Chapter 12: Greenhouse Gas Emissions and Climate Change

A. INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the construction and operation of the New York Blood Center's (the Applicant's) Proposed Project and its consistency with the citywide GHG reduction goals (see Section B). Per the 2020 *City Environmental Quality Review (CEQR) Technical Manual,* evaluation of GHG emissions serves as a proxy for evaluating the Proposed Project's impact on climate change.

As discussed in the *CEQR Technical Manual*,[1] climate change is projected to have 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 State and New York City have each established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change.

Per the *CEQR Technical Manual,* the citywide GHG reduction goal is currently the most appropriate standard by which to analyze a project under CEQR. The *CEQR Technical Manual* recommends that a GHG consistency assessment be undertaken for any project preparing an environmental impact statement expected to result in 350,000 square feet or more of development and other energy-intense projects. The Proposed Actions would result in 596,200 gross square feet (gsf) of developed floor area split between 206,400 gsf of community facility uses for the Applicant and 389,800 gsf of laboratories and related uses for the Applicant's partners. Accordingly, a GHG consistency assessment is provided.

PRINCIPAL CONCLUSIONS

The Proposed Project would not result in significant adverse impacts to greenhouse gas emissions or climate change. In order to determine the potential for significant impacts, the *CEQR Technical Manual* considers an individual project's consistency with the City's emission reduction goals. Based on the Proposed Project's focus on implementing an energy efficient design, its location, and the nature of construction in New York City, the Proposed Project would align with the City's emissions reduction goals, as defined in the *CEQR Technical Manual*. Therefore, the Proposed Project would not result in a significant impact.

The building energy use and vehicle use associated with the Proposed Project would result in up to approximately 13 thousand metric tons of carbon dioxide equivalent (CO_2e) emissions per year with the Proposed Project in 2026. The design of the Proposed Project would target energy efficiency measures, the inclusion of renewable energy, and carbon emission reductions in line with the City's goals. In addition, emissions associated with the Proposed Project's consumption of grid electricity is expected to decrease as New York State and New York City target 100 percent

[1] New York City Mayor's Office of Environmental Coordination. 2020 *CEQR Technical Manual*.

renewable electricity, and would result in significant reduction of emissions associated with the buildings' electricity consumption. Total GHG emissions associated with the construction, including direct emissions and upstream emissions associated with construction materials, would be approximately 16 thousand metric tons.

The Applicant has stated that they are currently evaluating the specific energy efficiency measures and design elements that may be implemented, and are required at a minimum to achieve the energy efficiency requirements of the New York City Building Code. In 2020, as part of the City's implementation of strategies aimed at achieving the *OneNYC* GHG reduction goals, the City brought the NYCECC up to date with the 2020 Energy Conservation Code of New York State (2020 ECCNYS), which substantially increased the stringency of the building energy efficiency requirements and adopted the ASHRAE 90.1-2016 standard as a benchmark, and aligns with NYStretch Energy Code 2020 developed by New York State Energy Research and Development Authority (NYSERDA).

Furthermore, additional energy savings for the Proposed Project would likely be achieved via guidance for tenant build-out, which would control much of the building's energy use and efficiency, but those are unknown at this time. The project's goal of building energy efficiency—meeting the City's updated building code energy requirements—endeavors to obtain consistency with the efficient buildings goal defined in the *CEQR Technical Manual* as part of the City's GHG reduction goal.

The Proposed Project would also align with other GHG goals by virtue of its proximity to public transportation, commitment to construction air quality controls and recycling construction materials, and the fact that, as a matter of course, construction in New York City uses recycled steel and includes cement replacements. All of these factors demonstrate that the Proposed Project supports the GHG reduction goal.

B. GREENHOUSE GAS EMISSIONS

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 phenomenon causes the general warming of the Earth's atmosphere, or the "greenhouse effect." Water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), methane, and ozone are the primary GHGs in the Earth's atmosphere.

There are also a number of entirely anthropogenic GHGs in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (and contribute to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, there is no need to address them in GHG assessments for most projects. Although ozone itself is also a major GHG, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see Chapter 11, "Air Quality"). Similarly, water vapor is of great importance to global climate change, but is not directly of concern as an emitted pollutant since the negligible quantities emitted from anthropogenic sources are inconsequential.

CO_2 is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most

influential GHG. CO_2 is emitted from any combustion process (both natural and anthropogenic); from some industrial processes such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products; from volcanic eruptions; and from the decay of organic matter. CO_2 is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CO_2 is included in any analysis of GHG emissions.

Methane and N_2O also play an important role since the removal processes for these compounds are limited and because they have a relatively high impact on global climate change as compared with an equal quantity of CO_2. Emissions of these compounds, therefore, are included in GHG emissions analyses when the potential for substantial emission of these gases exists.

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of a GHG analysis: CO_2, N_2O, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). This analysis focuses mostly on CO_2, N_2O, and methane. There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Project.

To present a complete inventory of all GHGs, component emissions are added together and presented as carbon dioxide equivalent (CO_2e) emissions—a unit representing the quantity of each GHG weighted by its effectiveness using CO_2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP). GWPs account for the lifetime and the radiative forcing[2] of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). The GWPs for the main GHGs discussed here are presented in **Table 12-1**.

Table 12-1
Global Warming Potential (GWP) for Major GHGs

Greenhouse Gas	100-year Horizon GWP
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydrofluorocarbons (HFCs)	140 to 11,700
Perfluorocarbons (PFCs)	6,500 to 9,200
Sulfur Hexafluoride (SF_6)	23,900

Note: The GWPs presented above are based on the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report (SAR) to maintain consistency in GHG reporting. The IPCC has since published updated GWP values that reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. In some instances, if combined emission factors were used from updated modeling tools, some slightly different GWP may have been used for this study. Since the emissions of GHGs other than CO_2 represent a very minor component of the emissions, these differences are negligible.
Source: 2020 *CEQR Technical Manual*

POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS FOR REDUCING GHG EMISSIONS

Because of the growing consensus that human activity resulting in GHG emissions has the potential to profoundly impact the Earth's climate, countries around the world have undertaken

[2] *Radiative forcing* is a measure of the influence a gas has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the gas as a GHG.

efforts to reduce emissions by implementing both global and local measures addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements that set emissions targets for GHGs, in December 2015, the U.S. signed the international Paris agreement[3] that pledged deep cuts in emissions, with a stated goal of reducing annual emissions to levels that would be between 26 and 28 percent lower than 2005 levels by 2025.[4] On June 1, 2017, the President of the U.S. announced that "the United States will withdraw from the Paris Climate Accord."[5]

Regardless of the Paris Agreement, EPA is required to regulate GHGs under the Clean Air Act and has begun preparing and implementing regulations. In coordination with the National Highway Traffic Safety Administration (NHTSA), EPA currently regulates GHG emissions from newly manufactured on-road vehicles. In addition, EPA regulates transportation fuels via the Renewable Fuel Standard program, which will phase in a requirement for the inclusion of renewable fuels increasing annually up to 36.0 billion gallons in 2022. In 2015, EPA also finalized rules to address GHG emissions from both new and existing power plants that would, for the first time, set national limits on the amount of carbon pollution that power plants can emit. The Clean Power Plan sets carbon pollution emission guidelines and performance standards for existing, new, and modified and reconstructed electric utility generating units. On February 9, 2016, the Supreme Court stayed implementation of the Clean Power Plan pending judicial review. In October 2017, EPA proposed to repeal the Clean Power Plan and issued the Affordable Clean Energy rule June 19, 2019, replacing the Clean Power Plan. The Affordable Clean Energy rule establishes revised emissions reduction measures accepted as best technology and focusing on energy efficiency improvements in place of direct emissions reduction measures.

There are also regional and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York State by 80 percent, compared with 1990 levels, by 2050, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal; an interim draft plan has been published.[6] The State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener Communities and Climate Smart Communities programs. The State has also adopted California's GHG vehicle standards (which are at least as strict as the federal standards).

The New York State Energy Plan outlines the State's energy goals and provides strategies and recommendations for meeting those goals. The latest version of the plan was published in June 2015. The new plan outlines a vision for transforming the state's energy sector that would result in increased energy efficiency (both demand and supply), increased carbon-free power production, and cleaner transportation, in addition to achieving other goals not related to GHG emissions. The 2015 plan also establishes new targets: (1) reducing GHG emissions in New York State by 40

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[3] Conference of the Parties, 21st Session. *Adoption of The Paris Agreement, decision -/CP.21*. Paris, December 12, 2015.

[4] United States of America. *Intended Nationally Determined Contributions (INDCs)* as submitted. March 31, 2015.

[5] Under the Agreement, countries are allowed to withdraw four years from the date the agreement entered into force—meaning the United States can officially withdraw on November 4, 2020. However, given the voluntary nature of the agreement, any action in the U.S. may or may not occur regardless of this status.

[6] New York State Climate Action Council. *New York State Climate Action Plan Interim Report.* November 2010.

percent, compared with 1990 levels, by 2030; (2) providing 50 percent of electricity generation in the state from renewable sources by 2030; and (3) increasing building energy efficiency gains by 600 trillion British thermal units (Btu) by 2030.

New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of nine northeastern and Mid-Atlantic states have committed to regulate the amount of CO_2 that power plants are allowed to emit, gradually reducing annual emissions to half the 2009 levels by 2020, and reducing an additional 30 percent from 2020 to 2030. The RGGI states and Pennsylvania have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

In 2019, New York State enacted the Climate Leadership and Community Protection Act (CLCPA) to achieve the GHG reductions goals established in the New York State Energy Plan as well as establishing a new long-term goal to reduce statewide GHG by 100 percent, compared with 1990 levels by 2050. The legislation charges New York State Climate Action Council with establishing statewide GHG emission limits and agency regulations to reduce emissions, increase investments in renewable energy sources, and ensure that significant portions of investments are made in disadvantaged communities. Pursuant to these requirements, the Climate Action Council will prepare and approve a scoping plan outlining recommendations for attaining the GHG emission limits and reduction goals. A final scoping plan is anticipated to be approved by 2022.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term comprehensive plan for a sustainable and resilient New York City, which began as PlaNYC 2030 in 2007, and continues to evolve today as OneNYC, includes GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 ("30 by 30") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal")[7] The City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 ("80 by 50"), which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. More recently, as part of *OneNYC*, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025 and achieving net-zero citywide GHG emissions by 2050.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in large new and existing buildings, in accordance with PlaNYC. The laws require owners of existing buildings larger than 50,000 square feet to conduct energy efficiency audits and retro-commissioning every 10 years, to optimize building energy efficiency, and to "benchmark" the building energy and water consumption annually, using an EPA online tool. By 2025, commercial buildings over 50,000 square feet will also require lighting upgrades, including the installation of sensors and controls, more efficient light fixtures, and the installation of submeters, so that tenants can be provided with information on their electricity consumption. The legislation also creates a local New York City Energy Conservation Code, which along with the Energy Conservation

[7] Administrative Code of the City of New York, §24-803.

Construction Code of New York State (as updated in 2016), requires equipment installed during a renovation to meet current efficiency standards.

To achieve the GHG reduction goals, the City is convening Technical Working Groups to analyze the GHG reduction pathways from the building sector, power, transportation, and solid waste sectors to develop action plans for these sectors. The members of the Technical Working Groups will develop and recommend the data analysis, interim metrics and indicators, voluntary actions, and potential mandates to effectively achieve the City's emissions reduction goal. In 2016, the City published the building sector Technical Working Group report, which included commitments by the City to change to building energy code and take other measures aimed at substantially reducing GHG emissions.

In 2019, the New York City Council enacted a legislative package targeting GHG emissions associated with building energy consumption—the Climate Mobilization Act. For most buildings that exceed 25,000 gsf (excluding electricity/steam generation facilities, rent-regulated accommodations, places of public worship, and City-owned properties), the City has established annual building emission limits beginning in 2024 and would require the owner of a covered building to submit annual reports demonstrating the building is in compliance with the current GHG emission limits. For buildings not covered under the GHG emissions limits, owners may either demonstrate compliance with the current limits or implement specified energy conservation measures where applicable.

For certain projects subject to CEQR (e.g., projects with 350,000 gsf or more of development or other energy intense projects), an analysis of the projects' contributions to GHG emissions is required to determine consistency with the City's reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR, and is therefore applied in this chapter.

A number of benchmarks for energy efficiency and green building design have also been developed. For example, the LEED system is a benchmark for the design, construction, and operation of high-performance green buildings that includes energy efficiency components. EPA's Energy Star is a voluntary labeling program designed to identify and promote the construction of new energy efficient buildings, facilities, and homes and the purchase of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

METHODOLOGY

Climate change is driven by the collective contributions of diverse individual sources of emissions to global atmospheric GHG concentrations. Identifying potential GHG emissions from a proposed action can help decision makers identify practicable opportunities to reduce GHG emissions and ensure consistency with policies aimed at reducing overall emissions. While the increments of criteria pollutants and toxic air emissions are assessed in the context of health-based standards and local impacts, there are no established thresholds for assessing the significance of a project's contribution to climate change. Nonetheless, prudent planning dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them. Therefore, this chapter presents the total GHG emissions potentially associated with the Proposed Project and identifies measures that would be implemented and measures that are still under consideration to limit emissions. (Note that this differs from most other technical areas in that it does not account for only the increment between the No Action and With Action conditions. The reason for that different approach is that to truly account for the incremental emissions only would require

speculation regarding where people or businesses would locate in a No Action condition, what energy use and efficiency might be like for those alternatives and other related considerations, and similar assumptions regarding commercial and other uses. The focus is therefore on the total emissions associated with the uses, and on the effect of measures to reduce those emissions.) This analysis estimates GHG emissions for the Proposed Project in 2026.

Estimates of potential GHG emissions associated with the Proposed Project are based on the methodology presented in the *CEQR Technical Manual*. Estimates of emissions of GHGs from the development have been quantified, including off-site emissions associated with use of electricity, on-site emissions from heat and hot water systems, and emissions from vehicle use associated with the proposed development. GHG emissions that would result from construction are discussed as well. As per the guidance, analysis of building energy is based on the average carbon intensity of electricity in 2008, which will likely be lower in the 2026 analysis year and lower still in future years as the fraction of electricity generated from renewable sources continues to increase.

Emissions from transportation apply the emission factors for the 2026 analysis year. Vehicular emission factors will also continue to decrease in future years as vehicle engine efficiency increases and emissions standards continue to decrease, resulting in lower emissions in future years. Since the methodology does not account for future years and other changes described above, it also does not explicitly address potential changes in future consumption associated with climate change, such as increased electricity for cooling, or decreased on-site fuel for heating. Overall, this analysis results in conservatively high estimates of potential GHG emissions for the 2026 analysis year, and emissions would decline in future years beyond 2026.

CO_2 is the primary pollutant of concern from anthropogenic emission sources and is accounted for in the analysis of emissions from all development projects. GHG emissions for gases other than CO_2 are included where practicable or in cases where they comprise a substantial portion of overall emissions. The various GHG emissions are added together and presented as metric tons of CO_2e emissions per year (see "Pollutants of Concern," above).

BUILDING OPERATIONAL EMISSIONS

Estimates of emissions from building electricity and fuel use were prepared using building carbon intensity by use type as detailed in the *CEQR Technical Manual*. Per *CEQR Technical Manual* guidance, the building carbon intensity data represents 2008 citywide averages by use type and not projections for the analysis year (2026). Future emissions are expected to be lower than the estimates using the 2008 citywide averages as efficiency and renewable energy use for grid-supplied electric power continue to increase with the objective of meeting state and city future GHG reduction goals.

The 2008 citywide average emissions intensities used to estimate GHG emissions as detailed in the *CEQR Technical Manual* meet or fall below the carbon intensity limits beginning in 2024, and align with the City's immediate emission reduction goals. Therefore, the Proposed Project would align with the City's carbon annual intensity limits (annual metric tons CO_2e per gsf) for buildings.

The analysis does not assume any on-site cogeneration (electricity production combining the use of heat and power).

MOBILE SOURCE EMISSIONS

The number of annual weekday vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Project was calculated using the transportation planning assumptions developed for the analysis and presented in Chapter 10, "Transportation." 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 18-6 and 18-7 and associated text of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars, taxis, and trucks. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of car, taxi, and truck miles traveled by road type, and roadway type distribution were estimated from street maps. The mobile GHG emissions calculator provided with the *CEQR Technical Manual* was used to estimate GHG emissions from all trips attributable to the Proposed Project.

Based on the latest fuel lifecycle model from Argonne National Laboratory,[8] emissions from producing and delivering fuel ("well-to-pump") are estimated to add an additional 25 percent to the GHG emissions from gasoline and 27 percent from diesel. Although upstream emissions (emissions associated with production, processing, and transportation) of all fuels can be substantial and are important to consider when comparing the emissions associated with the consumption of different fuels, fuel alternatives are not being considered for the proposed development, and as per the *CEQR Technical Manual* guidance, the well-to-pump emissions are not considered in the analysis. The assessment of tailpipe emissions only is in accordance with the *CEQR Technical Manual* guidance on assessing GHG emissions and the methodology used in developing the New York City GHG inventory, which is the basis of the GHG reduction goal.

The projected total annual vehicle miles traveled by roadway type, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 12-2**.

Table 12-2
Vehicle Miles Traveled per Year

Roadway Type	Passenger	Taxi	Truck
Local	155,532	184,193	546,475
Arterial	339,342	401,876	1,192,310
Interstate/Expressway	212,089	251,172	745,193
Total	**706,963**	**837,241**	**2,483,978**

CONSTRUCTION EMISSIONS

A description of construction activities is provided in Chapter 16, "Construction." Construction emissions include emissions from on-road trips, on-site non-road engines, and materials extraction, production, and transport.

The number of vehicle trips by mode (worker cars, delivery trucks) that would be generated by the Proposed Project's construction was calculated using the assumptions developed for the analysis and presented in Chapter 16, "Construction." The assumptions used in the calculation include average daily workers, the percentage of auto trips, and the average vehicle occupancy to develop annual vehicle miles traveled (VMT) associated with commuting workers. An average

[8] Based on GREET1_2016 model from Argonne National Laboratory.

round-trip commute distance for construction workers in the New York City Region of 25.3 miles (based on the average trip to work distance for the New York Metropolitan Area area)[9] was used. Similarly, the numbers of trucks (concrete trucks, dump trucks, and tractor trailers) for each phase of construction activity were used to estimate truck VMT. Distances for truck deliveries were developed based on estimates of the origin and destination of materials for the Proposed Project. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type and the most recent version of the EPA MOVES model was used to obtain an estimate of car and truck GHG emission factors used to produce the associated emissions attributable to the Proposed Actions.

The Proposed Actions would result in construction worker travel of 2.5 million VMT. Additionally, the Proposed Actions would result in construction truck trips totaling 1.1 million VMT. These data were used as the basis for the GHG emissions calculations from mobile sources, applying emission factors as described above for operational mobile source emissions.

On-site emissions were calculated for non-road construction engines based on specific estimates of construction activity and fuel consumption data from the NONROAD emissions module within model EPA's MOVES model. A detailed schedule for the use of non-road construction engines was developed, as described in Chapter 16, "Construction." The detailed data, including the number, type, power rating, and hours of operation for all construction engines was coupled with fuel consumption rate data from EPA's MOVES model to estimate total fuel consumption throughout the duration of the construction activities. Non-road construction engines are estimated to require approximately 49 thousand gallons of diesel equivalent throughout the duration of construction. The quantity of fuel was then multiplied by an emission factor of 10.30 kilograms CO_2e per gallon of diesel fuel.[10]

Upstream emissions related to the production of construction materials were estimated based on the expected quantity of iron or steel and cement. Although other materials will be used, cement and metals have the largest embodied energy and direct GHG emissions associated with their production, and substantial quantities would be used for the Proposed Actions.

The construction is estimated to require 2,491 metric tons of cement. An emission factor of 0.928 metric tons of CO_2e per metric ton of cement produced was applied to estimate emissions associated with energy consumption and process emissions for cement production.[11] The precise origin of cement for this project is unknown at this time.

The construction is estimated to require 7,341 metric tons of steel. An emission factor of 0.6 metric tons of CO_2e per metric ton of steel product produced was applied to estimate emissions associated with production energy consumption,[12] and 0.65 metric tons of CO_2e per metric ton of steel product produced for process emissions associated with iron and steel production were applied.[13]

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[9] NYSDOT. *2009 NHTS, New York State Add-On*. Key Tables. Table 3: Average Travel Day Person-Trip Length by Mode and Purpose, trip-to work distance for SOV in NYMTC 10-county area. 2011.

[10] EPA. Emission Factors for Greenhouse Gas Inventories. 26 March 2020.

[11] The Portland Cement Association. Life Cycle Inventory of Portland Cement Manufacture. 2006.

[12] Arpad Horvath et al. Pavement Life-cycle Assessment Tool for Environmental and Economic Effects, Consortium on Green Design and Manufacturing. UC Berkeley. 2007.

[13] Based on 42.3 teragrams of CO_2e emitted and 65,460 thousand tons produced; Source: EPA. *Inventory of U.S. Climate Change and Sinks: 1990–2009*. April 15, 2011.

EMISSIONS FROM SOLID WASTE MANAGEMENT

The Proposed Project would not fundamentally change the City's solid waste management system. Therefore, as per the *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

PROJECTED GHG EMISSIONS

BUILDING OPERATIONAL EMISSIONS

The building floor area, emission intensity, and resulting GHG emissions from each of the uses are presented in detail in **Table 12-3**. The analysis presents the total emissions after construction. In general, the uses with more floor area result in greater annual GHG emissions, except for the garage parking, which has a substantially lower GHG intensity than other uses.

Table 12-3
Annual Building Operational Emissions

Source Use	Building Area (gsf)	GHG Intensity[1] (kg CO_2e / gsf / year)	Annual GHG Emissions (metric tons CO_2e)
Community Facility – New York Blood Center	206,400	11.42	2,357
Commercial Research Labs	389,800	11.42	4,452
		TOTAL:	**6,809**

Notes: Totals may not sum due to rounding.
Per *CEQR Technical Manual* guidance, electricity emissions are representative of existing conditions in 2008 and not the analysis year (2026). Future emissions are expected to be lower.
Representative emission intensity for existing buildings are higher than new and future construction, and do not include the expected energy efficiency measures.
Source: [1] *CEQR Technical Manual*

MOBILE SOURCE EMISSIONS

The mobile-source-related GHG emissions from the Proposed Project are presented in detail in **Table 12-4**. In addition to the direct emissions included in the analysis, an additional approximately 25 percent would be emitted upstream, associated with fuel extraction, production, and delivery.

Table 12-4
Annual Mobile Source Emissions
(metric tons CO_2e, 2026)

Use	Passenger Vehicle	Taxi	Truck	*Total*
Community Facility – New York Blood Center	196	9	1,926	*2,130*
Commercial Research Labs	196	407	3,296	*3,899*
Total	**392**	**416**	**5,221**	***6,029***

Note: Totals may not sum due to rounding.

CONSTRUCTION EMISSIONS

The estimated GHG emissions from construction of the Proposed Project are presented in **Table 12-5**. Total construction emissions, 15,731 metric tons CO_2e, would be equivalent to

approximately 2.5 years of operational emissions. Emissions for the Proposed Project are approximately proportional to the size of their respective development areas.

Table 12-5
Total Construction GHG Emissions
(metric tons CO_2e)

Use	2022	2023	2024	2025	2026	*Total*
Nonroad	266	167	63	30	2	*528*
Transportation	230	775	1,597	843	190	*3,635*
Materials[1]	---	---	---	---	---	*11,568*
Total	**496**	**942**	**1,661**	**873**	**191**	***15,731***

Notes: Totals may not sum due to rounding.
[1] Emissions associated with construction materials are not reported annually, as emissions are associated with the production of materials and may not occur within the same year.

SUMMARY

A summary of GHG emissions by source type is presented in **Table 12-6**. Emissions associated with mobile sources represent approximately two thirds of the total emissions, and the building energy emissions represent approximately one third of the total. Note that if new buildings were to be constructed elsewhere to accommodate the same number of units and space for other uses, the emissions from the use of electricity, energy for heating and hot water, and vehicle use could equal or exceed those estimated for the Proposed Project, depending on their location, access to transit, building type, and energy efficiency measures. The Proposed Project is not expected to fundamentally change the City's solid waste management system, and therefore, emissions associated with solid waste are not presented.

Table 12-6
Summary of Annual GHG Emissions, 2026
(metric tons CO_2e)

Use	Building Operations	Mobile	*Total*
Community Facility – New York Blood Center	2,357	2,130	*4,487*
Commercial Research Labs	4,452	3,899	*8,350*
Total	**6,809**	**6,029**	***12,838***

Note: Totals may not sum due to rounding.

The operational emissions from building energy use include on-site emissions from fuel consumption as well as emissions associated with the production and delivery of the electricity to be used on-site. Since the above estimate reflects the average efficiency of existing buildings, the resulting emissions are conservatively high.

In addition, total GHG emissions associated with the construction, including direct emissions and upstream emissions associated with construction materials (excluding fuel), would be approximately 16 thousand metric tons.

CONSISTENCY WITH THE CITYWIDE GHG REDUCTION GOALS

The Proposed Project would include a number of sustainable design features that would result in lower GHG emissions, detailed below, addressing the OneNYC goals as outlined in the *CEQR Technical Manual* as well as New York State GHG reduction goals stated in the CLCPA.

BUILD EFFICIENT BUILDINGS

Specific measures also under consideration would include the installation of high efficiency HVAC systems, efficient lighting systems, and incorporating inverted roofing systems—locating waterproofing element below thermal insulation elements to reduce heating/cooling loads.

The Applicant has identified several measures under consideration that may be implemented in the final design and would reduce GHG emissions (directly or indirectly). Specific measures also under consideration would include the installation of high efficiency HVAC systems, reduced energy demand using peak shaving/load shifting strategies, motion sensor lighting/climate controls, and re-use of gray water/collected rainwater. These measures include the following (this list represents measures currently under consideration, but other measures may be included once the specific design progresses):

- High efficiency HVAC systems;
- Stormwater/groundwater recharge during excavation (dependent on ground water levels);
- Use of environmentally friendly refrigerants (refrigerants with low global warming potential such as ethane, isobutane, propane, R-441A, and HFC-32) when required;
- Incorporate efficient, directed exterior lighting;
- Incorporate motion sensors for light/climate controls in specific locations;
- Incorporate invert roofing systems to reduced heating/cooling loads;
- Incorporate recycled content in some building materials, such as finishes, structural steel, and concrete design if practicable; and
- Offer construction project management services to future tenants to oversee and deliver interior spaces that comply with all guidelines and building codes with respect to energy efficient and sustainable design and construction techniques. In the event that tenants choose to manage their own buildouts, construction and design guidelines will be provided to tenants to establish minimum standards for materials and operations to ensure sustainable and energy efficient design and construction.

The estimated GHG emissions associated with the Proposed Project's building energy use using the 2008 citywide average emission intensities would fall below the immediate carbon intensity limits established by the City, and with the implementation of the above measures the Proposed Project would be in line with the City's energy efficiency measures, renewable energy, and carbon emission reduction goals. GHG emissions associated with the Proposed Project's electricity consumption would continue to decrease in future years as the carbon intensity associated with grid electricity is expected to decrease as New York State and New York City target 100 percent renewable electricity by 2040.

Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

USE CLEAN POWER

While the use of clean power would not be specifically required, the buildings would use natural gas, a lower carbon fuel, for the normal operation of the heat and hot water systems. It is also possible that local renewable power production (e.g., geothermal, solar, wind) would be considered while reviewing options for LEED, EPA Energy Star, and achieving the above efficient building goal.

Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of using clean power.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The Proposed Project is located within walking distance from the 72nd Street, 68th Street/ Hunter College, Lexington Avenue/63rd Street, and Lexington Avenue/59th Street subway stations, and supported by the M15 and M66 bus routes. In addition, the Proposed Project is located adjacent to the First and Second Avenue dedicated bike lanes, and three Citi Bike stations are located within several blocks.

REDUCE CONSTRUCTION OPERATION EMISSIONS

Construction specifications would include an extensive diesel emissions reduction program, as described in detail in Chapter 16, "Construction," including diesel particle filters for large construction engines and other measures. These measures would reduce particulate matter emissions; while particulate matter is not included in the list of standard GHGs ("Kyoto gases"), recent studies have shown that black carbon—a constituent of particulate matter—may play an important role in climate change.

USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

Recycled steel may be used for most structural steel since the steel available in the region is mostly recycled. Some cement replacements such as fly ash and/or slag may also be used, and concrete content would be optimized to the extent feasible.

The use of local, rapidly renewable, or certified sustainable wood, and recycled build-out materials would be considered. Construction waste would be diverted from landfills to the extent practicable by separating out materials for reuse and recycling.

CONCLUSION

As described above, the Proposed Project would include substantial energy efficiency and other design measures and features aimed at reducing GHG emissions. The implementation of the various design measures and features described would result in development that is consistent with the City's emissions reduction goal, as defined in the *CEQR Technical Manual*. ✶