

## Carbon Footprint Comparisons

Revised: 2019-09-28

Descriptor	Value			Units
	2015	2016	2017	
Gross U.S. GHG Emissions	6638.1	6511.3		MMT CO2e/yr
Net U.S. GHG Emissions	5942.9	5794.5		MMT CO2e/yr
Residential GHG Emissions--Total	1051.4	999.6		MMT CO2e/yr
Residential GHG Emissions--Combustion	353.9	332.1		MMT CO2e/yr
Residential GHG Emissions--Electricity	697.5	667.5		MMT CO2e/yr
U.S. Population	321.4	323.4	325.7	millions
Per Capita U.S. Residential GHG Emissions (less Transp.)	3.27	3.09		MT CO2e/person/yr
U.S. Residential Energy Consumption (Total Energy, less Transp.)	20,539	20,081	19,969	TBtu/yr
U.S. Residential Retail Electricity Sales	4,791	4,815	4,705	TBtu/yr
U.S. Residential Electrical System Energy Losses	9,362	9,334	9,243	TBtu/yr
U.S. GT&D Efficiency	0.339	0.340	0.337	Fraction
U.S. Site Residential Energy Use (less Transp.)	11,177	10,747	10,726	TBtu/yr
Per Capital U.S. Residential Energy Consumption (Total Energy, less Transp.)	63.9	62.1	61.3	MMBtu/person/yr
Per Capital U.S. Residential Energy Consumption (Site Energy, less Transp.)	34.8	33.2	32.9	MMBtu/person/yr
MA Total GHG Emissions	76.1	74.2		MMT CO2/yr
MA Residential GHG Emissions (less transp. & elect.)	0.18	0.155		Fraction
MA Residential GHG Emissions (less transp. & elect.)	13.7	11.5		MMT CO2e/yr
MA Residential Electricity GHG Emissions	5.8	5.4		MMT CO2e/yr
MA Residential GHG Emissions (less transp.)	19.5	16.9		MMT CO2e/yr

MA Population	6.794	6.8237	6.8598	millions
Per Capita MA Residential GHG Emissions (less transp.)	2.87	2.48		MT CO2e/yr

Carlisle Residential GHG Emissions			41,400	MT CO2e/yr
Carlisle Resid. Transp. GHG Emissions			19,986	MT CO2e/yr
Carlisle Resid. GHG Emissions, less Transp.			21,415	MT CO2e/yr

Carlisle Population			5235	
Per Capita Carlisle Resid. GHG Emissions, less Transp.			4.09	MT CO2e/person/yr

<b>Per-Capita Resid. Emissions Comparison; Carlisle vs. MA (excluding Transp.)</b>	<b>1.43</b>	<b>1.65</b>	<b>1.65</b>	
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Total Residential Energy Use in MA (less Transp.)	394.9		TBtu/yr
Residential Retail Electricity Sales in MA	67.2		TBtu/yr
Residential Electrical System Energy Losses in MA	128.4		TBtu/yr
GT&D Efficiency in MA	0.344		Fraction
Site Residential Energy Use in MA (less Transp.)	266.5		TBtu/yr
Per Capital Total Residential Energy Use in MA (less Transp.)	57.9		MMBtu/person/yr
Per Capital Site Residential Energy Use in MA (less Transp.)	39.1		MMBtu/person/yr

Carlisle Site Residential Energy Use		529,392	MMBtu/yr
Carlisle Resid. Transp. Energy Use		256,371	MMBtu/yr
Carlisle Site Residential Energy Use, less Transp.		273,022	MMBtu/yr
Carlisle Site Residential Electricity Use		75,286	MMBtu/yr
Carlisle Total Residential Electricity Use (includes losses)		219,136	MMBtu/yr
Carlisle Total Residential Energy Use, less Transp.		416,872	MMBtu/yr
Per Capita Carlisle Total Residential Energy Use, less Transp.		79.6	MMBtu/person/yr
Per Capita Carlisle Site Residential Energy Use, less Transp.		52.2	MMBtu/person/yr

<b>Resid. Total Energy Comparison; Carlisle vs. MA (excluding Transp.)</b>			<b>1.38</b>	
<b>Resid. Site Energy Comparison; Carlisle vs. MA (excluding Transp.)</b>			<b>1.34</b>	

**Comparison of Total Carbon Emissions**

Carlisle Carbon Footprint per Household, including Embedded Carbon (2013)	81.6		81.6	MT CO2e/HH/yr
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Carlisle Carbon Footprint per Household, including Embedded Carbon (2013)	83		83	MT CO2e/HH/yr
MA Carbon Footprint per Household, including Embedded Carbon (2013)	50.4		50.4	MT CO2e/HH/yr
Total per Household Emissions Ratio (Carlisle/MA)			1.65	

**Comparison of Passenger Vehicle Miles**

Carlisle Daily Passenger Vehicle Miles per Household			77.2	Miles/day
Carlisle Passenger Vehicle Miles per Household			28,186	Miles/yr
MA Daily Passenger Vehicle Miles per Household			48.0	Miles/day
MA Passenger Vehicle Miles per Household			17,516	Miles/yr
Ratio of Carlisle Miles to MA Miles			1.61	

**Comparison of Home Sizes**

Carlisle Avg. Home Size			3462	Sq. ft.
MA Avg. Home Size			2076	Sq. ft.
Ratio of Avg. Home Size			1.67	

**Comparisons of Household Incomes**

Carlisle Avg. Household Income			\$252,373	\$/yr
MA Avg. Household Income			\$101,858	\$/yr
Ratio of Avg. Household Income			2.48	

<b>Per-Capita Comparisons</b>			<b>2017</b>	<b>Units</b>
MA Owner-Occupied Housing Units			1,612,329	
MA Renter-Occupied Housing Units			973,386	
MA Owner-Occupied Avg. Household Occupants			2.69	
MA Renter-Occupied Avg. Household Occupants			2.26	
MA Avg. Household Occupants			2.53	
Carlisle Owner-Occupied Housing Units			1680	
Carlisle Renter-Occupied Housing Units			93	
Carlisle Owner-Occupied Avg. Household Occupants			2.98	
Carlisle Renter-Occupied Avg. Household Occupants			1.63	
Carlisle Avg. Household Occupants			2.91	
MA per-Capita Total Emissions (2013)			19.9	MT CO2e/Person/yr
Carlisle per-Capita Total Emissions (2013)			28.5	MT CO2e/Person/yr
<b>Total per-Capita Emissions Ratio</b>			<b>1.43</b>	
MA Per-Capita Vehicle Use (2014)			19.0	Miles/Person/Day
Carlisle Per-Capita Vehicle Use (2014)			26.5	Miles/Person/Day
<b>Ratio of Per-Capita Vehicle Use</b>			<b>1.40</b>	
MA Home Size/Person			821	Sq. ft./Person
Carlisle Home Size/Person			1190	Sq. ft./Person
<b>Ratio of Avg. Home Size per Person</b>			<b>1.45</b>	
MA Avg. per-Capita Income			\$40,290	\$/Person/yr.
Carlisle Avg. per-Capita Income			\$86,750	\$/Person/yr.
<b>Ratio of Avg. per-Capita Income</b>			<b>2.15</b>	

**Source/Comments****Link**

Fig. ES-1 and Table ES-7; *Inventory of U.S. Greenhouse Gas Emissions and Sinks--1990 - 2016* ; EPA430-R-18-003

[https://www.epa.gov/sites/production/files/2018-01/documents/2018\\_complete\\_report.pdf](https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf)

Ibid; Table ES-7

Excludes transportation. Ibid; Table ES-7

Excludes transportation. Ibid; Table ES-6

Excludes transportation. Calculation

U.S. Census Bureau; Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2017; NST-EST2017-01

<https://www2.census.gov/programs-surveys/popest/tables/2010-2017/state/totals/nst-est2017-01.xlsx>

Table 2.2; *October 2018 Monthly Energy Review* ; U.S. Energy Information Administration; DOE/EIA-0035(2018/10); October 26, 2018

<https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf>

Ibid

Ibid

Calculation

Calculation

Calculation

Calculation

Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs (accessed 2019-9-09-28)

<https://www.mass.gov/service-details/ma-ghg-emission-trends>

Ibid; Excludes transportation and electricity (2016 value accessed 2019-05-07; 2016 value accessed 2019-09-28)

Calculation; Excludes transportation and electricity

Ibid (accessed 2019-09-28)

Calculation; Excludes transportation

Google public data (from U.S. Census Bureau); Updated Sep. 19, 2018

Calculation; Excludes transportation

[https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude\\_&ctype=l&strail=false&bcs=d&nselm=h&met\\_y=population&scale\\_y=lin&ind\\_y=false&rdim=state&idim=state:25&ifdim=state&hl=en&dl=en&ind=false](https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude_&ctype=l&strail=false&bcs=d&nselm=h&met_y=population&scale_y=lin&ind_y=false&rdim=state&idim=state:25&ifdim=state&hl=en&dl=en&ind=false)

From "2017" tab, summary tables; neglect differences between 2015 and 2017

Ibid

Calculation; excludes transportation

<https://www.census.gov/quickfacts/carlisletownmiddlesexcountymassachusetts>

U.S. Census Bureau; Quick Facts

Calculation; excludes transportation

**Calculation; excludes transportation; Compares 2017 Carlisle to 2015 and 2016 MA values**

Table C5.; State Profiles and Energy Estimates; U.S. Energy Information Administration; State Profile and Energy Estimates

Ibid

Ibid

Calculation

Calculation

Calculation

Calculation

[https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep\\_sum/html/sum\\_btu\\_res.html&sid=US](https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/sum_btu_res.html&sid=US)

From "2017" tab

Ibid

Calculation; excludes transp.

From "2017" tab

Calculation, using 2016 MA GT&D efficiency

Calculation

Calculation

Calculation

Calculation; excludes transp.; Compares 2017 Carlisle to 2016 MA values
Calculation; excludes transp.; Compares 2017 Carlisle to 2016 MA values

U.C. Berkeley CoolClimate Network, Average Annual Household Carbon Footprint (2013)	<a href="http://coolclimate.berkeley.edu/maps">http://coolclimate.berkeley.edu/maps</a>
Jones, Christopher, and Daniel M. Kammen; <i>Spatial Distribution of U.S. Household Carbon Footprints Reveals Suburbanization Undermines Greenhouse Gas Benefits of Urban Population Density</i> ; Environ. Sci. Technol., 2014, 48(2), pp 895 - 902; December 13, 2013.	<a href="https://pubs.acs.org/doi/abs/10.1021/es4034364">https://pubs.acs.org/doi/abs/10.1021/es4034364</a>
U.C. Berkeley CoolClimate Calculator, per Chris Jones email to Debbie Bentley; 2019-01-24	
Ibid.	
Calculation	

From "Vehicle Data" tab, assuming no change since 2014	
Calculation	
From "Vehicle Data" tab, assuming no change since 2014	
Calculation	
Calculation	

From "Housing Energy Data" tab	
Ibid.	
Calculation	

