NEW JERSEY

GREENHOUSE GAS INVENTORY

2022 MID-CYCLE UPDATE REPORT

December 2022

Introduction

The New Jersey Global Warming Response Act (GWRA, P.L. 2007, c.112, as amended 2019) calls for an annual compilation of statewide greenhouse gas (GHG) emissions data. This inventory is used to monitor and track progress towards New Jersey's goals of reducing GHG emissions to below 1990 levels by 2020 (known as the 2020 goal), to below 50% of 2006 levels by 2030 (known as the 50x30 goal), and to 80% of 2006 levels by 2050 (known as the 80x50 goal).[1]

Since 2008, the New Jersey Department of Environmental Protection (DEP) has released a comprehensive statewide GHG inventory report approximately every two years. Following the 2019 amendments to the GWRA, the DEP is also committed to releasing updated data annually to help inform the state's climate mitigation planning and implementation efforts.

The DEP therefore releases a full Emissions Inventory Report every other year and provides a "Mid-Cycle Update" during the intervening years. The full Emissions Inventory Reports contain detailed analysis, including updated emissions calculations, review of GHG trends, adjustments to baselines (when necessary), and discussion of any changes in emission calculation methodologies.[2] In contrast, the Mid-Cycle Update is a brief summary of the latest emissions data, with concise complementary analysis. The inventory presented below is a Mid-Cycle Update.

New Jersey's Greenhouse Gas Reporting Framework

Emissions Inventory Report

- Full report released every two years
- Includes the latest emissions estimates and projections
- Includes a detailed discussion on:
  - Statewide Greenhouse Gas trends
  - Federal and International trends and policy
  - Changes in methodologies
  - Adjustment of Baselines

Mid-Cycle Update

- Brief summary released between Emissions Inventory Reports
- Includes the latest emissions estimates and projections
- Features a discussion of key findings

Greenhouse Gas Inventory Emissions Estimates and Projections

Data used to develop the New Jersey greenhouse gas inventory is gathered from multiple sources, including state, local and federal agencies, as well as global organizations such as the International Panel on Climate Change. The time necessary to obtain data extends as long as two years after the end of a given calendar year.[3] Estimates for earlier years may also be revised in light of updates to underlying data, emissions factors or methods.

[1] Based on current estimates, the emissions goal for the 2030 is 60.6 and 2050 is 24.2 MMT CO_2e. Future refinements to assessment methods could lead to small adjustments in the 2006 estimate, and therefore the 2050 figure. The 2020 goal is 111.5 MMT CO_2e.

[2] In June of 2022, the NJDEP released the 2022 Greenhouse Gas Emissions Inventory Report 1990-2019, which is available from https://dep.nj.gov/ghg/nj-ghg-inventory/inventory-archive/

[3] Non-fuel agricultural and non-fuel industrial emissions for 2020 (marked with asterisks in Tables 1 and 2) were set equal to 2019 estimated emissions, the most recent year available in the March 2022 release of the USEPA State Inventory Tool. Emissions in these sectors have been historically consistent over time and are thought unlikely to have changed significantly.

2020 Inventory Update

Total net greenhouse gas emissions for 2020 (Figure 1; Table 1) were 91.0 MMT CO_2e, based on 100-year global warming potentials (GWP_{100}). This represents a decrease of 7.6 MMT CO_2e, or 7.7%, from 2019 (Table 1). When estimated using 20-year global warming potentials (GWP_{20}), 2020 emissions were 114.8 MMT CO_2e, a drop of 7.4 MMT CO_2e (6.0%) from 2019 levels (Figure 2; Table 2). The emissions reductions in 2020 can in part be attributed to less energy consumption and reduction in vehicle miles traveled during the COVID-19 pandemic, and the long-term trends of increasing energy efficiency and greater reliance on renewable energy. 2020 total net emissions (91.0 MMT CO_2e, GWP_{100}) were below estimated 1990 emissions (111.5 MMT CO_2e, GWP_{100}), thereby satisfying the 2020 emissions goal established in the GWRA.

Transportation Sector

Transportation saw substantial shifts during the COVID-19 pandemic as workplaces closed and remote work practices became commonplace. Emissions from gasoline-powered passenger cars dropped by 3.0 MMT CO_2e, or 25.7%, to 8.7 MMT CO_2e, while those from gas-powered passenger trucks and SUVs dropped 1.6 MMT CO_2e, or 10.2%, to 13.7 MMT CO_2e (Table 3). Most diesel vehicle categories also saw lower emissions, with the exception of combination short-haul and combination long-haul semi-tractor trailers, which increased by 22.1% and 31.4%, respectively. Together, the combination trucks emitted 0.8 MMT CO_2e more in 2020 than in 2019, for a combined 2020 total of 3.6 MMT CO_2e. Among on-road vehicles in general, gasoline emissions dropped 4.9 MMT CO_2e, or 16.4%, to 24.9 MMT CO_2e in 2020, and net diesel emissions rose by 0.3 MMT CO_2e, or 4.9%, to 6.6 MMT CO_2e. Emissions from vehicles using compressed natural gas (CNG) dropped slightly (2.3%) to 0.11 MMT CO_2e. Transportation sector emissions overall, including rail, marine, aviation and on-road vehicles, dropped 4.0 MMT CO_2e, or 10.5%, to 34.0 MMT CO_2e, using GWP_{100} (Table 1). Using GWP_{20}, the 2020 transportation sector total was 34.1 MMT CO_2e (Table 2).

Electric Generation Sector

Emissions from electricity generation, including those from in-state facilities, solid waste resource recovery facilities, and electricity imported from out of state, decreased by 0.7 MMT CO_2e, or 3.4%, to 18.7 MMT CO_2e, based on GWP_{100}. Using GWP_{20}, emissions dropped by 0.7 MMT CO_2e, or 3.4%, to 18.8 MMT CO_2e. A significant decrease in emissions from in-state generating facilities took place, falling 3.6 MMT CO_2e, or 21.0%, to 13.7 MMT CO_2e (based on either GWP_{100} or GWP_{20}), while emissions from imported electricity increased by 3.0 MMT CO_2e to reach 4.2 MMT CO_2e.

Commercial and Residential Sectors

Emissions from the commercial sector dropped 1.1 MMT CO_2e or 9.3% below 2019 levels to reach 9.0 MMT CO_2e in 2020. Residential emissions dropped 1.2 MMT CO_2e or 8.1% below 2019 levels to reach 14.1 MMT CO_2e. Estimates based on GWP_{100} and GWP_{20} are nearly identical since fuel combustion is the dominant emissions process in both sectors. Emissions in these sectors are closely tied to space heating of buildings and serve as a proxy for the use of fossil space heating, but smaller amounts of energy are also used for

hot water and cooking. Emissions associated with electricity consumption are not included in these estimates since they are already accounted for in the electricity sector.

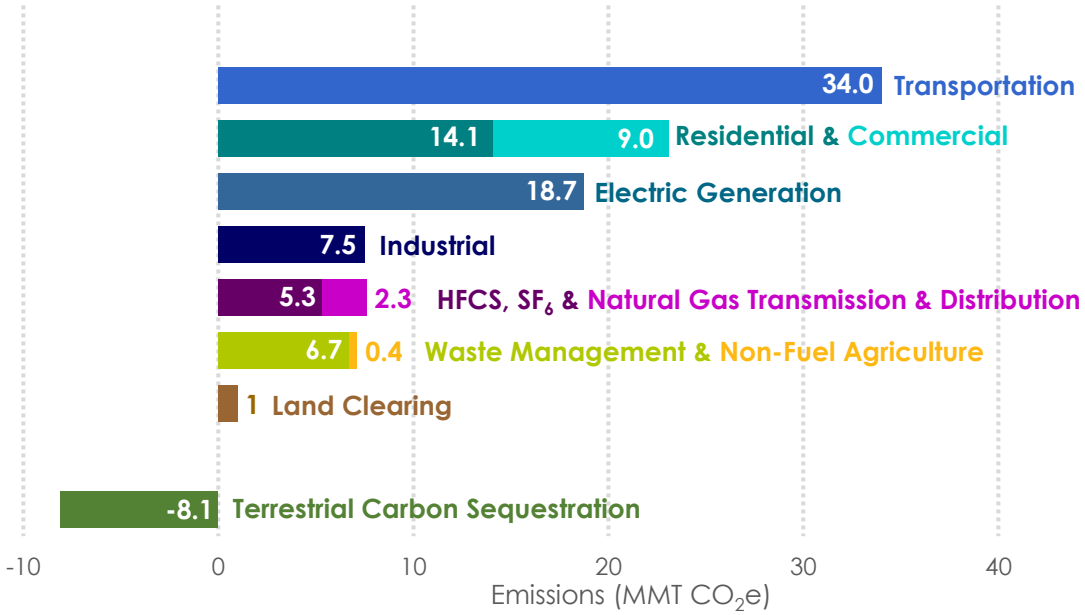
Industrial Sector

Industrial sector emissions from fuel combustion decreased 0.8 MMT CO_2e, or 10.0% below 2019 levels, to reach 7.2 MMT CO_2e in 2020. Emissions estimates from industrial processes (non-fuel emissions) are projected to have remained constant during 2020 at the 2019 rate of 0.3 MMT CO_2e based on historical trends.[4]

Non-Energy Emissions

Emissions from non-energy sources, including halogenated gases, natural gas transmission and distribution, and waste management were not decisively affected by the pandemic and continued to follow existing trends.[5] Increased reliance on out-of-state solid waste disposal led to a 7.1% increase in those emissions, reaching 3.2 MMT CO_2e (GWP_{100}) or 9.2 MMT CO_2e (GWP_{20}). Landfills and wastewater treatment had combined emissions of 6.7 MMT CO_2e (GWP_{100}) or 19.3 MMT CO_2e (GWP_{20}).[6]

Figure 1. Projected Greenhouse Gas Emissions for 2020 (GWP_{100})
In millions of metric tons CO_2e. Total net emissions 91.0 MMT CO_2e.



[4] Industrial sector process emissions for 2020 will be calculated when final data becomes available and will be included in a future report. However, any changes from the historical trend are expected to be small.

[5] Emissions from non-fuel agricultural activities were also projected to follow historical trends. Due to limited data availability, the values shown in Tables 1 and 2 for this sector were assumed equal to 2019 estimates.

[6] Non-fuel agricultural emissions for 2020 were assumed unchanged from 2019 levels at 0.4 MMT CO_2e. Emissions will be calculated when final 2020 data becomes available and the result will be included in a future report. Any changes from the historical trend are expected to be small.

Figure 2. Greenhouse Gas Emissions for 2020 (GWP_{20})
In millions of metric tons CO_2e. Total net emissions 114.8 MMT CO_2e.

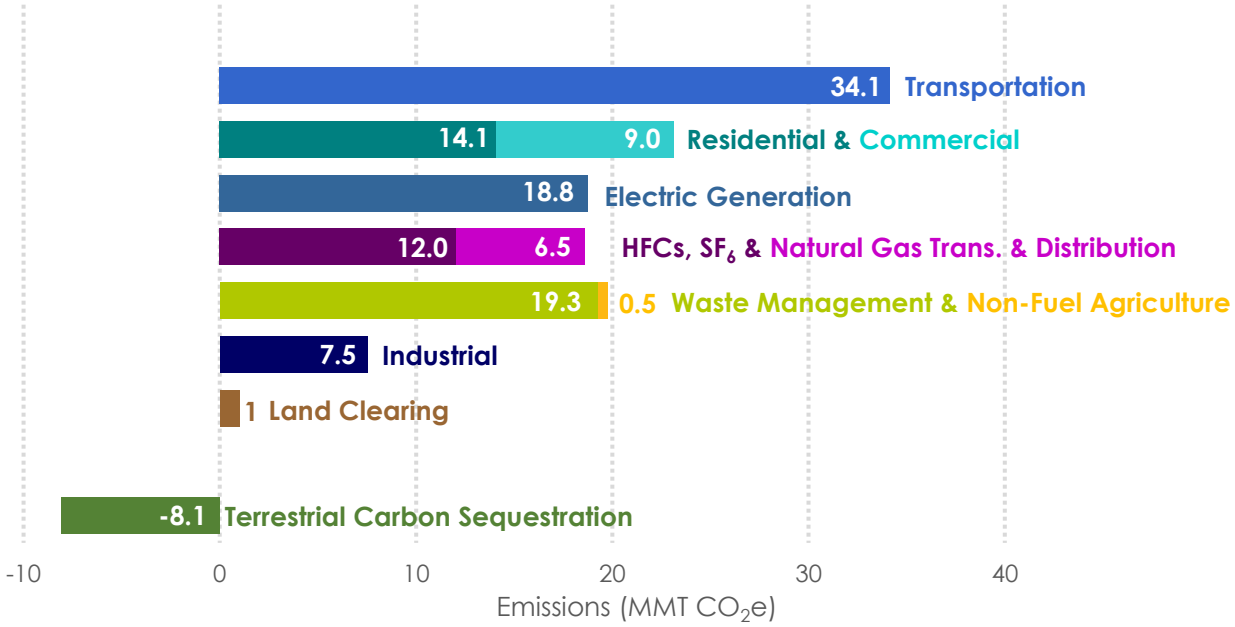


Table 1. Estimated NJ Greenhouse Gas Emissions, 2017-2020 (GWP_{100})
Values are in millions of metric tons CO_2e. 2020 projected values are noted with an asterisk. See notes below table.

	YEAR	1990	2006	2017	2018	2019	2020
ENERGY	**Transportation**	**33.2**	**47.6**	**40.3**	**40.6**	**38.0**	**34.0**
	On-Road Gasoline	26.2	34.5	31.1	30.4	29.7	24.8
	On-Road Distillate	4.0	8.4	6.9	7.2	6.3	6.6
	On-Road CNG and Other	0.0	0.0	0.1	0.1	0.1	0.1
	Aviation	1.0	1.0	1.0	1.0	1.0	1.0
	Marine	1.6	3.2	1.1	1.7	0.6	1.1
	Rail (Distillate)	0.3	0.4	0.2	0.2	0.3	0.4
	Buildings	**26.5**	**23.8**	**23.6**	**26.5**	**25.5**	**23.1**
	Commercial	11.0	9.6	9.7	10.7	10.2	9.0
	Residential	15.6	14.2	13.9	15.8	15.3	14.1
	Fuel-Based Industrial	14.7	12.0	7.5	8.0	8.0	7.2
	Electricity	**26.9**	**30.9**	**18.0**	**19.1**	**19.4**	**18.7**
	In-State Electric	12.3	18.5	17.2	17.9	17.3	13.7
	Imported Electric	14.5	11.6	0.0	0.4	1.2	4.2
	MSW Incineration	0.1	0.8	0.8	0.8	0.9	0.8

	YEAR	1990	2006	2017	2018	2019	2020	
NON-ENERGY	Halogenated Gases (excl. SF_6)	0.0	2.3	4.8	5.0	5.2	5.3	
	SF_6	0.5	0.2	0.1	0.1	0.1	0.1	
	Non-Fuel Agriculture	0.8	0.6	0.5	0.5	0.4	0.4	*
	Natural Gas Transmission & Distribution	2.7	2.8	2.4	2.4	2.3	2.3	
	Landfills	**8.6**	**3.6**	**5.2**	**5.5**	**5.5**	**5.7**	
	In-State	4.7	1.5	2.0	2.1	2.1	2.1	
	Out-of-State	3.4	1.7	2.8	3.0	3.0	3.2	
	Industrial	0.4	0.3	0.3	0.3	0.3	0.3	
	Wastewater Treatment	0.8	1.0	1.0	1.0	1.0	1.0	
	Non-Fuel Industrial	0.1	0.6	0.3	0.3	0.3	0.3	*
	Released through Land Clearing	0.6	1.8	1.0	1.0	1.0	1.0	
TOTAL GROSS EMISSIONS		115.5	127.1	104.8	110.0	106.7	99.1	
SEQUESTERED		-4.0	-6.0	-8.1	-8.1	-8.1	-8.1	
TOTAL NET EMISSIONS		**111.5**	**121.1**	**96.7**	**101.9**	**98.6**	**91.0**	
BLACK CARBON			5.6	2.3				

Notes

(*) Non-fuel agricultural and non-fuel industrial emissions for 2020 (marked with asterisks) were set equal to 2019 estimated emissions, the most recent year available in the March 2022 release of the USEPA State Inventory Tool. Emissions in these sectors have been historically consistent over time and are thought unlikely to have changed significantly. 2020 emissions from natural gas transmission and distribution; in-state landfills; and wastewater treatment were found using the March 2022 release of the

State Inventory Tool and input data from the US Department of Transportation Pipeline and Hazardous Materials Safety Administration; NJDEP solid waste records, and US Census Bureau population estimates.

Black carbon estimates are based on the USEPA National Emissions Inventory (NEI), for which the most recent data is for 2017. However, black carbon emissions likely continued their long-term downward trend due to replacement of older, high-emission diesel engines, as projected in Figure 6.4.4 of the NJDEP Global Warming Response Act 80x50 Report (October 2020). Black carbon is not included in the total net emissions of the greenhouse gas inventory because it is an aerosol component of particulate matter (PM) and not a gas.

All numbers are rounded to the nearest tenth. Subtotals may not agree exactly with sums of the numbers shown due to rounding.

Table 2. Estimated NJ Greenhouse Gas Emissions, 2017-2020 (GWP_{20})
Values are in millions of metric tons CO_2e. 2020 projected values are noted with an asterisk. See notes below table.

	YEAR	1990	2006	2017	2018	2019	2020
ENERGY	**Transportation**	**33.2**	**47.9**	**40.5**	**40.8**	**38.1**	**34.1**
	On-Road Gasoline	26.3	34.8	31.1	30.5	29.7	24.9
	On-Road Distillate	4.0	8.4	6.9	7.2	6.3	6.6
	On-Road CNG and Other	0.0	0.0	0.1	0.2	0.2	0.2
	Aviation	1.0	1.0	1.0	1.0	1.0	1.0
	Marine	1.6	3.3	1.1	1.7	0.6	1.1
	Rail (Distillate)	0.3	0.4	0.2	0.2	0.3	0.4
	Buildings	**26.6**	**23.8**	**23.7**	**26.6**	**25.5**	**23.1**
	Commercial	11.0	9.6	9.7	10.7	10.2	9.0
	Residential	15.6	14.2	13.9	15.8	15.3	14.1
	Fuel-Based Industrial	14.8	12.1	7.5	8.0	8.0	7.2
	Electricity	**27.0**	**31.0**	**18.0**	**19.2**	**19.4**	**18.8**
	In-State Electric	12.3	18.5	17.2	17.9	17.4	13.7
	Imported Electric	14.5	11.6	0.0	0.4	1.2	4.2
	MSW Incineration	0.1	0.8	0.8	0.8	0.9	0.9

	YEAR	1990	2006	2017	2018	2019	2020	
NON-ENERGY	Halogenated Gases (excl. SF_6)	0.0	5.6	10.9	11.3	11.9	12.0	
	SF_6	0.4	0.1	0.1	0.1	0.1	0.1	
	Non-Fuel Agriculture	1.1	0.8	0.7	0.7	0.5	0.5	*
	Natural Gas Transmission & Distribution	7.7	8.1	7.0	6.8	6.6	6.5	
	Landfills	**24.6**	**10.4**	**15.0**	**15.7**	**15.8**	**16.3**	
	In-State	13.6	4.4	5.9	6.1	6.2	6.1	
	Out-of-State	9.9	4.9	8.1	8.6	8.6	9.2	
	Industrial	1.1	1.0	1.0	1.0	1.0	1.0	
	Wastewater Treatment	2.4	2.8	2.9	2.9	2.9	2.9	
	Non-Fuel Industrial	0.1	0.6	0.3	0.3	0.3	0.3	*
	Released through Land Clearing	0.6	1.8	1.0	1.0	1.0	1.0	
TOTAL GROSS EMISSIONS		138.5	144.9	127.4	133.3	130.3	122.9	
SEQUESTERED		-4.0	-6.0	-8.1	-8.1	-8.1	-8.1	
TOTAL NET EMISSIONS		**134.5**	**138.9**	**119.3**	**125.2**	**122.2**	**114.8**	
BLACK CARBON								

Notes

(*) Non-fuel agricultural and non-fuel industrial emissions for 2020 (marked with asterisks) were set equal to 2019 estimated emissions, the most recent year available in the March 2022 release of the USEPA State Inventory Tool. Emissions in these sectors have been historically consistent over time and are thought unlikely to have changed significantly. 2020 emissions from natural gas transmission and distribution; in-state landfills; and wastewater treatment were found using the March 2022 release of the State Inventory Tool and input data from the US Department of Transportation Pipeline and Hazardous Materials Safety Administration; NJDEP solid waste records, and US Census Bureau population estimates.

Black carbon estimates are based on the USEPA National Emissions Inventory (NEI), for which the most recent data is for 2017. However, black carbon emissions likely continued their long-term downward trend due to replacement of older, high-emission diesel engines, as projected in Figure 6.4.4 of the NJDEP Global Warming Response

Act 80x50 Report (October 2020). Black carbon is not included in the total net emissions of the greenhouse gas inventory because it is an aerosol component of particulate matter (PM) and not a gas.
All numbers are rounded to the nearest tenth. Subtotals may not agree exactly with sums of the numbers shown due to rounding.

Table 3. On-Road Emissions (2019-2020)
Values are in millions of metric tons CO_2e.[7]

Fuel and Vehicle Type	GWP100			GWP 20		
	2019	2020	Change (2019-2020)	2019	2020	Change (2019-2020)
Gasoline Motorcycle	0.16	0.13	-0.02	0.16	0.14	-0.02
Gasoline Passenger Car	11.68	8.68	-3.00	11.70	8.70	-3.00
Gasoline Passenger Truck	15.24	13.68	-1.56	15.27	13.71	-1.56
Gasoline Light Commercial Truck	1.95	1.74	-0.21	1.95	1.75	-0.21
Gasoline Other Buses	0.01	0.01	0.00	0.01	0.01	0.00
Gasoline Transit Bus	0.04	0.03	-0.01	0.04	0.03	-0.01
Gasoline School Bus	0.00	0.00	0.00	0.00	0.00	0.00
Gasoline Refuse Truck	0.00	0.00	0.00	0.00	0.00	0.00
Gasoline Single Unit Short-haul Truck	0.39	0.32	-0.06	0.39	0.33	-0.06
Gasoline Single Unit Long-haul Truck	0.11	0.10	-0.01	0.11	0.10	-0.01
Gasoline Motor Home	0.03	0.03	0.00	0.03	0.03	0.00
Gasoline Combination Short-haul Truck	0.00	0.00	0.00	0.00	0.00	0.00
Diesel Passenger Car	0.09	0.07	-0.03	0.09	0.07	-0.03
Diesel Passenger Truck	0.72	0.67	-0.04	0.72	0.67	-0.04
Diesel Light Commercial Truck	0.15	0.14	-0.01	0.15	0.14	-0.01
Diesel Other Buses	0.09	0.07	-0.02	0.09	0.07	-0.02
Diesel Transit Bus	0.26	0.20	-0.05	0.26	0.20	-0.05
Diesel School Bus	0.31	0.29	-0.02	0.32	0.29	-0.02
Diesel Refuse Truck	0.10	0.10	-0.01	0.10	0.10	-0.01
Diesel Single Unit Short-haul Truck	1.41	1.17	-0.24	1.41	1.17	-0.24
Diesel Single Unit Long-haul Truck	0.39	0.35	-0.04	0.39	0.35	-0.04
Diesel Motor Home	0.02	0.02	0.00	0.02	0.02	0.00
Diesel Combination Short-haul Truck	0.92	1.12	0.20	0.92	1.13	0.20

[7] All numbers are rounded to the nearest one-hundredth. The difference between the figures shown for 2019 and 2020 may not agree exactly with the figure shown in the Change column due to rounding.

Fuel and Vehicle Type	GWP100			GWP 20		
	2019	2020	Change (2019-2020)	2019	2020	Change (2019-2020)
Diesel Combination Long-haul Truck	1.85	2.43	0.58	1.85	2.43	0.58
CNG Other Buses	0.01	0.01	0.00	0.01	0.01	0.00
CNG Transit Bus	0.03	0.02	-0.01	0.04	0.03	-0.01
CNG School Bus	0.00	0.00	0.00	0.01	0.01	0.00
CNG Refuse Truck	0.02	0.02	0.00	0.02	0.02	0.00
CNG Single Unit Short-haul Truck	0.03	0.02	0.00	0.03	0.03	0.00
CNG Single Unit Long-haul Truck	0.01	0.01	0.00	0.01	0.01	0.00
CNG Motor Home	0.00	0.00	0.00	0.00	0.00	0.00
CNG Combination Short-haul Truck	0.02	0.03	0.01	0.03	0.04	0.01
E-85 Passenger Car	0.01	0.01	0.00	0.01	0.01	0.00
E-85 Passenger Truck	0.04	0.05	0.01	0.04	0.05	0.01
E-85 Light Commercial Truck	0.01	0.01	0.00	0.01	0.01	0.00
On-Road Gasoline	29.7	24.8	-4.9	29.7	24.9	-4.9
On-Road Distillate	6.3	6.6	0.3	6.3	6.6	0.3
On-Road CNG	0.114	0.112	-0.003	0.154	0.152	-0.002
Total	36.1	31.5	-4.6	36.2	31.6	-4.6