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Cutting Carbon & Costs: Greening NYU's Buildings

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Executive Summary

Greenhouse gas (GHG) emission reductions are crucial to combating the threat of climate change. In the absence of significant federal action to address GHG emissions, universities have become laboratories for innovative energy efficiency policy solutions to reduce such emissions. We believe that New York University (NYU) can play a vital role in this movement by developing and implementing a pioneering energy efficiency program on an urban campus. NYU should pay particular attention to reducing energy use in buildings, which are an overwhelming source of GHG emissions.

There are three key factors which suggest it is an opportune time for NYU to revisit its building energy policies. First, the New York City Council has recently passed bills that provide an impetus for greening buildings. In April 2019, the New York City Council passed a bill that sets mandatory greenhouse gas emissions targets that buildings have to meet beginning in 2024 This bill follows up on an earlier local law that requires large building owners to publicly display grades indicating the energy efficiency of their buildings in 2020. In order to ensure compliance and favorable results under these laws, and reduce energy costs, NYU needs to assess the efficiency of its building stock. Second, NYU has committed to ambitious greenhouse gas reduction goals, such as carbon neutrality by 2040. The current trend in NYU's GHG emissions suggests that it may not be on track to meet these commitments. Third, NYU risks significant reputation costs if it fails to improve its energy efficiency to meet its climate commitments and improve the energy grades of its buildings. Conversely, adopting an innovative energy efficiency program would position NYU as a leader in urban sustainability.

This paper recommends the formation of a Working Group, which would work in coordination with the NYU Office of Sustainability, to develop a plan to reduce energy use in NYU's buildings. We identify four tasks for the Office and the Working Group to pursue. (1) Take stock of NYU's energy use and analyze how its buildings will perform under the new energy efficiency regulations. Appendix A presents a snapshot of NYU's 2017 Energy Star scores and predicted grades under the new law, but this is by no means an exhaustive analysis. (2) Evaluate whether NYU should implement an internal shadow pricing scheme for its GHG emissions. This would allow the central administration to account for the price of its GHG emissions in administrative decision-making, thereby accounting for environmental externalities. As there are many ways to implement a shadow pricing scheme, the Working Group should analyze current approaches employed at other universities and develop a method best suited to NYU's needs. (3) Recommend measures to improve NYU's energy efficiency by analyzing the University's current approach (centrally-led initiatives) alongside alternatives implemented at other institutions. (4) As New York City is considering a buildings emissions trading regime, the Office and the Working Group should analyze how such a scheme would affect NYU and consider making recommendations to the City on the design of a building emissions trading regime.

Through an aggressive, efficient buildings program, NYU has an exciting opportunity to play a significant role in the environmental movement locally in New York City, and globally. The University should take this opportunity to establish itself as a leader in sustainability and accrue the cost-saving and reputational benefits that would follow from such a program.

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I. Introduction

NYU should continue to build on its existing sustainability initiatives and establish a presidential initiative that is specifically focused on greening the University's buildings. NYU is one of the largest private landowners in New York City, owning approximately 12.78 million square feet of property, spread across over 100 buildings.[1] Energy use within buildings is by far the most important source of NYU's greenhouse gas ("GHG") emissions, accounting for 96.5% of NYU's emissions according to University data.[2]

Buildings are also the largest source of the GHG emissions in New York City as a whole, and the City government is prioritizing reducing GHG emissions from buildings. Buildings contribute roughly 70% of emissions in the City, with transportation a distant second source.[3] Most NYC building GHG emissions come from natural gas combustion (47% of building-based emissions) and use of electricity (37%).[4]

In 2018, the City Council passed Local Law 33 which will require large buildings, including many NYU buildings, to prominently display letter grades reflecting the buildings' relative energy efficiency starting in 2020.[5] The grades are intended to spur building owners to invest in improving energy efficiency, which will reduce GHG emissions. Based on data about the energy performance of 30 NYU buildings in 2017, it appears that many NYU buildings may receive letter grades of B, C or D, with perhaps less than half earning an A grade. The potential that many NYU buildings will receive such mixed grades provides an important impetus for the University to focus on greening its buildings.

Introduction 1253, passed by the City Council in April 2019, offers an even stronger incentive. This bill goes further than Local Law 33 and *mandates* reductions in GHG emissions from large buildings. Introduction 1253 will cause NYU and other owners of large buildings to incur new costs for continuing to emit GHGs, as permissible GHGs caps will be reduced over time under the bill.

NYU has other reasons to reduce the GHG emissions from its buildings in addition to the initiatives at the City level. As discussed later in this paper, NYU has committed to reduce its GHG emissions and there are potential energy cost savings and reputational benefits to pioneering aggressive reductions in building GHG emissions.

In light of all these incentives to reduce building energy use across NYU, this paper recommends that NYU's President and Provost form a high-level Working Group of staff, faculty and students to work with the Office of Sustainability to develop a plan to aggressively green NYU's buildings. In particular, the high-level Working Group and the Office would prepare a report that:

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[1] Eddie Small, *Cracking the University Real Estate Code*, THE REAL DEAL (May 1, 2018), https://therealdeal.com/issues_articles/cracking-the-university-real-estate-code/. These figures exclude properties and buildings owned by NYU Langone. Aleksey Bilogur, *Who Are the Biggest Landowners in New York City?* (May 27, 2016), http://www.residentmar.io/2016/05/27/biggest-landowners-nyc.html; New York University, *NYU at a Glance*, https://www.nyu.edu/about/news-publications/nyu-at-a-glance.html (last visited Aug. 26, 2018).

[2] New York University, *Energy*, https://www.nyu.edu/life/sustainability/areas-of-focus/energy.html (last visited July 30, 2018) (no longer available).

[3] MAYOR'S OFFICE OF SUSTAINABILITY, NYC CARBON CHALLENGE 6 (2018), http://www.nyc.gov/html/gbee/downloads/pdf/NYC%20Carbon%20Challenge_2018_Progress%20Report.pdf.

[4] CITY OF NEW YORK, INVENTORY OF NEW YORK CITY GREENHOUSE GAS EMISSIONS IN 2016 5 (2017), https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/GHG%20Inventory%20Report%20Emission%20Year%202016.pdf.

[5] Local law No. 33, https://www1.nyc.gov/assets/buildings/local_laws/ll33of2018.pdf.

- analyzes the implications for NYU of local green building laws, as well as NYU's own commitments to reduce its GHG emissions, and the extent to which NYU is on track to comply with these laws and commitments;
- suggests a shadow price for GHG emissions that NYU should incorporate into its internal planning and budgeting for real estate and sustainability initiatives, given the costs that the University will soon face under local laws for emitting GHGs from buildings;
- recommends measures that NYU could take to reduce building GHG emissions, including potentially building retrofits, changes in energy sources, and behavioral changes,[6] and how these measures might be implemented; and
- provides input on the potential outlines of a New York City carbon credit trading regime for large buildings, which Introduction 1253 contemplates.

The City's ongoing initiatives present the University with a historic opportunity to bolster its environmental credentials by improving the performance of its buildings and potentially reduce its costs of complying with the local legal requirements as well. Other universities, most notably Yale, have derived significant reputational benefits[7] from implementing their own internal carbon pricing regimes on GHG emissions from buildings. New York City's local legal requirements create an external impetus for NYU to develop innovative internal responses to government regulation of GHGs focused on reducing building emissions. [8] NYU's responses also could advance the University's academic mission; as the premier urban university in the first U.S. city to require that buildings reduce their GHG emissions, NYU could serve as a laboratory for testing strategies for aggressively reducing GHG emissions from buildings, which are the largest source of GHG emissions in many cities around the world.

This paper will first explain why NYU should focus on its building energy use now. Second, the paper discusses how NYU currently manages its energy use, the problems and opportunities inherent in this framework for reducing GHG emissions from buildings, and recent internal carbon pricing initiatives at other universities. Third, the paper recommends that the President and Provost establish a high-level Working Group to work with the Office of Sustainability to seize the opportunities for innovation created by the local policy environment.

II. Why NYU Should Focus on Its Building Energy Use Now

There are three principal reasons why NYU should focus on reducing its building energy use *now* in addition to the potential cost savings from more energy efficient buildings: local laws, the University's internal commitments to reduce its GHG emissions; and the potential reputational benefits from innovatively reducing building GHG emissions.

[6] This non-exhaustive list of potential changes to reduce GHG emissions draws on lists in JOHN MADDEN ET AL., CASE STUDY: CLIMATE ACTION IN CONTEXT OF AN EXTERNALLY IMPOSED PRICE ON CARBON (Sept. 3, 2018), https://secondnature.org/wp-content/uploads/UBC-Case-Study-Climate-Action-in-the-Context-of-an-Externally-Imposed-Price-on-Carbon.pdf..

[7] For instance, a number of media outlets have reported on Yale's carbon pricing program. *See, e.g.*, Matt Simon, *Thank Colleges for Imminent Carbon Tax (No Seriously, Thank Them*), WIRED (Mar. 12, 2018), https://www.wired.com/story/thank-colleges-for-imminent-carbon-taxes-no-seriously-thank-them/.

[8] For the distinction between externally and internally imposed carbon prices, see MADDEN ET AL., *supra* note 6.

Local Laws

As mentioned above, in April 2019, the City Council passed Introduction 1253 to require GHG emission reductions from large existing buildings starting in 2024. The legislation establishes progressively more stringent limits on building energy use from 2024 and onwards. Introduction 1253 establishes annual GHG emissions targets for privately-owned buildings over 25,000 square feet. Buildings that emit more than the allowable volume of GHG emissions will be fined up to $268 per excess metric ton of emissions.

Introduction 1253 is a highly innovative initiative. NYC is the first U.S. city to require that buildings undertake potentially costly measures to reduce their GHG emissions to meet regulatory targets. In order to avoid financial penalties for non-compliance, building owners will have to make investments to reduce their emissions to stay within the legally permissible annual caps on GHG emissions, and these caps will be ratcheted down over time. The legislation also includes a notable requirement that the City complete a study of establishing an emissions trading regime by January 2021.

Emissions trading is a proven economic approach for reducing air pollution. Rather than requiring all covered sources to reduce their emissions by the same amount, it allows sources to allocate emission reductions among themselves, provided the sum total of reductions adds up to the "cap" established by government. There are many examples of emissions trading programs to reduce GHGs and conventional air pollutants in the U.S. and abroad from power plants and other large industrial sources of pollution. There is no experience to our knowledge applying an emissions trading regime to buildings in the U.S.; however, Tokyo has a GHG emissions trading regime that covers commercial buildings that might offer lessons for an NYC regime.[9] Under an emissions trading regime, it would not be necessary for every building to reduce its GHG emissions. Buildings that can cheaply reduce their emissions might aggressively do so and then sell credits for reductions to buildings with higher abatement costs, thereby reducing the overall cost of achieving the City's GHG reduction goals. As the owner of a large number of buildings, NYU might benefit from an emissions trading regime because the University could focus on reducing emissions in the buildings where reductions can be achieved at least cost, perhaps in accordance with capital improvement plans. The University also might be able to sell credits to other building owners with higher abatement costs and thus treat GHG emission reductions as a commodity.

Introduction 1253, which is the culmination of years of efforts,[10] expands on earlier City efforts to increase the energy efficiency of existing buildings and thereby reduce their GHG emissions. Local Law 84 of 2009 required buildings over 50,000 square feet to benchmark their energy and water use against similar buildings and report this information to the City; NYU owns or leases approximately 84 buildings of this size or larger.[11] Local Law 133 of 2016 expanded the buildings that must benchmark their energy and water use to buildings over 25,000 square feet;[12] NYU owns or leases approximately 103 buildings of this size.[13]

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[9] On Tokyo's building emissions trading regime, see, e.g., Sven Rudolph & Toru Morotomi, *Acting Local! An Evaluation of the First Compliance Period of Tokyo's Carbon Market*, 1 CARBON & CLIMATE L. REV. 75 (2016); Sven Rudolph, *Carbon Markets in Japan: Recent Experiences from CO2 Cap-and-Trade at the National and Local Level*, CARBON & CLIMATE L. REV. 354 (2012); ENVIRONMENTAL DEFENSE FUND ET AL., TOKYO: AN EMISSIONS TRADING CASE STUDY (May 2015).

[10] Brady Dennis & Kayla Epstein, *New York's Buildings Emit Most of its Greenhouse Gases. The Mayor has a Plan to Change That.*, WASHINGTON POST, (Sept. 13, 2017), https://www.washingtonpost.com/news/energy-environment/wp/2017/09/13/new-yorks-buildings-emit-most-of-its-greenhouse-gases-the-mayor-has-a-plan-to-change-that/?noredirect=on&utm_term=.28b06c867284.

[11] *See* NYU Owned v Leased Properties (on file with author).

[12] Local law No. 133, https://www1.nyc.gov/assets/buildings/local_laws/ll133of2016.pdf.

[13] *See* NYU Owned v Leased Properties (on file with author).

Local Law 33 of 2018 requires that, starting in 2020, buildings over 25,000 square feet publicly display letter grades reflecting their energy efficiency, and establishes the scores that will garner different grades.[14] Publicly grading buildings based on their energy efficiency is intended to create a market incentive for building owners to increase the efficiency of their buildings, and in so doing reduce building GHG emissions. The theory is similar to that behind requiring restaurants to openly display letter grades; restaurant grades are intended to prompt greater restauranteur attention to complying with health requirements. Grades will be based on Energy Star scores, which are a measure of a building's energy performance as compared to other, similar buildings.[15] Notably, Introduction 1251, which passed in April of 2019, amended the initial grading scheme contemplated by Local Law 33 and results in a larger number of properties receiving Cs and Ds.

We were able to obtain Energy Score data for 30 NYU buildings for 2017, the most recent year from which Energy Star data are available on the NYC benchmarking database.[16] Table 1 identifies how many of these 30 buildings would receive As, Bs, Cs, and Ds under Introduction 1251 (assuming that the data that we obtained is correct). NYU's 2017 Energy Star scores indicate that many NYU buildings will receive As, but many buildings will garner Bs, Cs and even Ds.[17] In fact, under Introduction 1251, 50% would earn less than an A. This data indicates that NYU should be focusing on improving the energy efficiency of its buildings to avoid the embarrassment of having to display low letter grades near the entrances to certain buildings.

Table 1: Projected Letter Grades for 30 NYU Energy Star-Scored Buildings from 2017 Data

Grade	Count/Percent
A	15 (50%)
B	4 (13%)
C	5 (17%)
D	6 (20%)

*Figures are rounded to nearest whole percent

NYU's GHG Reduction Commitments

In addition to the external incentives that the City policy environment provides to focus on building energy efficiency, NYU also has internal incentives to improve building energy efficiency because the University has committed to achieving ambitious GHG reduction by 2025 and 2040.

In 2012, NYU succeeded in reducing its emissions by 30% from a 2006 baseline as part of the NYC Carbon Challenge.[18] NYU subsequently pledged to achieve a 50% reduction from the 2006 baseline in emissions

[14] Local Law No. 33, https://www1.nyc.gov/assets/buildings/local_laws/ll33of2018.pdf; New York City, *NYC Benchmarking Law Frequently Asked Questions*, http://www.nyc.gov/html/gbee/downloads/pdf/NYC%20Benchmarking%20Law%20One%20Pager_final.pdf (last visited July 30, 2018).
[15] Local law No. 33, https://www1.nyc.gov/assets/buildings/local_laws/ll33of2018.pdf.
[16] As implied above, NYU has 103 buildings meeting the 25,000 square feet threshold for letter grades under Local Law 33. One reason that not all 103 NYU buildings have Energy Star scores is that Energy Star does not currently score College/University type buildings.
[17] See Appendix A for a full description of the data.
[18] N.Y.C. Mayor's Office of Sustainability, New York University, https://www1.nyc.gov/html/gbee/html/challenge/nyu.shtml (last visited Feb. 10, 2019).

by 2025.[19] In addition, NYU is a signatory to the American College and University President's Climate Commitment and has pledged to achieve carbon neutrality by 2040.[20]

Since meeting the 30% reduction target in 2012, NYU's GHG emissions have remained fairly stable and even increased slightly.[21] This trajectory suggests that NYU requires a renewed focus on reducing GHG emissions from buildings, which account for a large share of the University's emissions. Otherwise, the University risks failing to meet its own commitments.

Reputational Benefit

Lastly, NYU stands to reap considerable reputational benefits from implementing aggressive measures to reduce GHG emissions from its buildings. Yale University has received significant press coverage and acclaim for its decision to introduce a program pricing carbon emissions from its buildings.[22] As a premier urban university, NYU could distinguish itself by developing and publicizing its own approaches to reducing GHG emissions from buildings and setting an example for other building owners in the largest U.S. city. On the flip side, given Local Law 33's letter grades, NYU may suffer reputational costs if some of its buildings continue to use energy inefficiently.

Aside from the potential for favorable press coverage, such an innovative program presents an exciting opportunity for faculty and students from a range of schools to use the NYU campus as a laboratory for reducing GHG emissions in an urban environment. Unlike many other private building owners, NYU has the ability to make its efforts to reduce building emissions available for academic input and research.[23] It also has the benefit of having leading researchers on building energy efficiency on campus, such as Constantine Kontokosta at the Marron Institute.[24] An innovative program to reduce building GHG emissions could draw on, and provide the basis for, academic research, and attract students interested in environmental engineering and policy. It also might be of interest to foundations and others interested in funding decarbonization to limit climate change.

III. How NYU Currently Manages Building Energy Use and Innovations Elsewhere

To develop a plan to green NYU's buildings, it is necessary to understand how NYU currently manages its energy use, and options that NYU might consider to further reduce its GHG emissions.

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[19] Press Release, New York University, NYU Outlines Sustainability Efforts for 2018-19 and Beyond (Sept. 26, 2018), https://www.nyu.edu/about/news-publications/news/2018/september/nyu-outlines-sustainability-efforts-for-2018-19-and-beyond.html.

[20] New York University, *NYU's Climate Commitments*, https://www.nyu.edu/content/dam/nyu/universityInitiatives/images/181mercer/NYUclimateCommitments.pdf (last visited Aug. 27, 2018).

[21] NYU Better Buildings Powerpoint (on file with Author). NYU's emissions reached their lowest point in 2012 and increased slightly in 2013 and 2014.

[22] *See, e.g.*, Kenneth Gillingham et al., *Lessons from First Campus Pricing Scheme*, 551 NATURE 27 (Oct. 31, 2017), https://www.nature.com/news/lessons-from-first-campus-carbon-pricing-scheme-1.22919; Matt Simon, *Thank Colleges for Imminent Carbon Taxes (No Seriously, Thank Them)*, WIRED (Mar. 12, 2018), https://www.wired.com/story/thank-colleges-for-imminent-carbon-taxes-no-seriously-thank-them/; Yale University, *John Kerry Congratulates Yale on Carbon Charge*, https://carbon.yale.edu/news/john-kerry-congratulates-yale-carbon-charge (last visited Aug. 27, 2018). The Yale pricing program is described further below.

[23] *See also* Gillingham et al., *supra* note 22.

[24] For Dr. Kontokosta's recent work, see The Urban intelligence Lab, http://www.urbanintelligencelab.org/people/ (last visited Feb. 12, 2018).

As discussed below, since NYU does not pay for the GHG emissions from its current energy use, it has no direct external incentive to reduce GHG emissions beyond a general incentive to reduce energy costs overall. Working on their own, some universities and colleges have recently begun accounting for their building GHG emissions through internal carbon pricing programs. These programs may not be appropriate for NYU, but they are interesting precedents for the University to consider as it formulates a response to the novel NYC policies to reduce building GHG emissions and looks toward achieving the University's own commitments to reducing its GHG emissions.

NYU's Energy Use Management

Currently, NYU does not account for the contribution its buildings' GHG emissions make to global climate change. Specifically, while the University pays its energy bills, these bills currently do not incorporate a charge reflecting the social costs of GHG emissions, and, as such, the University does not pay for its buildings' GHG emissions from heating and cooling or electricity use. NYU therefore has little economic incentive to focus on reducing its emissions.[25] Nor does NYU charge its constituent departments for the GHGs they emit from their buildings, as Yale does, or use a shadow price reflecting the costs of GHG emissions in internal planning decisions as Swarthmore and some other universities and colleges do. It would certainly be more efficient if University's energy provider, Con Ed, fully incorporated the social costs of GHG emissions at the billing stage, but, in the absence of such a program, NYU can create incentives for energy use reduction at the University-level.[26] Further, Introduction 1253 will impose costs on NYU and other large building owners for emitting GHGs and create a new external incentive to focus on reducing GHG emissions.

NYU largely pays for building energy use centrally; this centralization creates both advantages and disadvantages for reducing building GHG emissions in the new world where they have reputational and potentially financial consequences. The centralization of financial responsibility for building energy use

[25] The only economic incentive to consider carbon dioxide emissions is the price that is built into electricity prices paid by NYU by the state law requirement that electricity generators purchase Regional Greenhouse Gas Initiative (RGGI) permits to emit carbon dioxide. However, the inclusion of the price of RGGI permits adds little to the cost of electricity paid by NYU; power generators currently pay only $5.35 per ton of carbon dioxide emitted (according to the most recent clearing price data). Dept. of Environmental Conservation, *The Regional Greenhouse Gas Initiative*, https://www.dec.ny.gov/energy/rggi.html (last visited Sept. 20, 2018); RGGI, Inc., *Auction Results*, https://www.rggi.org/auctions/auction-results (Feb. 10. 2019). Electricity rates in New York State also incorporate a System Benefits Charge, but this charge is not calibrated to equal the magnitude of social costs that greenhouse gas emissions impose. New York State Dept. of Public Service, *System Benefits Charge* (June 3, 2014), http://www3.dps.ny.gov/W/PSCWeb.nsf/All/58290EDB9AE5A89085257687006F38D1?OpenDocument.

There currently are discussions at the New York State Independent System Operator (NYSIO) of adding a cost to wholesale electricity prices to reflect the social cost of GHG emissions. On the proposal, see, e.g., Robert Walton, *Earliest New York Will Have Carbon Price is Q2 2021*, UTILITY DIVE (July 19, 2018), https://www.utilitydive.com/news/earliest-new-york-will-have-carbon-price-is-q2-2021-nyiso-says/528100/; NEW YORK INDEPENDENT SYSTEM OPERATOR, IPPTF CARBON PRICING PROPOSAL (Prepared for the Integrating Public Policy Task Force) (Dec. 7, 2018).

It should be remembered that NYU's building-related GHG emissions stem not only from electricity use, but also heating and cooling buildings. Moreover, the major source of building GHG emissions is burning fossil fuels onsite to heat and cool buildings, not the GHG emissions associated with the production of electricity used by buildings. ARJUN MAKHIJANI, MAKING RESIDENTIAL HEATING AND COOLING CLIMATE-FRIENDLY IN NEW YORK STATE 5 (2017) (Prepared for Alliance for a Green Economy) ("Space and water heating and air conditioning in New York State's buildings are responsible for more CO_2 emissions – about 50 million metric tons in 2011 – than the entire electricity sector (including electricity imports) – about 42 million metric tons."). Building emissions for heating and cooling are unaffected by RGGI and the proposed NYSIO carbon adder.

[26] See *supra* note 25 for a discussion of current energy pricing in New York City.

takes the following form. A team within the Office of Capital Projects and Facilities, largely pays for energy usage across the University, paying ConEd for electricity for example. In FY 2019, Facilities paid $39,551,000 for energy usage, which was 1.2% of the University's total expense budget. The University Budget Office allocates to departments a "Facilities Charge," which is a pro-rated share of projected University facilities costs; this charge includes a component for projected energy use. The energy component is based on a central administration prediction of a building's energy use, based mostly on prior cost and consumption trends. At year-end, departments are not told their actual energy consumption and projected and actual energy costs are not reconciled.[27] If the department uses less energy than Facilities predicted that it would, the department is not refunded the extra; conversely, if the department uses more than the predicted amount the University pays the extra charge. [28] This system of shared risk ensures that building occupants are not penalized for unforeseen circumstances (e.g. cold or hot weather events).

The centralization of responsibility for energy costs means that the central administration has an incentive to reduce these costs because it benefits from resultant cost savings and reputational rewards. The central administration has made several significant investments in the past in improving campus energy efficiency. For example, several NYU buildings have been LEED certified[29] and, going forward, NYU has committed to requiring all new construction projects to achieve LEED certification, with a LEED silver minimum target.[30] The University also has installed 4,500 occupancy sensor lighting controls and 4,700 occupancy sensor air conditioning and heating controls across campus.[31]

Perhaps the most high-profile central investment in the past in energy efficiency was the renovation of the natural gas powered CoGeneration Plant in 2011 which decreased GHG emissions by 20% over the previous, oil-fired plant.[32] NYU's CoGeneration Plant, which provides heating to 28 University buildings and 3 non-University buildings, cooling to 21 University buildings and 1 non-University building, and electricity to 28 University buildings, operates on a simplified system. Not all buildings that receive power from the plant are metered, so the cost of running the plant is allocated to departments based on the square footage of buildings receiving commodities (heating, cooling, or electricity) from the CoGen plant, and this allocation is weighted based on the type of commodity involved. NYU has developed a limited metering system to charge non-NYU parties who receive commodities from the CoGen plant.

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[27] NYU buildings are metered separately for electricity purchased from Con Ed, thus information is available on the power consumption at the building level. However, several departments may occupy a building, which might complicate efforts to allocate electricity costs among departments based on actual usage, even though total building usage is available from the Con Ed meter.

[28] There are limited exceptions to this billing system. The Law School's energy usage is charged directly to its operating budget, giving the school much more detail on its facilities costs. Faculty Housing has the same arrangement.

[29] See the full list at New York University, *Built Environment & Landscaping*, https://www.nyu.edu/life/sustainability/areas-of-focus/built-environment---landscaping.html (last visited Aug. 27, 2018).

[30] NYU Better Buildings PowerPoint (on file with author).

[31] New York University, *Infrastructure and Sustainability*, https://www.nyu.edu/about/leadership-university-administration/office-of-the-president-emeritus/accomplishments/infrastructure-and-sustainability.html (last visited Aug. 27, 2018),

[32] Press Release, New York University, NYU Switches on Green CoGen Plant and Powers Up for Sustainable Future (Jan. 21, 2011), https://www.nyu.edu/about/news-publications/news/2011/january/nyu-switches-on-green-cogen-plant-and-powers-up-for-the-sustainable-future.html; New York University, *Energy*, *supra* note 2. NYU is currently expanding the CoGeneration Plant. For project updates, see New York University, *Co-Generation Plant Upgrade*, https://www.nyu.edu/community/nyu-in-nyc/construction/current-projects/co-generation-plant-upgrade.html (last visited Feb. 14, 2019).

Centralized responsibility for energy costs and investments in energy efficiency might be justified on the basis that under NYU's current governance system, schools and departments generally do not choose where they are placed and which buildings they occupy – such space is centrally allocated. In conjunction, not all of NYU's buildings are equally energy efficient – some are newly renovated or constructed and LEED certified while others are older members of the building portfolio. The University's administration also may be better positioned than many of its constituent departments to improve energy efficiency and reduce GHG emissions because it has more access to necessary capital, and there may be economies of scale in proceeding on a multi-unit basis.

However, the centralization of responsibility also means that departments, or more specifically building users, have no economic incentive to improve energy efficiency and reduce their GHG emissions through behavioral changes that they are well positioned to make, such as reducing building temperatures and electricity use. As explained above, departments across the University are not informed of, or billed for, their actual energy consumption and so have no means or incentive of factoring this consumption into their activities. While it is possible that the largest improvements in energy efficiency and reductions in GHG emissions might require capital investments that are best made by the central administration, behavioral changes might still be a cost-effective way of improving energy efficiency and reducing GHG emissions.

The University implicitly recognizes the potential for building users to reduce energy use through behavioral changes by annually organizing NYU Unplugged during Earth Week. NYUnplugged is an annual weeklong competition between residence halls to reduce their energy consumption.[33] However, outside of time limited events such as NYUnplugged, NYU largely leaves energy savings through behavioral changes on the table, by relying solely on central investments in energy efficiency.

Innovative Carbon Pricing Programs at Other Universities and Colleges

Recently, other universities and colleges have introduced internal carbon pricing mechanisms to spur greater internalization of the costs of energy use, including the social costs of GHG emissions. These initiatives in higher education follow the efforts of hundreds of companies around the world to use carbon prices in making investment decisions.[34] NYU is differently situated than other U.S. schools that have adopted internal carbon pricing because the University must comply with New York City's unique local laws requiring the posting of letter grades for building energy efficiency, and mandatory reductions in building GHG emissions under Introduction 1253.[35] Nonetheless, other schools' internal carbon pricing programs provide some ideas that NYU might consider in further greening its buildings. Yale's carbon pricing program, in particular, is an interesting effort to spur behavioral changes by building users.

In general terms, universities and colleges have adopted two types of approaches to carbon pricing. One is shadow pricing, which involves factoring in the social costs of GHG emissions when considering the costs and benefits of future projects. The second approach charges departments for GHG emissions from energy

[33] The 2013 description of NYUnplugged states that "[t]he contest awards NYU apparel for all students at the residence hall that lowers its electricity use by the greatest percentage against a baseline of three year historical usage for the same week." Press Release, New York University, NYU Residence Halls Unplug for Energy Reduction Competition, April 15-22, 2013 (Apr. 8, 2013), https://www.nyu.edu/about/news-publications/news/2013/april/nyu-residence-halls-unplug-for-energy-reduction-competition-april-15-22-2013.html. NYUplugged started in 2008. *Id.*

[34] *See*, e.g., Gillingham et al., *supra* note 22.

[35] NYU's position is similar to that of the University of British Columbia (UBC) after British Columbia's government imposed a carbon tax under which the University "is required to pay $60 per metric tonne of carbon dioxide equivalent emitted (MTCDE)." On UBC's response to the provincial carbon tax, see MADDEN ET AL., *supra* note 6.

use in existing buildings. A university could adopt a shadow price without implementing a carbon change and vice versa, although the two instruments also can be combined. A carbon charge ensures that departments account for their day to day GHG emissions from energy usage while a shadow pricing scheme encourages administrators to take the cost of GHG emissions into account when making investment decisions.

Shadow Pricing

Shadow pricing is a tool for accounting for the price of carbon emissions in future projects. It requires the selection of a shadow price that reflects the cost of a metric ton of GHG emissions. One option is the "Social Cost of Carbon," ("SCC") a monetary value initially developed by the federal government under the Obama administration to incorporate the consequences of GHG emissions into cost-benefit analysis of proposed regulations.[36] Estimates of the SCC vary but electricity regulators in New York State recently set a value of $47.30 for a ton of emissions in 2020.[37]

The shadow price is incorporated into a budget analysis of a proposed project. For example, in considering whether to construct a new campus facility, the administration would estimate the GHG emissions that would result from the construction and lifetime use of the building, multiply the emissions estimate by the SCC, and use the resultant value as one of the many costs of the project when considering whether to go forward. The shadow price could be fully incorporated into the budget analysis of the proposed project like other standard costs of the project. Alternatively, the shadow price could be considered separately from other project costs, so that decisionmakers are made aware of the GHG costs of a project that they are considering but allowed to treat them discreetly. The shadow price also could be used to monetize the benefits of university projects to improve energy efficiency, such as refurbishing a building, to recognize the benefits of avoiding greenhouse gas emissions.

Swarthmore has implemented a shadow pricing scheme at $100 per CO2e[38] ton emission. Harvard University has also developed a life cycle costing calculator, which has been influential in the development of other schools' shadow pricing efforts.[39] This calculator allows decisionmakers to consider all of the

[36] For background on the "social cost of carbon," including a link to a National Academy of Sciences report on it, see Resources for the Future, *RFF's Social Cost of Carbon Initiative*, http://www.rff.org/research/collection/rffs-social-cost-carbon-initiative. The Trump Administration has revised the estimates of the social cost of carbon downward as part of its justification for rolling back Obama-era regulations of GHGs. Richard G. Newell, *Unpacking the Administration's Revised Social Cost of Carbon*, RESOURCES FOR THE FUTURE BLOG (Oct. 10, 2017), http://www.rff.org/blog/2017/unpacking-administration-s-revised-social-cost-carbon. The Institute for Integrity at NYU has considerable in-house expertise on the social cost of carbon. *See* Institute for Policy Integrity, *The Costs of Carbon Pollution*, https://costofcarbon.org/.

[37] Institute for Policy Integrity, *NYISO and NYSPSC Work on Carbon Price for Wholesale Market*, https://costofcarbon.org/states/entry/nyiso-and-nyspsc-work-on-carbon-price-for-wholesale-market (last visited Feb. 14, 2019). The Obama Administration's SCC estimate for 2015 was $38. Howard Shelanski & Maurice Obstfeld, *Estimating the Benefits from Carbon Dioxide Emissions Reductions* (July 2, 2015), https://obamawhitehouse.archives.gov/blog/2015/07/02/estimating-benefits-carbon-dioxide-emissions-reductions.

[38] CO2e stands for "Carbon dioxide equivalent." This term is used to express all types of GHG emissions in terms of the amount of CO2 that would have the "equivalent global warming impact." Matthew Brander, *Greenhouse Gases, CO2, CO2e, and Carbon: What Do All These Terms Mean?*, ECONOMETRICA (2012), https://ecometrica.com/assets/GHGs-CO2-CO2e-and-Carbon-What-Do-These-Mean-v2.1.pdf.

[39] *See* Harvard University Sustainability, *Life Cycle Costing*, https://green.harvard.edu/topics/green-buildings/life-cycle-costing (last visited Aug. 28, 2018).

present and future costs of a project, including its GHG emissions.[40] The use of Life Cycle is part of Harvard's Green Building Standards, which are requirements for capital projects that exceed $100,000.[41]

Carbon Charges

To make departments consider the climate change costs of their use of existing buildings, schools have implemented carbon charges.

Yale University is well-known in university sustainability circles for its building-by-building carbon charge. Its leadership likely the reflects the presence on its faculty of Professor William Nordhaus, who shared the 2018 Nobel Prize in Economics with NYU Professor Paul Romer; Nordhaus was a pioneer in using economics to analyze climate change, and his work helped to lay the groundwork for the Social Cost of Carbon.[42] Yale piloted an internal carbon charge program for 20 buildings from December 2015 to May 2016,[43] and implemented a University-wide carbon charge program in July 2017.[44] To implement the full program, the University was divided into "administrative units." These units range from separate schools (School of Law, School of Drama) to sections of Yale's campus (i.e. West Campus).[45] Each building used by an administrative unit receives a monthly report detailing its energy use and the administrative units were charged $40 per metric ton of carbon dioxide equivalent emitted[46] (MTCDE).[47] The emissions reduction (or increase) for each building is compared to Yale's average emissions reduction, and if the building outperforms the average, the administrative unit that is responsible for the building receives a rebate.[48] Conversely, if the building performs poorer that the average, the administrative unit associated with the building pays a net charge.[49] Essentially, all buildings are charged per unit of emissions and then the money is redistributed to give high performing buildings a rebate and buildings that performed poorly, a charge.[50] This program is revenue neutral; the central university does not receive any of the money collected from the carbon charges.

In contrast to Yale's building-by-building approach, Swarthmore levies a flat carbon charge on all departmental budgets based on the volume of the College's CO2 equivalent emissions as a whole.[51] The volume of campus emissions is multiplied by the Social Cost of Carbon, and the resultant amount is then allocated among departments as a tax on departmental budgets.[52] In 2018, the carbon charge amounted to a 1.25% tax on all departmental budgets; in addition, departments and offices can make voluntary, additional contributions to the fund.[53] The revenue from this tax goes into a Carbon Charge Fund which is

[40] *Id.*
[41] Harvard University Sustainability, *Green Building Standards*, https://green.harvard.edu/topics/green-buildings/green-building-standards (last visited Sept. 20, 2018).
[42] Kenneth Gillingham, *The Costs of Climate Change*, YALEGLOBAL ONLINE (Oct. 18, 2018), https://yaleglobal.yale.edu/content/costs-climate-change.
[43] Yale Carbon Charge Project, *Yale University's Carbon Charge: Preliminary Results from Learning by Doing* 1 (2016).
[44] Yale Carbon Charge Project, *Implementation*, https://carbon.yale.edu/implementation (last visited Feb. 14, 2019).
[45] Yale Carbon Charge Project, *Frequently Asked Questions*, Yale University, https://carbon.yale.edu/about/frequently-asked-questions (last visited July 31, 2018).
[46] Metric ton of carbon dioxide equivalent (MTCDE) refers to the same measurement as CO2e, see *supra* note 38.
[47] Yale Carbon Charge Project, *Implementation*, *supra* note 44.
[48] Yale Carbon Charge Project, *Frequently Asked Questions*, *supra* note 45.
[49] *Id.*
[50] Yale Carbon Charge Project, *Implementation*, *supra* note 44.
[51] Swarthmore College, *The Carbon Charge to Departments*, https://www.swarthmore.edu/sustainability/carbon-charge-to-departments (last visited Sept. 1, 2018).
[52] *Id.*
[53] *Id.*

used to pay for research, education, and for energy efficiency projects, as allocated by the Carbon Charge Committee.[54] Departments do not currently receive individual information on their energy use, as Swarthmore currently lacks the metering capacity to provide such information.

The Swarthmore charge focuses on raising campus awareness and revenue for sustainability actions. The Swarthmore charge is likely less effective than the Yale program in encouraging individual units to reduce their energy use than the Yale charge because the Swarthmore charge is not based on actual energy use. While the Yale charge may not be appropriate for NYU given NYU's current framework for managing energy use and the policy environment in New York City, the Yale program is an interesting decentralized effort to enlist administrators, students and faculty across a university in reducing energy use. It might be worth investigating whether there are other ways of encouraging greater awareness of energy use and spurring behavioral changes to reduce energy use among university administrators, students and faculty as part of improving building energy efficiency.

IV. Recommendations

NYU and its Office of Sustainability should seize the opportunity created by the City's buildings initiatives to continue to reduce energy use in its building stock and enhance its reputation as an environmental leader. To do so, the University needs to develop an ambitious plan to reduce building energy use that treats the campus as an urban laboratory and communicates the University's intentions to be a force for innovation in improving building energy efficiency. To develop such a plan, the President and the Provost should appoint a high-level Working Group of staff, faculty, and students to work with the Office of Sustainability to prepare a report within six months that would be the basis for a presidential initiative to green NYU's buildings. Involving a working group in the preparation of a plan would help to promote awareness of building energy use across campus and the need to reduce it. Broad awareness of energy use is necessary to make the fundamental changes required to green NYU's buildings.

The overarching mandate of the Office and the Working Group should be to develop a proposed plan to aggressively reduce energy use in NYU's buildings. The Office and the Working Group should be specifically tasked with the following four responsibilities:

1. *Take Stock of NYU's Existing Obligations and Commitments to Reduce Building GHG Emissions*

As explained above, there are a variety of reasons why NYU should redouble its efforts to reduce energy use in its buildings including: Local Law 33, which will require that many University buildings display letter grades indicating their energy performance starting in 2020; Introduction 1253, the new law mandating that buildings reduce their GHG emissions and that the City analyze establishing a GHG emissions trading regime for buildings to further reduce building emissions; NYU's commitments to reducing its GHG emissions by 50% by 2025 and to achieve carbon neutrality by 2040;and the potential for reputational benefits and energy cost savings.

The recent history of University GHG emissions suggests that NYU is not on track to aggressively reduce its GHG emissions. Since 2012, NYU's GHG emissions have been stable and even increased slightly.[55] The Working Group should analyze how NYU buildings are likely to be rated in 2020 under Local Law 33, and whether NYU is on track to comply with Introduction 1253's mandatory reductions in GHG

[54] Swarthmore College, *The Carbon Charge Fund*, https://www.swarthmore.edu/sustainability/carbon-charge-fund (last visited Sept. 1, 2018).
[55] NYU Better Buildings Powerpoint (on file with author).

emissions and its own commitments to reduce its GHG emissions. The Working Group should clearly identify any assumptions underpinning its analysis of the University's predicted GHG trajectory.

2. Establish a Shadow Price for GHG Emissions

The Working Group should recommend a shadow price for GHG emissions from buildings that NYU uses in costing future building and energy efficiency projects. As described above, a shadow price is a price that the central administration considers in decisionmaking; it is not a price paid by a university department. Some universities and colleges already use a shadow price to factor the costs of GHG emissions into planning for future projects, similar to the way that over 500 private firms use shadow carbon pricing in planning investments.[56] Shadow pricing will enable NYU decisionmakers to consider the climate change consequences of building and other decisions. It makes economic sense for the University to adopt a shadow price to guide its budgetary decisionmaking because local NYC laws mean that the University will now face increased costs for building GHG emissions – reputational costs for building inefficiency because of the legal requirement to post letter grades, and direct expenses under the legislation establishing mandatory GHG emission budgets for buildings..

Shadow pricing is a relatively straightforward tool to implement in part because it affects mainly the central administration. The key variable is the choice of the shadow price. NYU is fortunate in having on campus at the Institute for Policy Integrity leading US experts on the Social Cost of Carbon, which is likely the most widely used basis for converting the social consequences of climate change into a monetary value.[57] In addition to selecting a shadow price for GHG emissions, NYU must decide whether to fully incorporate the shadow cost of GHG emissions into the budget analyses of projects, or merely identify the cost on a separate line so that decisionmakers can choose how to consider GHG emissions in making building choices. The Working Group should recommend how the shadow price should be used, in addition to what it should be.

3. Recommend Measures for NYU to Reduce Its Building GHG Emissions

In the past, NYU has focused on improving the energy efficiency of its buildings through centrally led initiatives, such as the renovation of the CoGeneration Plant, LEED certification of new buildings, and revamping lighting and heating and air conditioning. The Working Group should identify the costs and benefits of pursuing different levels of GHG reductions from buildings, as well as the costs and benefits of pursuing different strategies for reducing GHG emissions. Among the questions that the Working Group should consider is the relative merit of (1) continuing to focus on centrally led initiatives such as changes in energy sources (the renovation of the CoGeneration Plan) and building retrofits, as compared with (2) pairing centrally led initiatives with decentralized efforts to induce change from below by building users through changes in the way departments pay for energy costs or other means.

4. Recommend How the University Can Support a NYC Buildings Emissions Trading Regime

For over a decade, New York City has been seeking to spur improvements in energy efficiency and reductions in GHG emissions from large buildings through a variety of policy instruments. Introduction 1253 requires the City to undertake a study of using emissions trading to reduce building GHG emissions. An emissions trading regime appears to be a worthwhile municipal initiative because it holds out the promise of reducing GHG emissions at lower cost than other policy instruments, such as mandates that require all buildings to reduce their emissions by the same amount regardless of whether a building has

[56] Gillingham et al., *supra* note 22, at 27.
[57] *See* Institute for Policy Integrity, *The Costs of Carbon Pollution*, https://costofcarbon.org/.

high or low abatement costs. As the owner of a large number of buildings, NYU has the potential to be a major beneficiary of the City using an emissions trading regime to comply with GHG reduction targets. Such an approach might allow NYU to treat its buildings as a single portfolio and focus on achieving required GHG reductions at buildings where this can be done at least cost in line with capital planning, rather than reducing emissions at all NYU buildings. Additionally, NYU could also benefit from a program that allows it to treat its buildings as individual units and trade credits among them, allowing it to allocate reductions and costs among its own buildings most efficiently. Given the benefits that NYU stands to reap from emissions trading, and the academic expertise that members of the community have in the design of emissions trading programs, the Office of Sustainability and the Working Group should assemble an expert group that could provide recommendations to NYC as it attempts to build an emissions trading regime for buildings.

Supporting the Office of Sustainability and the Working Group

To fulfill their mandate the Office of Sustainability and the Working Group will need to be supported by staff, faculty, and students from across the University, and thus presidential and provostial interest in the initiative would be essential. Engineering, economic, business, policy, legal, maintenance, and operations expertise would be vital. Development should also assist in identifying potential outside funding sources, such as foundation sources, for academic work to analyze and spur NYU efforts to green its buildings. Communications should assist in developing a plan to communicate the University's efforts to green its buildings.

Reducing energy use in the University's buildings should be regarded as an ambitious initiative with a large potential upside for the University – and the environment.

Appendix A: Predicted Letter Grades for NYU Buildings

NYC collects energy data (and several other metrics) from all buildings covered under Local Law 84 and makes this data publicly available online. Building users submit this data via the Energy Star Portfolio Manager and receive a score measuring their building's performance against other similar buildings.[58] The table below identifies the Energy Star scores assigned to buildings that NYU owns and leases. Energy Star scores for 2017 are provided; they are the most recent data available from the NYC Benchmarking database.

The table below provides information about only 30 NYU buildings, even though NYU owns or leases 103 buildings that meet the size threshold of 25,000 square feet for posting letter grades under Local Law 33. Energy Star scores are available for so few NYU buildings partly because currently, Energy Star does not assign scores to the College/University Property Type. It is unclear if, prior to the 2020 Energy Grade posting requirement, Energy Star will begin awarding scores to the College/University type. Additionally, in gathering the data for this report, we noted several gaps in the reporting of NYU's energy use to the City. It is unclear whether these gaps are due to issues with NYU's reporting to the City, or issues with the City database.

In the table below, we have projected the letter grades that 30 NYU buildings would receive in 2020 based on their Energy Star scores for 2017, under Local Law 33 as modified by Introduction 1251. Under Introduction 1251, which was adopted in April of 2019, grades are allocated as follows: 85 or greater is an A, 84-70 is a B, 69-55 is a C, and all buildings that receive lower than a 55 are given a D. NYU would receive a considerable number of A grade scores, but the fact remains that not all of its buildings would receive favorable grades. Of the 30 buildings that currently have an Energy Star score, fifteen buildings would receive As, four would receive Bs, five would receive Cs, and six would receive Ds. In 2020, NYU will need to *conspicuously* post the Energy Grades for *all* buildings that receive an Energy Star score and are issued a corresponding grade. Unless NYU takes significant steps to improve energy efficiency, it will be required to prominently post several lower grades.

Energy Star Data Legend

D Grade	C Grade	B Grade	A Grade

Building Name or Address	BBL // BIN	Energy Star Score	Grade Per Int. 1251
2 Washington Square	1005530001	1	**D**
47 West 13th Street (L)	1005770015	17	**D**
Othmer Residence Hall	3001310025	32	**D**
636 Greenwich Street/Hotel (L)	1006030046	42	**D**
Palladium Hall	1005590022	45	**D**
University Hall	1005590012	48*	**D**
1 East 2nd Street (L)	1004570009	57	**C**
80 Lafayette Street (L)	1001720020	57	**C**
14 Washington Place	1005460015	59	**C**
10 Astor Place (L)	1005450026	60	**C**

[58] NYC Mayor's Office of Sustainability, NYC Benchmarking Law, http://www.nyc.gov/html/gbee/html/plan/ll84.shtml (last visited Sept. 20, 2018).

Brittany	1005620030	67	**C**
26th Street Dorm	1009310021	70	**B**
Carlyle I	1008430022	77	**B**
12th Street Dorm	1005560048	77*	**B**
Rubin Hall	1005680001	79	**B**
Gramercy Green	1008797502	86	**A**
Puck Building (L)	1005107502	87	**A**
105 E 17th Street (L)	1008730010	88	**A**
15 Washington Place	1005470020	91	**A**
2 MetroTech- 8th Flr Gaming (L)	3001480007	94	**A**
Paulette Goddard Hall	1005460001	100	**A**
29 Washington Square West	1005520060	100	**A**
D'Agostino Hall, 110 West 3rd Street	1005400014	100	**A**
Weinstein Hall	1005480004	100	**A**
Hayden Hall	1005520024	100	**A**
240 Mercer Street	1005320008	100	**A**
Silver Tower	1005240066	100	**A**
1 Washington Square	1005330001 // 1077833	100	**A**
3 Washington Square	1005330001 // 1077835	100	**A**
4 Washington Square	1005330001 // 1077836	100	**A**

*not included on the Covered Buildings List