AECOM

City of Chicago 2015 Community-Scale Greenhouse Gas Emissions Inventory

Preliminary Analysis

January, 2017

City of Chicago 2015 Community-Scale Greenhouse Gas Emissions Inventory

Summary of Results

The City of Chicago announces preliminary results from its 2015 Community-scale Greenhouse Gas (GHG) Emissions Inventory. Community activities within the City of Chicago boundaries generated approximately 31,000,000 metric tonnes of carbon dioxide equivalent (MT CO_2e) in 2015.

Preliminary analysis indicates Chicago achieved a 7 percent reduction in total emissions and 8 percent reduction in per capita emissions since 2010 when the last inventory was completed, despite an approximate 1 percent growth in the City's population[1] and 12 percent growth in the Chicago Metropolitan Gross Regional Product (GRP)[2] over the same time period.

Background

The City of Chicago is a recognized leader in climate action planning. The City has assessed the economic, social and environmental risks of climate change and has begun implementing actions that will help minimize the effects on its community.[3] The City has also begun aggressive action to reduce community GHG emissions and contribute to global climate protection efforts. In 2008, the City unveiled the Chicago Climate Action Plan (CCAP), which outlined its ambitious goals and actions to reduce community GHG emissions to 80 percent below 1990 levels by the year 2050 and established an interim goal of reducing emissions to 25 percent below 1990 levels by the year 2020. To monitor progress towards these goals, the City has developed GHG emissions inventories for the years 1990, 2000, 2005 and 2010.

Chicago joins other global cities in completing one of the first GPC-compliant GHG inventories in the world. The City of Chicago is a member of C40 Cities and joined the Compact of Mayors in August 2015. The Compact of Mayors is the world's largest cooperative effort among mayors to reduce GHG emissions, track progress and prepare for the impacts of climate change. As a signatory of the Compact of Mayors in 2015, the City of Chicago pledged to conduct a GHG emission inventory in compliance with the Global Protocol for Community-Scale GHG Emissions Inventories (GPC)[4] in 2016.

The GPC provides the first global standard protocol under which cities can complete community-scale inventories. Where previous community-scale inventories have been difficult to compare because of wide differences in methodologies, both across geography and time, resulting often in "apples-to-oranges" comparisons, the GPC

[1] According to the U.S. Census Bureau, the City of Chicago population was 2,695,598 in 2010 and 2,720,546 in 2015.

[2] According to World Business Chicago, the Chicago Metropolitan Gross Regional Product (GRP) was approximately $500 billion in 2010 and $561 billion in 2015.

[3] For additional information on climate change and its potential impacts on the Chicago region, visit http://www.chicagoclimateaction.org/

[4] The Global Protocol for Community-Scale GHG Emissions Inventories can be found online at: http://www.ghgprotocol.org/city-accounting

provides a foundation upon which cities can conduct “apples-to-apples” comparisons of their own year-over-year GHG emissions going forward, as well as evaluate performance compared to other cities around the world.

The GPC-compliant 2015 Chicago Community GHG Emissions Inventory meets the Compact of Mayors requirement and also provides the City with data to continue to monitor its progress toward achieving its 2020 and 2050 CCAP GHG emissions reduction goals.

2015 Community GHG Emissions Inventory Results

In 2015, stationary energy emissions were the largest contributor to the community inventory, accounting for 70 percent (21,735,703 MT CO_2e) of total emissions. Transportation emissions contributed an additional 26 percent (8,117,376 MT CO_2e), with the waste sector responsible for the remaining 4 percent (1,102,783 MT CO_2e) of community emissions.

The four sub-sectors that together generated over 85 percent of Chicago’s 2015 total GHG emissions included residential buildings (28 percent), commercial and institutional buildings and facilities (25 percent), on-road transportation (17 percent), and manufacturing industries and construction (16 percent).

Over half (54.5 percent) of Chicago’s emissions are generated by fuel combustion within the city boundaries (Scope 1 emissions), followed by emissions from electricity consumption (Scope 2), which comprised approximately 42 percent of emissions. Remaining emissions (Scope 3) resulting from treatment and disposal of solid waste and wastewater generated within the city contributed less than 4 percent of the total 2015 GHG emissions.

Over three-quarters of Scope 1 emissions were generated by just three subsectors: residential buildings (31 percent), on-road transportation (31 percent), and commercial and institutional buildings and facilities (16 percent). The majority of electricity-related emissions are generated in the Stationary Energy sector. More specifically, residential buildings (26 percent), commercial and institutional buildings and facilities (38 percent), and manufacturing industries and construction (33 percent) representing over 98 percent of the electricity consumed in Chicago in 2015.

Chicago’s GHG Emission Trends

Chicago conducted a preliminary comparison using the existing 2010 and 2015 data to evaluate how community emissions have changed over the last five years. Due to on-going changes in community-scale GHG inventory methodologies prior to the establishment of the GPC, some sub-sectors within the previous 2010 inventory and the GPC-compliant 2015 inventory could not be compared on an “apples to apples” basis. For this reason, the City conducted a preliminary analysis that attempts to normalize the methodological differences between the two inventories and improve the City’s ability to track emissions performance over time.

Results of this preliminary analysis of 2010 and 2015 GHG emissions reveals Chicago continued to reduce total GHG emissions through 2015 in the stationary and waste sectors resulting in a greater than 7 percent reduction in GHG emissions over the last five years. During that time, Chicago’s population grew by approximately 1 percent while the region’s GRP grew by more than 12 percent. Growth coupled with reduction in total emissions resulted in a greater than 8 percent decrease in per capita emissions in the City.

Between 2010 and 2015, the majority of MT CO_2e reductions occurred in the stationary energy sector, followed by waste. When considering percent reductions, the waste sector experienced the greatest reduction (30 percent) which included a 35 percent emissions reduction in the solid waste disposal sub-sector. This reduction in the solid waste sector is likely driven by a decrease in the total amount of solid waste sent to landfills and an improvement in the solid waste treatment technologies at those landfills. The City expanded its residential curbside recycling pilot program to now serve over 400,000, or approximately 33 percent, of additional City

houeholds.[5] Because of the program's expansion the City experienced a significant increase in the number of tons collected for recycling, from 58,000 in 2010 to 97,000 in 2015[6]. The landfills receiving the City's solid waste also varied between 2010 and 2015. This resulted in a substantial improvement to the methane capture assumptions in the 2015 inventory, which in turn resulted in lower solid waste emissions.

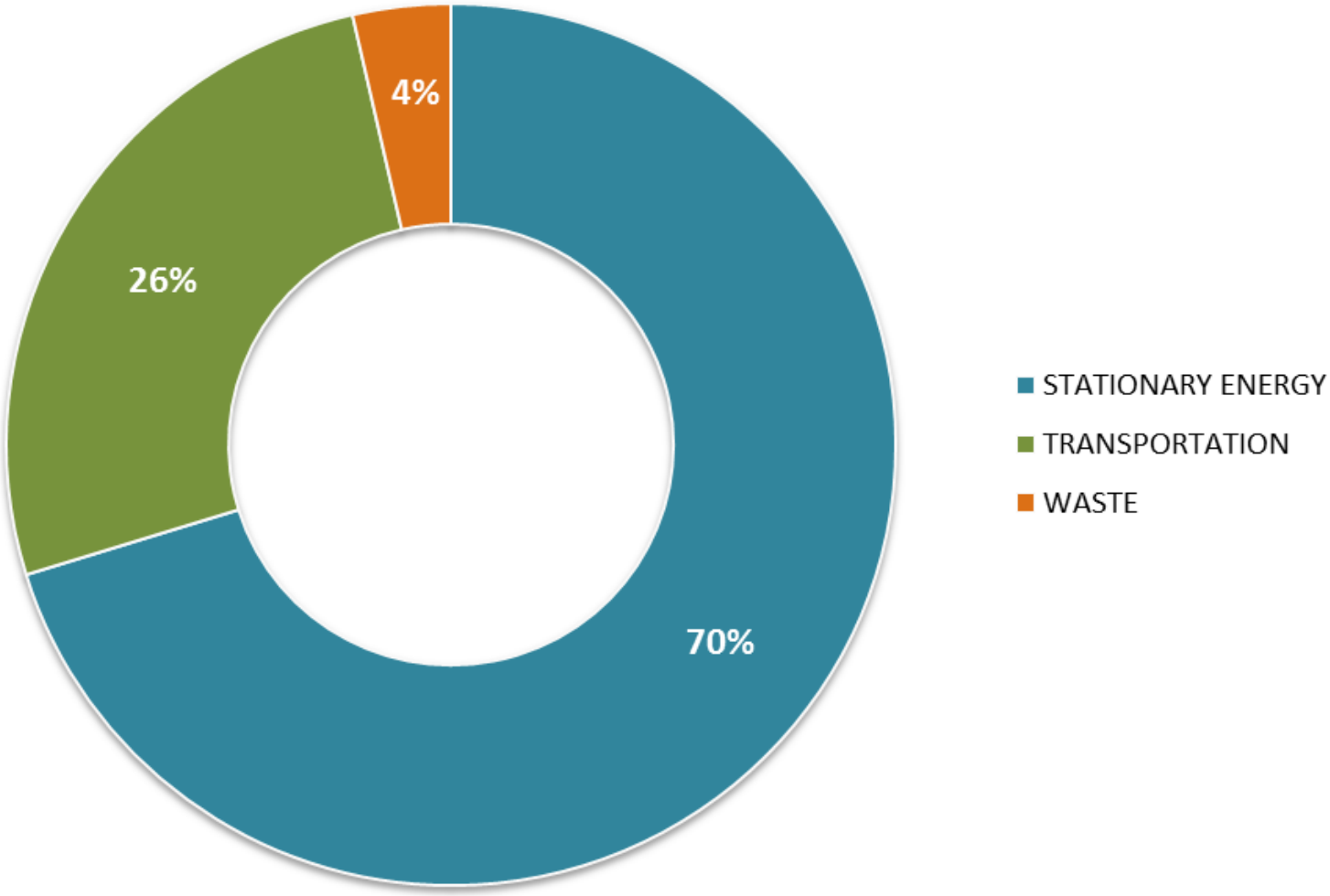
The stationary energy sector overall saw a 10 percent drop in emissions, including 11, 12 and 8 percent emissions reductions in the residential, commercial and institutional buildings and facilities, and manufacturing industries and construction sub-sectors, respectively. Stationary energy sector GHG emissions reductions are likely driven by a general trend in the building industry to improve energy efficiency of buildings as well as a regional shift in energy generation towards renewable energy sources. The City has also implemented the Energy Benchmarking Ordinance, Retrofit Chicago, and the Chicago Solar Express to encourage increasing energy efficiency and renewable energy generation and consumption within the city.

The preliminary analysis indicates that transportation sector emissions increased by approximately 8 percent between 2010 and 2015. Increases in the on-road transportation subsector account for 3 percent of the total increase and are driven by increases in population and vehicle miles traveled. The on-road emissions in the revised 2010 inventory and the 2015 inventory were calculated using identical methods so the results are comparable. The methodologies used to calculate emissions in the off-road, waterborne navigation and railways subsectors in the two inventories are not fully comparable. The incompatibility limits the ability to create a perfect "apples to apples" comparison in these subsectors. Further revision of the off-road, waterborne navigation and railways subsectors would improve this estimate.

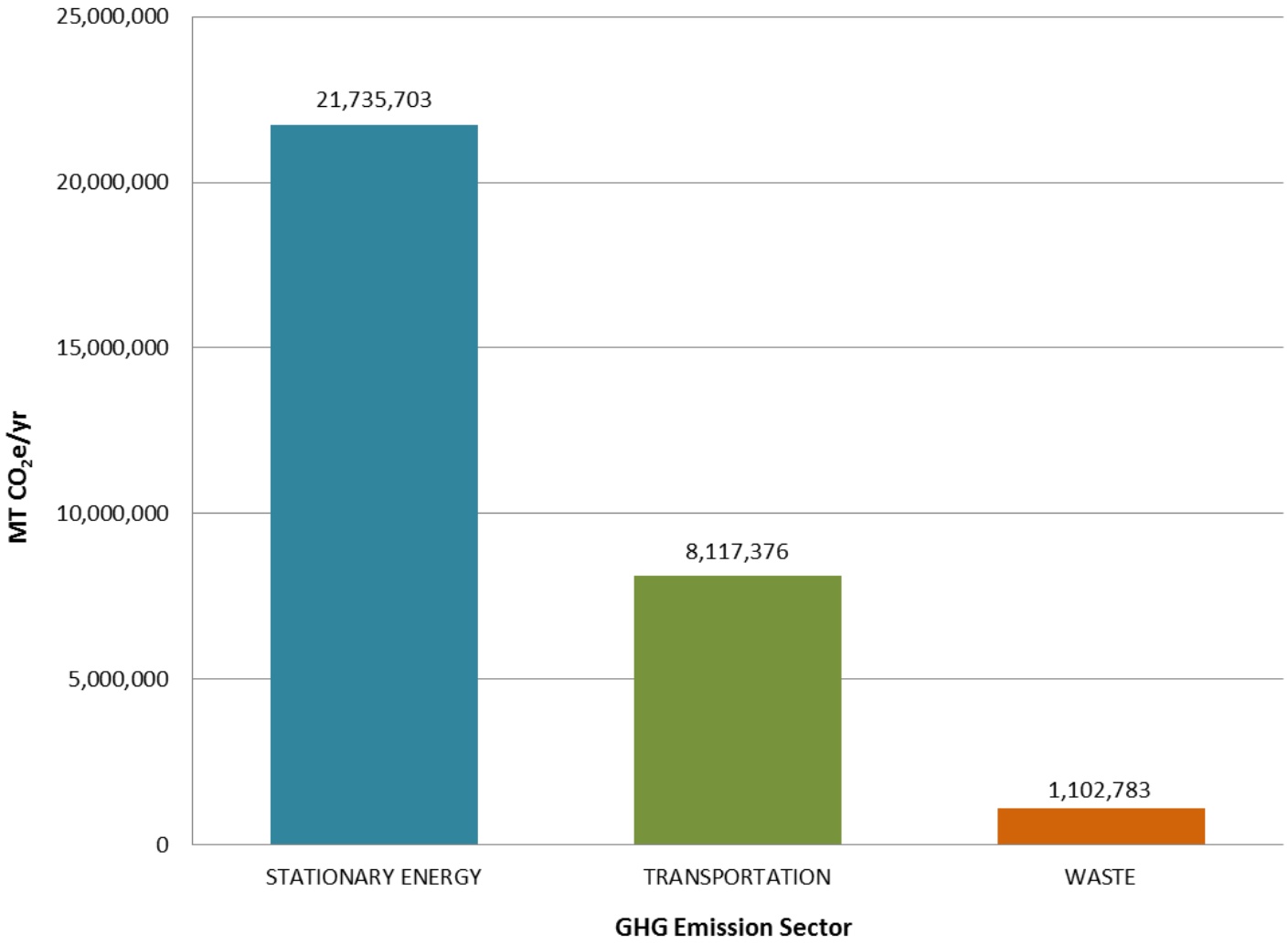
[5] Additional information on the City's sustainability actions from 2012 to 2015 can be found in the Chicago Sustainable Action Agenda 2012-2015 Highlights and Look Ahead at https://www.cityofchicago.org/content/dam/city/progs/env/Sustainable_Chicago_2012-2015_Highlights.pdf.

[6] Tonnage data is from the Chicago Department of Streets and Sanitation

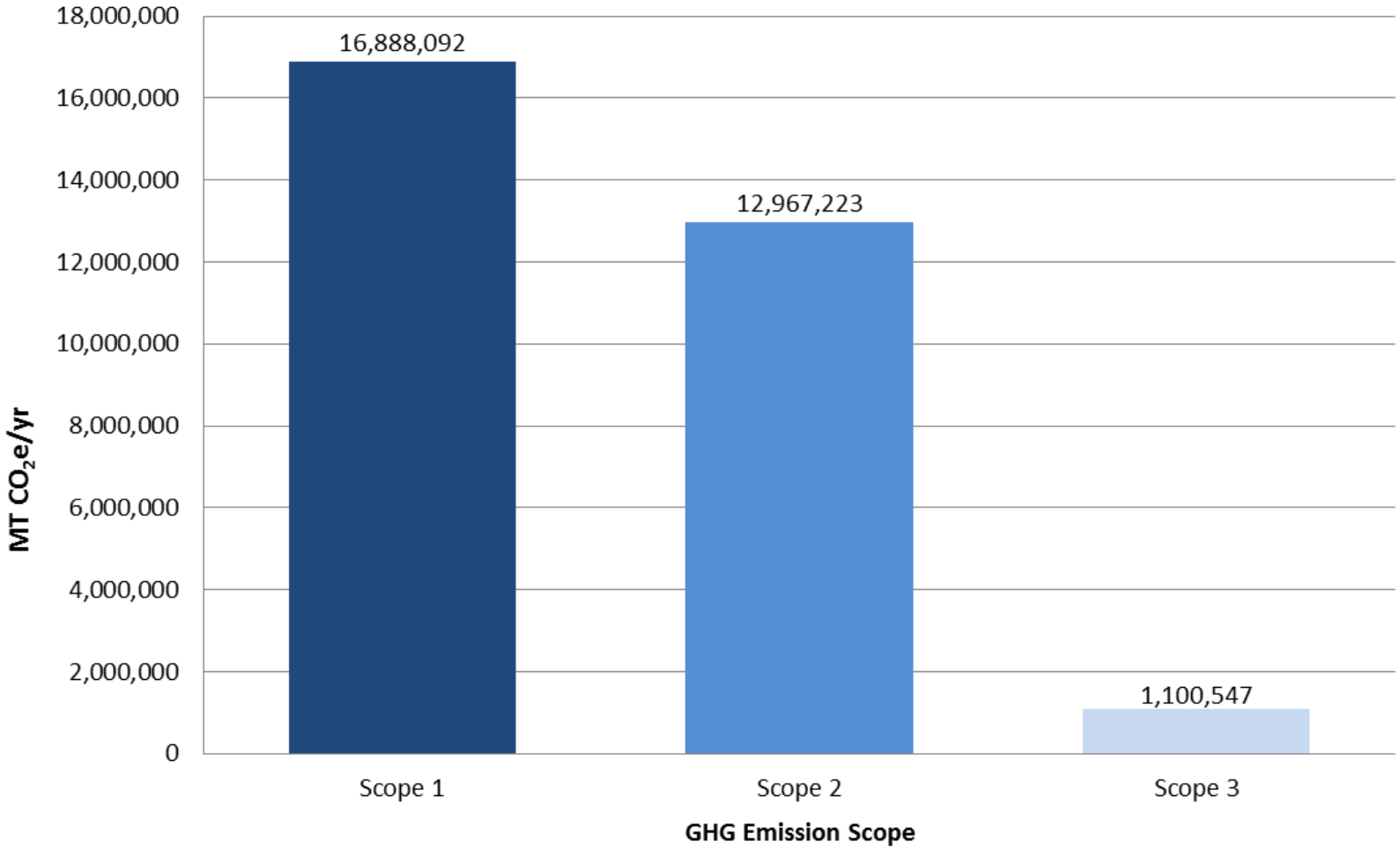
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Emissions by Sector



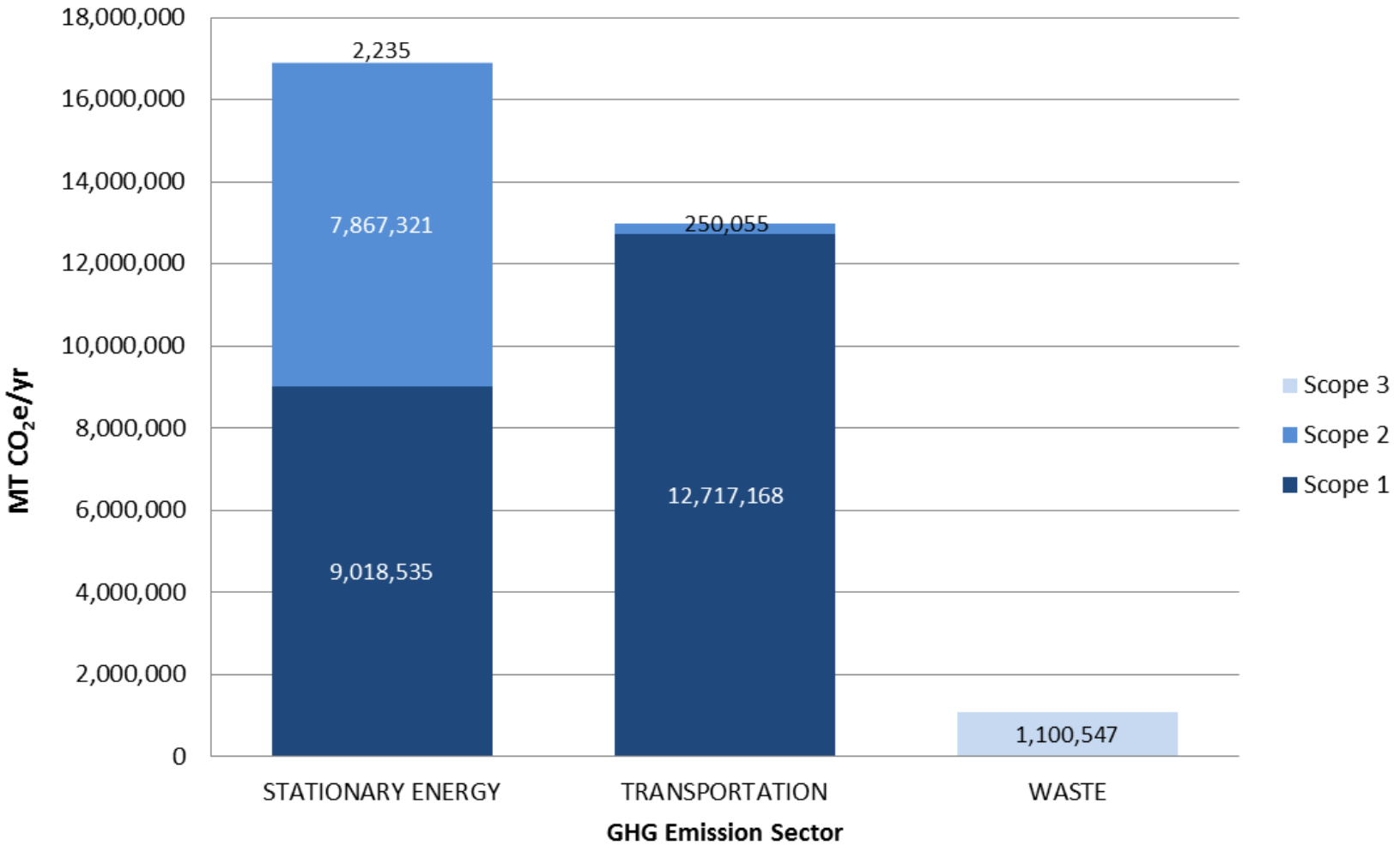
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Emissions by Sector



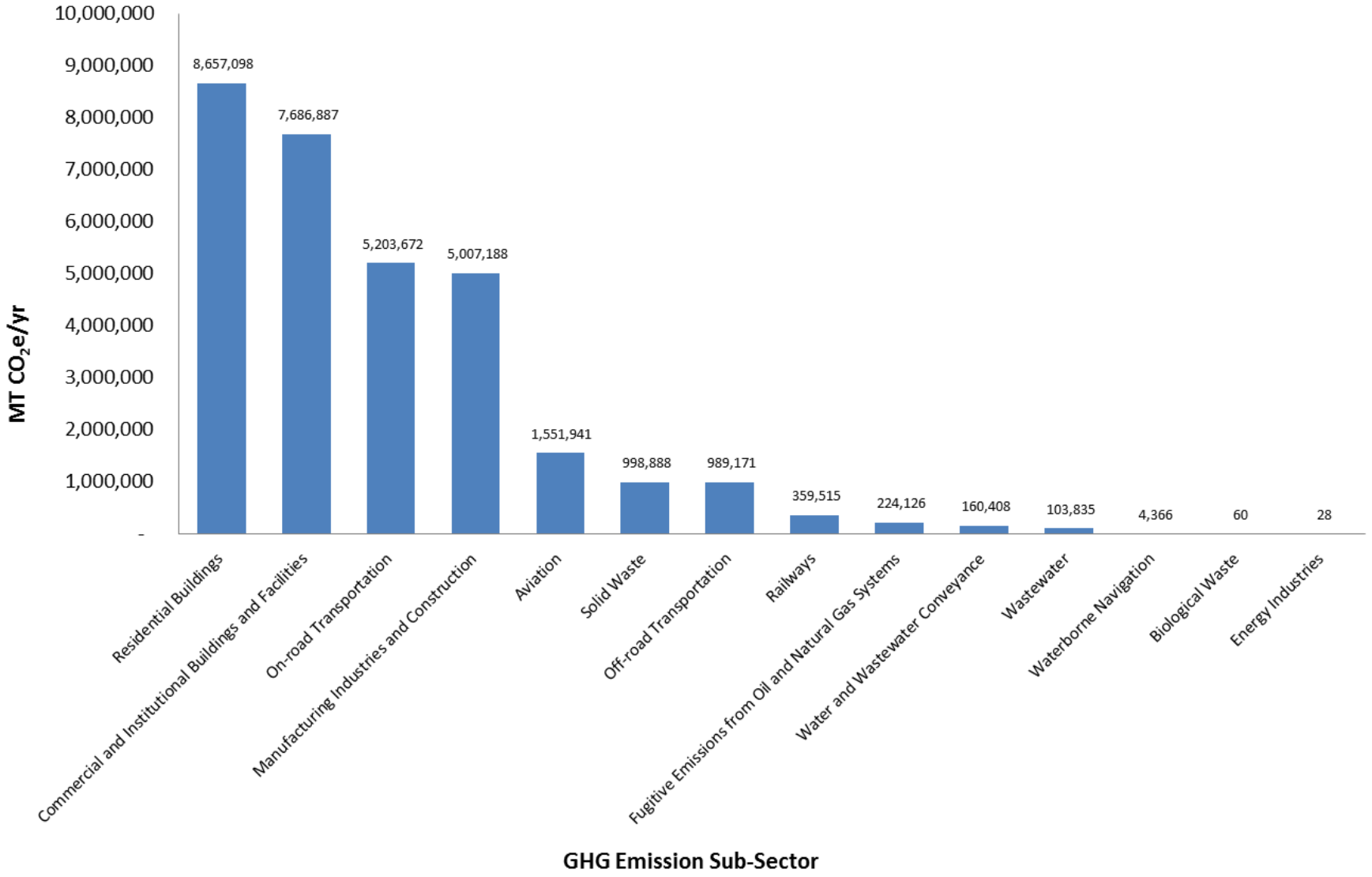
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Total Emissions by Scope



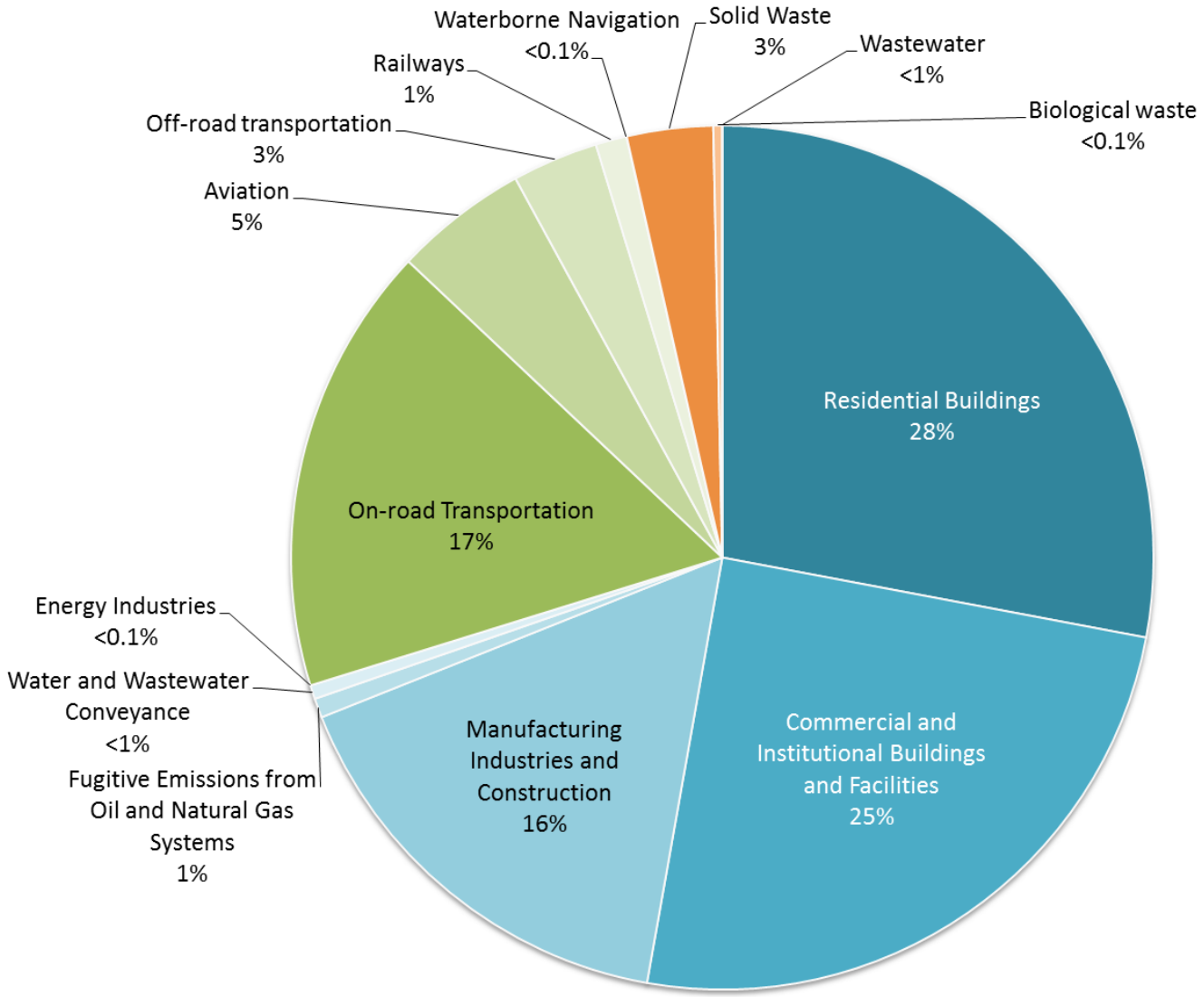
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Total Emissions by Sector and Scope



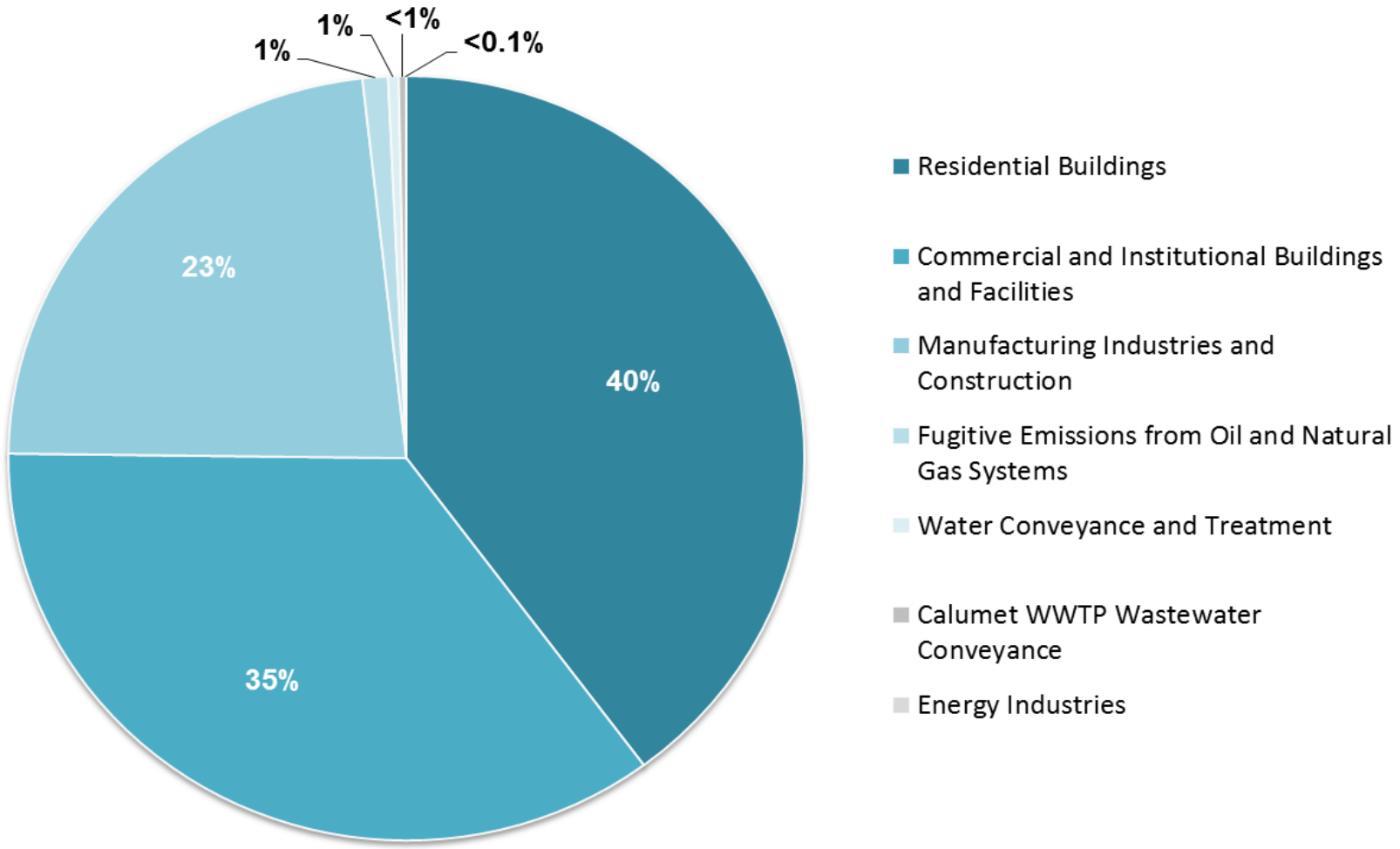
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Total Emissions by Sub-Sector



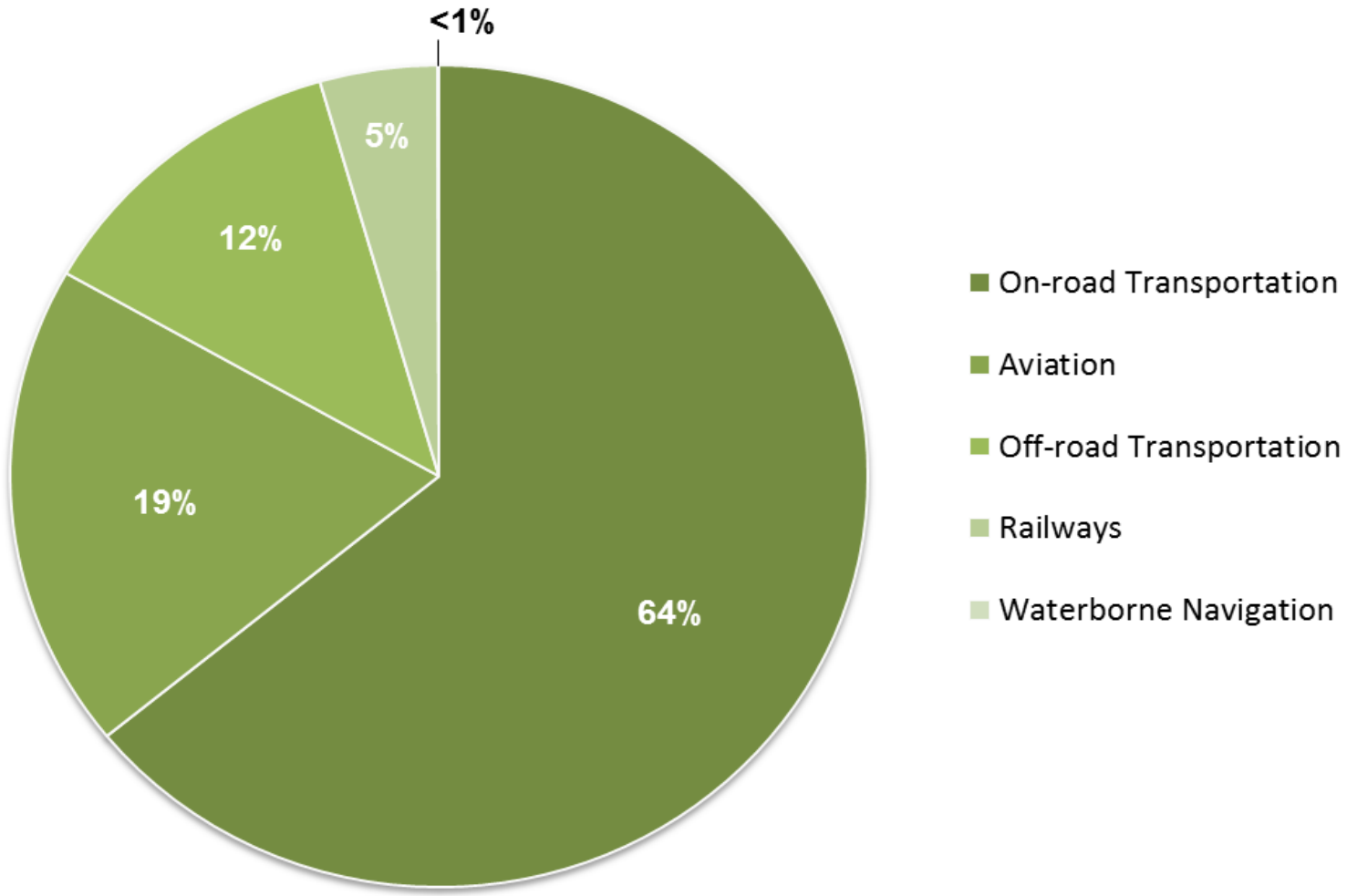
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Emissions by Sub-Sector



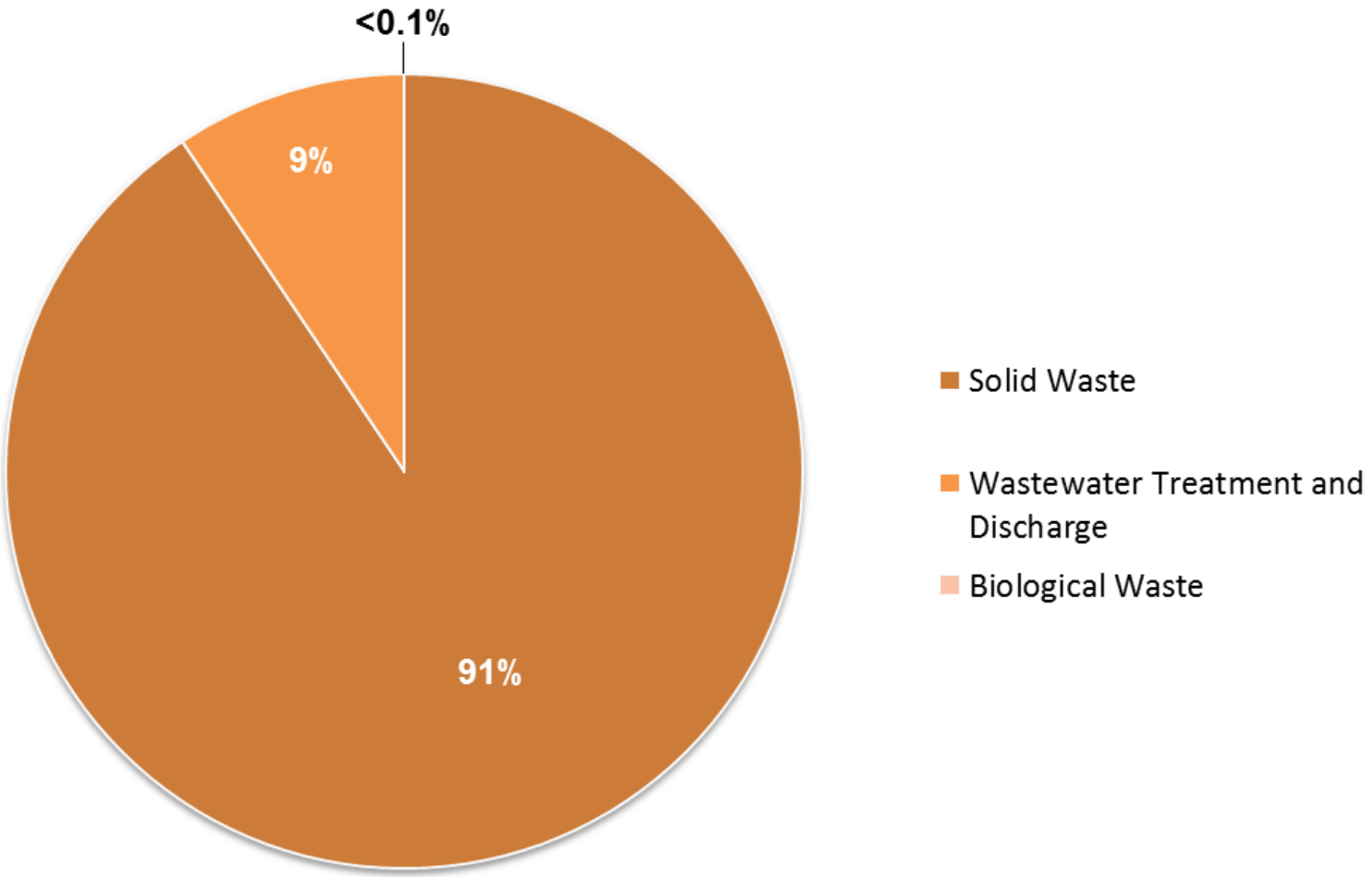
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Stationary Energy Sector GHG Emissions by Sub-Sector



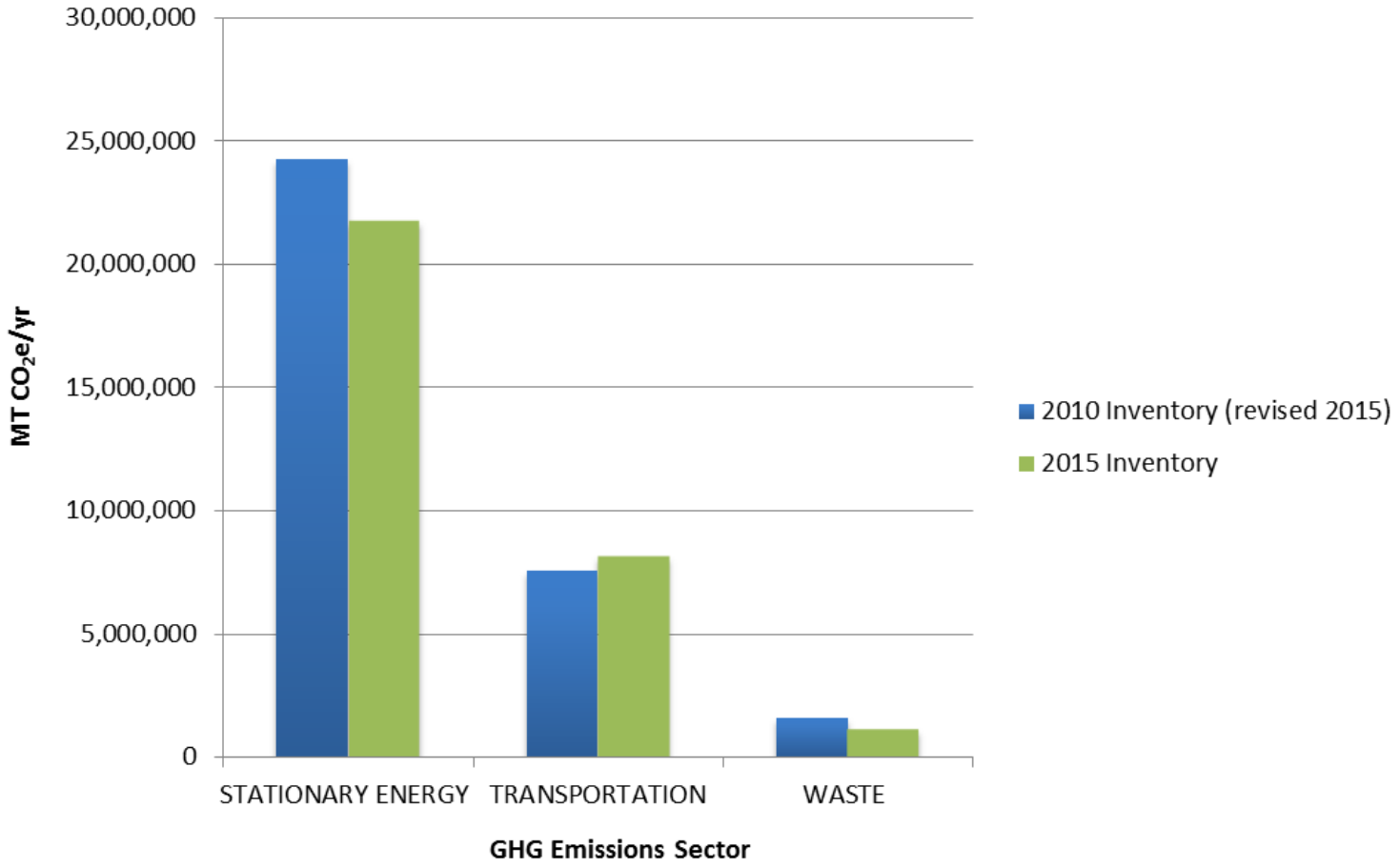
2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Transportation Sector GHG Emissions by Sub-Sector



2015 Chicago GPC BASIC Community GHG Emissions Inventory
Percent of Total Waste Sector GHG Emissions by Sub-Sector



2010 & 2015 Chicago GPC BASIC Community GHG Emissions Inventories
Preliminary Comparison



2015 Chicago GPC BASIC Community Greenhouse Gas Emissions Inventory by Sector and Sub-Sector

Sector	Emissions MT CO_2e/yr				% of Total
	Scope 1[a]	Scope 2[b]	Scope 3[c]	BASIC Total	
Stationary Energy	**9,018,535**	**12,717,168**	**0**	**21,735,703**	**70.2%**
Residential Buildings	*5,264,148*	*3,392,950*		*8,657,098*	**28.0%**
Commercial and Institutional Buildings and Facilities	*2,699,359*	*4,987,528*		*7,686,887*	**24.8%**
Manufacturing Industries and Construction	*781,710*	*4,225,475*		*5,007,185*	**16.2%**
Energy Industries	*28*	*NA*		*28*	**0.0%**
Water Conveyance and Treatment	*46,774*	*45,273*		*92,046*	**0.3%**
Calumet WWTP Wastewater Conveyance	*2,390*	*65,944*		*68,333*	**0.2%**
Fugitive Emissions from Oil and Natural Gas Systems	*224,126*	*NA*		*224,126*	**0.7%**
Transportation	**7,867,321**	**250,055**	**0**	**8,117,376**	**26.2%**
On-road Transportation	*5,203,672*	*NA*		*5,203,672*	**16.8%**
Railways	*109,459*	*250,055*		*359,515*	**1.2%**
Waterborne Navigation	*4,366*	*NA*		*4,366*	**0.0%**
Aviation	*1,551,941*	*NA*		*1,551,941*	**5.0%**
Off-road Transportation	*997,883*	*NA*		*997,883*	**3.2%**
Waste	**2,235**	**0**	**1,100,547**	**1,102,783**	**3.6%**
Solid Waste Generated in the City	*NA*		*998,888*	*998,888*	**3.2%**
Biological Waste Generated in the City	*NA*		*60*	*60*	**0.0%**
Wastewater Treatment and Discharge	*2,235*		*101,599*	*103,835*	**0.3%**
TOTAL	**16,888,092**	**12,967,223**	**1,100,547**	**30,955,862**	**100.0%**

[a] Scope 1 emissions are GHG emissions from sources located within the city boundary
[b] Scope 2 emissions are GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
[c] Scope 3 emissions are all other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary