A. INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the construction and operation of the proposed One Vanderbilt development and its consistency with the citywide GHG reduction goals.

As discussed in the 2014 *City Environmental Quality Review* (*CEQR) Technical Manual*, 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. Through PlaNYC, the City has established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change in the City.

The proposed actions, as detailed in Chapter 1, "Project Description," include a zoning text amendment to create the Vanderbilt Corridor and a new special permit for a Grand Central Public Realm Improvement Bonus. In addition to other requirements, any proposed development pursuant to the new special permit would be required to include sustainable design measures, including but not limited to improvements to the building's energy performance; enhanced water efficiency; and utilization of sustainable or locally sourced materials—all of which will contribute to limiting GHG emissions. As a consequence, the proposed One Vanderbilt development would include a number of sustainable design features, described in this chapter.

Per the *CEQR Technical Manual*, the citywide 2030 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 conducted for any project resulting in 350,000 square feet or more of development and other energy-intense projects. The proposed One Vanderbilt development would result in 1.8 million gross square feet (gsf) of developed floor area on the One Vanderbilt site. Accordingly, a GHG consistency assessment is provided. In addition, a 1.6 million-gsf increase in floor area may be developed in the future on the other sites in the Vanderbilt Corridor (see analysis of the cumulative GHG emissions including the additional potential future development in Chapter 19, "Conceptual Analysis.")

PRINCIPAL CONCLUSIONS

The building energy use and vehicle use associated with the proposed One Vanderbilt development would result in up to approximately 21.8 to 24.1 thousand metric tons of carbon dioxide equivalent (CO_2e) emissions per year.

The *CEQR Technical Manual* defines five goals through which a project's consistency with the City's emission reduction goal is evaluated: (1) efficient buildings; (2) clean power; (3) sustainable transportation; (4) construction operation emissions; and (5) building materials carbon intensity.

317 Madison is currently evaluating the specific energy efficiency measures and design elements that may be implemented, and is seeking to achieve Gold-level certification under the Leadership in Energy and Environmental Design (LEED) Core and Shell rating system, version 4. 317 Madison is committed at a minimum to achieve the prerequisite energy efficiency requirements under LEED and would likely exceed them. To qualify for LEED, the project would be required to exceed the energy requirements of the New York City building code (currently the same as ASHRAE 90.1-2010), resulting in energy expenditure at least 2 percent lower than a baseline building designed to meet but not exceed the minimum building code requirements. Furthermore, additional energy savings 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 commitment to building energy efficiency, exceeding the building code energy requirements, ensures consistency with the efficient buildings goal defined in the *CEQR Technical Manual* as part of the City's GHG reduction goal (see Section F), and would be specified and required under the conditions of the special permit.

The proposed One Vanderbilt development would support the other GHG goals by virtue of its nature and location: its proximity to public transportation, reliance on natural gas, commitment to construction air quality controls (which will be reflected in special permit conditions for the proposed One Vanderbilt development), 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 development supports the GHG reduction goal.

Therefore, based on the commitment to energy efficiency and by virtue of location and nature, the proposed One Vanderbilt development would be consistent with the City's emissions reduction goals, as defined in the *CEQR Technical Manual*.

B. 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, methane, and ozone are the primary greenhouse gases in the Earth's atmosphere.

There are also a number of entirely anthropogenic greenhouse gases 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 greenhouse gas, 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 nitrous oxide 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 an EIS: CO_2, nitrous oxide (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 development.

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 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

Source: 2014 *CEQR Technical Manual*
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.

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

As a result 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 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 which set emissions targets for GHGs, in a step toward the development of national climate change regulation, in 2010, the U.S. agreed that deep cuts are necessary and agreed to take action to meet this objective, with a stated goal of reducing emissions to 17 percent lower than 2005 levels by 2020 and to 83 percent lower than 2005 levels by 2050 (pending legislation) via the Copenhagen Accord.[1,2] In 2014, President Obama announced a new target to cut net GHG emissions to 26 to 28 percent below 2005 levels by 2025.[3] Without legislation focused on these goals, the U.S. Environmental Protection Agency (EPA) is required to regulate greenhouse gases under the Clean Air Act (CAA), 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 2014, EPA also proposed 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. EPA expects to expand this program in the future to limit emissions from additional stationary sources.

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 and an interim draft plan has been published.[4] 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 2009 New York State Energy Plan outlines the State’s energy goals and provides strategies and recommendations for meeting those goals. A new draft plan was published in January 2014. While the draft plan does not set any specific quantified GHG reduction goals, it does outline a vision for transforming the State’s energy sector which 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.

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. 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.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ (CCP) campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and

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[1] UNFCCC Conference of the Parties, Copenhagen Accord, March 30, 2010.

[2] Todd Stern, U.S. Special Envoy for Climate Change. Letter to Mr. Yvo de Boer, UNFCCC. January 28, 2010.

[3] The White House. *Fact Sheet: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation*. November 11, 2014.

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

enhance urban livability and sustainability. New York City's long-term sustainability program, PlaNYC 2030, includes GHG emissions reduction goals, 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 was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[1] The City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050, and has published a study evaluating the potential for achieving that goal. More recently, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025.

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 their 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.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in 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 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 Code, which along with the New York State Energy Conservation Code (as updated in 2010), requires equipment installed during a renovation to meet current efficiency standards.

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. 317 Madison is currently evaluating the specific energy efficiency measures and design elements which would be implemented, and intends to achieve certification under the LEED rating system.

D. METHODOLOGY

Although the contribution of any single project's emissions to climate change is infinitesimal, the combined GHG emissions from all human activity have been found to be significantly impacting global climate. 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 One Vanderbilt development and

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

identifies measures that would be implemented and measures that are still under consideration to limit emissions.

The analysis of GHG emissions that would be associated with the proposed One Vanderbilt development is 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 and steam, 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 accounts for current carbon intensity of electricity, which will likely be lower in the 2021 build year and lower still in future years. Emissions from transportation conservatively apply the emission factors for the earlier 2021 year, although the potential developments within the Vanderbilt Corridor would likely not be fully developed by then and emissions would be lower due to the lower traffic generated. 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 potential GHG emissions.

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 carbon dioxide equivalent (CO_2e) emissions per year (see “Pollutants of Concern,” above).

BUILDING OPERATIONAL EMISSIONS

Estimates of emissions due to electricity and natural gas use were prepared using projections of energy consumption developed specifically for the proposed development by the project engineers and the emission factors referenced in the 2013 GHG emissions inventory for New York City.[1] The proposed One Vanderbilt development is estimated to require 28.5 gigawatt-hours per year (GWh/yr) of electricity for general building use and a total of 17,487 million British thermal units per year (MMBtu/yr) of natural gas for heat and hot water. An option including on-site electricity and heat cogeneration is under consideration, which would provide approximately half of the electricity demand using a natural gas-fired system, requiring 148,268 MMBtu/yr of natural gas and obviating the above natural gas consumption for heat and hot water.

Per *CEQR Technical Manual* guidance, electricity emissions represent the latest data (2012) and not future target year (2021). Future emissions are expected to be lower as efficiency and renewable energy use continue to increase with the objective of meeting State and City future GHG reduction goals.

MOBILE SOURCE EMISSIONS

The number of annual weekday vehicle trips by mode (cars, taxis, and trucks) that would be generated by the proposed One Vanderbilt development was calculated using the transportation planning assumptions developed for the analysis and presented in Chapter 10, “Transportation.”

[1] The City of New York Mayor’s Office of Long-Term Planning and Sustainability. *Inventory of New York City Greenhouse Gas Emissions*. November 2014.

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. To calculate annual totals, the number of trips on Sundays was assumed to be the same as on Saturday. 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 vehicle miles traveled by road type and the mobile GHG emissions calculator was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the projects.

EPA estimates that the well-to-pump GHG emissions of gasoline and diesel are more than 20 percent of the tailpipe emissions.[1] 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 annual vehicle miles traveled, 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	301,782	319,074	1,069,115
Arterial	658,433	696,161	2,332,615
Interstate/Expressway	411,521	435,101	1,457,885
Total	**1,371,735**	**1,450,336**	**4,859,616**

CONSTRUCTION EMISSIONS

A description of construction activities is provided in Chapter 16, "Construction Impacts." Consistent with CEQR practice, emissions associated with construction have not been estimated explicitly for the proposed One Vanderbilt development, but analyses of similar projects 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) are equivalent to the total operational emissions over approximately 5 to 10 years.

EMISSIONS FROM SOLID WASTE MANAGEMENT

The proposed One Vanderbilt development 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.

[1] EPA, *MOVES2004 Energy and Emission Inputs*, Draft Report, EPA420-P-05-003, March 2005.

E. PROJECTED GHG EMISSIONS FROM THE PROPOSED DEVELOPMENT

BUILDING OPERATIONAL EMISSIONS

The fuel consumption, electricity use, emission factors, and resulting GHG emissions from each of the development components are presented in detail in **Table 12-3**. Without cogeneration, the vast majority of the building operational emissions would be associated with electricity consumption rather than fuel use. In the scenario with cogeneration, a larger portion of the emissions would be associated with fuel consumption, mostly used to generate electricity, with recovered heat mainly reducing the need for heating fuel and also reducing, to some extent, the electricity demand (via the operation of an absorption chiller during summer months, where the chiller is actuated by waste heat from the cogeneration plant). Overall, the emissions with the cogeneration as calculated here would be higher than without cogeneration. This is because the generation tracks electric consumption and is not focused on producing power only when the heat byproduct is needed. Given the high price of electricity in New York City, it is anticipated that the system would be used at full capacity, or in track-electric mode, in order to produce the highest return on investment. At this time, the cogeneration system being considered consists of two 1-megawatt, natural-gas-fired reciprocating engines. Thus, the efficiency of the potential cogeneration system is not as high as that of the larger utility-scale natural gas generation facilities unless the co-generated heat demand sufficiently offsets the differences in efficiency. In track-electric mode electricity is at times generated when there is insufficient need for the heat it produces. Under this scenario, even when accounting for the heat recovery from the reciprocating engines and for power distribution losses in grid power, we estimate that the energy use for the scenario with cogeneration would be higher.

Table 12 3
Proposed Development's Annual Building Operational Emissions

Source	Annual Consumption	Emission Factor	GHG Emissions (metric tons CO_2e)
Design without Cogeneration:			
Natural Gas	17,487 MMBtu	53.196 Kg CO_2e/MMBtu (1)	930
Grid Electricity	28.526 GWh	306.3 metric tons/GWh (2)	8,738
		Total without Cogeneration:	**9,668**
Design with Cogeneration:			
Natural Gas (Heat and Power)	146.268 MMBtu	53.196 Kg CO_2e/MMBtu (1)	4,148
Grid Electricity	13.540 GWh	306.3 metric tons/GWh (2)	7,887
		Total with Cogeneration:	**12,035**

Notes: Totals may not sum due to rounding.
Per *CEQR Technical Manual* guidance, electricity emissions represent the latest data (2012) and not the future target year (2021). Future emissions are expected to be lower.

Sources: 1. *CEQR Technical Manual*
2. *Inventory of New York City Greenhouse Gas Emissions*, 2014, *Appendix I*. Note that this factor represents a correction of the factor presented in the *CEQR Technical Manual* 2014 Edition, which was used in the Draft Environmental Impact Statement (DEIS).

In terms of GHG emissions, the average grid-provided electricity emission factors include nuclear and renewable power as well, further reducing GHG emissions from grid power as compared with cogeneration. Note that this comparison may not reflect the reality in which the use of cogeneration at peak hours may reduce electricity demand from the more carbon-intense electric generation (rather than the average). However, in the long-term future (midcentury and on), if

State and City GHG reduction goals (80 percent by 2050) are to be met, a very large portion of electricity would need to be from renewable sources, making grid-provided electricity lower in carbon than local natural gas-generated power. Overall, the benefit of cogeneration in providing heat as a byproduct in this case is not large enough to result in a net benefit in terms of energy use and GHG emissions if cogeneration is operated at all hours (including off-peak) as currently envisioned. Nonetheless, cogeneration is under consideration for cost and LEED purposes, and in support of the City and State goal to provide more distributed generation capacity.[1]

MOBILE SOURCE EMISSIONS

The mobile-source-related GHG emissions from the proposed development are presented in detail in **Table 12-4**.

Table 12-4
Proposed Development's Annual Mobile Source Emissions
(metric tons CO_2e, 2021)

Roadway Type	Passenger Vehicle	Taxi	Truck	Total
Local	284	272	3,509	4,065
Arterial	377	357	4,723	5,457
Interstate/Expressway	166	156	2,261	2,583
Total	**827**	**784**	**10,494**	**12,105**

SUMMARY

A summary of GHG emissions by source type is presented in **Table 12-5**. 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. As described in the "Methodology" section above, construction emissions were not modeled explicitly, but are estimated to be equivalent to approximately 5 to 10 years of operational emissions, including both direct energy and emissions embedded in materials (extraction, production, and transport). The proposed One Vanderbilt development is not expected to fundamentally change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Table 12-5
Summary of the Proposed Development's
Annual GHG Emissions, 2021 (metric tons CO_2e)

Source	Emissions with Cogeneration	Emissions without Cogeneration
Building Operations	12,035	9,668
Mobile	12,105	
TOTAL	**24,140**	**21,773**

1 Both the City, in *PlaNYC*, and the State, in the draft *2014 State Energy Plan*, encourage cogeneration, and distributed generation in general, as a way of reducing the need for an ever growing electric generation system designed to provide peak power needs which are well in excess of the average electricity demand, and to provide greater resiliency in case of power interruption. Reducing peak power demand also has the benefit of reducing air pollutant and GHG emissions by offsetting the peak power generation from sources which are often less efficient than the system as a whole but not reducing demand from renewable and low carbon generators.

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. 317 Madison is currently evaluating the specific energy efficiency measures and design elements that would be implemented (see Section F, below), and intends to achieve certification under the LEED rating system. To qualify for LEED, the buildings would be required to exceed the energy requirements of ASHRAE 90.1-2010 (which will be the same as New York City building energy code when adopted later this year) so as to reduce energy expenditure by at least 2 percent as compared with a baseline building designed to meet the minimum building code requirements. While the above estimate reflects the current building design, the energy evaluation is not final and detailed design measures may continue to evolve as design to attain LEED energy efficiency requirements progresses. Furthermore, design guidelines for tenant build-out would likely result in much greater savings since much of the building’s energy use and efficiency is tied to tenant uses, which are unknown at this time and could not be included in this estimate.

Note that building energy expenditure and consumption are not directly correlated, and GHG emissions are not directly correlated to either due to differences in carbon intensity and cost of different sources. The cogeneration under consideration would reduce expenditure substantially but, as mentioned above, would not necessarily reduce actual energy consumption and would not result in reduced GHG emissions

F. ELEMENTS OF THE PROPOSED DEVELOPMENT THAT WOULD REDUCE GHG EMISSIONS

The proposed One Vanderbilt development would include a number of sustainable design features which would, among other benefits, result in lower GHG emissions—these features would be specified and required under the conditions of the special permit. In general as a prerequisite for LEED certification, the proposed development would use less energy than it would if built only to meet the building code. In general, dense, mixed-use development with access to transit and existing roadways is consistent with sustainable land use planning and smart growth strategies to reduce the carbon footprint of new development. These features and other measures currently under consideration are discussed in this section, addressing the PlaNYC goals as outlined in the *CEQR Technical Manual*. 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*.

BUILD EFFICIENT BUILDINGS

The proposed One Vanderbilt building would have energy-efficient glazing designed to reduce heat loss and facilitate daylight harvesting by admitting more daylight than solar heat. The energy systems would utilize high-efficiency heating, ventilation, and air conditioning (HVAC) systems, with many components designed to reduce energy consumption. The building would have high-albedo roofs to reduce energy consumption and reduce the buildings contribution to the urban heat-island effect, and green roofs are also being considered. Motion sensors for lighting would be incorporated in all areas controlled by the core and shell design (back of house, stairwells, amenity spaces) resulting in efficient energy consumption.

Efficient lighting in all areas controlled by the core and shell design, daylight harvesting in areas where practicable, and elevators with regenerative breaking would be installed to reduce electricity consumption. Exterior lighting would be energy efficient and directed. Large tenants would be provided with submeters for electricity allowing tenants to track and optimize their electricity use.

Third-party fundamental and enhanced building energy systems commissioning would be undertaken upon completion of construction to ensure energy performance. 317 Madison would also provide sustainable design guidelines to tenants for build-out.

Water conserving fixtures, meeting the stringent New York City building code requirements, would be installed and water-efficient landscaping would be selected to reduce water consumption, indirectly reducing energy consumption associated with potable water production and delivery. Storage and collection of recyclables would be incorporated in building design. Electricity would be sub-metered. Storage and collection of recyclables would be designed for explicitly.

If cogeneration is pursued, the system would reduce electricity consumption during peak hours when grid power is being generated from less efficient sources.

317 Madison may also consider reusing storm water, but the energy use for pumping this water would be considered before making a decision.

USE CLEAN POWER

The proposed One Vanderbilt development would use natural gas, a lower carbon fuel, for the normal operation of the heat and hot water systems and, if implemented, for the cogeneration system.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The proposed One Vanderbilt development is located in an area heavily supported by many transit options (existing bus and subway services immediately adjacent to the project) and would improve pedestrian circulation within Grand Central Terminal and its vicinity. These include the designation of the portion of Vanderbilt Avenue between East 42nd and East 43rd Streets as a "public place" (pedestrian plaza), several entrance and access improvements to the transit system, and a direct subgrade connection to the Grand Central Terminal transit hub supporting the use of the subway system, the future Long Island Rail Road connection, and Metro-North commuter rail (for details see Chapter 1, "Project Description".) In addition, the proposed development is located immediately adjacent to the West 43rd Street and West 44th Street cross-town bike route and next to two Citi Bike stations on East 42nd and East 43rd Streets. The project would also include some roadway improvements to improve traffic flow.

REDUCE CONSTRUCTION OPERATION EMISSIONS

Construction specifications would include an extensive diesel emissions reduction program, as described in detail in Chapter 16, "Construction Impacts," 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 would most likely 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 core and shell components will use recycled materials, materials produced regionally, rapidly renewable materials, certified sustainable wood products, and materials that contain recycled content as appropriate, but the greatest opportunity would be associated with tenant build out, and details are unknown at this time. 317 Madison would provide sustainable guidelines addressing these to the extent practicable depending on the specific uses and tenants.

Construction waste would be diverted from landfills to the extent practicable by separating out materials for reuse and recycling, with a diversion target of minimum 75 percent. ✷