

14. Greenhouse Gas Emissions

14.1 INTRODUCTION

As discussed in the *City Environmental Quality Review (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. Through the *PlaNYC 2011 Update*, the City has established sustainability initiatives and goals for both greatly reducing GHG emissions and 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 greenhouse gas reductions. Seeking to expand its goal, the City is undertaking a study to determine potential strategies to reduce its GHG emissions by more than 80 percent by 2050.

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 Action, which is expected to facilitate the construction of large new office buildings, would result in the increased development of over 3,498,612 gross square feet (gsf), a GHG consistency assessment has been conducted. As such, GHG emissions that would be generated as a result of the Proposed Action are presented in this chapter, along with an assessment of the Proposed Action’s consistency with the citywide GHG reduction goal.

14.2 PRINCIPAL CONCLUSIONS

Following the methodology provided in the *CEQR Technical Manual*, it is estimated that the Proposed Action would annually result in approximately 34,248 metric tons of GHG emissions from its operations and 32,612 metric tons of GHG emissions from mobile sources—for an annual total of approximately 66,860 metric tons of GHG emissions as compared to New York City’s 2011 annual total of 53.36 million

14 – Greenhouse Gas Emissions

metric tons. In addition, according to the PlaNYC *Inventory of New York City Greenhouse Gas Emissions* (December 2012), the total GHG emissions associated with energy used (electricity and heating) by buildings (residential, commercial, industrial, and institutional) was 39.4 million metric tons.

As compared to these values, the contribution of the Proposed Action's GHG emissions to GHG emissions citywide is miniscule; it is approximately 0.13 percent of the total (and 0.17 percent of building-related emissions). Further, the new buildings associated with the Proposed Action would be located in a dense, transit-rich environment, and will be required to comply with the new Energy Conservation Code (NYCECC) that requires greater energy efficiency, consistent with New York City's GHG reduction goals as stated in *PlaNYC*.

The Proposed Action is, therefore, consistent with the City's citywide GHG and climate change goals, and there would be no significant adverse GHG emission or climate change impacts as a result of the Proposed Action.

14.3 POLLUTANTS OF CONCERN

Some GHGs, such as carbon dioxide (CO₂), occur naturally and are emitted into the atmosphere through natural processes and human activities. The principal GHGs emitted as a result of human activities are described below.

14.3.1 Carbon Dioxide (CO₂)

CO₂ 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). CO₂ is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

14.3.2 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.

14.3.3 Nitrous Oxide (N₂O)

N₂O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste.

14.3.4 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).

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of an environmental impact statement: CO₂, nitrous oxide (N₂O), methane, Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF₆). This analysis focused on CO₂, N₂O, and methane as there are no significant direct or indirect sources of HFCs, PFCs, or SF₆ associated with the Proposed Action.

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 CO₂ is taken as the standard, and emissions are expressed in terms of CO₂ equivalents (CO₂e), but can also be expressed in terms of carbon equivalents. The GWPs for the main GHGs are presented in Table 14-1.

TABLE 14-1: 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 ₂ O - 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 CO₂. 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>.

14.4 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 Action is would result in an increase of over 3,498,612 gross square feet (gsf) of commercial development at 19 projected development sites spread throughout the 70-block proposed rezoning area.

A project's GHG emissions can generally be assessed in two steps: the first would be to estimate the GHG emissions of the Proposed Action and the second would be to examine the action 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.

Operational emissions and mobile source emissions were quantified for this analysis. Given the lack of specific construction sequences and data for the proposed rezoning sites, emissions associated with construction of the Proposed Action have been 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.

14.5 GHG EMISSIONS

14.5.1 Operational Emissions

According to the *CEQR Technical Manual*, for projects such as a proposed rezoning action, where the action would result in construction on sites that are not under the control of an applicant and where details such as the specific fuel type to be used are unknown, annual GHG emissions should be estimated based on a project's built floor area. Table 18-3 of the *CEQR Technical Manual* provides the carbon intensities of New York City building types, which were used to calculate annual operations emissions of the Proposed Action's reasonable worst-case development scenario (RWCDS) projected developments.

Compared with the No-Action scenario, the Proposed Action would result in a net increase of 3,821,339 gross square feet (gsf) of office floor area, 119,662 gsf of retail floor area, 123,286 gsf of hotel floor area, and a net decrease of 565,675 gsf of residential floor area. This results in a total increase of 3,941,001 gsf of commercial space, excluding parking, and a 442,389 gsf decrease of residential area.

Table 14-2 displays the estimated GHG emissions associated with the operation emissions of the Proposed Action for year 2033 once all development sites are assumed to be operational. As shown, operational

GHG emissions are estimated to be approximately 34,248 metric tons of carbon dioxide equivalents. This represents less than 0.06 percent of the City’s overall GHG emissions in 2011, which, according to the PlaNYC *Inventory of New York City Greenhouse Gas Emissions*, is approximately 53.36 million metric tons.

TABLE 14-2: OPERATIONAL EMISSIONS

Building Type	Carbon Dioxide Equivalent (CO₂e) kilogram (kg) / square foot / year	Floor Area (square ft)	CO₂e (metric tons/year)
Commercial	9.43	3,941,001	37,164
Large Residential	6.59	-442,389	-2,915
TOTAL			34,248

14.5.2 Mobile Source Emissions

The number of annual weekday motorized vehicle trips by mode (cars, taxis, trucks) that would be generated by the Proposed Action was calculated using the transportation planning assumptions developed for the analysis. The assumptions used in the calculation include average daily weekday person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances shown in Table 18-4 of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars and trucks. An average one-way truck trip was assumed to be 38 miles, as per the *CEQR Technical Manual*. Table 18-6 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type. The mobile GHG emissions calculator provided in the *CEQR Technical Manual* was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Action.

As shown Table 14-3, annual mobile source emissions related to the Proposed Action would result in approximately 32,612 metric tons of carbon dioxide equivalents.

TABLE 14-3: MOBILE SOURCE EMISSIONS

Carbon Dioxide Equivalent (CO₂e) Emissions (metric tons/year)				
Road type	Passenger Vehicles	Taxis	Trucks	TOTAL
Local	936	124	9,874	10,934
Arterial	1,243	163	13,290	14,696
Interstate/Expressway	548	71	6,363	6,982
TOTAL	2,727	359	29,526	32,612

14 – Greenhouse Gas Emissions

14.5.3 Construction Phase Emissions

A description of construction activities is provided in Chapter 18, “Construction.” During construction, the Proposed Action will comply with the New York City Air Pollution Control Code. As per *CEQR Technical Manual* guidance, given the lack of specific construction sequences and data for the proposed rezoning sites, emissions associated with construction of the Proposed Action 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 5 to 10 years.

14.5.4 Emissions from Solid Waste Management

The Proposed Action would not change the City’s solid waste management system. Therefore, as per *CEQR Technical Manual* guidance, GHG emissions from solid waste generation, transportation, treatment, and disposal were not quantified.

14.6 PROJECTED GHG EMISSIONS FROM THE PROPOSED ACTION

The operational and mobile source emissions estimates are presented in Table 14-2 and Table 14-3, respectively. The total projected GHG emissions from the Proposed Action are shown in Table 14-4 below. The estimated total of 66,860 metric tons of GHG emissions is about 0.13 percent of New York City’s 2011 annual total of 53.36 million metric tons.

TABLE 14-4: TOTAL EMISSIONS

Emissions Source	CO2e Emissions (metric tons)
Operations	34,248
Mobile Sources	32,612
TOTAL	66,860

14.7 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 30 percent below 2005 levels by 2030. 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 Action);
- 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 Action); and
- Encourage sustainable transportation through improving public transit, improving the efficiency of private vehicles, and decreasing the carbon intensity of fuels.

The Proposed Action shows consistency with these goals in that:

- The proposed rezoning area is well served by public transportation. A total of 8 subway stations/complexes, 16 local bus routes, 54 express bus routes, and 1 commuter rail station are located in the vicinity of the rezoning area. Reinforcing the economic competitiveness of the East Midtown business district supports transit-oriented development not only in New York City but throughout the region.
- The District Improvement Bonus would facilitate improvements in public transit facilities serving the East Midtown area.
- The new buildings, which will replace the existing structures, 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 Action would not 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 Action would not result in a significant adverse impact on energy systems.
- The type of buildings anticipated as a result of the Proposed Action (e.g., new Class A office buildings) commonly adheres to LEED or other high standards for environmental performance. In addition, the Proposed Action incorporates requirements that sites utilizing the District Improvement Bonus be designed to meet standards for reduced energy consumption that exceed code compliance.