

# Summary of Siliguri City Energy Consumption and GHG Emissions (2018-19)

## City Profile & Overview of GHG Emissions:

Siliguri is a rapidly developing metropolis in the Indian state of West Bengal. It is the commercial nerve centre of North Bengal, having a large number of trade centres and readymade markets for consumer goods which makes it the home to many retailers, wholesalers, dealers, distributors and small-scale entrepreneurs. As estimated in our study, the total GHG emissions from Siliguri was 1.5 million tCO<sub>2</sub>e in the year 2018-19. Taking this into consideration, the average per capita<sup>1</sup> GHG emission for the year 2018-19 for Siliguri is 2 tCO<sub>2</sub>e, while India's per capita GHG emission was 1.56 tCO<sub>2</sub>e for the year 2010<sup>2</sup>.

Table 1 City Profile

Local Government	Siliguri Municipal Corporation
State	West Bengal
Population (2018-19)	602,194
Area (sq. km)	41.9
No. of Zones/Boroughs	5
No. of Wards	47
No. of Households	136,862
Household Size	4.4

Table 2 GHG Emissions from Siliguri City

GHG Emission Scenario of Siliguri City in 2018-19	
Total Energy Use (GJ)	14,009,083
Total GHG Emission (tCO <sub>2</sub> e)	1,465,114
Per Capita Energy Use (GJ)	23
Per Capita GHG Emission (tCO <sub>2</sub> e)	2
Emissions from Waste Sector (tCO <sub>2</sub> e)	213,063

## Community-Scale Energy Consumption & GHG Emissions:

### Energy Consumption by Siliguri City in 2018-19:

Table 3 Sector-wise Energy Consumption in 2018-19

Sector	Energy Use (GJ)
<b>Stationary Units</b>	<b>5,236,821</b>
Residential Buildings	3,600,366

<sup>1</sup>Population of Siliguri for year 2018-19 is 630,923 persons as per population projections based on the Census population of 513,264 in the year 2011, and a compound annual growth rate of 0.83%.

<sup>2</sup>India: First Biennial Update Report to the United Nations Framework Convention on Climate Change (2016), [http://unfccc.int/essential\\_background/library/items/3599.php?rec=j&preref=7828#beg](http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=7828#beg)

Commercial and Institutional Buildings/Facilities	1,378,491
Manufacturing Industry and Construction (i.e., Industrial sector)	257,964
<b>Mobile Units</b>	<b>8,772,262</b>
Road Transport	8,772,262
<b>Total</b>	<b>14,009,083</b>

### Waste Generated and Treated at Siliguri City in 2018-19:

Table 4 Waste Sector Activity Data

Waste Sector Activities	Data	Unit
<b>Solid Waste Management</b>		
Daily MSW Generated	340	TPD
MSW Biologically Processed - composting	70	TPD
MSW Biologically Processed - Biomethanation	NA	TPD
MSW Processed - Incineration/Recycling	NA	TPD
MSW Disposal in landfills (wet) *	212	TPD
<b>Wastewater Management</b>		
Daily Waste Water Generated	38	MLD
Treatment Capacity	0	MLD
Sewerage Network Coverage	0	%
Population coverage using Septic tanks	70	%
Population coverage using pit latrines	27	%
Discharge of wastewater without treatment	100	%
Inlet BoD (Organic load)	200	Mg/L

\*City's landfills categorised as wet/dry, shallow/deep, managed/unmanaged contribute different levels of emissions

### GHG Emissions from Siliguri City in 2018-19:

Table 5 Sector-wise GHG Emission in 2018-19

Sector	GHG Emissions (tCO <sub>2</sub> e)
<b>Stationary Units</b>	<b>601,524</b>
Residential Buildings	373,578
Commercial and Institutional Buildings/Facilities	197,739
Manufacturing Industry and Construction (i.e. Industrial sector)	30,207

<b>Mobile Units</b>	<b>650,527</b>
Road Transport	642,095
Rail	8,432
<b>Waste</b>	<b>213,063</b>
Solid Waste Disposal	179,172
Composting	9,864
Wastewater	24,026
<b>Total</b>	<b>1,465,114</b>

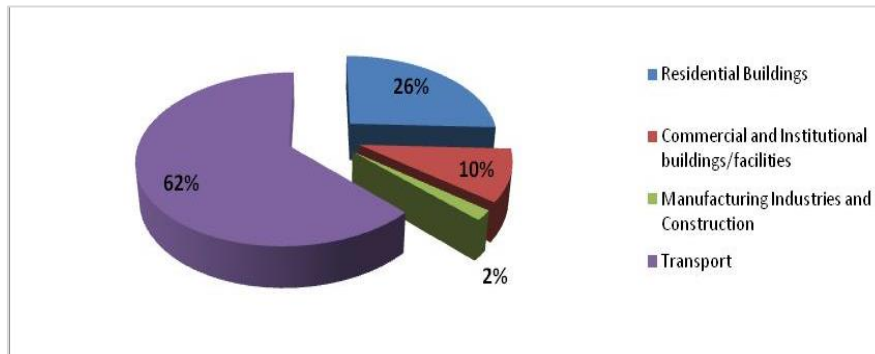


Figure 1: Sector-wise Energy consumption in Siliguri, 2018-19

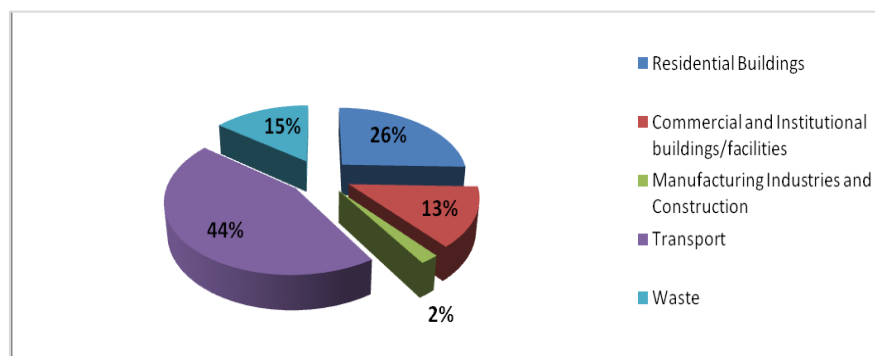


Figure 2: Sector-wise GHG emission in Siliguri, 2018-19

- Total Community-Scale Energy use in 2018-19: 14,009,083 Giga Joules
- Largest Energy consumers: Road Transport (62%), Residential Buildings (26%), and Commercial and Institutional Buildings/Facilities (10%)
- Total community-scale GHG emission in 2018-19: 1,465,114 tonnes of CO<sub>2</sub>e
- Largest GHG emitters: Road Transport (44%), Residential Buildings (26%), and Waste management sector (15%)

## Trend of Energy Consumption and GHG Emission in Siliguri City from 2015-16 to 2018-19

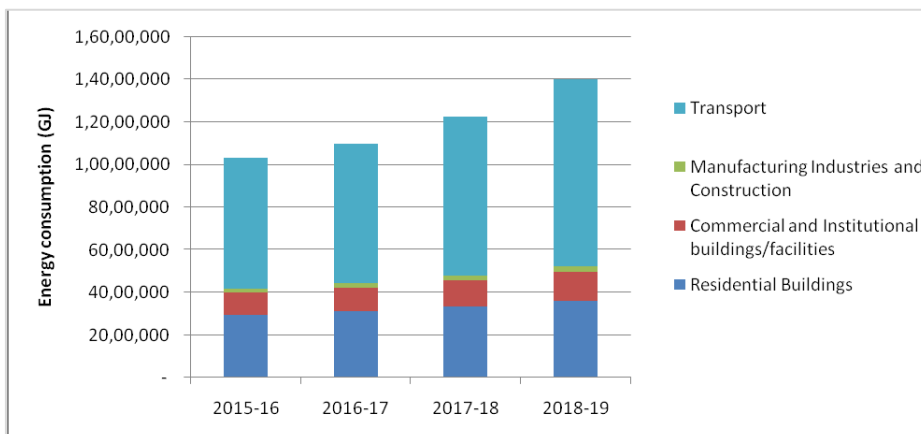


Figure 3 Trend of energy consumption in Siliguri from 2015-16 to 2018-19

The Transport sector has consistently remained the major energy consumption source in Siliguri, followed by Residential buildings and Commercial and Institutional buildings/facilities. The city-scale energy consumption increased at a compounded annual growth rate (CAGR) of 7.9% from 2015-16 to 2018-19.

While consuming the largest amount of energy, the Transport sector also has the highest CAGR of energy consumption (9.4%) from 2015-16 to 2018-19, driven primarily by an increase in the city's private vehicle population. Commercial and Institutional buildings/facilities ranks second in terms of growth rate over the years with a CAGR of 7.6%. Energy consumption in Residential buildings grew at a CAGR of 5.1% while energy use in the Manufacturing Industries and Construction sector has registered a CAGR of 5.3%.

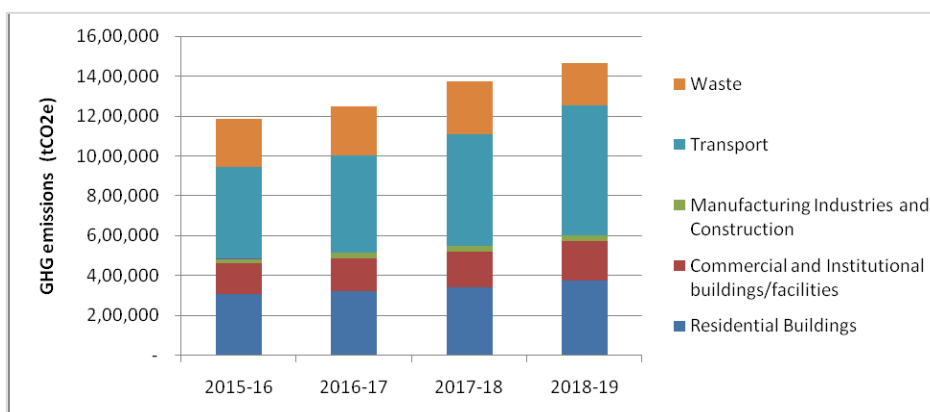


Figure 4: Trend of GHG emission in Siliguri from 2015-16 to 2018-19

Siliguri's community-wide GHG emissions have increased at a CAGR of 5.4% from 2015-16 to 2018-19. The Transport sector (inclusive of road and rail sectors both) has consistently remained the major source of GHG emissions, followed by Residential buildings and the Waste sectors. Emissions from the Transport sector have increased at a CAGR of 9.2%, registering the highest growth rate in GHG emissions among all sectors. CAGR of emissions from Residential buildings stands at 5%. Emissions from Waste sector have reduced at a CAGR of -3%, attributable mainly to increased composting of organic waste through the Sunya initiative of the CapaCITIES project. The Sunya initiative helped restart the city's composting facility that was defunct since 2010. Commercial and Institutional buildings/facilities ranks fourth in terms of overall share of GHG emissions in the city, but ranks second in terms of growth rate over the years, with a CAGR of 6.4%. The Manufacturing Industries and Construction sector has the lowest contribution to city wide GHG

emissions and also the lowest growth rate (CAGR of 2.6%), given the lack of industrial units within the city limits.

### Supply Side Energy Consumption and associated GHG Emissions:

Primary and secondary energy sources supplied to the demand-side sectors for consumption are referred to as the supply-side sources. These include liquid, solid and gaseous fuels, electricity and renewable sources of energy. Grid electricity is the dominant energy type that is typically used in almost all sectors. Petroleum products are used extensively for community transportation in Siliguri city and in the industrial sector.

### Energy Consumption and GHG Emission based on Energy Source in 2018-19:

Table 6 Supply side-based Energy Consumption and GHG Emission in 2018-19

Fuel/Energy Source	Energy Use by Source Category (GJ) (2019-20)		GHG emission by Source Category (t CO <sub>2</sub> e) (2019-20)	
	Stationary Units	Mobile Units	Stationary Units	Mobile Units
Diesel	701,625	6,656,443	52,169	494,932
Petrol	-	2,115,819	-	147,163
LPG	2,791,430	-	176,292	-
Furnace oil	6,213	-	482	-
Coal	59,269	-	5,548	-
Kerosene	105,761	-	7,631	-
Indirect Electricity	1,572,523	-	359,402	-

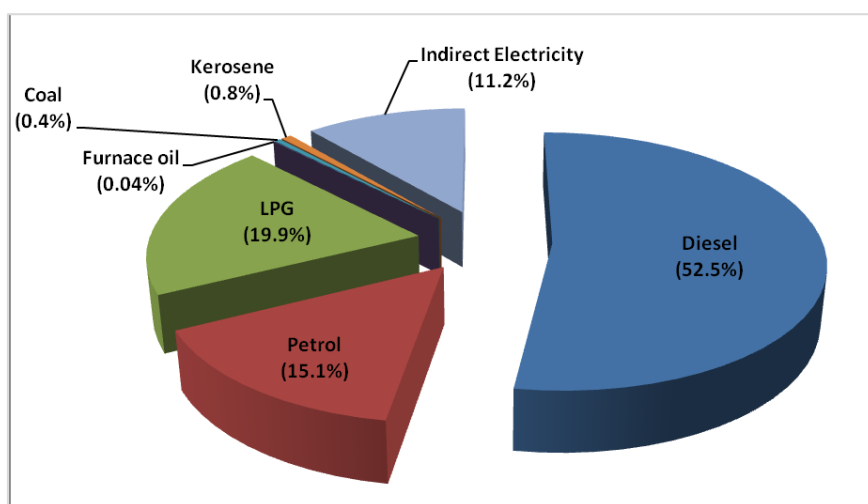


Figure 5: Source-wise supply side energy consumption in Siliguri, 2018-19

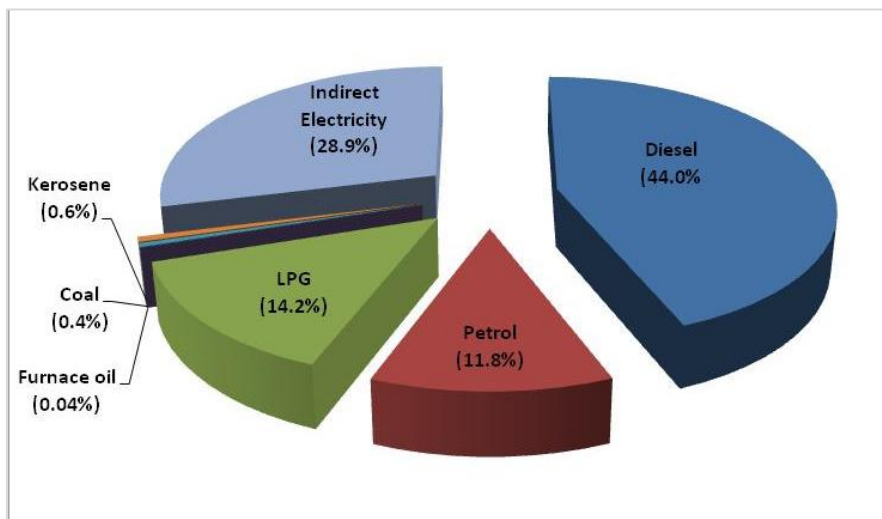


Figure 6: Source-wise supply side GHG emission in Siliguri, 2018-19

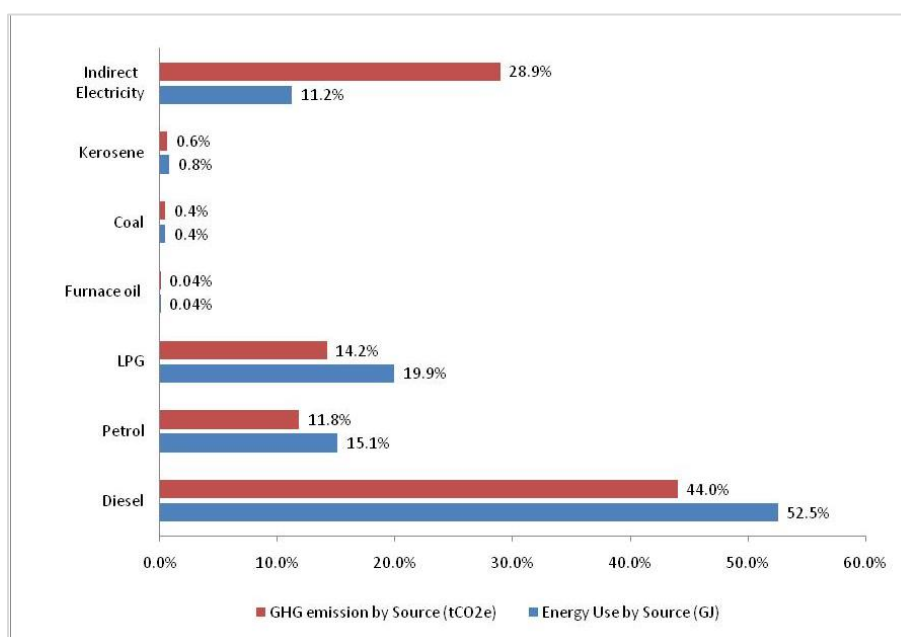


Figure 7: Source-wise supply side energy consumption and GHG emission in Siliguri, 2018-19

- Prominently used Energy sources: Diesel (52.5%), Petrol (15.1%), LPG (19.9%), and Electricity (11.2%)
- Total community-scale GHG emission from energy consumption in baseline year: 1,243,620 tonnes of CO<sub>2</sub>e
- Largest GHG emitting Energy sources: Diesel (44%), Electricity (28.9%), LPG (14.2%), and Petrol (11.8%)

## Local Government Level Energy Consumption & GHG Emissions:

### Energy Consumption and GHG Emission by Siliguri Municipal Corporation in 2018-19:

Table 7 Sector-wise Energy Consumption and GHG Emission by Siliguri Municipal Corporation in 2018-19

Sector	Energy Use (GJ)	GHG emission (tonnes of CO <sub>2</sub> e)
Buildings	1,874.97	413.09
Water Supply	29,383.20	6,715.57
Street Lighting	25,009.20	5,715.88

Transport	28,250.19	2,101.89
<b>Total</b>	<b>84,517.55</b>	<b>14,946.44</b>

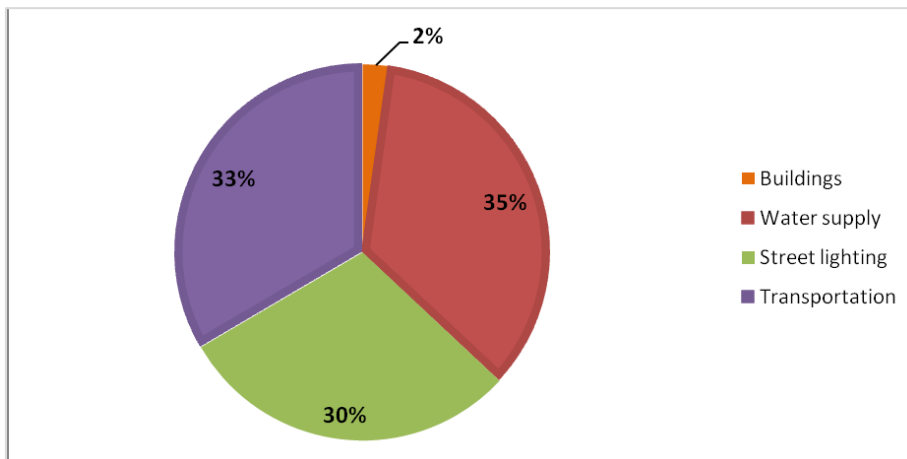


Figure 8: Energy consumption due to local government activities in Siliguri, 2018-19

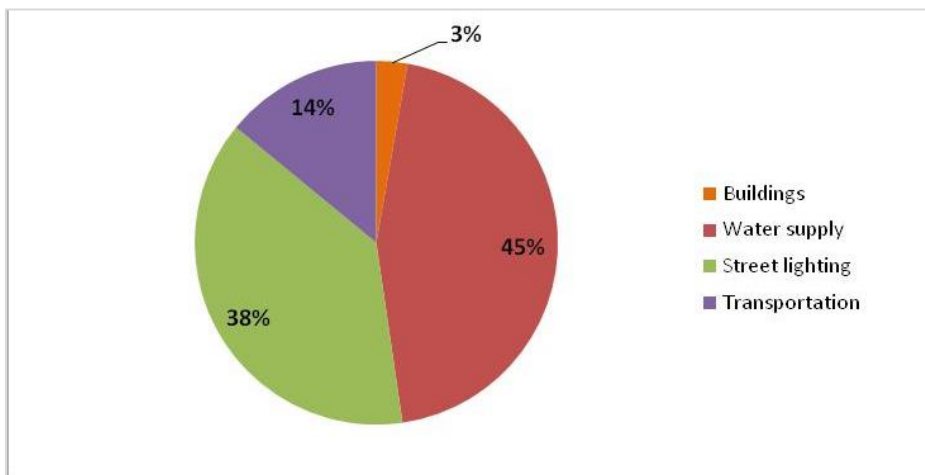


Figure 9: GHG emissions due to local government activities in Siliguri, 2018-19

- Total Energy use in 2018-19 by Siliguri Municipal Corporation: 84,517.55 Giga Joules
- Largest Energy consumers: Water supply (35%), Transportation (33%), Street lighting (30%)
- Total GHG emission in 2018-19 by Siliguri Municipal Corporation: 14,946.44 tonnes of CO<sub>2</sub>e
- Largest GHG emitting sector: Water supply (45%), Street lighting (38%), Transportation (14%)

#### Trend of Energy Consumption and GHG Emission by Local Government:

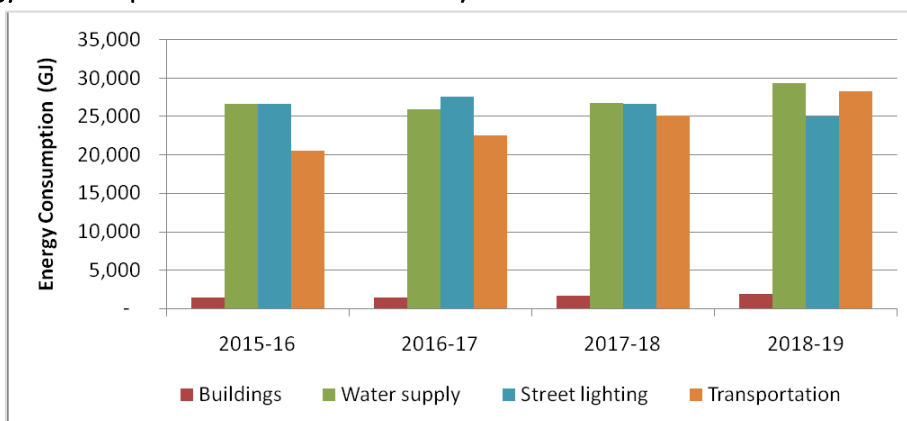


Figure 10: Trend of energy consumption due to local government activities in Siliguri from 2015-16 to 2018-19

Energy consumption from different local government operations showed an increasing trend, with a CAGR of 2.9%

Energy consumption in municipal vehicles has the highest growth rate in local government operations in Siliguri (CAGR of 8.3%), ranking second in terms of quantum of energy consumed in this regard in 2018-19. Energy use in Municipal buildings has a CAGR of 7.9% while water supply facilities have a CAGR of 2.4%. Street lighting has displayed a negative CAGR of -1.6% in energy consumption due to the replacement of conventional streetlights with LED streetlights.

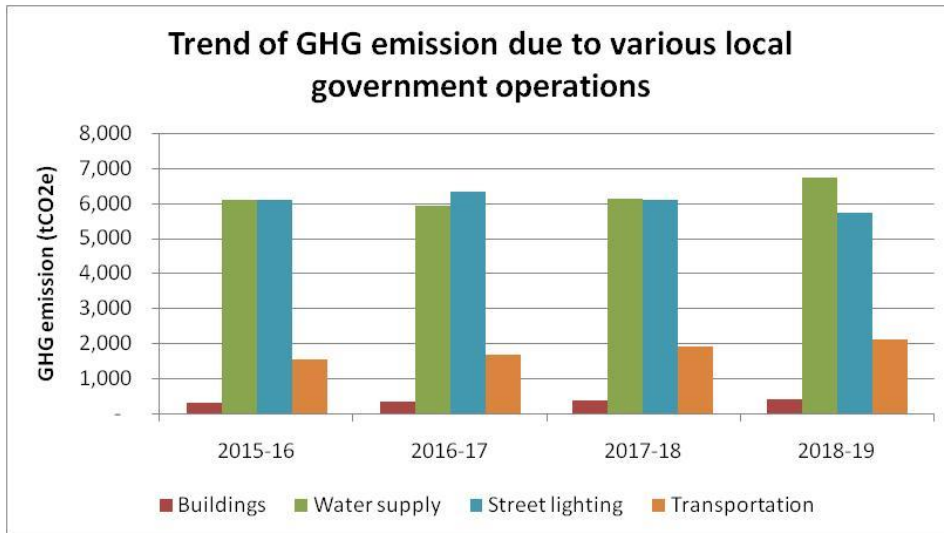


Figure 11: Trend of GHG emission due to local government activities in from 2015-16 to 2018-19

GHG emission from different local government operations demonstrated a slight increase from 2015-16 to 2018-19, with a CAGR of 1.6%. The growth rate of GHG emission is the maximum in the transport sector (CAGR of 8.4%), although it is third highest emitter among all operations of Siliguri Municipal Corporation. GHG emissions from energy use in municipal buildings grew at a CAGR of 8.2% and that from water supply increased at a CAGR of 2.4%. Emission from streetlighting operations reduced by a CAGR of -1.6%, mirroring the reduced energy consumption as a result of LED retrofits.