	30	30	1200	4.22046	0.00013	2.29724313	7.0271E-05	126.6137	0.003873
Concrete Truck	Diesel	1	40	30	30	1200	4.22046	0.00013	2.29724313	7.0271E-05	126.6137	0.003873
Total									8.56306299	0.00033619	471.9575	0.018529
GC Tower - July 2011 - March 2012												
Pickup	Gasoline	3	5	30	90	450	1.02352	0.00008	0.2089167	1.5672E-05	92.11639	0.00691
Crew-cab Pickup	Gasoline	2	5	30	60	300	1.02352	0.00008	0.1392778	1.0448E-05	61.41092	0.004607
Boom Truck	Diesel	1	1	30	30	30	4.22046	0.00013	0.05743108	1.7568E-06	126.6137	0.003873
Concrete Truck	Diesel	8	1	30	240	240	4.22046	0.00013	0.45944863	1.4054E-05	1012.91	0.030984
Dump Truck	Diesel	5	2	40	200	400	4.22046	0.00013	0.76574771	2.3424E-05	844.0914	0.02582
2-ton Flat-bed Truck	Diesel	1	5	30	30	150	4.22046	0.00013	0.28715539	8.7838E-06	126.6137	0.003873
Potholer / Vac Truck	Diesel	2	2	30	60	120	4.22046	0.00013	0.22972431	7.0271E-06	253.2274	0.007746
Total									2.14770162	8.1165E-05	2516.983	0.083813
GC Line - July 2011 - March 2012												
Pickup	Gasoline	3	8	30	90	720	1.02352	0.00008	0.33426672	2.5075E-05	92.11639	0.00691
Crew-cab Pickup	Gasoline	1	8	30	30	240	1.02352	0.00008	0.11142224	8.3584E-06	30.70546	0.002303
Bucket Truck	Diesel	2	8	30	60	480	4.22046	0.00013	0.91889725	2.8108E-05	253.2274	0.007746
Line Truck	Diesel	1	4	30	30	120	4.22046	0.00013	0.22972431	7.0271E-06	126.6137	0.003873
Total									1.59431052	6.8569E-05	502.663	0.020833
Distribution Overhead - January 2012 - May 2012												
Pickup	Gasoline	3	50	30	90	4500	1.10153	0.00007	2.2483985	0.00014633	99.13729	0.006452
Crew-cab Pickup	Gasoline	3	50	30	90	4500	1.10153	0.00007	2.2483985	0.00014633	99.13729	0.006452
Line Truck	Diesel	4	25	30	120	3000	4.21591	0.00012	5.73691757	0.00015854	505.9089	0.013981
Bucket Truck	Diesel	5	5	30	150	750	4.21591	0.00012	1.43422939	3.9636E-05	632.3862	0.017477
Splicing Van	Diesel	5	25	30	150	3750	4.21591	0.00012	7.17114697	0.00019818	632.3862	0.017477
Crane Truck	Diesel	6	10	30	180	1800	4.21591	0.00012	3.44215054	9.5127E-05	758.8634	0.020972
Total									22.2812415	0.00078415	2727.819	0.08281
Distribution Underground - January 2012 - May 2012												
Pickup	Gasoline	1	32	30	30	960	1.10153	0.00007	0.47965835	3.1217E-05	33.04576	0.002151
Crew Truck	Diesel	1	32	30	30	960	4.21591	0.00012	1.83581362	5.0734E-05	126.4772	0.003495
Dump/Cement Truck	Diesel	1	32	100	100	3200	4.21591	0.00012	6.11937874	0.00016911	421.5908	0.011651
Total									8.43485071	0.00025107	581.1138	0.017297

1: Calculated based on information supplied by PG&E.

2: Most conservative emissions factors from EMFAC2007 v.2.3 for the SCAQMD.

4: Calculated in metric tons.