Inventory of New York City Greenhouse Gas Emissions in 2017

Mayor's Office of Sustainability

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Introduction

Climate change has reached a crucial tipping point: our actions right now will determine the long-term health and even survival of our community and our planet. The City of New York has committed to reduce its greenhouse gas (GHG) emissions 80 percent by 2050, compared to 2005 levels. We have further committed to do our part to fulfill the Paris Agreement by accelerating our progress and developing strategies to achieve carbon neutrality by 2050. These strategies have the potential to remove 10 million tons of carbon dioxide equivalent from our air by 2020 and 500,000 pounds of fine particulate matter by 2030, preventing 40 deaths and 100 hospital visits every single year. In addition to fighting climate change, our actions will provide economic innovation, improved public health, and quality jobs for New Yorkers.

Citywide GHG Emissions by Source



NYC GHG Inventories

The Inventory of New York City GHG emissions is a critical tool to pursue these goals. It allows us to understand where emissions come from and track our progress in reducing them. The City's annual inventory report consists of two inventories. The Citywide GHG inventory reports all activities taking place within the boundary of New York City, and the City Government Inventory reports activities associated with the New York City government.

Citywide Inventory

The Citywide Inventory consists of all direct and indirect GHG emissions from:

 Stationary energy: energy used by buildings and other stationary sources, as well as fugitive emissions from natural gas distribution within NYC city limits;



Citywide GHG Emissions by Sector



- Transportation: on-road transportation, railways, marine navigation, and aviation within city limits; and
- Waste: wastewater treatment within city limits, and solid waste generated within the city

GHG emissions in the Citywide Global Inventory are calculated and reported in accordance with the <u>Global Protocol for Cities (GPC)</u> and the <u>Global Covenant of Mayors for Climate and Energy</u>, a global cooperative effort among mayors and city officials to reduce GHG emissions, track progress, and prepare for the impacts of climate change. The citywide GHG emissions inventory is compliant with the GPC BASIC level of reporting.

City Government Inventory

The City Government Inventory reports GHG emissions from operations, facilities, or sources owned by the city, or over which the city has full authority to introduce and implement operations, health and safety, and

Citywide 2017 GHG Emissions by Sector: Transportation



Citywide 2017 Emissions by Sector: Stationary Energy



Citywide 2017 GHG Emissions by Sector: Waste



CH₄ and N₂O from composting CH₄ N₂O



environmental policies. GHGH emissions from leased real estate, vehicles, and other equipment are included. Non-city operated public entities (e.g. Metropolitan Transportation Authority) are not included. The City Government Inventory is calculated and reported per the Local Government Operations Protocol.

Energy Consumption & Greenhouse Gas Emissions

NYC's GHG emissions come almost entirely from the combustion of fossil fuels to provide energy. However, this energy is delivered in many different forms. This chart shows the primary energy sources, or energy harvested directly from natural resources, used by New Yorkers. It also shows the secondary forms of energy that these primary resources are converted to, such as electricity and steam. Finally, this chart shows the quantity of greenhouse gases that are emitted when we use each of these sources of energy.

City Government Annual GHG Emissions by Sector & Source



City Government Annual GHG Emissions by Sector



City Government Annual GHG Emissions by Source



Mayor's Office of Sustainability

2017 New York City Energy Consumption and Greenhouse Gas Emissions



Energy, GHG Emissions, & Economic Indicators

This chart plots NYC's GHG emissions and the trends in factors that can drive emissions, including energy consumption, population, heating degree days, cooling degree days, and building area. This chart also shows the city's Gross City Product, which has risen as emissions have decreased since 2005.

Data

New York City strives for transparency in energy and climate data. This tool allows users to configure and download energy consumption, waste, and emissions data for both the Citywide and City Government inventories, dating back to NYC's 2005 base year. These data downloads are available in CSV format at https://nyc-ghg-inventory.cusp.nyu.edu/.

Acknowledgements

The Inventory of New York City Greenhouse Gas Emissions is published

25 20 15 ndexed to 2005 (%) 10 -5 -10 -15 2005 2015 2006 2007 2009 2010 2011 2012 2013 2014 2016 201 Gross City Product Population — Energy Consumption _ Building Sg. Ft -HDD + CDD GHG Emissions

pursuant to Local Law 22 of 2008. This inventory and report was produced by Ross MacWhinney and Max Barnett in the New York City Mayor's Office of Sustainability.

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Energy, GHG Emissions, and Economic Indicators Trends

Citywide GHG Emissions Summary

			CY2005		CY2016						
Sector	Units	Consumed	tCO2e	Source MMBtu	Consumed	tCO2e	Source MMBtu				
Stationary Energy											
Residential (small and large residential)											
#2 fuel oil	liter	555,115,513	1,509,205	20,485,363	464,030,301	1,261,569	17,124,056				
#4 fuel oil	liters	294,735,132	858,782	11,486,968	260,808,590	759,929	10,164,719				
#6 fuel oil	liters	733,787,288	2,202,564	29,446,928	6,434,347	19,314	258,211				
Biofuel	liters	2,723,585	5	92,994	27,967,126	48	954,906				
Electricity	kWh	14,168,364,734	6,079,321	133,021,044	15,452,546,915	4,023,713	147,225,753				
Natural gas	GJ	180,307,273	9,088,939	179,443,212	208,143,266	10,492,098	207,145,809				
Steam	kg	1,998,982,584	332,201	5,749,261	2,733,212,561	270,734	5,910,697				
Commercial and Institutional (commerci	al, institut	tional, and streetlig	hts)								
#2 fuel oil	liters	314,564,916	855,215	11,608,353	262,950,052	714,888	9,703,615				
#4 fuel oil	liters	52,603,950	153,274	2,050,179	46,548,784	135,631	1,814,186				
#6 fuel oil	liters	90,043,029	270,277	3,613,432	789,559	2,370	31,685				
Biofuel	liters	685,603	1	23,409	7,040,114	12	240,377				
Electricity	kWh	26,226,076,079	11,253,009	246,226,018	24,148,998,629	6,288,195	230,082,104				
Natural gas	GJ	60,301,084	3,039,660	60,012,112	110,890,445	5,589,772	110,359,040				
Steam	kg	7,457,786,326	1,239,372	21,449,291	4,861,229,054	481,522	10,512,629				
Manufacturing and construction (industr	ial)										
#2 fuel oil	liters	72,520,283	196,673	2,676,208	60,620,912	164,402	2,237,086				
#4 fuel oil	liters	11,333,710	32,943	441,718	10,029,102	29,151	390,873				
#6 fuel oil	liters	6,952,951	20,819	279,022	60,968	183	2,447				
Biofuel	liters	121,709	0	4,156	1,249,771	2	42,672				
Electricity	kWh	8,779,889,926	3,767,250	82,430,834	9,006,092,446	2,345,110	85,806,485				
Natural gas	GJ	18,090,325	910,089	18,003,634	27,223,866	1,369,580	27,093,405				
Steam	kg	2,237,335,898	371,812	6,434,787	1,458,368,718	144,456	3,153,789				
Fugitive natural gas		•									
CH4 - natural gas distribution	GJ	442,833	207,589	-	1,041,898	488,415	-				
Transportation	•										
On-Road			, 								
Passenger cars	VMT	19,318,051,038	12,881,945	192,791,648	20,094,018,685	12,417,699	188,179,800				
Medium duty trucks	VMT	487,628,577	387,786	5,670,969	507,215,343	402,454	5,914,422				
Heavy duty trucks	VMT	632,294,047	1,419,991	19,772,771	657,691,524	1,470,944	20,461,236				
Buses	VMT	346,001,787	687,896	9,548,307	284,094,199	548,489	7,961,896				
Railways											
Electricity - subway and commuter rail	kWh	2,223,041,708	953,856	20,871,239	2,128,891,161	554,345	20,283,233				
Diesel - commuter rail	liters	5,207,218	14,098	192,691	5,028,922	13,615	186,093				
Marine Navigation											
Diesel - marine navigation	liters	18,247,501	49,962	673,385	31,449,176	86,108	1,160,565				
Biofuel	liters	-	-	-	95	0.0	3				
Aviation	Aviation										
Jet fuel - aviation	liters	933,093	2,426	33,610	974,354	2,533	35,096				
Waste	•										
Landfills											
Exported solid waste - landfills	MT	7,420,036	2,021,979	-	6,205,163	1,690,923	-				
Biological treatment											
CH4 and N2O - composting	MT	26,351	4,991	-	43,783	8,293	-				
Wastewater treatment											
CH4 - wastewater treatment plants	MT	6,536	163,402	-	4,141	103,514	-				
N2O - wastewater treatment plants	MT	286	85,120	-	237	70,514	-				
TOTALS			61,062,452	1,084,533,543		51,950,525	1,114,436,888				

Citywide GHG Emissions Summary

CY2017			Cha	ange from CY2	016	Change from CY2005				
Consumed	tCO2e	Source MMBtu	Consumed	tCO2e	MMBtu	Consumed	tCO2e	MMBtu		
400,983,849	1,090,164	14,797,460	-14%	-14%	-14%	-28%	-28%	-28%		
279,593,372	814,663	10,896,835	7%	7%	7%	-5%	-5%	-5%		
3,557,501	10,678	142,763	-45%	-45%	-45%	-100%	-100%	-100%		
44,192,030	76	1,508,888	58%	58%	58%	1523%	1523%	1523%		
15,430,213,718	3,672,168	151,635,452	-0%	-9%	3%	9%	-40%	14%		
198,868,511	10,024,575	197,915,501	-4%	-4%	-4%	10%	10%	10%		
2,713,815,386	250,272	5,548,358	-1%	-8%	-6%	36%	-25%	-3%		
227,223,790	617,758	8,385,213	-14%	-14%	-14%	-28%	-28%	-28%		
49,901,468	145,400	1,944,853	7%	7%	7%	-5%	-5%	-5%		
436,541	1,310	17,518	-45%	-45%	-45%	-100%	-100%	-100%		
11,124,380	19	379,830	58%	58%	58%	1523%	1523%	1523%		
24,400,061,836	5,806,863	239,783,743	1%	-8%	4%	-7%	-48%	-3%		
122,227,544	6,161,253	121,641,809	10%	10%	10%	103%	103%	103%		
4,671,669,504	430,828	9,551,163	-4%	-11%	-9%	-37%	-65%	-55%		
I I										
52,384,525	142,066	1,933,140	-14%	-14%	-14%	-28%	-28%	-28%		
10,751,450	31,250	419,026	7%	7%	7%	-5%	-5%	-5%		
33,709	101	1,353	-45%	-45%	-45%	-100%	-100%	-100%		
1,974,815	3	67,428	58%	58%	58%	1523%	1523%	1523%		
8,941,456,438	2,127,938	87,869,281	-1%	-9%	2%	2%	-44%	7%		
28,905,109	1,454,160	28,766,591	6%	6%	6%	60%	60%	60%		
1,401,500,853	129,248	2,865,349	-4%	-11%	-9%	-37%	-65%	-55%		
1,053,163	493,695	-	1%	1%		138%	138%			
I										
20,156,310,143	12,456,065	188,764,885	0%	0%	0%	4%	-3%	-2%		
508,787,711	403,701	5,932,756	0%	0%	0%	4%	4%	5%		
659,730,368	1,475,504	20,524,666	0%	0%	0%	4%	4%	4%		
275,531,210	532,636	7,704,883								
<u> </u>										
2,104,459,510	500,831	20,680,897	-1%	-10%	2%	-5%	-47%	-1%		
5,400,289	14,620	199,835	7%	7%	7%	4%	4%	4%		
I										
17,747,494	48,593	654,934	-44%	-44%	-44%	-3%	-3%	-3%		
3,109	0.0	106	3185%	3185%	3185%					
II										
962,021	2,501	34,652	-1%	-1%	-1%	3%	3%	3%		
I										
6,221,002	1,695,239	-	0%	0%		-16%	-16%			
· · · ·										
57,098	10,814	-	30%	30%		117%	117%			
·I										
2,950	73.756	-	-29%	-29%		-55%	-55%			
249	74,177	-	5%	5%		-13%	-13%			
	50,692,927	1,130,569,167		-2.421%	1.45%		-16.98%	4.24%		

City Government GHG Emissions Summary

		FY 2006			FY 2016			
Sector	Units	Consumed	MgCO2e	Source MMbtu	Consumed	MgCO2e	Source MMbtu	
Buildings								
#2 fuel oil	liter	56,816,067	154,467	2,212,111	36,292,258	98,669	1,413,025	
#4 fuel oil	liter	32,426,496	94,482	1,333,365	48,817,617	142,242	2,007,361	
#6 fuel oil	liter	75,041,558	225,248	3,177,219	161,657	485	6,844	
Biodiesel	liter	-	-	-	4,476,246	55	161,251	
Electricity	kWh	3,199,648,988	1,209,240	30,640,036	3,259,637,740	848,782	32,629,481	
Kerosene	liter	-	-	-	-	-	-	
Natural Gas	GJ	11,068,300	557,932	11,621,715	11,724,754	591,022	12,310,992	
Propane	liter	4,086,926	6,095	104,778	81,617	122	2,092	
Steam	kg	781,066,529	104,024	2,009,223	854,481,146	84,639	1,984,314	
Transportation								
Gasoline	liter	51,838,820	122,621	1,824,101	39,396,458	93,189	1,386,280	
Ethanol	liter	5,972,192	-	142,111	4,379,873	507	104,221	
Diesel - trucks	liter	60,061,625	161,136	2,344,917	56,824,209	152,451	2,218,522	
Biodiesel - trucks	liter	-	-	-	6,994,728	9	251,976	
Diesel - marine vessels	liter	18,247,504	49,962	710,459	32,645,061	89,383	1,271,023	
Electricity	kWh	-	-	-	358,922	93	3,593	
Jet fuel	liter	933,093	2,426	35,460	1,036,695	2,695	39,397	
Streetlights and Traffic Signals								
Electricity	kWh	306,246,001	115,739	2,932,631	201,684,110	52,517	2,018,889	
Wastewater Treatment								
#1 fuel oil	liter	-	-	-	780	2	30	
#2 fuel oil	liter	18,314,093	49,667	713,052	8,880,845	24,085	345,772	
#4 fuel oil	liter	1,129,823	3,284	46,458	-	-	-	
Biodiesel	liter	-	-	-	-	-	-	
Electricity	kWh	596,089,952	225,280	5,708,194	696,495,485	181,362	6,972,028	
Natural gas	GJ	380,655	19,150	399,688	618,110	31,096	649,016	
Steam	kg	106,123,696	14,134	272,994	25,301,585	2,506	58,756	
Methane	Mg CH4	7,068	176,698	-	4,540	113,504	-	
Nitrous oxide	Mg N2O	268	79,916	-	242	72,011	-	
Water Supply								
#2 fuel oil	liter	234,386	637	9,126	714,742	1,943	27,828	
Biodiesel	liter	-	-	-	28,528	0	1,028	
Electricity	kWh	23,253,033	8,788	222,672	68,481,452	17,832	685,510	
Natural gas	GJ	2,921	147	3,067	118,924	5,983	124,870	
Propane	liter	-	-	-	4,064,234	6,061	104,196	
Solid Waste Facilities								
Methane	Mg CH4	9,969	249,217		3,302	82,555	-	
Fugitive and Process Emissions								
HFCs - municipal vehicle fleet	kg	8,722	12,513		9,157	13,393	-	
TOTALS								
TOTAL Scope 1			1,965,598	24,677,628		1,521,554	22,429,319	
TOTAL Scope 2			1,677,206	41,785,750		1,187,638	44,348,979	
TOTALS			3,642,804	66,463,378		2,709,192	66,778,298	

City Government GHG Emissions Summary

FY 2017			Ch	ange from FY2	2016	Change from FY2006			
Consumed	MgCO2e	Source MMbtu	Consumed	tCO2e	MMBtu	Consumed	tCO2e	MMBtu	
37,834,856	102,862	1,473,085	4%	4%	4%	-33%	-33%	-33%	
51,598,547	150,345	2,121,712	6%	6%	6%	59%	59%	59%	
10,796	32	457	-93%	-93%	-93%	-100%	-100%	-100%	
4,685,962	57	168,806	5%	5%	5%	-	-	-	
3,246,716,499	772,672	33,662,680	-0%	-9%	3%	1%	-36%	10%	
-	-	-	-	-	-	-	-	-	
11,921,530	600,941	12,517,606	2%	2%	2%	8%	8%	8%	
115,430	172	2,959	41%	41%	41%	-97%	-97%	-97%	
829,853,368	76,530	1,790,033	-3%	-10%	-10%	6%	-26%	-11%	
42,076,440	99,529	1,480,583	7%	7%	7%	-19%	-19%	-19%	
4,675,160	541	111,248	7%	7%	7%	-22%	-	-22%	
57,611,501	154,563	2,249,259	1%	1%	1%	-4%	-4%	-4%	
7,645,045	10	275,403	9%	9%	9%	-	-	-	
19,213,794	52,608	748,082	-41%	-41%	-41%	5%	5%	5%	
300,660	72	3,117	-16%	-23%	-13%	-	-	-	
960,152	2,496	36,489	-7%	-7%	-7%	3%	3%	3%	
169,385,754	40,311	1,756,229	-16%	-23%	-13%	-45%	-65%	-40%	
-	-	-	-100%	-100%	-100%	-	-	-	
7,089,089	19,225	276,011	-20%	-20%	-20%	-61%	-61%	-61%	
-	-	-	-	-	-	-100%	-100%	-100%	
373,110	5	13,441	-	-	-	-	-	-	
698,076,397	166,132	7,237,812	0%	-8%	4%	17%	-26%	27%	
832,460	41,879	874,083	35%	35%	35%	119%	119%	119%	
28,141,301	2,768	64,889	11%	10%	10%	-73%	-80%	-76%	
3,674	91,857	-	-19%	-19%	-	-48%	-48%	-	
242	72,171	-	0%	0%	-	-10%	-10%	-	
754,586	2,052	29,380	6%	6%	6%	222%	222%	222%	
39,715	0	1,431	39%	39%	39%	-	-	-	
102,433,758	24,378	1,062,056	50%	37%	55%	341%	177%	377%	
193,338	9,726	203,005	63%	63%	63%	6519%	6519%	6519%	
4,018,076	5,992	103,013	-1%	-1%	-1%	-	-	-	
							r		
3,744	93,598	-	13.38%	13.38%	-	-166%	-166%	-	
							r		
9,242	13,546	-	0.93%	1.14%	-	6%	8%	-	
	1,514,279	22,689,169		-0.48%	1.16%		-30%	-9%	
	1,082,791	45,573,699		-8.83%	2.76%		-55%	8%	
	2,597,070	68,262,867		-4.14%	2.22%		-28.71%	2.71%	