

# Chapter 16: GREENHOUSE GAS EMISSIONS

## 16.1 Introduction

As explained in the *CEQR Technical Manual*, increased greenhouse gas (“GHG”) emissions contribute to climate change, the effects of which are predicted to include rising sea levels, increases in temperature, and changes in precipitation levels. While climate change would occur at a global level, effects likely would be experienced at the local level. For example, in New York City, increases in summertime electricity demand to support air conditioner usage may lead to power outages. Changes in sea level could directly affect coastal areas and lead to increased potential for flooding in some areas, which could cause damage to infrastructure not designed to withstand saltwater exposure. Increased precipitation could affect the function of sewer systems and also lead to flooding of streets, while periods of drought could affect the municipal water supply.

GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated gases, which contribute to atmospheric absorption of infrared radiation and cause heat to be retained in the atmosphere. In New York City, the energy used by buildings in general, and residential buildings in particular (such as the residential buildings that would be constructed with the proposed action) result in the largest percentage-by-sector of total GHG emissions.

Per the guidance of the *CEQR Technical Manual*, a GHG consistency assessment is warranted for any project that would result in 350,000 square feet (“sf”) or more of development. As described in Chapter 1, “Project Description,” the proposed action would include approximately 1.1 million sf of residential and commercial space. Therefore, a GHG consistency assessment is warranted for the proposed action.

## 16.2 Principal Conclusions

The proposed action is estimated to generate approximately 7,578 total metric tons of carbon dioxide equivalents (“CO<sub>2</sub>e”) emissions on an annual basis resulting from building operations and approximately 5,923 metric tons of CO<sub>2</sub>e emissions from mobile sources. As a point of comparison, this estimated annual total of 13,501 metric tons of CO<sub>2</sub>e emissions represents approximately 0.03 percent of the 2013 annual total for all of New York City, which is estimated to have been 48.02 million metric tons.

The proposed action would be consistent with the goals of encouraging construction of resource- and energy-efficient buildings and encouraging development that is reliant upon public transit. The proposed action would involve the construction of new resource- and energy-efficient buildings that

would partially rely on renewable fuel sources, expected to include on-site solar and/or wind generation to serve each building group on both parcels A and B. In addition, some critical building infrastructure, including boiler rooms, would be located at the rooftop, making it more efficient in operations (compared to cellar locations).

Finally, the proposed action would be consistent with current City policy aimed at reducing GHG emissions by 2050 through a variety of City initiatives. In particular, the proposed action would support development that relies on sustainable modes of transportation. Specifically, the proposed action would not encourage private automobile ownership; the proposed affordable housing development would provide on-site parking spaces of an amount equal to 35 percent of the proposed dwelling units not set aside for senior housing, compared to the provision of on-site parking for between 80 percent and 100 percent of dwelling units, as would typically be required of R7-A zoning (the equivalent of which would be effectuated by the proposed action). Rather, the proposed action would take advantage of an existing network of public transit that serves the project site. For example, although the project site does not have direct access to New York City subway service, the project site is served directly by four Metropolitan Transportation Authority (“MTA”) bus routes (which also provide linkage to subways), as well as bicycle paths and pedestrian walkways. Therefore, the proposed action would be consistent with applicable policy associated with GHG emissions and climate change.

## 16.3 Methodology

### APPLICABLE POLICY

The particular GHG emissions resulting from a single proposed action may be considered an insignificant portion of total global GHG emissions. However, the *CEQR Technical Manual* states that a GHG assessment of certain actions should be conducted to determine the project’s consistency with the Citywide GHG reduction goal of reducing GHG emissions 30 percent below 2005 levels by 2030. This goal was developed as part of *PlaNYC*<sup>1</sup> for the purpose of planning for increases in the city population while achieving significant greenhouse gas reductions. It was initially codified by the *New York City Climate Protection Act* (Local Law 22 of 2008) and further strengthened by subsequent New York City Council adoption of *One New York: The Plan for a Strong and Just City*<sup>2</sup> (“*OneNYC*”), which develops the goals outlined by previous *PlaNYC: A Stronger, More Resilient New York* (“*PlaNYC*”)<sup>3</sup> efforts as they

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<sup>1</sup> *PlaNYC: A Stronger, More Resilient New York*. June 2013. The City of New York.

<sup>2</sup> *One New York: The Plan for a Strong and Just City*. April 2015. The City of New York.

<sup>3</sup> Note that the *CEQR Technical Manual* references *PlaNYC*, rather than the subsequent *OneNYC*, though *OneNYC* is considered the mayoral policy currently in effect for the purposes of this EIS.

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relate to GHG emissions.<sup>4</sup> Through the *OneNYC* policy, the City is committed to achieving 80 percent reductions in GHG emissions by 2050.

## **APPROACH**

The assessment of GHG emissions focuses on the potential for a proposed action to result in increased emissions of GHGs both on-site and off-site. Pursuant to guidelines outlined in the *CEQR Technical Manual*, GHG estimates are typically determined for the four primary emissions sources which include: operations (direct and indirect); mobile sources (direct and indirect); and, when applicable, emissions from both construction activities and the solid waste management process.

For the proposed action, the assessment includes emissions calculations from mobile and operations sources of the proposed action; given the lack of specific construction related data for the proposed action, and as the construction phase is not likely to be a significant part of total emissions resulting from the proposed action, emissions associated with construction of the proposed action are described qualitatively based on other similar analyses for large building construction. Similarly, because the proposed action is not expected to fundamentally change the City's solid waste management system, an estimate of emissions from solid waste management is not warranted here.

Because GHG emissions impact the global climate, a project's associated GHG emissions cannot be assessed for a potential discernible localized impact. Therefore, according to the *CEQR Technical Manual*, the assessment of GHG incorporates a two-step process.

- Step one involves calculating the total GHG emissions associated with a project and examining the contribution of GHG emissions of the proposed action in relation to qualitative goals for reducing GHG emissions.
- The second step is to assess the consistency of the proposed action with the GHG reduction goals set forth in the *CEQR Technical Manual* and the portions of *PlaNYC* (and, consequently, *OneNYC*).

## **OVERVIEW OF GREENHOUSE GASES**

There are six principal greenhouse gases that enter the atmosphere due to human activities. These include:

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<sup>4</sup> Although a detailed assessment to determine the consistency of the proposed action with *PlaNYC* (or the subsequent *OneNYC*) is not warranted per the guidance of the *CEQR Technical Manual*, relevant portions of *OneNYC* are considered in this EIS as they relate to GHGs, as well as public policy (discussed in Chapter 2, "Land Use, Zoning, and Public Policy," of this EIS.)

### *Carbon Dioxide (“CO<sub>2</sub>”)*

CO<sub>2</sub> is the most prevalent of the principal GHGs. CO<sub>2</sub> is emitted primarily from the burning of fossil fuels (oil, natural gas, coal) by power plants and motor vehicles, the burning of solid waste, trees, and wood products, and as a result of chemical reactions such as the manufacture of cement.

### *Methane (“CH<sub>4</sub>”)*

CH<sub>4</sub> is emitted during the production and transport of various energy sources, including coal, natural gas, and oil. Methane also comes from agricultural practices and from landfills as waste decays.

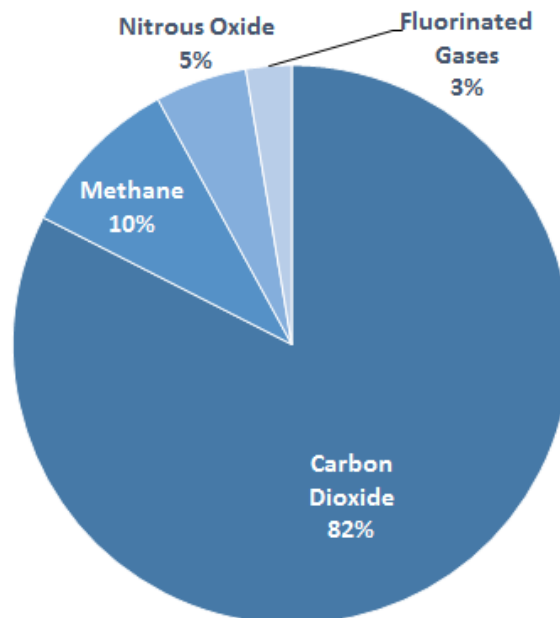
### *Nitrous Oxide (“N<sub>2</sub>O”)*

N<sub>2</sub>O is emitted during various agricultural and manufacturing activities, as well as during combustion of fossil fuels and solid waste.

### *Fluorinated Gases*

Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic gases that are emitted from a variety of industrial processes. These include refrigeration, aluminum smelting, semiconductor manufacturing and various electrical systems. These gases are emitted in smaller quantities than the others, as shown in Figure 16-1, “Primary GHG Emissions as a Percentage of the Total.” However, they have a high Global Warming Potential (“GWP”) (i.e., the potential to trap heat in the atmosphere).

**Figure 16-1: Primary GHG Emissions as a Percentage of the Total**



Source: USEPA, 2015

No significant direct or indirect sources of fluorinated gases, which typically are emitted through industrial processes, electricity transmission, and use of substitutes for ozone-depleting products, are expected to be associated with the proposed action. Therefore, the GHG assessment for the proposed action focuses on three GHGs: CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>.

Because GHG's differ in their ability to trap heat, as per guidelines outlined in the *CEQR Technical Manual*, all calculations of emissions for the proposed action will be presented in units of metric tons of CO<sub>2</sub>e. This represents a common measure that allows gases such as CO<sub>2</sub> and methane with different global warming potentials to be added together and compared. In order to convert gases into units of metric tons of CO<sub>2</sub>e, a list of GWP's for the primary greenhouse gases is presented in Table 16-1, "Global Warming Potential for Primary Greenhouse Gases (CO<sub>2</sub> Equivalents – CO<sub>2</sub>e)." Based on the table, Methane has approximately twenty one times the global warming potential as carbon dioxide, with sulfur hexafluoride having almost approximately twenty four thousand times the potential.

**Table 16-1: Global Warming Potential for Primary Greenhouse Gases (CO<sub>2</sub> Equivalents – CO<sub>2</sub>e)**

Greenhouse Gas	Global Warming Potential
CO <sub>2</sub> - Carbon Dioxide	1
CH <sub>4</sub> - Methane	21
N <sub>2</sub> O - Nitrous Oxide	310
HFCs - Hydrofluorocarbons	140-11,700*
PFCs - Perfluorocarbons	6,500-9,200*
SF <sub>6</sub> - Sulfur Hexafluoride	23,900

Note:  
 Subsequent to the *Second Assessment Report* ("SAR"), which was published in 1995, the Intergovernmental Panel on Climate Change ("IPCC") has published updated GWP values in its *Third Assessment Report* ("TAR") and *Fourth Assessment Report* ("AR4") that reflect new information on atmospheric lifetimes of greenhouse gases and an improved calculation of the radiative forcing of CO<sub>2</sub>. However, GWP values from the SAR are still used by international convention to maintain consistency in GHG reporting, including by the United States when reporting under the United Nations Framework Convention on Climate Change.

\* The GWPs of HFCs and PFCs vary depending on the specific compound emitted. A full list of these GWPs is available in Table ES-1 of the U.S. Environmental Protection Agency's Inventory of Greenhouse Gas Emissions and Sinks: 1990-2008, available at: <http://epa.gov/climatechange/emissions/usinventoryreport.html>.

Source: 2014 *CEQR Technical Manual*, Table 18-1, "Global Warming Potential for Primary Greenhouse Gases"

## OPERATIONS EMISSIONS CALCULATION

GHG emissions attributable to future operations on the project site are calculated based on the floor area measurements of the buildings for the proposed action. Carbon intensity data (GHG emissions per gross square foot of floor area) from Table 18-5 in the *CEQR Technical Manual* are used to develop projections of operations emissions. All energy sources (e.g., fuel oil, electricity etc.) that potentially could be used for the proposed action are considered for the purpose of calculating carbon intensity.

**MOBILE SOURCE EMISSIONS CALCULATION**

Mobile-source GHG emissions that would be induced by the proposed action (i.e., the GHG emissions associated with transportation serving the project site in the future with the proposed action), are calculated according to the transportation planning factors developed for the Transportation Analyses prepared for this EIS (see Chapter 14, “Transportation,” Table 14-1, “Transportation Planning Factors”) and baseline vehicle miles traveled (“VMT”) data provided in Table 18-6 and Table 18-7 of the *CEQR Technical Manual*. The assignments for project-induced trips throughout the City, based on roadway types, are based on Table 18-8 of the *CEQR Technical Manual*.

**16.4 Projected GHG Emissions from the Proposed Action**

**OPERATIONS**

Table 16-2, “Annual Operational Emissions – Proposed Action,” displays the estimated GHG emissions that would be associated with the on-site operations of the proposed action, once fully completed and occupied in 2028. As shown in Table 16-2, annual operational GHG emissions with the proposed action are estimated to be approximately 7,578 metric tons CO<sub>2</sub>e.

**Table 16-2: Annual Operational Emissions – Proposed Action**

Building Type	Carbon Intensity Rates (kg CO <sub>2</sub> e/ft <sup>2</sup> )	Proposed Action Floor Area (ft <sup>2</sup> )	GHG Emissions (kg CO <sub>2</sub> e)	GHG Emissions (metric tons CO <sub>2</sub> e)
Commercial	9.43	122,524	1,155,401	1,155
Industrial	21.18	0	0	0
Institutional	11.42	0	0	0
Large Residential (> 4family)	6.59	974,669	6,423,069	6,423
Small Residential (1-4 family)	4.52	0	0	0
<b>Total</b>		1,097,193	7,578,470	<b>7,578</b>

Source: STV Incorporated, 2016

**MOBILE SOURCES**

The projected annual VMT with the proposed action, which forms the basis for the mobile-source GHG emissions calculations, are summarized in Table 16-3, “Proposed Action Annual VMT (miles/year).”

**Table 16-3: Proposed Action Annual VMT (miles/year)**

Mode	Land Use							Total Project Related VMT by Mode
	Residential	Local Retail	Restaurant	Medical Office	Office	Day Care Center	Commercial	
Auto	4,981,273	528,760	435,893	799,164	206,034	19,652	1,989,503	6,970,776
Taxi	242,096	208,331	136,896	52,478	6,077	9,126	412,908	655,004
Truck	788,046	244,577	611,767	49,281	39,369	12,760	957,754	1,745,800
<b>Total Project Related VMT by Land Use</b>	6,011,415	981,668	1,184,555	900,923	251,480	41,538	3,360,165	9,371,580

Source: STV Incorporated, 2016

Utilizing the VMT projections presented in the previous Table 16-3, “Proposed Action Annual VMT (miles/year),” the *CEQR Technical Manual* mobile source GHG emissions calculator<sup>5</sup> is used to estimate GHG emissions for cars, taxis, and trucks, comprising the transportation activities attributable to the proposed action upon its full completion and occupancy in 2028. As shown Table 16-4, “Annual Mobile Source Emissions – Proposed Action (metric tons CO<sub>2</sub>e),” annual mobile source emissions related to the proposed action would result in approximately 5,621 metric tons of CO<sub>2</sub>e emissions.

**TABLE 16-4: Annual Mobile Source Emissions – Proposed Action (metric tons CO<sub>2</sub>e)**

Road Type	Mode			Total GHG Emissions by Road Type
	Passenger Vehicle	Taxi	Truck	
<b>Local</b>	728	56	745	1,529
<b>Arterial</b>	1,218	97	1,226	2,542
<b>Freeways</b>	734	60	756	1,550
<b>Total</b>	2,679	214	2,728	5,621

Source: STV Incorporated, 2016

## CONSTRUCTION

The assessment of construction emissions for other similarly large development projects<sup>6</sup> within New York City show that estimated annual construction emissions appear to be significantly less than the total combined annual emissions from operational and mobile sources. These emissions, annualized over the lifetime of the project (typically 80 years for developments such as the proposed action), appear to be no more than approximately 8 percent of the total annual emissions from both operational

<sup>5</sup> 2014 *CEQR Technical Manual* - Chapter 18, “mobile GHG emissions calculator”

<sup>6</sup> Project examples include GHG analyses prepared for the EIS for Riverside Center, the Domino Sugar Rezoning, and Western Rail Yard.

and mobile sources. Based on this assumption, total GHG emissions from construction as a result of the proposed action are estimated at approximately 1,020 metric tons of CO<sub>2</sub>e emissions.

Table 16-5, “Total Annual GHG Emissions – Proposed Action (metric tons CO<sub>2</sub>e),” shows the results of the GHG assessment for both operational and mobile sources, calculated for the year 2028. The estimated total of 14,219 metric tons of GHG emissions represents approximately 0.03 percent of the 2013 annual total for all of New York City, which is estimated to have been 48.02 million metric tons.

**Table 16-5: Total Annual GHG Emissions – Proposed Action (metric tons CO<sub>2</sub>e)**

Emissions Source	Total GHG Emissions
Operational	7,578
Mobile	5,621
Construction	1,020*
<b>Total</b>	<b>14,219</b>
Notes: * Based on the assumption that GHG construction emissions appear to be no more than approximately 8 percent of the total annual emissions from both operational and mobile sources.	

Source: STV Incorporated, 2016

### CONSISTENCY WITH THE GHG REDUCTION POLICIES

The *CEQR Technical Manual* does not provide a threshold criterion against which GHG emission quantities would be compared to determine impact significance, but the *CEQR Technical Manual* provides guidance for assessing the consistency of the proposed action with the GHG reduction goal through consideration of whether the proposed action would meet objectives related to:

- encouraging transit-oriented development,
- generating and expanding the use of clean and renewable energy,
- constructing resource- and energy-efficient buildings, and
- encouraging sustainable transportation through improvements to public transit, private vehicle efficiency, and decreases in the carbon intensity of fuels.

Further, the *CEQR Technical Manual* states that a GHG assessment of certain actions should be conducted to determine the project’s consistency with the Citywide GHG goal of reducing GHG emissions 30 percent below 2005 levels by 2030. However, this goal was developed as part of *PlaNYC* and was initially codified by the *New York City Climate Protection Act* (Local Law 22 of 2008); subsequently, *OneNYC* has been adopted. *OneNYC* retains the primary goals of *PlaNYC* at its core, outlining goals and initiatives per each of the four “Visions,” the third of which, “Our Sustainable City,” includes policies related to reduction of GHG emissions. Specifically, *OneNYC* states that New York City



GHG emissions will be 80 percent lower by 2050 than in 2005. This goal is further expressed in *OneNYC* through a series of Initiatives:

**Initiative 1: Develop near-term local actions and long-term regional strategies to reduce GHG emissions from the power sector by:**

- A. *Removing barriers to more efficient power generation and increased renewable power production;*
- B. *Supporting the develop of renewable power resources;*
- C. *Increasing the share of wind power in the City's power mix;*
- D. *Adopting smart grid technologies;*
- E. *Expanding decentralized power production; and*
- F. *Achieve net-zero energy at in-city wastewater treatments plants by 2050*

**Initiative 2: Develop a mode shift action plan to reduce GHG emissions from the transportation sector by:**

- A. *Reducing carbon emissions from the City government's vehicle fleet*

**Initiative 3: Build upon Zero Waste (sending zero waste to landfills by 2030) to reduce GHG from the solid waste sector; and**

**Initiative 4: Continue implementation of "One City: Built to Last" to reduce GHG emissions from buildings 30 percent by 2025, and chart a long-term path away from fossil fuels.**

In considering the consistency of the proposed action with the applicable GHG emissions policy, it is noted that the proposed action is not of a type that would directly affect power generation, or alter municipal facilities or vehicle fleet. However, there remain applicable elements of GHG emissions policy with which the proposed action would be consistent. The proposed action would be consistent with the goals of encouraging construction of resource- and energy-efficient buildings and encouraging development that is reliant upon public transit, as outlined in the *CEQR Technical Manual*, and it would be consistent with *OneNYC* initiatives aimed at increasing use of renewable energies. Specifically, as described in Chapter 1, "Project Description," the proposed action would involve the construction of new resource- and energy-efficient buildings that would partially rely on on-site solar and/or wind generation to serve each building group on both parcels A and B. In addition, some critical building infrastructure, including boiler rooms, would be located at the rooftop, making it more efficient in operations (compared to cellar locations).

Finally, the proposed action would be consistent with current City policy aimed at reducing GHG emissions by 2050 through a variety of City initiatives. In particular, the proposed action would support development that relies on sustainable modes of transportation. The proposed action would not encourage private automobile ownership; the proposed affordable housing development would provide on-site parking spaces of an amount equal to 35 percent of the proposed dwelling units not set aside for senior housing, compared to the provision of on-site parking for between 80 percent and 100 percent of

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dwelling units, as would typically be required of R7-A zoning (the equivalent of which would be effectuated by the proposed action). Rather, the proposed action would take advantage of the existing network of public transit that serves the project site. For example:

- The project site is served directly by four MTA local bus routes (B84, B83, B13, and Q8) which provide linkage to seven MTA subway lines (A, C, J, Z, L, 3, and M) from eight subway stations serving the bus routes;
- The project site is served by bicycle facilities, include a bicycle path located along Gateway Drive from Vandalia Avenue to Erskine Street; a bicycle lane along Vandalia Avenue connecting the path to Flatlands Avenue, and along Erskine Street connecting to the bicycle path along Shore Parkway; and a potential future bike path along Cozine Avenue and a portion of Fountain Avenue;
- The project site is surrounded by local streets and substantial commercial development, including the Gateway Center, which along with the on-site commercial development would be within walking distance of the proposed affordable housing; and
- The proposed action would include the development of Schroeders Walk, which would improve pedestrian connections through Parcel B, and provide attractive public open space with direct access to local commercial uses that would be developed on-site.

Therefore, the proposed action would be consistent with applicable portions of City GHG emissions policy, specifically as the proposed method of construction and building operations would be designed to meet Enterprise Green Communities Standards of energy efficiency; the buildings would partially rely on on-site solar- and/or wind-generated power; the project site is served by a substantial network of public transit services, bicycle paths, and walkways; and both existing area commercial development and future on-site commercial development would be within walking distance of the project site.