11

Greenhouse Gas Emissions

This section considers whether the proposed action is consistent with the Citywide greenhouse gas (GHG) emissions reduction goal.

11.1 Introduction

As discussed in the *2014 CEQR Technical Manual*, increased concentrations of greenhouse gases (GHGs) are changing the global climate, resulting in wide-ranging effects on the environment, including rising sea levels, increases in temperature, and changes in precipitation levels. Although this is occurring on a global scale, the environmental effects of climate change are also likely to be felt at the local level. New York City's sustainable development policy, starting with PlaNYC, and continued and enhanced in OneNYC, established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change in the City. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal"). This goal was developed for the purpose of planning for an increase in population of almost one million residents while achieving significant GHG reductions. In this same vein, on November 13, 2014, the City Council passed a bill to reduce citywide greenhouse gas emissions by 80 percent by 2050. The bill was adopted on December 14, 2014 (Local Law 66 of 2014).

Although the contribution of a proposed project's GHG emissions to global GHG emissions is likely to be considered insignificant when measured against the scale and magnitude of global climate change, certain projects' contribution of GHG emissions still should be analyzed to determine their consistency with the City's citywide GHG reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR. The

CEQR Technical Manual recommends that any project resulting in 350,000 square feet of development, or more, and other energy-intense projects, quantify project-related GHG emissions and assess the project's consistency with the citywide GHG reduction goal.

The proposed actions, which are expected to facilitate the construction of mixed-use and commercial buildings, would result in total developments of 375,431, 86,711, and 4,759 gross square feet (gsf). As such, GHG emissions that would be generated as a result of the proposed actions are presented in this chapter, along with an assessment of the proposed actions' consistency with the citywide GHG reduction goal.

11.2 Principal Conclusions

The proposed actions would be consistent with the applicable City GHG emissions reduction and climate change goals, and there would be no significant adverse GHG emission or climate change impacts as a result of the proposed actions.

Following the methodology provided in the *CEQR Technical Manual*, it is estimated that the proposed actions would annually result in approximately 3,469 metric tons of carbon dioxide equivalent (CO_2e) emissions from its operations and 1,598 metric tons of CO_2e emissions from mobile sources, for an annual total of approximately 5,067 metric tons of CO_2e emissions. This represents approximately 0.01 percent of the City's overall 2016 GHG emissions of 52.0 million metric tons. It should also be noted that, to assure a conservative analysis, the estimated GHG emissions for the proposed actions do not account for any energy efficiency measures that may be implemented by individual developments on the Projected Development Sites.

As compared to the City's overall GHG emissions, the contribution of the proposed actions' GHG emissions is miniscule. Further, the new buildings associated with the proposed actions would be located in a dense, transit-rich environment, and will be required to comply with the New York City Energy Conservation Code, which governs performance requirements of heating, ventilation, and air conditioning systems, as well as the exterior building envelope of new buildings. This locational advantage and performance requirements should contribute to reducing potential GHG emissions.

11.3 Pollutants of Concern

GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the general warming of the Earth's atmosphere, or the "greenhouse effect." Some GHGs, such as carbon dioxide (CO_2), occur naturally and are emitted into the atmosphere through natural processes and human activities. The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of an environmental impact statement: CO_2, nitrous oxide (N_2O), methane, Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6).

GHGs differ in their ability to trap heat. To compare emissions of GHGs, compilers use a weighting factor called a Global Warming Potential (GWP), where the heat-trapping ability of 1 metric ton (1,000 kilograms) of CO_2 is taken as the standard, and emissions are expressed in terms of CO_2 equivalents (CO_2e) but can also be expressed in terms of carbon equivalents.

These GHGs, which are emitted as a result of human activities are described below, and the GWPs for the main GHGs are presented in **Table 11-1**.

Table 11-1 Global Warming Potential for Primary Greenhouse Gases

Greenhouse Gas	Common Sources	Global Warming Potential
CO_2 - Carbon Dioxide	Fossil fuel combustion, forest clearing, cement production	1
CH_4 - Methane	Landfills, production and distribution of natural gas and petroleum, anaerobic digestion, rice cultivation, fossil fuel combustion	21
N_2O - Nitrous Oxide	Fossil fuel combustion, fertilizers, nylon production, manure	310
HFCs - Hydrofluorocarbons	Refrigeration gases, aluminum smelting, semiconductor manufacturing	140–11,700*
PFCs - Perfluorocarbons	Aluminum production, semiconductor manufacturing	6,500–9,200*
SF_6 - Sulfur Hexafluoride	Electrical transmissions and distribution systems, circuit breakers, magnesium production	23,900

Notes: Since the Second Assessment Report (SAR) 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_2. 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.

- Carbon Dioxide (CO_2). CO_2 enters the atmosphere via the combustion of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- Methane (CH4). CH4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, as well as by the decay of organic waste in municipal solid waste landfills.
- Nitrous Oxide (N_2O). N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste.
- Fluorinated Gases. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are powerful synthetic greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons [CFCs], hydrochlorofluorocarbons [HCFCs], and halons). These gases are typically emitted in smaller quantities. However, because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases (High GWP gases).

This analysis focuses on CO_2, N_2O, and methane as there are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the proposed actions.

11.4 Methodology

According to the *CEQR Technical Manual*, a GHG emissions assessment is typically conducted for larger projects undergoing an EIS, especially projects that would result in development of 350,000 square feet or greater. The proposed actions would result in a total development of 466,901 gross square feet (gsf) of mixed-use and commercial development.

A project's GHG emissions are generally assessed in two steps: first, GHG emissions of the proposed actions are estimated, and second, the proposed actions are assessed in terms of the qualitative goals for reducing GHG emissions. The *CEQR Technical Manual* recommends that the project's emissions be estimated with respect to the following main emissions sources: on-site operational emissions (direct and indirect); mobile source emissions (direct and indirect); and, when applicable, construction emissions and emissions from solid waste management. Pursuant to *CEQR Technical Manual* methodology, the assessment is based on the total GHG emissions associated with the proposed actions rather than the relative increment of the proposed actions' GHG emissions as compared to the No-Action condition.

Operational emissions and mobile source emissions were quantified for this analysis. For emissions associated with construction, the proposed actions are described based on other similar analyses for large building construction. Also, because the project is not expected to fundamentally change the City's solid waste management system, no estimate of emissions from solid waste management is required.

11.5 Assessment

Operational Emissions

The proposed actions would result in a total development of 466,901 gsf, including 399,344 sf of residential space and 67,557 sf of commercial space (i.e., the retail space, CPC space, and Jewish Heritage and Cultural Center).

Table 11-2 shows the estimated energy consumption due to the proposed actions. Buildings developed under the Proposed Action would use approximately 65,209 million Btu of energy annually (19 GWh).

Table 11-2 Estimated Annual Energy Consumption on Projected Development Sites

Building Type/Use	Rate of Consumption (Thousand Btu (MBtu)/sq. ft)[1]	With-Action Condition	
		Floor Area (sq. ft)[2]	Annual Energy Consumption (million Btu)
Commercial	216.3	67,557	14,613
Residential (>4 family)	126.7	399,344	50,597
Total Energy Consumption (million Btu)		**65,209**	

Notes:
[1] Based on rates provided in the CEQR Technical Manual, Table 15-1.
[2] RWCDS totals for all Projected Development Sites (refer to Table 1.2 in Chapter 1, "Project Description").
MBtu = Thousand Btu

Additionally, assuming that the proposed development would use 100 percent natural gas of its 65,209 MMBtu annual energy consumption, Table 18-4 of the *CEQR Technical Manual* was used to estimate the overall project operational emissions by energy source. The overall energy consumption by energy source would be 3,469 metric tons of CO_2e. This represents approximately 0.01 percent of the City's overall GHG emissions in 2016, which, according to the most recent Inventory of New York City Greenhouse Gas Emissions from 2017 (utilizing 2016 data), is approximately 52.0 million metric tons.[1]

Mobile Source Emissions

The number of annual weekday motorized vehicle trips by mode (cars, taxis, trucks) that would be generated by the proposed actions was calculated using the transportation planning assumptions presented in **Table 10-2** in **Chapter 10**, "**Transportation**." The assumptions used in the calculation include average daily weekday and Saturday person trips and delivery trips by use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Average one-way trip distances as shown in Tables 18-6 and 18-7 of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars and taxis (see below). The average truck trip was assumed to be 38 miles as per the *CEQR Technical Manual*. The mobile GHG emissions calculator provided in the *CEQR Technical Manual* was used to obtain an estimate of car, taxi, and truck CO_2e emissions attributable to the proposed actions.

The projected annual vehicle miles traveled under the RWCDS for the proposed actions, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 11-3**. The annual mobile source emissions related to the proposed actions are presented in **Table 11-4**. As shown in **Table 11-4**, the proposed actions would result in approximately 1,598 metric tons of CO_2e, approximately 0.003 percent of the City's overall GHG emissions in 2016.

[1] Inventory of New York City Greenhouse Gas Emissions in 2016 (December 2017).

Table 11-3 Proposed Action (RWCDS) Annual Vehicle Miles Traveled (miles per year)

Land Use	Annual Auto VMT	Annual Taxi VMT	Annual Truck VMT	Total VMT
Residential	481,446	50,316	321,024	852,786
Community Facility	102,570	9,708	133,152	245,430
Local Retail	110,304	19,944	80,940	211,188
Total VMT	**694,320**	**79,968**	**535,116**	**1,309,404**

Table 11-4 Mobile Source Emissions

	Carbon Dioxide Equivalent (CO_2e) Emissions (metric tons/year)			
Road type	**Passenger Vehicles**	**Taxis**	**Trucks**	**TOTAL**
Local	139.93	14.60	383.83	538.35
Arterial	185.86	19.16	516.62	721.64
Freeway/Interstate/Expressway	81.96	8.37	247.33	337.66
Total[1]	407.75	42.12	1,147.79	1,597.65

Notes:

[1] Per the New York State Department of Transportation Functional Class Viewer, the proposed project is bounded by streets that are considered arterial and local roads. However, it was assumed that the VMT per year would take place on local, arterial, and freeways. Thus, VMTs were assigned to arterials, local roads, and interstate/expressways based on percentages provided in the *CEQR Technical Manual*, Table 18-8.

Construction Phase Emissions

Construction of the proposed actions would comply with the New York City Air Pollution Control Code. As per *CEQR Technical Manual* guidance, emissions associated with construction of the proposed actions have not been estimated explicitly. Other similar analyses for large building construction have shown that construction emissions (both direct and emissions embedded in the production of materials, including on-site construction equipment, delivery trucks, and upstream emissions from the production of steel, rebar, aluminum, and cement used for construction) would be equivalent to the total emissions from the operation of the buildings over approximately five to ten years. This would lead to a range of GHG emissions from 17,345 metric tons of CO_2e to 34,690 metric tons of CO_2e over the construction period.

Projected GHG Emissions from the Proposed Actions

The total projected GHG emissions, including operational and mobile source emissions from the projected developments under the proposed actions, are shown in **Table 11-6** below. The estimated total of 5,067 metric tons of GHG emissions is approximately 0.01 percent of New York City's 2016 annual total of 52.0 million metric tons. As noted above, the estimated operational GHG emissions for the proposed actions conservatively do not include any additional energy efficiency measures that may be implemented by the proposed development. Construction emissions were not modeled explicitly but are estimated to be equivalent to approximately five to ten years of operational emissions, including both direct

energy and emissions embedded in materials (extraction, production, and transport). The proposed actions are not expected to change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Table 11-6 Total Mobile Source and Operational GHG Emissions

Emissions Source	CO2e Emissions (metric tons)
Mobile Sources	1,598
Operations (energy source)	3,469
Total	5,067

11.6 Consistency with the GHG Reduction Goal

According to the *CEQR Technical Manual*, the assessment of consistency with the City GHG reduction goal should answer the following question: Is the project consistent with the goal of reducing GHG emissions, specifically the attainment of the City's established GHG reduction goal of reducing citywide GHG emissions by 80 percent below 2005 levels by 2050. Four major goals are cited in the *CEQR Technical Manual*, as follows:

- Pursue transit-oriented development;
- Generate clean, renewable power through replacement of inefficient power plants with state-of-the-art technology and expanding the use of clean distributed generation; (not applicable in case of the proposed actions);
- Construct new resource- and energy-efficient buildings (including the use of sustainable construction materials and practices) and improve the efficiency of existing buildings (applies only to new construction for the proposed actions); and
- Encourage sustainable transportation through improving public transit, improving the efficiency of private vehicles, and decreasing the carbon intensity of fuels.

The proposed actions show consistency with these goals in that:

- The proposed action area is well served by public transportation. The Delancey Street subway station (F, M, J, and Z trains) and the Grand Street subway station (B and D trains) are located close to Projected Development Sites 1 and 2. In addition, several bus routes including the M9, M14A, M15, M15SBS, M21, and M22 serve the project block.
- The new buildings are subject to the New York City Energy Conservation Code (NYCECC), which comprises the 2010 Energy Conservation Construction Codes of New York State (ECCCNYS) in addition to a series of local laws. The NYCECC governs performance requirements of heating, ventilation, and air conditioning systems, as well as the exterior building envelope of new buildings. In compliance with this code, new development must meet standards for energy efficiency.
- The proposed actions would neither substantially involve energy-intensive uses such as data centers or web hosting facilities, nor would it remove a source of energy generation. For these reasons, the proposed actions would not result in a significant adverse impact on energy systems.

Compared to the City's policies and goals to promote GHG reduction, as set forth in the *CEQR Technical Manual*, the proposed actions comport with the goals and are consistent with them.