2021 Entergy Corporate GHG Emissions breakdown by category

All numbers in the table below represent CO2 equivalents (CO2e)

Operational Emissions Category	Emissions Source Category	Corporate emissions source	Greenhouse gas	Total emissions short tons CO2e	Total emissions in metric tons CO2e	percentage of total corporate emissions	Calculation worksheet in inventory document
Scope 1 Direct Emission Sources	Stationary Combustion	**Power generating units** (includes emergency and backup generators)	CO2	38,941,746	35,327,358	69.10%	Stationary Combustion CEM
			CH4	16,385	14,864	0.03%	
			N2O	64,949	58,920	0.12%	
		Small stationary combustion sources (co-located at generation stations and PT)	CO2	156,618	142,081	0.28%	All small stat cbn totals
			CH4	63	57	0.00%	
			N2O	94	85	0.00%	
		Biomass power generation	Not applicable				
	Mobile Combustion	**Corporate fleet**	CO2	53,428	48,469	0.09%	Mobile Combustion
			CH4	78	71	0.00%	
			N2O	416	378	0.00%	
		Biomass fleet	Not applicable				
	Fugitive Emissions	**Natural gas transmission and distribution**	CH4	57,538	52,198	0.10%	Fugitive CH4-NG T&D
		Electricity transmission and distribution	SF6	14,562	13,211	0.03%	Fugitive SF6
		Cooling/air-conditioning (building, mobile and nuclear cooling eqpt)	HFCs	6,610	5,997	0.01%	Fugitive HFCs
	Process emissions	**none applicable**	Not applicable				
Total Emissions from Direct Sources				**39,312,487**	**35,663,688**	**69.75%**	
Scope 2 Indirect Emission Sources	**Purchased Electricity**	**Power purchased for business operations outside Entergy service territory**	CO2	9,621	8,728	0.02%	Purchased power
			CH4	14	13	0.00%	
			N2O	28	25	0.00%	
	T&D losses	**Entergy purchased power consumed on Entergy T&D system**	CO2	313,831	284,702	Note: these emissions are calculated for information only - they are NOT included in the subtotal or the grand total shown below because any T&D losses are accounted for by the scope 1 emissions necessary to make up for these losses.	
			CH4	291	264		
			N2O	434	394		
Total Emissions from Indirect Sources				**9,663**	**8,766**	**0.02%**	
Scope 3 Optional Emissions Sources	**Purchased power**	**Controllable Purchased Power** (contracted power where the source is known sold to customers)	CO2	2,879,159	2,611,929	5.11%	Purchased power
			CH4	2,673	2,425	0.00%	
			N2O	3,983	3,613	0.01%	
		Non-Controllable Power (market purchases with exact source being unknown sold to customers)	CO2	4,947,377	4,488,185	8.78%	
			CH4	5,346	4,850	0.01%	
			N2O	7,965	7,226	0.01%	
	Delivered Gas	**Gas supplier emissions - gas delivery** (primarily CH4, but does include other GHGs)	CH4	8,258,578	7,492,056	14.65%	Delivered gas
	Gas Customer Combustion	**Product combustion by LDC customers**	CO2	893,501	810,570	1.59%	Product Combustion
			CH4	357	324	0.00%	
			N2O	536	486	0.00%	
	Business Travel	**Travel by air, rental car, hotel stays and personal vehicles**	CO2	4,353	3,949	0.01%	Business Travel
			CH4	3	3	0.00%	
			N2O	9	8	0.00%	
	Employee Commuting	**Travel by employees to and from normal work locations**	CO2	32,885	29,832	0.06%	Employee Commuting
			CH4	26	24	0.00%	
			N2O	69	63	0.00%	
Total Emissions from Optional Sources				**17,036,820**	**15,455,543**	**30.23%**	
Total Corporate emissions				**56,358,971**	**51,127,998**	**100.00%**	

Direct Emissions from fossil fuel usage at generating facilities using CEM data

2021

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	CO2 from CEM: Total unit CO2 (1) short tons CO2	CO2 from CEM: Entergy equity share of unit CO2 emissions short tons CO2	CH4: Entergy share CH4 emissions from generation (2) short tons CO2e	N2O: Entergy share N2O emissions from generation (3) short tons CO2e	Total Facility CO2e in short tons	Total CO2e in metric tons
Acadia (Unit 2)	CT3	580	LA	100%	Natural Gas	504,016.50	504,016.50	236.89	282.25		
Acadia (Unit 2)	CT4		LA	100%	Natural Gas	504,016.50	504,016.50	236.89	282.25		
Totals							1,008,033.00	473.78	564.50	1,009,071.27	915,414.06
Attala	A01	480	MS	100%	Natural Gas	526,307.50	526,307.50	247.36	294.73		
Attala	A02		MS	100%	Natural Gas	526,307.50	526,307.50	247.36	294.73		
Totals		480					1,052,615.00	494.73	589.46	1,053,699.19	955,899.83
Baxter Wilson	1	550	MS	100%	Gas/Oil	462,654.00	462,654.00	217.45	259.09		
Baxter Wilson	2	771	MS	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Totals		1321					462,654.00	217.45	259.09	463,130.53	420,144.95
Big Cajun 2[5]	2B3 (3)	257	LA	42%[5]	Coal	2,371,361.80	995,971.96	268.91	5,039.62		
Totals		257					995,971.96	268.91	5,039.62	1,001,280.49	908,346.38
Calcasieu Plant	GTG1	322	LA	100%	Natural gas	29,600.00	29,600.00	13.91	16.58		
Calcasieu Plant	GTG2		LA	100%	Natural gas	20,345.00	20,345.00	9.56	11.39		
Totals		322					49,945.00	23.47	27.97	49,996.44	45,356.01
Choctaw County	CTG1		MS	100%	Natural gas	553,299.33	553,299.33	260.05	309.85		
Choctaw County	CTG2		MS	100%	Natural gas	553,299.33	553,299.33	260.05	309.85		
Choctaw County	CTG3		MS	100%	Natural gas	553,299.33	553,299.33	260.05	309.85		
Totals							1,659,898.00	780.15	929.54	1,661,607.69	1,507,385.14
Gerald Andrus	1	761	MS	100%	Gas/Oil	123,711.00	123,711.00	58.14	69.28		
Totals		761					123,711.00	58.14	69.28	123,838.42	112,344.33
Hardin County Peaking Facility		146	TX	100%	Natural Gas	6,555.00	6,555.00	3.08	3.67		
Hardin County Peaking Facility			TX	100%	Natural Gas	6,167.00	6,167.00	2.90	3.45		
Totals							12,722.00	5.98	7.12	12,735.10	11,553.09
Hinds Energy Facility	H01	456	MS	100%	Gas CT	717,065.50	717,065.50	337.02	401.56		
Hinds Energy Facility	H02		MS	100%	Gas CT	717,065.50	717,065.50	337.02	401.56		
Hinds Energy Facility	Unit 2	29	MS	100%	Gas CT	5,285.00	5,285.00	2.48	2.96		
Totals		485					1,439,416.00	676.53	806.07	1,440,898.60	1,307,161.22
Hot Spring Energy Facility	CT-1	620	AR	100%	Gas CT		1,104,697.00	519.21	618.63		
Hot Spring Energy Facility	CT-2		AR	100%	Gas CT		0.00	0.00	0.00		
Totals		620					1,104,697.00	519.21	618.63	1,105,834.84	1,003,196.49
Independence	1	472	AR	56.5%	Coal	2,995,471.00	1,692,441.12	456.96	8,563.75		
Independence	2	332	AR	39.37%	Coal	1,931,433.00	760,405.17	205.31	3,847.65		
Totals		804					2,452,846.29	662.27	12,411.40	2,465,919.96	2,237,044.96
Lake Catherine	4	547	AR	100%	Gas/Oil	130,551.00	130,551.00	61.36	73.11		
Totals		547					130,551.00	61.36	73.11	130,685.47	118,555.86
Lake Charles Power Station	1A	877	LA	100%	Natural Gas	1,113,982.50	1,113,982.50	523.57	623.83		
Lake Charles Power Station	1B		LA	100%	Natural Gas	1,113,982.50	1,113,982.50	523.57	623.83		
Totals		877					2,227,965.00	1,047.14	1,247.66	2,230,259.80	2,023,257.66
Lewis Creek	1	260	TX	100%	Gas/Oil	503,140.00	503,140.00	236.48	281.76		
Lewis Creek	2	260	TX	100%	Gas/Oil	341,507.00	341,507.00	160.51	191.24		
Totals		520					844,647.00	396.98	473.00	845,516.99	767,040.11
Little Gypsy	1	244	LA	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Little Gypsy	2	436	LA	100%	Gas/Oil	186,030.00	186,030.00	87.43	104.18		
Little Gypsy	3	573	LA	100%	Gas/Oil	258,476.00	258,476.00	121.48	144.75		

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)	Total Facility CO2e in short tons	Total CO2e in metric tons
Totals		1253					444,506.00	208.92	248.92	444,963.84	403,664.41
Montgomery County Power Station	CT1		TX	100%	CCGT	1,093,012.00	1,093,012.00	513.72	612.09		
Montgomery County Power Station	CT2		TX	100%	CCGT	1,093,012.00	1,093,012.00	513.72	612.09		
Totals		0					2,186,024.00	1,027.43	1,224.17	2,188,275.60	1,985,170.24
Ninemile Point	3	135	LA	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Ninemile Point	4	748	LA	100%	Gas/Oil	1,424,844.00	1,424,844.00	669.68	797.91		
Ninemile Point	5	763	LA	100%	Gas/Oil	1,284,917.00	1,284,917.00	603.91	719.55		
Ninemile Point	6A	280	LA	100%	CCGT	807,348.00	807,348.00	379.45	452.11		
Ninemile Point	6B	280	LA	100%	CCGT	807,348.00	807,348.00	379.45	452.11		
Totals		1646					4,324,457.00	2,032.49	2,421.70	4,328,911.19	3,927,122.17
New Orleans Power Station	1	132	LA	100%	Natural Gas	101,942.00	101,942.00	47.91	57.09		
Totals		132					101,942.00	47.91	57.09	102,047.00	92,575.48
Ouachita Power	CTGEN1	242	LA	100%	Natural gas	327,266.00	327,266.00	153.82	183.27		
Ouachita Power	CTGEN2	244	LA	100%	Natural gas	404,029.00	404,029.00	189.89	226.26		
Ouachita Power	CTGEN3	241	LA	100%	Natural gas	503,696.00	503,696.00	236.74	282.07		
Totals		727					1,234,991.00	580.45	691.59	1,236,263.04	1,121,518.97
Perryville	1-1	718	LA	100%	Gas/Oil	460,508.00	460,508.00	216.44	257.88		
Perryville	1-2		LA	100%	Gas/Oil	460,508.00	460,508.00	216.44	257.88		
Perryville	2-1		LA	100%	Gas/Oil	34,381.00	34,381.00	16.16	19.25		
Totals		718					955,397.00	449.04	535.02	956,381.06	867,614.30
R S Cogen[4]	RS-5	425	LA	50%	Natural gas	683,153.90	341,576.95	160.54	191.28		
R S Cogen[4]	RS-6		LA	50%	Natural gas	667,543.00	333,771.50	156.87	186.91		
Totals		425					675,348.45	317.41	378.20	676,044.06	613,296.85
R S Nelson	4	500	LA	100%	Gas/Oil	0.00	0.00	0.00	0.00		
R S Nelson[6]	6	385	LA	80.9%	Coal	1,887,704.00	1,527,152.54	412.33	7,727.39		
Totals		885					1,527,152.54	412.33	7,727.39	1,535,292.26	1,392,793.71
Rex Brown	3	349	MS	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Rex Brown	4		MS	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Totals		349					0.00	0.00	0.00	0.00	0.00
Sabine	1	230	TX	100%	Gas/Oil	157,780.00	157,780.00	74.16	88.36		
Sabine	2	230	TX	100%	Gas/Oil	0.00	0.00	0.00	0.00		
Sabine	3	420	TX	100%	Gas/Oil	429,833.00	429,833.00	202.02	240.71		
Sabine	4	530	TX	100%	Gas/Oil	908,197.00	908,197.00	426.85	508.59		
Sabine	5	480	TX	100%	Gas/Oil	606,335.00	606,335.00	284.98	339.55		
Totals		1890					2,102,145.00	988.01	1,177.20	2,104,310.21	1,908,998.11
Sterlington	7AB	102	LA	100%	Gas/Oil	2,989.50	2,989.50	1.41	1.67		
Sterlington	7C	101	LA	100%	Gas/Oil	2,989.50	2,989.50	1.41	1.67		
Totals		203					5,979.00	2.81	3.35	5,985.16	5,429.64
St Charles Power Station	1A	926	LA	100%	CCGT	1,053,818.00	1,053,818.00	495.29	590.14		
St Charles Power Station	1B		LA	100%	CCGT	1,053,818.00	1,053,818.00	495.29	590.14		
Totals		926					2,107,636.00	990.59	1,180.28	2,109,806.87	1,913,984.59
Union Power Station[7]	CT 1	495	AR	100%	Gas	509,881.00	509,881.00	239.64	285.53		
Union Power Station	CT 2		AR	100%	Gas	509,881.00	509,881.00	239.64	285.53		
Union Power Station	CT 3	495	AR	100%	Gas	713,959.00	713,959.00	335.56	399.82		
Union Power Station	CT 4		AR	100%	Gas	713,959.00	713,959.00	335.56	399.82		
Union Power Station	CT 5	495	AR	100%	Gas	613,631.50	613,631.50	288.41	343.63		
Union Power Station	CT 6		AR	100%	Gas	613,631.50	613,631.50	288.41	343.63		
Union Power Station	CT 7	495	AR	100%	Gas	576,833.00	576,833.00	271.11	323.03		
Union Power Station	CT 8		AR	100%	Gas	576,833.00	576,833.00	271.11	323.03		

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)		Total Facility CO2e in short tons	Total CO2e in metric tons
Totals		1980					4,828,609.00	2,269.45	2,704.02		4,833,582.47	4,384,952.25
Washington Parish Energy Center	1	361	LA	100%	Gas	101,494.00	101,494.00	47.70	56.84			
Totals		361					101,494.00	47.70	56.84		101,598.54	92,168.64
Waterford	1	411	LA	100%	Gas/Oil	8,459.00	8,459.00	3.98	4.74			
Waterford	2	411	LA	100%	Gas/Oil	156,335.00	156,335.00	73.48	87.55			
Waterford	4		LA	100%	Oil	4,611.00	4,611.00	2.17	2.58			
Totals		822					169,405.00	79.62	94.87		169,579.49	153,839.92
White Bluff	1	465	AR	57%	Coal	3,694,964.00	2,106,129.48	568.65	10,657.02			
White Bluff	2	481	AR	57%	Coal	4,394,488.00	2,504,858.16	676.31	12,674.58			
Totals		946					4,610,987.64	1,244.97	23,331.60		4,635,564.20	4,205,313.11
Totals						**46,200,860.70**	**38,941,745.87**	**16,385.23**	**64,948.69**		39,023,079.79	35,401,142.49
						short tons CO2	short tons CO2	short tons CO2e	short tons CO2e			
						Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)		Total Facility CO2e in short tons	Total CO2e in metric tons
						CO2 from CEM		**CH4**	**N2O**			

(1) CEM data reported to EPA Acid Rain program - can be verified at EPA's Clean Air Market's Database located at http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard&EQW_datasetSelection=

(2) Emissions factor derived from CH4 (in CO2e) as percentage of emissions from CO2 for a specific fuel type. See "Emissions and Conversion Factors" for EPA emissions factors for specific fuels; emissions factor for natural gas used for all dual-fuel units as this represents the larger fuel input

(3) Emissions factor derived from N2O (in CO2e) as percentage of emissions from CO2 for a specific fuel type. See "Emissions and Conversion Factors" for EPA emissions factors for specific fuels; emissions factor for natural gas used for all dual-fuel units as this represents the larger fuel input

(4) Emission data obtained directly from the EPA's Database located at http://ampd.epa.gov/ampd/

(5) While Entergy owns 42% of Big Cajun 2 Unit 3, our actual consumption of the MWhs generated from this facility varies from 42% to 45%. CO2 emission number shown is based on actual consumption of MWhs received from Fossil Operations.

(6) During 2012, EWC (EAM Nelson Holdings, LLC) acquired 10.9% of this unit. Therefore, Entergy's overall ownership share of this unit increased to 80.9%

Additional Notes

- Emissions from Louisiana Station Plant 1 (Units 1A, 2A, 3A, 4A, 5A) are not included in the inventory; these units exist for the sole use of Exxon under a long term lease agreement.

- The following units were removed from the Inventory in 2014 - Lynch 2&3, Couch 1&2, Lake Catherine 1-3, Louisiana Station 2 (units 10-12), Ninemile 1&2, Nelson 3, Richie 1&2, and Sterlington 10. These units are either permanently retired (decommissioned in some cases) or are in extended reserve shutdown and are not expected to return to service.

- The following units were ADDED to the inventory in 2014 - Ninemile 6A and 6B - these units came online during December of 2014.

- The Acadia power plant has two units - Unit 1 (CT1 & CT2) is owned by CLECO, while Unit 2 (CT3 & CT4 as shown above) is owned by Entergy.

- Michoud Plant units removed from inventory in 2018 Inventory - the units were permanently retired in January 2016 and scheduled for demolition

Small combustion sources at all generation stations

Small stationary combustion sources were initially calculated for all known equipment co-located at generating stations using parameters (such as max energy input/hour) developed in internal emissions compliance documents and assumed equipment capacity factors.

Starting in 2013, Entergy reported the previous year's GHG (CO_2e) emissions from small sources co-located at Fossil plants in compliance with the EPA Mandatory Reporting Rule (General Stationary Fuel Combustion - Subpart C).

These updated values are substituted for the older, 2005 calculations in order to be consistent with mandatory GHG reporting. Nuclear estimates continue to rely on the 2005 calculations unless otherwise noted. The Thermal assets were divested in late 2013, so these assets and emission are removed from the inventory.

More detail on each of these facilities, the specific data collection methods, and the calculation methodology, can be found in the GHG Monitoring Plan required by the EPA Mandatory Reporting Rule.

Plant	CO_2e Emissions reported under Mandatory Reporting Rule (short tons of all gases in 2020) [obtained from Power Generation unless otherwise noted]	CO_2e Emissions reported under Mandatory Reporting Rule (metric tons of all gases in 2020) [obtained from Power Generation unless otherwise noted]	Comments
Fossil fuel generating stations			
Attalla	0.0	0.0	No Subpart C affected sources
Baxter Wilson	29,545.3	26,810.6	
Calcasieu	0.0	0.0	No Subpart C affected sources
Choctaw	23.5	21.3	
Gerald Andrus	0.0	0.0	No Subpart C affected sources
Hinds County	34.8	31.6	
Hot Spring	0.0	0.0	No Subpart C affected sources
Independence	3,996.2	3,626.3	(~50% ownership share)
Lake Catherine	1,688.6	1,532.3	
Lewis Creek	104,148.4	94,508.6	
Little Gypsy	703.5	638.4	
RS Nelson	0.0	0.0	No Subpart C affected sources (80.9% ownership share)
Ninemile Point	3,360.3	3,049.3	
Ouachita	2,531.6	2,297.2	
Perryville	3,849.2	3,492.9	
Rex Brown	0.0	0.0	Retired in 2011
Sabine	0.0	0.0	
St Charles	0.0	0.0	No Subpart C affected sources
Union	0.0	0.0	No Subpart C affected sources
Waterford	0.0	0.0	No Subpart C affected sources
White Bluff	1,506.0	1,366.6	(57% ownership share)
Power Gen TOTAL	**151,387.3**		

Nuclear generating stations[2][3]	Plant total small sources CO_2e (short tons using 2005 estimate calculations)
River Bend	523.1
Indian Point 2	0.0
Indian Point 3	137.8
Palisades [1]	953.5
Waterford 3	1,050.0
Grand Gulf	547.7
Arkansas Nuclear 1&2	2,175.0
Nuclear TOTAL (short tons)	**5,387.1**

All small source totals	**156,774.3**

(1) Estimated based on average of other units
(2) Vermont Yankee entered decommission status and did not operate beginning in 2016. Has been removed.
(3) James Fitzpatrick was sold in 2017 and has been removed
(4) Mablevale, Michoud, and Willow Glenn removed from inventory in 2018 since units have been retired, demolished, or scheduled for demolition.
(5) Harrsion County and NISCO removed from inventory in 2018 since Entergy has no equitiy share in ownership. Entergy only operates these units.
(6) Pilgrim ownership was transferred to Holdtec on 8/26/2019. Pilgrim has been removed for the 2020 inventory.

Estimate of individual GHG breakdown (short tons)	
CO_2	156617.56
CH_4	62.65
N_2O	93.97

Direct Emissions from fossil fuel usage for company mobile fleet ("Mobile Combustion")

Note: The information below was collected and results calculated based on 2016 data.

Beginning in 2013, the GWP for N2O and CH4 was modified based on the EPA final rule effective 1/1/14.

Fuel Description	Fuel Code	Units consumed (gal)	Assumptions/Comments
Diesel	**D**	2,946,657	**Based on 2017 Entergy data provided by Carolanne Nichols**, it is assumed that totals for all bi-fuel categories are split at a 90/10 ratio between constituent fuel types and are calculated as such. Bi-fuels are separated below into its constituent fuel type category and emissions calculated. Green Plug-In (JEMS) units run on diesel on the highway and electricity on the job site.
Gasoline	**G**	1,109,488	
BiFuel-Gasoline/Ethanol	**S**	768,122	
BiFuel-Gasoline/CNG	**A**	2	
BiFuel-Gasoline/LPG	**B**	11	
BiFuel-Diesel/Electricity	**F**	0	CNG is measured in Gallons of Gasoline Equivalency or GGE. One gallon of CNG or GGE has the same energy value as a gallon of gasoline.
Propane	**P**	20	
CNG	**C**	7	
LPG	**L**	288	"Unknown" split evenly (50/50) between diesel and gasoline.
Green Plug-In JEMS	**J**	1,476	
BiFuel-Gasoline/Electricity	**H**	884	**2021 Fuel purchases provided by Josh McDonald**
Unknown	-	0	
Jet fuel		234,560	**Total 2021 Fuel Purchase - from Louis Gruntz**
Total gallons consumed		**5,061,516**	

Total units of each fuel type

Fuel	Total units consumed (GALLONS) - from inputs above	conversion to energy content (MMBtu/gallon)	Total MMBtu consumed	CO2 using EPA Climate Leaders Efs: Emissions Factor (lbs CO2/MMBtu)	CO2 using EPA Climate Leaders Efs: Total CO2 Emissions (short tons)	CO2 using WRI/WBCSD Protocol Efs: Emissions Factor (kg CO2/Gallon)	CO2 using WRI/WBCSD Protocol Efs: Total CO2 Emissions (short tons)
Diesel	2,948,133	0.1387	408,906	159.68	32,647	10.15	32,985
Gasoline	1,801,694	0.1251	225,392	156.44	17,630	8.81	17,497
Ethanol (E85)	76,812	0.0843	6,475	149.59	484	5.56	471
CNG	7	0.1251	1	116.41	0	See note	0
LPG	289	0.092	27	138.76	2	5.79	2
Propane	20	0.092	2	138.32	0	5.79	0
Jet fuel	234,560	0.135	31,666	154.72	2,450	9.57	2,474
Totals	5,061,516		672,468		**53,213**		**53,428**

Note: Emissions from Ethanol are considered "biogenic" emissions are do not contribute to net CO2 additions to the atmosphere. They are include with fossil fuel CO2 because it is de minimus.

Regarding CNG, no SCF measurement is available; used the EPA CL number as a proxy.

Direct Emissions of N2O and CH4 from mobile fleet ("Mobile Combustion")

The calculation below uses conservative N2O and CH4 emissions factors to estimate these emissions from mobile sources.
The emissions factors are from EPA Climate Leaders Guidance for construction vehicles.

NOTE - Emission factors for these gases were not available for all fuel types - a conservative approach was used by using the emission factor for diesel.

N2O from mobile sources

N2O	gallons consumed	g N2O/gal fuel	total kg N2O	short tons	CO2e short tons
Gasoline	1,801,694	0.22	396.37	0.445	132.65
Diesel	2,948,133	0.26	766.51	0.861	256.52
Jet Fuel	234,560	0.26	60.99	0.068	20.41
Propane	20	0.26	0.01	0.000	0.00
CNG	7	0.26	0.00	0.000	0.00
LPG	289	0.26	0.08	0.000	0.03
Ethanol	76,812	0.26	19.97	0.022	6.68
total					**416.28**

CH4 from mobile sources

CH4	gallons consumed	g CH4 /gal fuel	total kg CH4	short tons	CO2e short tons
Gasoline	1,801,694	0.50	900.85	1.012	25.29
Diesel	2,948,133	0.58	1,709.92	1.920	48.01
Jet Fuel	234,560	0.58	136.04	0.153	3.82
Propane	20	0.58	0.01	0.000	0.00
CNG	7	0.58	0.00	0.000	0.00
LPG	289	0.58	0.17	0.000	0.00
Ethanol	76,812.23	0.58	44.55	0.050	1.25
total					**78.37**

Total N2O and CH4 CO2e	**494.66**

Total Estimated Emissions from Mobile Sources (short tons CO2e)	**53,923**

Emissions from natural gas from T&D operations

The calculation for Gas Operations below is based on as reported data from the GHG Summary Report for 2020. The Spindletop Gas Storage facility emissions are calculated using GRI emission factors (see notes below).

Gas Operations	CO2 equivalent emissions from facility subparts C-II, SS, and TT (metric tons) Subpart W, Fugitive	Total C02 equivalent emissions (short tons)	
Entergy Louisiana, L.L.C. Gas Business	10,013.9	11,038.4	Updated from GHG Full Report_ELL_2020RY
Entergy New Orleans, Inc. Gas Business	19,846.2	21,876.7	Updated from GHGR Full Report_ENO_2020RV.pdf
SUB-TOTAL		**32,915.1**	

Reported Natural Gas Release	Short tons natural gas	CO2 Equivalent Emissions
Entergy Ouachita Site, December 10 2021	0.887	22.175
SUB-TOTAL		**22.175**

Spindletop Storage					
Storage facilities	**# storage facilities**	**Emissions factor (metric ton CH4/station-yr)**	**Total metric tons CH4**	**Total short tons CH4**	**Total short tons CO2e (Cell E x 25)**
Fugitive Emissions from Storage Facilities[3]	1	675.4	675.40	744.50	18,612.50
Vented Emissions from Storage Facilities[4]	1	217.3	217.30	239.53	5,988.30
SUB-TOTAL					**24,600.80**

TOTALS FROM FUGITIVE NATURAL GAS **57,538** **short tons CO2e**

GENERAL NOTES:
Source for emissions factors by equipment type is the Gas Research Institute (GRI), which provides factors in metric units only.

SPECIFIC NOTES:
(1) Compressors are assumed to be for natural gas transmission, not storage.
(2) general emissions factor used for vented gas; GRI provides emissions factors for specific equipment venting.
(3) EF from API Table 6-1, (American Petroleum Institute), Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry February 2004).
(4) EF from GRI

Direct Emissions of Escaped SF6 in Electricity T&D System ("Fugitive Emissions")

Note: The information below was as reported to the EPA under Subpart DD of the Mandatory GHG Reporting Rule.

More detail on the specific data collection methods, and the calculation methdology, can be found in the GHG Monitoring Plan required by the EPA Mandatory Reporting Rule.

2020 Fugitive SF6 Emissions Estimate			
SF6 Emissions (short tons) (1)	**Global Warming Potential (GWP) (2)**	Total CO2 Equivalent Emissions (short tons)	Total CO2 Equivalent Emissions metric tons)
0.64	22,800	**14,562.1**	**13,210.5**

(1) Converted 1,277.38 pounds to short tons - the amount of emissions reported for RY 2020.

Direct Emissions of Fugitive HFCs in all utility cooling and A/C equipment

This sheet contains calculations for all sources of fugitive HFCs. HFCs from all sources are considered de minimus (i.e. insignificant in the Entergy corporate total). The activity data required to provide the highest level of accuracy is difficult and impractical to obtain for such a small source. Instead, emissions factors have been created based on national averages for a number of variables to provide a rough estimate of these emissions. The methodology behind these emissions factors is found below.

These CO2e totals are calculated using data, provided by Real Estate as of December 31, 2016, that does not change significantly between inventory years. These same data and emissions totals are used each year.

2010 Update - Facilities indicates that there is no significant change to these numbers; therefore, these numbers will continue to be carried forward each year.
2013 Update - carried historical data forward; however, updated the GWP consistent with an EPA final rule that became effective on 1/1/14.
2014 Update - removed the Thermal Operations facilities, as these were sold in late-2013.
2015 Update - No changes made
2016 Update - Values updated as of December 31, 2016
2017 Update - No changes made
2018 Update - No changes made
2019 Update - No changes made
2020 Update - No changes made
2021 Update - Updated Entergy owned space & capital lease space, per Amanda Distefano

	square footage air-conditioned	EF: fugitive HFCs (short tons CO2e/sq ft) *	Facility fugitive HFC (short tons CO2e)
Entergy owned space	2,884,572	**0.00078**	2,248
Entergy capital lease space	1,474,194	**0.00078**	1,149
Generation plant space	1,700,000	**0.00078**	1,325
Total Fugitive HFCs	6,058,766		4,723

Generation plant space assumes 50,000 sq. ft. per plant; 34 plants assumed.

From Nuclear facility

	lbs HFC charged to equipment	EF: fugitive HFCs as CO2e (GWP=1300)	Facility fugitive HFC (short tons CO2e)
	0	1300	0

Entergy nuclear facilities **do not** use HFCs for cooling

From all Entergy-owned vehicles

	Total CO2 from mobile sources (short tons)	EF: HFC as % of CO2 emissions **	Facility fugitive HFC (short tons CO2e)
Vehicular A/C	53,923	3.50%	1,887

Total CO2 from all mobile source fuels are included

Total fugitive HFC emissions **6,610** short tons CO2e

*** Calculation for estimating fugitive HFC emissions from building space using A/C**

The calculation used in calculating the emissions factor for metric tons of CO2e fugitive HFC.	Average cooling capacity of chiller (ft2/ton of cooling capacity)	HFCs in chiller (kg HFC/tons of cooling)	Annual HFC loss factor (percent)	Total Annual HFC losses (MT HFC/1000 ft2)	Total Annual HFC losses (MT CO2e)/1000 ft2	Total Annual HFC losses (**MT CO2e**)/ ft2	Total Annual HFC losses (**short tons** CO2e)/ ft2
	280	1.2	15%	0.000642857	0.71	0.00071	**0.00078**
	Source: ASHRAE (http://www.themcdermottgroup.com/Newsworthy/HVAC%20Issues/Rule%20of%20Thumb%20Sizing.htm) Note that this is a conservative estimate - a reasonably designed building should be more like 400	Source: http://www.usgbc.org/LEED/tsac/energy.asp	Source: EPA Climate Leaders Gudance, January 2004. Note: This estimate is the source of the greatest uncertainty in the calculation, since the range is 2-15%, and the average is probably more like 5%.		This is the emissions factor that is applied to the square footage of air-conditioned space. This EF includes the global warming potential for HFC 134a (1,100).	Emissions factor for MT CO2e per ft2.	Emissions factor for short tons CO2e per ft2; conversion factor 1.1023

Calculation to estimate HFCs from mobile A/C as percentage of CO2 emissions from mobile sources using national averages for equipment leakage and miles/gallon

HFC Emissions Estimate				**CO2 Emissions Estimate**				**Emissions factor**
Vehicle type	HFC capacity (kg HFC)	annual leakage rate (percentage)	CO2 emissions (kg CO2e/yr-veh); GWP=1100	Miles per gallon	Miles per year	Emission factor (kg CO2/gal)	CO2 Emissions (kg CO2/yr-veh)	Emissions factor: HFC emissions (CO2e) to CO2 (as %)
Car	0.8	20%	176	20	15,000	8.87	6,653	**2.6%**
light truck	1.2	20%	264	15	15,000	8.87	8,870	**3.0%**

Power purchased to serve utility customers

Controllable power purchases - 2021

				2019			
Code	Plant description	FACILITY CODE (SPO)	State	Total Entergy purchased from plant (MWh)	Unit/Plant-Specific Emission Factor (lbs CO2/MWh), Based on Total Output [from eGRID2020 data, accessed 02/8/2022 unless otherwise noted]	CO2 emissions from puchased power (short tons) [using eGRID Unit-Specific Factors (when available)]	Comments/Notes
AGRILECTRIC	AGRILECTRIC LP		LA	67,920.80	98.3	3,338.8	Lake Charles, LA
CARVILLE	Carville Energy Center		LA	2,697,815.60	745.4	1,005,532.5	Calpine, St. Gabriel, LA
EXELON	Frontier – Tenaska		TX	7,200.00	870.0	3,132.1	Kennett Square, TX
ETEC	Jacinto Peaking Power Facility		TX	49,554.70	1,493.8	37,013.0	Nacogdoches, TX
MONTAUK	Montauk		TX	26,280.00	-	-	Montauk LFG in Cleveland
STUTTGART	Stuttgart Solar		AR	164,469.20	-	-	West Memphis
Tenaska LA3	Capital Region Solar - West Baton Rouge Parish		LA	107,897.6	-		West Baton Rouge, La
SRMPA	Nelson 1 & 2		LA	1,301,220.00	1,526.4	993,058.6	NISCO
OXYCHEM	Oxy Chem – Taft		LA	2,019,293.60	809.1	816,885.0	In eGrid as Taft Cogeneration
CARBON	Ralone		LA	224,181.60	-	-	Rain Carbon, Lake Charles Facility
SRMPA	White Bluff		AR	16,560.00	2,439.5	20,199.4	Entergy White Bluff Plant
Totals				**6,682,393.1**		**2,879,159.4**	**short tons CO2**
N2O emissions from controlled purchases (SERC MS Valley Total Output Rate, eGRID2020)				0.004	lbs/MWh	**3,982.7**	**short tons CO2e**
CH4 emissions from controlled purchases (SERC MS Valley Total Output Rate, eGRID2020)				0.032	lbs/MWh	**2,673.0**	**short tons CO2e**

* - some units may be in different control areas or eGRID subregions; however, impact to the overall GHG inventory is expected to be negligible.

Total CO2e from Controllable Purchases

TOTAL	**2,885,815.0**	**short tons CO2e**

Indirect Emissions associated with purchased power	**Totalpchsd power MWh**	**Loss factor %**	**Total power lost MWh**		
CO2 emissions from T&D losses of purchased power on Entergy system	**20,047,179**	3.633%	728,386	313,830.7	short tons CO2
CH4 emissions from T&D losses of purchased power on Entergy system				291.4	short tons CO2e
N2O emissions from T&D losses of purchased power on Entergy system				434.1	short tons CO2e
			TOTAL	**314,556.2**	**short tons CO2e**

Purchase Type	**Percentage of Utility Supply** (10-k pages 252-253, Fuel Supply Section)	**MWh**	**CO2 Emissions (ST)**	**CH4 Emissions (ST CO2e)**	**N2O Emissions (ST CO2e)**	**Total CO2e (ST)**	**Total CO2e (MT)**		
Controllable Purchases	6%	6,682,393	2,879,159	2,673.0	3,983	2,885,815.03	2,617,968.11	calc above	
Uncontrollable (Market) Purchases	12%	13,364,786	4,947,377	5,345.9	7,965	4,960,687.88	4,500,261.64	use eGRID factor	
	TOTALS	**20,047,179**	**7,826,536**	**8,019**	**11,948**	**7,846,502.92**	**7,118,229.75**		

Grid Power purchased for EWC plants/operations (non-Entergy power)

Plant and associated facilities[1,2,3]	**2020 Electricity Usage (kwh)**	**eGRID Subregion**	**eGRID2019 Emission Factor (lb CO2/MWh)**	**2014 eGRID Emission Factor** (lb CH4 per MWh)	**2014 eGRID Emission Factor** (lb N2O per MWh)	**Estimated CO2 Emissions (short tons)**	**Estimated CH4 Emissions (short tons CO2e)**	**Estimated N2O Emissions (short tons CO2e)**	**Estimated Emissions (short tons CO2e)**
Indian Point Energy Center (IPEC) Unit 2 (4)	-	NYCW	553.80	0.021	0.002	0.00	0.00	0.00	**0**
Indian Point Energy Center (IPEC) Unit 3 [5]	14,369,500	NYCW	556.06	0.021	0.002	3,995.12	3.17	4.45	**4,003**
Palisades (PAL)	9,460,150	RFCM	1,189.34	0.114	0.016	5,625.67	11.32	23.46	**5,660**
TOTAL	**23,829,650**								
					TOTAL	**9,620.79**	**14.49**	**27.92**	**9,663.20**

(1) Provided by Anthony Dichman based on Station Service Purchases from ISOs. Calculations on file.
(2) Vermont Yankee entered decommission status and did not operate beginning in 2016 - according to Nuclear, their power usage is negligible; so this was removed beginning in 2016.
(3) There were no purchases for Fitzpatrick or Pilgrim in 2020, as these plants were sold prior to 2020. They have been remoed from the inventory beginning in 2020.
(4) Indian Point 2 was shut down in April 2020
(5) Indian Point 3 was shut down in April 30 2021
(6) Palisades is slated to be shut down in 2022

Operating Company	**Generation GWh**	**Purchases GWh**	**Total Power**	**Losses**	**% Lost**
EAI	24,344	3,638	27,982	1,378	**0.049245944**
ELL	48,873	14,469	63,342	1,599	**2.524391399**
EMI	13,486	3,987	17,473	696	**3.983288502**
ENOI	3,064	4,471	7,535	127	**1.685467817**
ETI	7,338	14,381	21,719	937	**4.314194945**
SERI	5,820		5,820	(29)	**-0.498281787**
ELIM		(14,294)	(14,294)		
TOTALS*	**102,925**	**26,652**	**129,577**	**4,708**	**0.036333609**

Per Lesley & Rick

Source: 2020 Investor Guid pg 36

4,708.00 **Total Loss**
129,577.00 **Total Power**
0.0363 % Loss

2020_Investor_Guide.pdf (entergy.com)

Delivered Gas Emissions

This spreadsheet provides an estimate of upstream emissions associated with suppliers of natural gas for electric power generation and distribution to LDC customers. Delivered gas data was provided by System Planning & Operations.

Gas Deliveries (mmBtu)				Estimated Upstream Emissions (g CO2e)					
Electric Utility	Local Distribution Companies (ENO and ELL)	Emission Rate for Delivered Gas[1] (grams of CO2e per MJ)	Conversion of Emission Rate to g CO2e per mmBtu	Electric Utility	LDCs	Total	Conversion to lbs	Conversion to Short Tons	Conversion to Metric Tons
485,067,162	19,036,134	14.1	14875.5	7,215,616,568,331	283,172,011,317	7,498,788,579,648	16,517,155,462	8,258,578	7,492,058

GHGe Breakdown			
5,624,091,434,736	5,624,091	**TOTAL CH4, CO2e**	CH4 ~= 75% of Total Natural Gas Industry CO2e GHG Emissions in the U.S. (Exhibit 6-11, p. 44, NETL report)
1,874,697,144,912	1,874,697	**TOTAL CO2, CO2e**	CO2 ~= 25% of Total Natural Gas Industry CO2e GHG Emissions in the U.S. (Exhibit 6-11, p. 44, NETL report)
0.0000	937	**TOTAL N2O, CO2e**	N2O = 0.0005 lbs CO2e N2O/lb CO2 (ETR GHG Inventory emission factor for Industrial natural gas-fired facilities.)
8,267,033	**7,499,726**	**TOTAL CO2e**	Adjusted TOTAL

Notes and Sources

1 - NETL Report - Industry Partnerships and their Role in Reducing Natural Gas Supply Chain Greenhouse Gas Emissions (2020); pp 50, Exhibit 6-10

NETL-Industry-Partnerships-and-their-Role-in-Reducing-Natural-Gas-Supply-Chain-Greenhouse-Gas-Emissions-Phase-2-12FEB2021.pdf (doe.gov)

Employee Business Travel - GHG Footprint Estimate

This section of the GHG inventory was produced in 2022 using 2021 actual travel numbers from AMEX travel. UPDATED FROM VERIFICATION

Overall Summary	CO2 Emissions (lbs)	CO2 Emissions (short tons)	CO2 Emissions (metric tons)
Airline Flights	2,341,557	1,171	1,062
Rental Cars	389,858	195	177
Hotel Stays	964,691	482	438
Personal Vehicle Use	5,010,020	2,505	2,273
TOTAL ESTIMATE	**8,706,126**	**4,353**	**3,949**

Airline GHG Footprint Estimate

Year	Distance Flown (miles)	CO2 Footprint (lbs)	CO2 Footprint (short tons)	CO2 Footprint (metric tons)
2021	4,442,327	2,341,557	1,171	1,062

Note: The AMEX Travel group provided the CO2 footprint estimate calculations - have requested details of assumptions and calculations

Rental Car GHG Footprint Estimate

		Mileage Assumptions and Calculations				
Year	**Number of Days/Nights**	20% @ 5 mpd	30% @ 10 mpd	30% @ 20 mpd	15% @ 50 mpd	5% @ 100 mpd
2021	19,450	19,450	58,350	116,700	145,875	97,250

GRAND TOTAL	**437,625.0**	**miles**
	176,800.5	**kg CO2** (@411 grams CO2 per mile)
	389,857.8	**lb CO2**
	194.9	**short tons**
	176.8	**metric tons**

Source of assumptions and calculations: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf

Hotel Nights

Year	Number of Days/Nights	Assumed kwh usage per room per day	Emission Rate Assumption (lbs per MWh)	Natural Gas Usage per room per night (mmBtu)	Total Emissions (lbs)	Total Emissions (short tons)	Total Emissions (metric tons)
2021	32,156						
2021	**32,156**	30	1,000	0.097	**964,691**	**482.3**	**437.6**

Source of assumptions and calculation: https://www.epa.gov/sites/default/files/2018-12/documents/indirectemissions_draft2_12212018_b_508pass_3.pdf

Employee Personal Vehicle Mileage

Employee Personal Car Mileage GHG Footprint Estimate

Year	Miles	kg CO2	lbs CO2	short tons CO2	metric tons CO2
2021	5,623,872	2,272,044	5,010,020	2,505	2,272.51

Source of assumptions and calculations: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf

Product Combustion - Emissions from combustion of Natural Gas distributed to retail customers

Values below represent those reported in the RY 2020 GHG reports submitted by Gas Operations and provided to SEP for each location.

Gas Operation	CO2 equivalent emissions from supplier subparts LL-QQ (metric tons) Subpart NN Product Combustion	Total CO2 equivalent emissions (short tons)
Entergy Louisiana, L.L.C. Gas Business	357,379.9	393,943.4
Entergy New Orleans, Inc. Gas Business	454,002.6	500,451.6
TOTAL	**811,382.5**	**894,395.0**

Estimate of individual GHG breakdown (short tons)	
CO2	893500.65
CH4	357.40
N2O	536.10

Employee Commuting Emission Calculations

Commuter Travel Calculations

Commuting Method (more than 75% of time)	
Number of Employees =	**14000**
Walkers =	144
Bikers =	44
Carpoolers =	1154
Vanpoolers =	33
Public Transporters =	67
Individual Drivers =	12558
Total	14000

Survey # (n)	%
13	1.03%
4	0.32%
104	8.24%
3	0.24%
6	0.48%
1132	89.70%
1262	100.00%

Commuting Distance (miles one-way)						
	Low	**Avg**	**High**	**# Employees**	**SURVEY RESPONSES (#)**	**SURVEY RESPONSES (%)**
	0.0	0.5	0.9	202	25	1%
	1.0	3.0	5.0	1553	192	11%
	6.0	8.0	10.0	2572	318	18%
	11.0	15.5	20.0	3227	399	23%
	21.0	25.5	30.0	2548	315	18%
	31.0	35.5	40.0	3898	482	28%
Total	70.0	88.0	105.9	14000	1731	100%

Distribution of Commuting Method by Miles						
	Individual Drivers	**Carpoolers**	**Vanpoolers**	**Public**	**Bikers**	**Walkers**
	181	-	-	1	4	108
	1393	-	-	7	40	36
	2307	-	-	12	-	-
	2895	-	-	15	-	-
	2285	-	-	12	-	-
	3497	1154	33	19	-	-
Total	12558	1154	33	67	44	144

Method of Transportation	Miles Traveled by Method (using midpoint of mileage range)			Estimated Emissions			
	one way	**round trip**	**yearly miles**	**yearly gallons**	**lbs**	**short tons**	**met tons**
Walkers =	157	314	66811	-	-	-	
Bikers =	122	244	51890	-	-	-	
Carpoolers =	40957	81914	17447772	290796	5815924	2908	2638
Vanpoolers =	1181	2363	503301	3355	67107	34	30
Public Transporters =	1325	2650	564467	2258	45157	23	20
Individual Drivers =	249991	499981	106496040	4259842	85196832	42598	38645
Total			125130281	4556251	91125020	45563	41334

Employee Commuter Travel 2014

Commuting method (more than 75% of the time)	Miles travelled per year	Total emissions kg CO2e	Total emissions short tons CO2e	Total Emissions metric tons CO2e	% total commuting emissions
Individual car	106,496,040	39,890,328	43,971	39,891	77.8%
Vanpool	503,301	268,927	296	269	13.1%
Public Transportation	564,467	77,304	85	77	3.8%
Carpool	17,447,772	6,535,429	7,204	6,535	5.3%
Bikers	51,890	-	-	-	0.0%
Walkers	66,811	-	-	-	0.0%
Total	125,130,281	46,771,989	51,557	46,772	100.0%

Commuting method (more than 75% of the time)	Miles travelled per year	Greenhouse gas	Total emissions kg CO2e	Total emissions short tons CO2e	Total Emissions metric tons CO2e	% total commuting emissions
Individual car	106,496,040	CO2	38,764,559	42,730	38,765	82.9%
		CH4	69,329	76	69	0.1%
		N2O	1,056,441	1,165	1,056	2.3%
Vanpool	503,301	CO2	261,213	288	261	0.6%
		CH4	380	0.42	0.38	0.0%
		N2O	7,333	8	7	0.0%
Public Transportation	564,467	CO2	77,077	85	77	0.2%
		CH4	25	0.03	0.02	0.0%
		N2O	201	0.22	0.20	0.0%
Carpool	17,447,772	CO2	6,350,989	7,001	6,351	13.6%
		CH4	11,358	12.52	11.36	0.0%
		N2O	173,082	191	173	0.4%
Bikers	51,890	CO2	-	-	-	0.0%
		CH4	-	-	-	0.0%
		N2O	-	-	-	0.0%
Walkers	66,811	CO2	-	-	-	0.0%
		CH4	-	-	-	0.0%
		N2O	-	-	-	0.0%
Total	125,130,281		46,771,988	**51,557**	**46,772**	**100.0%**

MODIFICATION TO NUMBER FOR 2020 TELECOMMUTING POSITION				
	Monthly Pre-Pandemic	3,897,666		
	Monthly During Pandemic	2,206,079		
	Jan to Feb 2020	7,795,331		
	March to Dec 2020	22,060,787		
	Estimated Total for 2020	**29,856,119**	**32,917**	**29,862**

Calculation for Public Transportation	# of miles	Total emissions kg CO2e
50% Bus	282,233	30,246
5% Intercity Rail	28,223	5,231
5% Commuter Rail	28,223	4,864
40% Transit Rail	225,787	36,962
Total	564,467	77,304

Estimate of individual GHG breakdown (short tons)	
CO2	32884.52
CH4	26.31
N2O	69.06

EPA Methodology

$E=VMT*(EF_{CO2}+EF_{CH4}*0.021+EF_{N2O}*0.310)$
E= total CO2e
VMT= vehicle miles travelled per year
EF_{CO2}= CO2 emissions factor
EF_{CH4}= CH4 emissions factor
EF_{N2O}= N2O emissions factor
0.021= conversion factor
0.310= conversion factor

*used for individual car, carpool and vanpool

$E=PMT*(EF_{CO2}+EF_{CH4}*0.021+EF_{N2O}*0.310)$
E= total CO2e
PMT= passenger miles travelled per year
EF_{CO2}= CO2 emissions factor
EF_{CH4}= CH4 emissions factor
EF_{N2O}= N2O emissions factor
0.021= conversion factor
0.310= conversion factor

*used for bus, air and rail travel

Method of travel	EF_{CO2} (kg Co2/vehicle-mile)	EF_{CH4} (g CH4/vehicle-mile)	EF_{N2O}(g N2O/vehicle-mile)
Individual car	0.364	0.031	0.032
Vanpool	0.519	0.036	0.047
Carpool	0.364	0.031	0.032
Bus	0.107	0.0006	0.0005
Short haul airline (domestic)	0.185	0.0104	0.0085
Medium haul airline (continental)	0.229	0.0104	0.0085
Long haul airline (intercontinental)	0.277	0.0104	0.0085
Itercity rail	0.185	0.002	0.001
Commuter rail	0.172	0.002	0.001
Transit rail	0.163	0.004	0.002

Estimating Fuel Use
Fuel use= DT x FE
DT= Distance travelled activity factor
FE= Fuel economy factor (ie. kgCO2/mile, gCH4/mile, gN2O/mile) *see emissions factors chart above

*used to detrmine the breakdown of CO2, CH4, N20 within total CO2e.

EPA Methodology sourced from EPA website
http://epa.gov/climateleadership/documents/resources/commute_travel_product.pdf
http://www.epa.gov/climateleadership/documents/resources/mobilesource_guidance.pdf

Assumptions
9/80 schedule - all employees commute nine days every two weeks
2 weeks of vacation
12 holidays
For a total of 213 work days per employee per year
Walkers and bike riders all put into 0 to 5 miles
Carpoolers and Vanpoolers all put in the over 30 miles category
Used midpoint of mileage ranges surveyed
Assuming 20 pounds of CO2 emitted per gallon of fuel burned
Methodology sourced from *EPA Climate Leaders: Greenhouse Gas Inventory Protocol Core Module Guidance*
Specific sections: "Optional Emissions from Community Business Travel and Product Transport"
"Direct Emissions from Mobile Combustion Sources"
Data sourced from Copy of Employee Commuting Emission Estimation 2014.
Public transportation method compiled from percentages estimated from data recording passenger trips in urbanized areas: 50% bus, 5% intercity rail, 5% commuter rail and 40% transit rail.
Source: US Census Bureau, Statistical Abstract of the United States: 2012
Mileage based off of a survey of 1400 employees.
Data sourced from Copy of Employee Commuting Emission Estimation 2014.

EPA Climate Leaders Emissions Factors for Fossil Fuel and Biomass Combustion

The emissions factors below have been updated from the EPA Climate Leaders GHG inventory Protocol, October 2004 and with any other EPA Final Rules.

				CO2 Emissions -- kg			CO2 Emissions -- lbs			CH4 Emissions				N20 Emissions			
Fuel type	Heating Value (HHV): custom heating values should be used if available	Carbon content coefficient (kg C/MMBtu) (based on HHV)	Fraction oxidized	EPA emission factor (kg CO2/MMBtu (HHV)*	EPA emission factor (kg CO2/mass or volume unit)	EPA emission factor (kg CO2/mass or volume unit)	EPA emission factor (lbs CO2/MMBtu (HHV)*	EPA emission factor (lbs CO2/mass or volume unit)	EPA emission factor (lbs CO2/mass or volume unit)	EPA emission factor (g CH4/MMBtu)	EPA emission factor (kg **CO2e**/MMBtu) GWP=25	EPA emission factor (lbs **CO2e**/MMBtu)	CH4 (**CO2e**) emissions factor (**lbs** CO2e CH4/**lb** CO2)	EPA emission factor (g N20/MMBtu)	EPA emission factor (kg **CO2e**/MMBtu) GWP=298	EPA emission factor (lbs **CO2e**/MMBtu)	N2O (**CO2e**) emissions (**lbs** CO2e N2O/**lb** CO2)
Liquid fossil	**MMBtu/bbl**				kg CO2/gallon	kg CO2/bbl		lbs CO2/gallon	lbs CO2/bbl								
Gasoline / petrol	5.253	19.34	0.99	70.95	8.79	369.18	156.44	19.38	814.04								
Kerosene	5.670	19.72	0.99	71.58	9.66	405.88	157.84	21.31	894.97	Note: CH4/N2O emissions factors for all mobile sources are dependent on many variables; for mobile sources consult the EPA Guidance Protocol							
Jet Fuel	5.670	19.33	0.99	70.17	9.47	397.74	154.72	20.88	877.02								
Aviation gasoline	5.048	18.87	0.99	68.50	8.23	345.66	151.04	18.15	762.18								
Distillate fuel (# 1,2,4, diesel)	5.825	19.95	0.99	72.42	10.08	423.36	159.68	22.23	933.51	1.8 (ind) 2.7 (elect gen)	0.045 0.068	0.099 0.149	0.0006 0.0009	.54 (ind) .54 (elect gen)	0.16092 0.16092	0.355 0.355	0.0022 0.0022
Residual fuel oil (#5,6)	6.287	21.49	0.99	78.01	11.68	490.44	172.01	25.75	1,081.42	1.8 (ind) 2.7 (elect gen)	0.045 0.068	0.099 0.149	0.0006 0.0009	1.8 (ind) 2.7 (elect gen)	0.16092 0.16092	0.355 0.355	0.0021 0.0021
LPG	3.861	17.25	0.99	62.62	5.65	237.45	138.07	12.47	523.58								
Propane	3.824	17.2	0.99	62.44	5.71	239.90	137.67	12.59	528.98								
Ethane	2.916	16.25	0.99	58.99	4.12	172.91	130.07	9.08	381.27								
n-Butane	4.326	17.72	0.99	64.32	6.66	279.80	141.83	14.69	616.96	Note: CH4/N2O emissions factors for all mobile sources are dependent on many variables; for mobile sources consult the EPA Guidance Protocol							
Isobutane	4.162	17.75	0.99	64.43	6.42	269.52	142.07	14.15	594.29								
E85	ee EPA Guidance					0.00	0.00		0.00								
CNG	1,027	14.47	0.995	52.79	.054 /cf			.12 /cf									
LNG					5.91 /gal			13.01 /gal									
Petroleum coke	6.024	27.85	0.99	101.10	609.00		0.00	0.00									
Gaseous fossil	**MMBtu/mcf**				cu. ft.			cu. ft.									
Natural gas (dry)	1.027	14.47	0.995	52.79	0.0542		116.41	0.1195		4.75 (ind) 0.95 (elect gen)	0.119 0.025	0.262 0.055	0.00225 0.00047	0.095 (ind) 0.095 (elect gen)	0.028 0.030	0.062 0.066	0.0005 0.0006
Solid fossil	**MMBtu/short ton**				short ton			short ton									
Anthracite	25.09	28.26	0.99	102.58	2,573.83		226.20	5,675.30		10.0 (ind) 1.0 (elect gen)	0.250 0.025	0.551 0.055	0.00265 0.00027	1.4 (ind) 1.4 (elect gen)	0.42 0.48	0.92 1.05	0.0044 0.0051
Bituminous coal	24.93	25.49	0.99	92.53	2,306.74		204.03	5,086.36		% of "unspecified coal"						% of "unspecified coal"	
Sub-bituminous coal	17.25	26.48	0.99	96.12	1,658.11		211.95	3,656.13		Use the CH4/N2O emissions factors above for all coal types							
Lignite	14.21	26.3	0.99	95.47	1,356.61		210.51	2,991.33									
Coke	24.80	27.85	0.99	101.10	2,507.17		222.92	5,528.31									
Unspecified (elec gen)	20.63	25.98	0.99	94.31	1,945.56		207.95	4,289.96									
Unspecified (indus)	23.03	25.75	0.99	93.47	2,151.84		206.11	4,744.81									
Biofuels																	
Wood and wood waste	15.38 MMBtu /short	25.6	0.995	92.93	1,429.23 /short		204.91	3,135.2 /short		30.1 (ind/elect gen)	0.753	1.659	0.0081	4.01 (ind/elect gen)	1.19	2.63	0.0129
Landfill gas (50/50)	502.5 Btu/cu ft.	14.2	0.995	51.81	.0260 /cf		114.24	.05733 /cf		Note: CH4 and N2O factors for wood are significant. All fossil fuels are less than 1% compared to the factors for CO2.							
Biodiesel					9.29 /gal			20.48 /gal	860.35 /gal	Note: CH4/N2O emissions factors for all mobile sources are dependent on many variables; for mobile sources consult the							
Ethanol (100)	3.539 MMBtu/bbl	17.99	0.99	65.30	5.5 /gal		143.99	12.13 /gal	509.46 /bbl								

Note: it is assumed the combustion of biomass and biofuels does not contribute to net CO2 emissions. As a result, Partners are required to list biomass CO2 emissions in terms of total gas but the emissions are not included in the overall CO2-equivalent emissions corporate inventory.

Conversion Factors used in this inventory

Mass			
1 pound (lb)	453.6 grams (g)	0.4536 kilograms (kg)	0.0004536 metric tons (tonne)
1 kilogram (kg)	2.205 pounds (lb)		.0011023 short tons
1 short ton (ton)	2'000 pounds (lb)	907.2 kilograms (kg)	.9072 metric tons
1 metric ton	2'205 pounds (lb)	1'000 kilograms (kg)	1.1023 short tons (tons)
Volume			
1 cubic foot (ft^3)	7.4805 US gallons (gal)	0.1781 barrel (bbl)	
1 cubic foot (ft^3)	28.32 liters (L)	0.02832 cubic meters (m^3)	
1 US gallon (gal)	0.0238 barrel (bbl)	3.785 liters (L)	0.003785 cubic meters (m^3)
1 barrel (bbl)	42 US gallons (gal)	158.99 liters (L)	0.1589 cubic meters (m^3)
1 litre (L)	0.001 cubic meters (m^3)	0.2642 US gallons (gal)	
1 cubic meter (m^3)	6.2897 barrels (bbl)	264.2 US gallons (gal)	1,000 liters (L)
Energy			
1 kilowatt hour (kWh)	3,412 Btu (btu)	3,600 kilojoules (KJ)	
1 megajoule (MJ)	0.001 gigajoules (GJ)		
1 gigajoule (GJ)	0.9478 million Btu (million btu)	277.8 kilowatt hours (kWh)	
1 Btu (btu)	1,055 joules (J)		
1 million Btu (million btu)	1.055 gigajoules (GJ)	293 kilowatt hours (kWh)	
1 therm (therm)	100,000 btu	0.1055 gigajoules (GJ)	29.3 kilowatt hours (kWh)
Other			
kilo	1,000		
mega	1,000,000		
giga	1,000,000,000		
tera	1,000,000,000,000		
1 psi	14.5037 bar		
1 kgf / cm^3 (tech atm)	1.0197 bar		
1 atmosphere (atm)	0.9869 bar	101.325 kilo pascals	14.696 pounds per square inch (psia)
1 mile (statue)	1.609 kilometers		
1 metric ton CH_4	21 metric tons CO_2 equivalent		
1metric ton N_2O	310 metric tons CO_2 equivalent		
1 metric ton carbon	3.664 metric tons CO_2		

Global Warming Potentials and Atmospheric Lifetimes (years)		
Gas Atmospheric Lifetime GWP[a]		
Greenhouse Gas	**Atmospheric Lifetime**	**Global Warming Potential**
Carbon dioxide (CO2)	50-200	1
Methane (CH4)[b,c]	12 +/- 3	25
Nitrous oxide (N2O)[c]	120	298
HFC-23[c]	264	14,800
HFC-125[c]	32.6	3,500
HFC-134a[c]	14.6	1,100
HFC-143a[c]	48.3	4,470
HFC-152a[c]	1.5	124
HFC-227ea[c]	36.5	3,220
HFC-236fa[c]	209	9,810
HFC-4310mee[c]	17.1	1,640
CF4	50,000	6,500
C2F6	10,000	9,200
C4F10	2,600	7,00
C6F14	3,200	7,400
SF6[c]	3,200	22,800

Source: Unless otherwise noted by note 'c' below, IPCC's Fourth Assessment Report (2007) GWPs.

a using a 100 year time horizon

b The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor.

c Effective January 1, 2014, the Environmental Protection Agency, through issuance of a final rule, raised the GWP for methane and several classes of hydrofluorocarbons, while lowering the GWP for both nitrous oxide and sulfur hexafluoride.

The indirect effect due to the production of CO2 is not included.

Color key to calculations in the Entergy GHG Inventory

The colored heading cells in each worksheet of this GHG inventory enable inventory managers and users update and understand the role of each step of the calculation process.

Yellow	Specific fuel or gas calculated	This heading identifies the fuel and emissions being calculated below it.
Red	Annual activity data input	This is an input cell for company activity or usage data related to this emissions source for a given facility, source or even corporate-wide. Examples of input data are gallons of gasoline, lbs of CO2 (provided as CEM data), or square footage of building space occupied by the company. This activity data is currently identified in the units provided during the completion of PNM's GHG inventory for years 2001-2003. For some de minimus emissions sources (such as fugitive HFCs from building space
Orange	Calculation constant	This cell contain as constant (coefficient) such as a conversion factor or unit measurement and does not to be changed annually unless there is a change to an emissions factor, input units or facility status.
Green	Calculation conversion subtotal	This figure is calculated automatically and is a subtotal or unit conversion resulting from a spreadsheet calculation such as MMBtu converted from mcf or gallons. This cell contains an emissions or conversion factor in its formula.
Blue	Emissions source total	This figure is calculated automatically and is a total of CO2e (CO2-equivalent) for a given emissions source (e.g. a facility or equipment type) and the sum of individual sources is carried into the annual corporate emissions table. This cell contains an emissions or conversion factor in its formula.
123.45	Emissions source total	Bolded cells contain a figure for total emissions in CO2e for that source and are carried to the corporate emissions totals sheet for emissions source comparison.