COMMENTS

BUILDING BETTER BUILDING PERFORMANCE STANDARDS

by Danielle Spiegel-Feld and Katrina M. Wyman

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Policymakers at the local,[1] state,[2] and federal[3] levels are increasingly turning to building performance standards (BPSs) to reduce buildings' contributions to climate change. This growing interest in BPSs reflects the significance of buildings as a source of greenhouse gas (GHG) emissions; building emissions come from fossil fuels burned in buildings for cooking on natural gas stoves, from natural gas and oil used for heating and hot water, and from electricity bought by building occupants.[4] Performance standards seek to reduce GHG emissions attributable to buildings by setting a standard that buildings must meet. As the climate crisis accelerates, and the federal government continues to stumble in its efforts to decarbonize the energy sector, strategies that seek to reduce the market's appetite for carbon-intensive energy have become all the more important.

A key question in designing BPSs is what "metric" the standards should use to gauge a building's performance. For instance, should the laws measure and encourage reductions in the total amount of energy that buildings use? Or should the laws track and encourage reductions in the GHGs attributable to building energy use? The adage "you can't improve what you don't measure" underscores what is at stake in the debate about the metric for this emerging form of regulation.[5] Whether these laws measure the performance of buildings in terms of energy use, GHG emissions, or something else will have a major impact on the behavioral changes that they induce in buildings.

For example, a law that measures GHG emissions might induce building managers to substitute less GHG-intensive solar energy for more GHG-intensive oil or natural gas

Authors' Note: Spiegel-Feld was the lead author of a 2021 report for New York City that examined whether the city should develop a carbon trading program pursuant to its landmark building performance regulation, Local Law 97 of 2019. See Danielle Spiegel-Feld et al., *Carbon Trading for New York City's Building Sector: Report of the Local Law 97 Carbon Trading Study Group to the New York City Mayor's Office of Climate & Sustainability (2021). Wyman was also an author of the report. The views expressed in this Comment draw from lessons learned throughout the study of Local Law 97. Conversations with numerous members of the Local Law 97 Study Team, New York City officials, as well as outside stakeholders influenced our thinking about the design of building performance standards.*

1. *See*, *e.g.*, 2019 N.Y.C. Local Law No. 97, N.Y.C. Charter §651, N.Y.C. Admin. Code §§24-802(e), 24-803(a)-(b), 28-320, 28-321 (2022); Boston, Mass., Ordinance Amending City of Boston Code, Ordinances ch. VII, §§7-2.1 and 7-2.2, Building Energy Reporting and Disclosure (BERDO) (Oct. 5, 2021); Denver, Colo., Council Bill 21-1310 (Nov. 24, 2021); St. Louis, Mo., Building Energy Performance Standards (BEPS), Ordinance 71132 (Apr. 20, 2020); Washington, D.C., CleanEnergy DC Omnibus Amendment Act of 2018, D.C. Law 22-257, 66 D.C. Reg. 1344 (Jan. 18, 2019); Chula Vista, Cal., Ordinance 3498 (Mar. 2, 2021).
2. Washington State has a building performance standard (BPS). Washington State Department of Commerce, *Clean Buildings Performance Standard*, https://www.commerce.wa.gov/growing-the-economy/energy/buildings/clean-buildings-standards (last visited Feb. 20, 2022). In 2021, Colorado passed legislation directing the development of a BPS. Colorado Energy Office, *Building Benchmarking*, https://energyoffice.colorado.gov/climate-energy/energy-policy/building-benchmarking (last visited Feb. 20, 2022). New York State is considering developing a BPS. *See* New York State Climate Action Council, Draft Scoping Plan 123-25 (2021), https://climate.ny.gov/Our-Climate-Act/Draft-Scoping-Plan; New York State Energy Research and Development Authority (NYSERDA), *Day 1—Draft Carbon Neutral Buildings Roadmap Presentation*, YouTube, at 00:36 (June 23, 2021), https://www.youtube.com/watch?v=ldKaJk4fJm0.
3. President Joseph Biden issued an Executive Order on December 8, 2021, directing the Council on Environmental Quality to establish BPSs for federal buildings. Anna Phillips, *Biden Wants to Make Federal Government Carbon Neutral by 2050*, Wash. Post (Dec. 8, 2021, 4:18 PM), https://www.washingtonpost.com/climate-environment/2021/12/08/biden-government-purchasing-climate-change; Exec. Order No. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, §§205(a), 510(b), 86 Fed. Reg. 70935, 70936, 70941 (Dec. 8, 2021). In January 2022, President Biden officially announced the "Building Performance Standards Coalition," which includes 33 state and local governments. Rachel Frazin, *Biden Launches Green Buildings Partnership With States, Cities*, Hill (Jan. 21, 2022, 1:58 PM), https://thehill.com/policy/energy-environment/590805-biden-launches-green-building-partnership-with-states-cities. For a map of state and local jurisdictions with BPSs, see Institute for Market Transformation, *Building Performance Standards*, https://www.imt.org/public-policy/building-performance-standards (last visited Feb. 20, 2022).
4. RMI, *The Impact of Fossil Fuels in Buildings: A Fact Base*, https://rmi.org/insight/the-impact-of-fossil-fuels-in-buildings (last visited Mar. 2, 2022).
5. *See* Jacob Drucker, *You Are What You Measure*, Forbes (Dec. 4, 2018, 8:00 AM), https://www.forbes.com/sites/theyec/2018/12/04/you-are-what-you-measure (attributing the adage to Peter Drucker); *see also* Institute for Market Transformation, *Building Performance Policy Center*, https://www.imt.org/public-policy/building-performance-policy-center (last visited Feb. 20, 2022) (using the adage "[y]ou can't manage what you don't measure" in discussing benchmarking).

energy. However, the law will not necessarily incentivize the managers to pay attention to how much energy they use, because buildings can comply if they increase how much energy they use provided they use less GHG-intensive forms of energy, such as solar energy. The lack of attention to the amount of energy use is undesirable, because it may require the buildings' energy suppliers to build more new facilities for generating solar energy than they would have to if buildings simultaneously adopt solar energy and become more energy efficient. Recognizing the importance of the "metric" question for the design of BPSs, the U.S. Environmental Protection Agency (EPA) has been working on a white paper to provide guidance to local and state policymakers on how to select the appropriate metric for BPSs.[6]

This Comment offers recommendations regarding the choice of metrics. Our recommendations reflect the findings of a large-scale study of the predicted impacts of New York City's landmark BPS, Local Law 97 of 2019 (LL97), which caps the total GHG emissions of large buildings in New York City.[7] The study, which was conducted between February 2020 and June 2021, was led by a team of researchers at New York University (NYU), who worked in collaboration with the Brattle Group, HR&A Advisors, Steven Winter Associates, Sustainable Energy Partnerships, and the Mayor's Office of Climate and Sustainability. To our knowledge, the study marked the first rigorous analysis of the projected impacts of one of the emerging BPSs.[8]

A central takeaway from the study's analysis of LL97 in our view is that cities—and other levels of government—should be wary of following the lead of New York City[9] and Boston[10] in adopting BPSs that measure performance in terms of GHG emissions. The reason for this caution is that local governments and building owners have only limited control over the stringency of BPSs that peg compliance to GHGs. Electricity is a major source of energy for most buildings, yet cities typically do not control the carbon intensity of electricity that is supplied by the electricity grid. Thus, when cities adopt BPSs that incorporate GHG emissions from the grid, they are adopting a measure whose success depends on state or federal actions[11]; if the grid decarbonizes quickly, the performance targets they have set may be quite easy for the buildings to meet, while if the grid does not decarbonize, the targets could be quite challenging to meet.

To avoid this type of uncertainty, local policymakers should gear their BPSs toward reducing energy consumption instead of capping GHG emissions. Even at higher levels of government, the state or federal agencies in charge of establishing and monitoring BPSs are also unlikely to entirely control the carbon intensity of electricity supplied by the grid. As such, it may also behoove state and federal governments to establish BPSs that track and incentivize reductions in building energy consumption instead of GHG emissions.

The remainder of the Comment is structured as follows. It begins with some general background information on the case for regulating energy use in buildings. From here, we review the two general categories of metrics in existing BPSs and explain why an energy efficiency-based standard is superior to a GHG-based standard. Finally, we highlight the findings from the study of LL97 that underscore the disadvantages of regulating GHG emissions as opposed to energy use in a BPS.

I. Why Regulate Buildings?

Energy use in buildings is a major contributor to global GHG emissions. Nationwide, energy use in buildings accounts for more than 30% of annual GHG emissions.[12] In densely populated urban areas, where transportation is less GHG-intensive,[13] buildings' contribution to local emissions is often substantially more than the national average.

For example, in New York City, energy use in buildings is the source of approximately two-thirds of city GHG emissions.[14] Similarly, in Washington, D.C., energy use in

6. U.S. EPA, Building Performance Standards: Overview for State and Local Decision Makers 4-5 (2021) (EPA-430-F-21-002), https://www.epa.gov/system/files/documents/2021-12/section-2-building-performance-standards_2-12-2021_v2.pdf [hereinafter EPA BPSs] (discussing categories of performance metrics for BPSs); U.S. EPA, Understanding and Choosing Metrics for Building Performance Standards and Zero-Carbon Recognition—Draft (2021), https://www.energystar.gov/sites/default/files/asset/document/BPS-White_paper_v14May2021.pdf [hereinafter EPA Draft White Paper]; *see also* Institute for Market Transformation, Summary of IMT's Model Ordinance for a Building Performance Standard 9-10 (2021), https://www.imt.org/wp-content/uploads/2021/01/IMT-BPS-Model-Ordinance-Summary-January-2021-1-1.pdf (summarizing and analyzing options for metrics for BPSs).
7. Danielle Spiegel-Feld et al., Carbon Trading for New York City's Building Sector: Report of the Local Law 97 Carbon Trading Study Group to the New York City Mayor's Office of Climate and Sustainability (2021) [hereinafter CTS Report].
8. The overarching goal of the study was to examine the feasibility of developing a carbon trading program pursuant to LL97. However, in order to make this assessment, the study needed to first determine the predicted impact of LL97 as is, without a trading program, so that there would be a baseline for comparison. This Comment's discussion of the appropriate metric for BPSs is based on lessons we learned from the study's analysis of the expected impacts of LL97 as is; to be clear, the study itself did not examine the choice of metric for BPSs.
9. 2019 N.Y.C. Local Law No. 97, N.Y.C. Charter §651, N.Y.C. Admin. Code §§24-802(e), 24-803(a)-(b), 28-320, 28-321 (2022).
10. Boston, Mass., Ordinance Amending City of Boston Code, Ordinances ch. VII, §§7-2.1 and 7-2.2, BERDO (Oct. 5, 2021).
11. *See* Véronique Bugnion et al., Resources for the Future, Leading by Example: Building Performance Standards for Decarbonizing Federal Buildings 15-16 (2021), https://media.rff.org/documents/BPS_report_2.pdf (noting that local performance standards that measure performance in GHG emissions must be designed in a way that accounts for state and federal policy).
12. *See* United Nations Environment Programme, 2020 Global Status Report for Buildings and Construction: Towards a Zero-Emissions, Efficient and Resilient Buildings and Construction Sector—Executive Summary 4 (2020) (noting that "CO_2 emissions from the operation of buildings have increased to . . . 28% of total global energy-related CO_2 emissions," and to 38% if building construction emissions are included).
13. *See* Christopher Kennedy et al., *Greenhouse Gas Emissions From Global Cities*, 43 Env't Sci. & Tech. 7297, 7299 (2009) (finding an inverse relationship between population density and GHG emissions from the transportation sector).
14. CTS Report, *supra* note 7, at 26 n.29 (citing Ross MacWhinney & Omri Klagsbald, New York City Mayor's Office of Sustainability, Inventory of New York City Greenhouse Gas Emissions in 2016, at 4 (2017), https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/GHG%20Inventory%20Report%20Emission%20Year%202016.pdf).

Table 1. Percentage of GHG Emissions From Buildings in Cities

City	Percentage of GHG Emissions From Buildings
Boston	70%*
Chicago	70%**
Denver	64%***
New York	71%****
St. Louis	58%*****
Washington, D.C.	71%******

* City of Boston, *Building Emissions Reduction and Disclosure*, https://www.boston.gov/departments/environment/building-emissions-reduction-and-disclosure (last updated Feb. 22, 2022).
** Press Release, Office of the Mayor of Chicago, *Mayor Lightfoot Announces a Building Decarbonization Working Group* (June 2, 2021), https://www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2021/june/DecarbonizationWorkingGroup.html.
*** City and County of Denver, *High Performance Buildings & Homes*, https://www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Climate-Action-Sustainability-Resiliency/High-Performance-Buildings-Homes (last visited Feb. 20, 2022).
**** New York City Council, *Climate Mobilization Act*, https://council.nyc.gov/data/green/ (last visited Feb. 20, 2022).
***** City of St. Louis, 2018 Greenhouse Gas Emissions Inventory Report 13, 23-24 (2019), https://www.stlouis-mo.gov/government/departments/planning/sustainability/documents/upload/St-Louis-2018-GHG-Report-Final.pdf. Note that this figure includes only emissions from commercial and residential buildings; we have excluded emissions attributable to the industrial sector because the data provided do not disaggregate the energy used to produce industrial products from the energy used to operate the buildings that house industrial facilities (i.e., the energy needed for heating, lighting, elevators, etc.). Id. at 23-24. Thus, 58% is an underestimate of buildings' total contribution to St. Louis' GHGs.
****** Washington, D.C., Department of Energy & Environment, *Greenhouse Gas Inventories*, https://doee.dc.gov/service/greenhouse-gas-inventories (last visited Feb. 20, 2022).

buildings accounts for approximately 71% of total GHG emissions.[15] Given the relative contribution that large buildings make to these cities' total GHG emissions, their local governments have long made reducing emissions from large buildings a centerpiece of local climate mitigation plans.[16]

Buildings' GHG emissions come from two major sources: (1) on-site combustion of fossil fuels, such as oil and natural gas, for heating, cooling, hot water, and cooking; and (2) electricity purchased from the electricity grid. The extent to which buildings meet their energy needs through on-site combustion of fossil fuels versus grid-supplied electricity varies depending on the type of building. In New York City, on-site fossil fuel combustion accounts for a much larger share of total energy use in residential buildings than commercial buildings (such as office buildings). Approximately 74% of the GHG emissions from residential buildings subject to LL97 emissions caps come from on-site combustion,[17] compared to only 42% for commercial buildings.[18]

II. Design Options for BPSs

Bearing in mind the sources of buildings' GHG emissions and their substantial contribution to climate change, a number of jurisdictions have taken action to try to constrain emissions from buildings. Arguably the most widespread tool as of today is to set energy-efficient construction standards for new buildings.[19] Increasing energy efficiency should lower GHG emissions by reducing the amount of energy consumed, assuming, as is often the case, that energy is generated using fossil fuels, such as natural gas and oil. Some jurisdictions have also begun to restrict the ability to connect new buildings to natural gas.[20] These policies targeting new buildings are important, but are insuf-

15. Washington, D.C., Department of Energy & Environment, *Greenhouse Gas Inventories*, https://doee.dc.gov/service/greenhouse-gas-inventories (last visited Feb. 20, 2022).
16. *See*, *e.g.*, New York City Mayor's Office of Climate Justice & Environmental Justice, *Greener Greater Buildings Plan, 2009*, https://www1.nyc.gov/site/sustainability/legislation/greener-greater-buildings-plan-2009.page (last visited Feb. 20, 2022); City of Chicago, Chicago Climate Action Plan: Our City. Our Future. 17 (2008), https://www.chicago.gov/content/dam/city/progs/env/CCAP/CCAP.pdf; Climate Ready DC, The District of Columbia's Plan to Adapt to a Changing Climate 9-10 (2015), https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/CRDC-Report-FINAL-Web.pdf.
17. CTS Report, *supra* note 7, at 10.
18. *Id.*
19. *See*, *e.g.*, N.Y.C. Admin. Code §28-1001 (2022) (New York City Energy Conservation Code); N.Y. Comp. Codes R. & Regs. tit. 19, §1240 (2020) (New York State Energy Conservation Construction Code); Cal. Code. Regs. tit. 24, pt. 6 (2019) (California Energy Code).
20. Berkeley, California, became the first city to ban natural gas hookups in new buildings in 2019. Berkeley, Cal., Code §12.80 (2021); Emilie Raguso, *Berkeley First City in California to Ban Natural Gas in New Buildings*, Berkeleyside (July 17, 2019, 4:19 AM), https://www.berkeleyside.org/2019/07/17/natural-gas-pipes-now-banned-in-new-berkeley-buildings-with-some-exceptions. Since then, multiple municipalities in California and other states have followed suit, with varying levels of success.

ficient on their own to significantly reduce GHG emissions from buildings because the building stock is slow to turn over.[21] This means that buildings that already exist today will contribute a large portion of emissions from the sector for many years to come.

As in many other contexts, regulating pollution from incumbent actors (here, existing buildings) has been more challenging than regulating new market entrants,[22] and policymakers have proceeded incrementally. Initially, many cities pursued a light-touch approach to regulating existing buildings that largely relied on increasing information about building energy use.[23] The idea was that if building owners (and prospective occupants) knew more about how energy-intensive their properties were, and were presented with some cost-effective options for improving energy efficiency, they would voluntarily choose to do so.[24]

Over the years, these light-touch approaches have started to seem insufficient, especially given the lack of federal action to regulate emissions upstream in power generation. In response, several state and local governments have started to adopt performance standards for existing buildings.

A. *Two Main Types of BPSs: GHG- and Energy Efficiency-Based Standards*

Painted in broad strokes, two different types of performance standards have emerged. Some jurisdictions, such as Boston[25] and New York City,[26] have opted for an approach that caps total GHG emissions that buildings can release per square foot without penalty. Both of these cities' BPSs measure emissions from the combustion of fuels on-site as well as the production of electricity that is supplied from the grid.[27] Other jurisdictions, such as Denver,[28] St. Louis,[29] Washington State,[30] and Washington, D.C.,[31] have adopted energy-efficiency standards that simply limit the amount of total energy used per square foot without penalty. We refer to the first approach as "GHG standards," and the second approach as an "energy-efficiency standard."[32]

The different approaches can lead to quite different outcomes. The central reason for the divergence is that GHG standards do not necessarily incentivize owners to reduce the amount of energy that they use.[33] Owners can meet these standards by using less of the types of energy that emit lots of GHGs, such as energy from oil, coal, or natural gas, without necessarily using less energy overall, if they substitute low or zero GHG-emitting energy.

Brookline, Massachusetts, for example, first attempted to ban new fossil fuel infrastructure in 2019, but its efforts were halted by the state's attorney general for superseding state law. Nik DeCosta-Klipa, *Brookline Moved to Ban Oil and Gas Pipes in New Buildings. Maura Healey Says They Can't.*, Bos. Globe (July 22, 2020), https://www.boston.com/news/local-news/2020/07/22/maura-healey-brookline-oil-gas-ban-ruling. It has since launched another attempt. Bruce Gellerman, *Brookline Tries Again for a Fossil-Free Future*, WBUR (June 3, 2021), https://www.wbur.org/news/2021/06/03/brookline-fossil-fuel-natural-gas-ordinance. In 2021, New York City passed legislation banning natural gas hookups in new buildings. Brad Plumer & Hiroko Tabuchi, *How Politics Are Determining What Stove You Use*, N.Y. Times (Dec. 16, 2021), https://www.nytimes.com/2021/12/16/climate/gas-stoves-climate-change.html.

21. For example, of the nearly 3.5 million housing units in New York City, only about 8% have been built since 2000, and just around 35% since 1960; around 64% of the housing stock was built before 1960. Press Release, NYU Furman Center, Report: New York City's Housing Stock Is Outpaced by Growth in Adult Population and Job Growth (May 24, 2018), https://furmancenter.org/news/press-release/growth-in-new-york-citys-housing-stock-is-outpaced-by-growth-in-adult-popul; *see also 2019 Data on New York City's Housing Stock*, NYU Furman Ctr.: Stoop (Apr. 22, 2020), https://furmancenter.org/thestoop/entry/2019-data-on-new-york-citys-housing-stock (reviewing the number of new building permits in 2019).
22. *See*, *e.g.*, Richard Revesz & Jack Lienke, Struggling for Air: Power Plants and the "War on Coal" (2016).
23. *See* Energy Efficient Buildings Hub, Benchmarking and Disclosure (2013), http://www.cbei.psu.edu/wp-content/uploads/gravity_forms/1-1954a5d7adf734224142692621e513b1/2015/08/Research_Report-Benchmarking_and_Disclosure-012213.pdf (discussing benchmarking and disclosure legislation in a variety of cities, including Philadelphia and New York).
24. *See* Danielle Spiegel-Feld, Guarini Center on Environmental, Energy, and Land Use Law, Building Demand for Efficient Buildings: Insights From the EU's Energy Disclosure Regime 2 (2016), https://guarinicenter.org/wp-content/uploads/2016/05/Building-Demand-for-Efficient-Buildings_April-2016-1.pdf.
25. Boston, Mass., Ordinance Amending City of Boston Code, Ordinances ch. VII, §§7-2.1 and 7-2.2, BERDO (Oct. 5, 2021).
26. 2019 N.Y.C. Local Law No. 97, N.Y.C. Charter §651, N.Y.C. Admin. Code §§24-802(e), 24-803(a)-(b), 28-320, 28-321 (2022).
27. Note that a jurisdiction that takes a GHG approach could compute the emissions attributable to on-site combustion of fossil fuels alone, or it could compute the emissions associated with on-site combustion as well as electricity emissions. We are not aware of any jurisdiction that has adopted a metric that tracks on-site GHG emissions alone, although the idea of an on-site GHG emissions-based BPS has been proposed. EPA Draft White Paper, *supra* note 6, at 26-27; Institute for Market Transformation, *supra* note 6, at 10.
28. Denver, Colo., Council Bill 21-1310 (Nov. 24, 2021); Zachary Hart, *Denver Passes Building Performance Standard*, Inst. for Mkt. Transformation (Nov. 23, 2021), https://www.imt.org/denver-passes-building-performance-standard. Note that Denver has also adopted separate, complementary requirements for buildings to electrify heating equipment when it is replaced. *Id*.
29. St. Louis, Mo., BEPS, Ordinance 71132 (Apr. 20, 2020); Cliff Majersik & Jessica Miller, *St. Louis Passes First Building Performance Standard in the Midwest*, Inst. for Mkt. Transformation (Apr. 21, 2020), https://www.imt.org/st-louis-passes-first-building-performance-standard-in-the-midwest.
30. Wash. Rev. Code §19.27A.210 (2021); Washington State Department of Commerce, *supra* note 2.
31. Washington, D.C., CleanEnergy DC Omnibus Amendment Act of 2018, D.C. Law 22-257, 66 D.C. Reg. 1344 (Jan. 18, 2019); Washington, D.C., Department of Energy & Environment, *Building Energy Performance Standards (BEPS)*, https://doee.dc.gov/service/building-energy-performance-standards-beps (last visited Feb. 20, 2022).
32. Importantly, even among those jurisdictions that employ an energy-efficiency approach, there is some variation in the metrics; for example, both Denver, Colorado, and St. Louis, Missouri, employ an energy-efficiency metric that measures compliance in terms of total energy used per square foot, but Denver normalizes energy use for changes in weather, while St. Louis uses a raw score. *See* Institute for Market Transformation, Comparison of U.S. Building Performance Standards 3, 5 (2021), https://www.imt.org/wp-content/uploads/2021/07/IMT-Matrix-Comparison-of-Building-Performance-Standards-Nov-2021.pdf.

    In this Comment, we use the term "energy-efficiency standards" generically to incorporate metrics that simply track energy use intensity (i.e., the amount of energy used per square foot) as well as more complex metrics derived from energy use intensity such as ENERGY STAR scores. For a discussion of the pros and cons of these two approaches, see Bugnion et al., *supra* note 11. Although the existing BPSs regulate either energy use or GHG emissions, jurisdictions could adopt BPSs based on other metrics. For ideas for other potential metrics, see Institute for Market Transformation, *supra* note 6, at 9-10; EPA Draft White Paper, *supra* note 6, at 8.
33. *See* EPA Draft White Paper, *supra* note 6, at 29-30 (discussing the implications of BPSs based on GHG emissions metrics).

Under LL97, building owners' GHG emissions are calculated by multiplying the amount of energy used times the carbon intensity of each source of energy.[34] Thus, the lower the carbon intensity of the energy, the more energy that the owner can use. Given that New York State has pledged to decarbonize the electricity grid by 2040, building owners should be able to meet their GHG caps if they switch from on-site combustion of fossil fuels to power their heating systems and other appliances toward electricity. Indeed, once the grid fully decarbonizes, buildings should be able to use as much electricity as they want, even as emissions caps tighten. By contrast, under energy-efficiency standards, owners would need to use progressively less energy, either through behavioral changes, retrofits, or a combination of both, until they reach the regulatory targets.

Notably, LL97 is even more generous with respect to renewable forms of distributed generation (DG), such as rooftop solar, than it is with respect to renewable electricity procured from the grid, such as electricity produced at large-scale solar installations. Not only can owners use as much renewable DG as they like without it counting toward their annual GHG emissions, but they can also earn credits for using renewable DG that they can use to deduct a portion of the GHG emissions attributed to other sources of energy.[35] There is therefore a double subsidy for distributed energy under LL97, which incentivizes more use of it than perhaps is necessary; in theory at least, owners who might otherwise exceed their GHG caps can bring their properties into compliance with the law by installing solar panels on their roofs and using *even more* energy than they otherwise would.

To be sure, this solicitous treatment of DG is not an endemic feature of GHG standards, and other jurisdictions that opt for the total GHG approach might not include such a perk. Nonetheless, the fact that LL97 does include this underscores the extent to which the law is indifferent toward energy efficiency.[36]

While a GHG standard seems most likely to incentivize using less GHG-intensive forms of energy, but not necessarily less energy overall, a standard requiring improvements in energy efficiency will induce buildings to use less energy of all kinds. However, such an energy-efficiency standard may not provide an incentive to switch to less polluting types of energy (e.g., by converting a boiler from running on fuel oil to natural gas) or introduce renewable energy, as a GHG emission standard would. Achieving these policy goals would require complementary policies.

B. *The Superiority of an Energy-Efficiency Over a GHG Standard*

We think that it is preferable for a city to opt for an energy-efficiency standard compared with a GHG standard.

When cities peg their BPSs to the carbon intensity of energy sources, they adopt regulations whose stringency is generally outside of their control.[37] Recall that building energy comes from two sources: electricity that building users buy from electric utilities supplying it through the electrical grid, and energy generated on-site, for example from burning fossil fuels on-site for heating and cooking, or from rooftop solar or other forms of distributed energy. Many city governments have only limited influence over the GHG intensity of the electricity grid themselves, as state governments, rather than local governments, typically regulate GHG emissions from the electricity sector (if GHG emissions from the sector are regulated at all).[38]

If the state decarbonizes the grid more quickly than anticipated, the building caps become easy for many buildings to meet, and questions arise about whether the city should have gone further, or if it is spending resources to administer a program that makes little difference. If, by contrast, the grid decarbonizes more slowly than anticipated, the caps could be too far out of reach. All of this variability makes it exceedingly complicated—if not impossible—for cities to predict the stringency of forward-looking GHG standards.

Cities' lack of control over the GHG intensity of grid-supplied electricity also makes it administratively complex for cities to implement GHG standards. For example, to enable building owners to predict the actions that they will have to take to comply with their GHG caps, LL97 requires New York City's Department of Buildings (DOB) to estimate the GHG intensity of grid-supplied electricity more than a decade into the future.[39] Although the city might adjust the GHG coefficients of grid-supplied electricity as uncertainty about the pace of electricity grid decarbonization is resolved, the very need to guess the GHG intensity

34. CTS Report, *supra* note 7, at 28.
35. 2019 N.Y.C. Local Law No. 97, N.Y.C. Admin. Code §28-320.3.6 (2022); CTS Report, *supra* note 7, at 29.
36. *See also* EPA Draft White Paper, *supra* note 6, at 15 ("[S]ubtracting onsite renewable electricity from the total energy consumed by the building . . . is problematic because it obscures the efficiency of the building.").
37. *See also* Bugnion et al., *supra* note 11, at 16 (noting that "emissions per se are not under the building owner's control").
38. Shelley Welton, *Public Energy*, 92 N.Y.U. L. Rev. 267, 290-91 nn.98-99 (2017). There are some exceptions, however, where the city owns the electric utility. *See id.* at 290 (noting that "Seattle, Los Angeles, Cleveland, Austin, San Antonio, and two dozen other cities with populations over 100,000" have municipal electric systems); *see also* Sara Hughes, Repowering Cities: Governing Climate Change Mitigation in New York City, Los Angeles, and Toronto 59, 64 (2019) (discussing the city's ownership of its utility in Los Angeles).

    Cities that own their utilities might establish limits for GHG emissions from buildings that align with their local decisions about decarbonizing the electricity grid as utility owners. However, from the perspective of building owners, it is still unclear why they should be held responsible for GHG emissions from grid-supplied electricity over which they have no control. *See also* EPA Draft White Paper, *supra* note 6, at 6, 29-30. Building owners have some control over the amount of energy they use, whereas they have no control over the carbon intensity of grid-supplied electricity. As such, energy-efficiency standards would still seem more desirable even where the city owns the utility.
39. 2019 N.Y.C. Local Law No. 97, N.Y.C. Admin. Code §§28-320.3.1 to 28-320.3.5 (2022).

of the grid and then update these estimates adds to the complexity of implementing a GHG standard.

There is another problem with the GHG approach too: intensive building energy use imposes costs even if the energy comes from sources with low or zero GHG emissions, such as renewable sources like the wind and sun. The reason this is the case is that any policy that increases the amount of electricity that buildings use—be it renewable or otherwise—increases the required amount of investment in new renewable generation, transmission facilities, and distribution.[40] This increased cost will have to be paid by somebody, likely electricity ratepayers or taxpayers.

Along these lines, a recent study by Eric Fournier et al. finds that the peak in diurnal natural gas usage in southern Californian homes coincides with the electricity demand peaks, which suggests that a general shift from natural gas-powered residential appliances toward electric-powered appliances would substantially increase peak electrical demand and therefore electricity prices.[41] Another recent study of the impact of electrifying residential heating systems in Ireland found that doing so would require substantial expansion of the electricity grid.[42]

In short, reducing energy use is necessary to cost effectively decarbonize the grid.[43] There are also non-climate environmental reasons, such as protecting biodiversity,[44] for reducing the amount of energy used, even if that energy comes from renewable sources. GHG standards fail to address the non-climate impacts of energy use.

Some might argue that the problems with the GHG approach could be resolved by excluding emissions from grid-supplied electricity and counting only the emissions from the combustion of fossil fuels on-site. Under this approach, the regulator would simply compute the emissions associated with the combustion of the natural gas or oil that the building owner burns at their property for heating and hot water, and would be spared the difficult task of estimating the future carbon intensity of emissions from the grid.[45] While an improvement, this is an incomplete solution to the problem because it is not only electricity whose carbon intensity can change; the carbon intensity of liquid fuels can change too based on the stringency of upstream regulations, such as federal regulations regarding methane capture.[46] By focusing on efficiency, rather than GHGs, policymakers can insulate themselves from the impacts of revisions to estimates of the climate impacts of any particular technology.

Despite the drawbacks to the GHG approach, some policymakers may be inclined to establish GHG limits to encourage electrification of heating systems because electrification is widely believed to be needed for deep decarbonization.[47] Yet electrification remains quite expensive compared to many types of energy savings retrofits.[48] For example, the study of LL97 identified five different types of energy-efficiency measures that owners could implement for less than $1 per square foot, but only identified one type of electrification measure that could be implemented for less than $1, with the other identified electrification measures costing between $2.4 and $18 per square foot.[49]

Given current costs, it is far from clear that GHG standards, at least on their own, can spur the electrification that advocates hope will occur. Moreover, rigorous energy-efficiency standards might themselves spur electrification because electric appliances often operate more efficiently than appliances that are powered by liquid fuels.[50] Indeed, EPA mentions this as an argument for focusing on efficiency in its white paper.[51]

This Comment focuses mainly on the metric that cities should use in designing BPSs. But our argument about the superiority of energy efficiency over GHG metrics also likely applies if states and the federal government are establishing the BPSs. Of the three levels of government, cities likely have the least control of the GHG intensity of electricity and other sources of energy because these factors are more likely to be determined by state and or federal regulators. However, even the costs and other impacts of state BPSs could be profoundly shaped by decisions by the federal government.

Were the federal government to act to aggressively reduce GHG emissions from electricity generation through

40. *See* NYSERDA, *supra* note 2 (emphasizing that it is important to improve building energy efficiency while electrifying buildings to reduce the increase in peak electricity demand and lower the cost of extending the grid).
41. Eric Daniel Fournier et al., *Implications of the Timing of Residential Natural Gas Use for Appliance Electrification Efforts*, 15 Env't Rsch. Letters 124008, at 1 (2020), https://doi.org/10.1088/1748-9326/aba1c0.
42. Ankita Gaur et al., *Deep Electrification of Residential Heating and Possible Implications: An Irish Perspective*, 173 E3S Web Confs. 03003, at 1 (2020), https://doi.org/10.1051/e3sconf/202017303003.
43. EPA Draft White Paper, *supra* note 6, at 3-4; New York State Climate Action Council, *supra* note 2, at 125-30 (reviewing New York State's strategies to increase building energy efficiency and reduce energy consumption).
44. *See*, *e.g.*, Shifeng Wang et al., *Ecological Impacts of Wind Farms on Birds: Questions, Hypotheses, and Research Needs*, 44 Renewable & Sustainable Energy Revs. 599 (2015), https://doi.org/10.1016/j.rser.2015.01.031.
45. *See*, *e.g.*, Institute for Market Transformation, *supra* note 6, at 9 (referring to "onsite GHG emissions" metric); EPA Draft White Paper, *supra* note 6, at 26-27 (describing "Onsite GHG Emissions Intensity" as a metric that supports electrification).
46. Such rules have changed several times just in the past few years. *See* Jeff Brady, *Biden Signs Bill to Restore Regulations on Climate-Warming Methane Emissions*, NPR (June 30, 2021), https://www.npr.org/2021/04/28/991635101/congress-votes-to-restore-regulations-on-climate-warming-methane-emissions (describing President Biden's decision to reinstate rules that President Donald Trump had rolled back).
47. Imran Sheikh & Duncan Callaway, *Decarbonizing Space and Water Heating in Temperate Climates: The Case for Electrification*, 10 Atmosphere 435 (2019). Electrification involves switching from equipment that burns fossil fuels such as oil or natural gas for heating or cooking to equipment that uses electricity from the grid for these functions. Providing electricity is coming from low or zero GHG-emitting sources, such as wind and solar sources, electrification contributes to decarbonization.
48. *See* CTS Report, *supra* note 7, at 128-32 (noting the price difference between electrification and other abatement measures).
49. *Id.* at 129.
50. *See*, *e.g.*, Bismark Addo-Binney et al., *A Comparative Life Cycle Assessment of a Cascade Heat Pump and a Natural Gas Furnace for Residential Heating Purposes*, 18 Integrated Env't Assessment & Mgmt. 1, 1 (2021).
51. EPA Draft White Paper, *supra* note 6, at 7-8. *See also id.* at 12 (noting that "[i]f the building switches from a natural gas boiler to an electric heat pump for space heating, it will use less energy per square foot, whether measured in terms of site or source energy, and will also have a higher (better) ENERGY STAR score").

congressional legislation[52] or agency decisionmaking,[53] the resulting greening of electricity supplies would reduce the impacts of a state BPS by reducing the GHG intensity of the electricity supplied to buildings. Also, the cost and other impacts of federal BPSs could be contingent on decisions made at the state level about the GHG intensity of grid-supplied electricity.

For example, President Joseph Biden has ordered the Council on Environmental Quality (CEQ) to establish BPSs for federal buildings.[54] If CEQ were to establish BPSs based on GHG emissions, federal buildings in states, such as California and New York, that are actively engaged in decarbonizing their electricity supplies might be able to achieve the standards at much lower cost than buildings in other parts of the country where the state governments have no plans for decarbonizing electricity supplies.[55] Thus, not only cities, but also higher levels of government, would seem to be better off avoiding GHG-based BPSs and opting instead for energy-efficiency standards because of the lack of control that governments are likely to have over the impacts of GHG-based standards.

Further, there are compelling affirmative arguments for energy efficiency-based BPSs in addition to our negative argument focused on the lack of control that jurisdictions have over the impacts of a GHG standard. A key argument, to which we have already alluded, is the desirability of increasing the energy efficiency of buildings while electrifying buildings as part of societal decarbonization. Improving energy efficiency will reduce the expected increase in peak demand for electricity, and thus the need to expand generation, transmission, and distribution facilities to deliver the renewable power.

In so doing, efficiency-based BPSs can help to protect electricity consumers from rate increases as a result of grid decarbonization. Efficiency-based BPSs could also save building owners—and potentially tenants—money by lowering their energy costs. It is widely recognized that building owners are not implementing many potential measures that would reduce their energy use and energy costs.[56] If efficiency-based BPSs were sufficiently stringent, the BPSs could prod owners to implement measures that would save them—and potentially their tenants—money.

III. Case Study of a BPS: New York City's LL97

We now offer a brief case study of New York City's LL97 to illustrate the risk that GHG-based BPSs will be highly sensitive to policy decisions subsequently made by other levels of government. We begin with a brief explanation of LL97, and then turn to the findings of a recent study that underscores the sensitivity of a GHG-based standard. This part ends by underscoring the implications of this case study of a GHG-based BPS for other jurisdictions' efforts to craft BPSs.

A. *LL97*

As explained above, New York City's LL97 of 2019 is a preeminent example of a law that uses the GHG approach to reduce emissions from buildings. The centerpiece of a series of legislative measures that New York City adopted in the spring of 2019 as part of its Climate Mobilization Act,[57] LL97 caps the GHG emissions of buildings 25,000 square feet and larger, incorporating approximately 11,800 properties.[58] The covered buildings include most types of buildings, including commercial buildings (such as office buildings), residential buildings, industrial facilities, and schools.[59] The law's emissions limits take effect starting in 2024, and will decline progressively over time.[60]

52. *See* John Engel, *U.S. House Passes Build Back Better Bill. What's in It for Renewable Energy?*, Renewable Energy World (Nov. 19, 2021), https://www.renewableenergyworld.com/policy-regulation/whats-in-the-latest-build-back-better-budget-deal-for-renewable-energy.
53. EPA might seek to aggressively regulate power plant GHG emissions under the Clean Air Act, as the Barack Obama Administration attempted to do with the Clean Power Plan. *See* Benjamin Storrow, *Will Biden's EPA Regulate Power Plant CO_2? It Won't Say*, E&E News: ClimateWire (July 23, 2021), https://www.eenews.net/articles/will-bidens-epa-regulate-power-plant-co2-it-wont-say/. However, in 2021, the U.S. Supreme Court agreed to hear a case that could result in a decision limiting EPA's authority to regulate GHG emissions under the Act. *See* Amy Howe, *Justices Agree to Review EPA's Authority to Regulate Greenhouse Gases*, SCOTUSBlog (Oct. 29, 2021), https://www.scotusblog.com/2021/10/justices-agree-to-review-epas-authority-to-regulate-greenhouse-gases/.

    Power plant emissions also might be reduced through the Federal Energy Regulatory Commission (FERC) approving a price on carbon that would increase the wholesale price of power generated using fossil fuels. News Release, FERC, FERC Issues Policy Statement on Carbon Pricing in Organized Wholesale Markets (Apr. 15, 2021), https://www.ferc.gov/news-events/news/ferc-issues-policy-statement-carbon-pricing-organized-wholesale-markets. The New York Independent System Operator (ISO) has developed a carbon pricing proposal for wholesale electricity markets. *See* New York ISO, *Carbon Pricing*, https://www.nyiso.com/carbonpricing (last visited Feb. 20, 2022); Richard Dewey, President & Chief Executive Officer, New York ISO, Opening Remarks to FERC on Carbon Pricing in Organized Wholesale Electricity Markets (Sept. 30, 2020), https://www.ferc.gov/sites/default/files/2020-09/Panel-2-Dewey-NYISO-Opening-Remarks.pdf.
54. *See* Exec. Order No. 14057, 86 Fed. Reg. 70935 (Dec. 13, 2021).
55. To be sure, the federal standards might be designed to vary depending on the commitment of the state in which a federal building is located to decarbonizing electricity supplies. However, varying the standards would introduce greater complexity. Also, the standards would need to be able to be adjusted over time to reflect the actual implementation (or non-implementation) of state decarbonization goals.
56. *See generally* Todd Geraden et al., *Assessing the Energy Efficiency Gap*, 55 J. Econ. Literature 1486 (2017).
57. *See* William Neuman, *Big Buildings Hurt the Climate. New York City Hopes to Change That*, N.Y. Times (Apr. 17, 2019), https://www.nytimes.com/2019/04/17/nyregion/nyc-energy-laws.html; Bailey Hosfelt, *Big Decisions Loom on How NYC Will Implement Historic Carbon-Reduction Law*, City Limits (Oct. 7, 2019), https://citylimits.org/2019/10/07/big-decisions-loom-on-how-nyc-will-implement-historic-carbon-reduction-law/.
58. CTS Report, *supra* note 7, at 26. The number of buildings whose emissions are capped is likely larger as a property may have more than one building on it. *Id*. at 24 n.30.
59. There are some buildings 25,000 square feet and larger that are exempt and thus do not have GHG emission caps applied to them, such as power plants, city-owned buildings, and "properties in which 35% or more of the units are rent regulated." CTS Report, *supra* note 7, at 27. Under §321 of LL97, some of the exempted buildings 25,000 square feet and larger are required to undertake specified energy conservation measures, such as "[r]epairing all heating system leaks." N.Y.C. Admin. Code §28-321.2.2 (2022); CTS Report, *supra* note 7, at 28 ("[B]uildings with rent regulated units make up the largest share of the properties subject to Section 321.").
60. *See* N.Y.C. Admin. Code §§28-320.3.1 to 28-320.3.5 (2022).

For any given year, a building's emissions cap is the product of multiplying the building's square footage by the carbon intensity limit that is allowed for the building occupancy type.[61] The permissible carbon intensities vary by occupancy type; for example, hotels are allowed to use more carbon per square foot than office buildings, and office buildings are allowed to use more carbon per square foot than apartment buildings.[62]

As currently written, LL97 gives buildings several options for meeting their annual emission caps. Buildings can:

- Reduce energy usage, for example by retrofitting their buildings to improve energy efficiency, electrifying heating and hot water systems (because grid-tied electricity has a lower GHG-intensity factor than fuels that can be burned on-site), or making behavioral changes, such as raising the thermostat in the summer and lowering it in the winter;
- Purchase renewable energy credits (RECs) for renewable power that will be delivered to the New York City area to offset their emissions[63];
- Purchase carbon offsets (owners can offset up to 10% of their excess emissions); or
- Install clean distributed energy.[64]

Buildings that exceed their emissions limits must pay a fine of up to $268 per ton of excess emissions.[65]

In addition to the compliance pathways specified above, LL97 called upon the Mayor's Office of Sustainability to study the feasibility of adding an emissions trading program to the law. We led a team of researchers from across NYU as well as several private consulting firms to conduct the required study (the Carbon Trading Study).[66]

B. Carbon Trading Study Findings on Current LL97

The Carbon Trading Study began by examining the impact of LL97 as is, without an emissions trading program, in order to have a base case for assessing the impact of adding an emissions trading program to LL97. Although incidental to the study's effort to analyze the feasibility of adding an emissions trading program, our analysis of LL97 as is, without trading, revealed several important lessons about the impact of adopting a GHG approach to a BPS that were largely overlooked in other studies of LL97.[67]

For present purposes, a key finding of the study's analysis of current LL97 is that key impacts of LL97 are contingent on whether New York State will meet its goals for decarbonizing electricity supplies under the Climate Leadership and Community Protection Act (CLCPA). As discussed further below, the passage of the CLCPA affects the amount of GHG emissions that LL97 will reduce from buildings, the costs of achieving LL97's caps, and the distribution across buildings of the costs of LL97's caps. Passed in 2019, two months after New York City adopted LL97,[68] the CLCPA mandates that the state's electrical grid procure 70% of its energy from renewable sources by 2030 and procure 100% of energy from zero-emitting sources by 2040.[69]

Needless to say, New York City lawmakers were not cognizant of these state goals when they passed LL97 in April 2019, as the CLCPA was enacted later. The interplay of LL97 and the CLCPA is thus an example of the phenomenon highlighted by this Comment: the subsequent policy actions of another level of government impacting the costs of a GHG-based BPS.

For most purposes, the Carbon Trading Study assumed that New York State would meet its goals under the CLCPA because these are existing state law.[70] While there remains uncertainty, there are indications that the state is on track to meet its 2030 goal for obtaining 70% of power from renewable sources, although as of 2022 there is less certainty about the 2040 goal.[71]

The study showed that if the state achieves the CLCPA goals for decarbonizing electricity, LL97 will drive many fewer reductions in GHG emissions than the CLCPA. Collectively, the buildings with emissions limits under LL97 currently emit approximately nine million tons of carbon dioxide equivalent (CO_2e) each year.[72] The CLCPA will reduce more than 50 million metric tons of CO_2e from these buildings between 2024 and 2050, assuming grid decarbonization proceeds on track.[73] LL97 will only reduce

61. *See*, *e.g.*, *id*. §28-320.3.2. Carbon intensity is the amount of carbon that a building is allowed to use per square foot. Note that LL97 uses the term "emissions intensity limit" instead of "carbon intensity limit." As used in this Comment, the two terms are synonymous.
62. CTS Report, *supra* note 7, at 26.
63. Under LL97, the power generating the RECs must be delivered to Zone J. *See* N.Y.C. Admin. Code §28-320.6.1 (2022). For a map that includes Zone J, see New York ISO, *New York Control Area Load Zones*, https://www.nyiso.com/documents/20142/1397960/nyca_zonemaps.pdf/8c3807e1-5bab-ab44-3c71-2c8e61b5748b (last visited Feb. 20, 2022).
64. N.Y.C. Admin. Code §28-320.3.6.3 (2022). Note that owners who install clean DG not only reduce the amount of fossil-based energy they use, but they also get to deduct the GHG emissions attributable to the energy they do purchase from the grid or burn on-site. Thus, clean DG provides a double benefit.
65. *See* N.Y.C. Admin. Code §28-320.6 (2022).
66. CTS Report, *supra* note 7, at 8.
67. *See*, *e.g.*, Urban Green Council, Trading: A New Climate Solution for Buildings (2020), https://www.urbangreencouncil.org/sites/default/files/trading_report_urban_green_2020.pdf; Parichehr Salimifard et al., *Climate Policy Impacts on Building Energy Use, Emissions, and Health: New York City Local Law 97*, 238 Energy 121879 (2022), https://doi.org/10.1016/j.energy.2021.121879; Citizens Budget Commission, Balancing Incentives to Maximize Emission Reduction: Recommendations on Local Law 97 Implementation (2021), https://cbcny.org/sites/default/files/media/files/CBCREPORT_LL97_08092021_1.pdf [hereinafter CBC Report].
68. *See* David Roberts, *New York Just Passed the Most Ambitious Climate Target in the Country*, Vox (July 22, 2019), https://www.vox.com/energy-and-environment/2019/6/20/18691058/new-york-green-new-deal-climate-change-cuomo.
69. *See* CLCPA §4, N.Y. Pub. Serv. Law §66-p (West 2022).
70. CTS Report, *supra* note 7, at 102-03.
71. *See* Anne Barnard & Grace Ashford, *Can New York Really Get to 100% Clean Energy by 2040?*, N.Y. Times (Nov. 29, 2021), https://www.nytimes.com/2021/11/29/nyregion/hochul-electrical-grid-climate-change.html.
72. CTS Report, *supra* note 7, at 55.
73. *Id*.

an additional 14 million metric tons of CO_2e over the same 26-year period, assuming again that grid decarbonization proceeds as legislated.[74] In other words, the CLCPA will reduce roughly 3.6 times more CO_2e than LL97 from the buildings covered by LL97 (14 x 3.6 = 50). Importantly, because LL97 was legislated before the CLCPA, the building emissions limits in LL97 might have seemed more aggressive to local policymakers when LL97 was legislated.

The Carbon Trading Study's findings about the costs to building owners of implementing the law's GHG emissions limits also highlight the sensitivity of local GHG standards to state choices about the carbon intensity of the grid. In April 2019, just before LL97 was passed, the *New York Times* reported, "The cost to building owners will be high. Mark Chambers, the director of the Mayor's Office of Sustainability, said the cumulative cost to building owners to make the upgrades needed to meet the caps would exceed $4 billion."[75] The *Times* also mentioned that the law was "opposed by real estate industry executives in part because of the associated costs to meet the new targets."[76]

Taking into account the impact of the CLCPA in greening electricity supplies, the Carbon Trading Study, released in 2021, found that between 2024 and 2050, building owners would pay $1.24 billion upfront to meet their obligations.[77] When the energy savings that owners will accrue are taken into account,

> owners are expected to see total net *savings* of $2.03 billion USD over the 2024-2050 study period, or $0.87 per square foot on average. In other words, LL97 should generate modest savings for buildings on average, once the energy bill savings from energy efficiency offset the costs of capital expenditures for the retrofits.[78]

The study's findings thus imply that the passage of the CLCPA after LL97—assuming the state remains on track to achieve its goals—should have upended the expectations of city policymakers and members of the real estate industry about the cost impacts of LL97. Indeed, according to the Carbon Trading Study, the vast majority of buildings will not have to do anything to meet their 2024 GHG emissions limits,[79] and only roughly one-half of buildings will have to do something to meet their 2030 limits if the grid decarbonizes at pace with the CLCPA. In 2030, about 49% of square feet will be over their caps if they maintain emissions at 2018 levels.[80] This means that many buildings in the city will not have to do anything to reduce their emissions for the first 10 years that LL97 is in place.

The state's subsequent passage of the CLCPA also seems likely to alter the distribution of the costs of LL97, in addition to the impact of the law in driving GHG emission reductions and the overall costs to building owners of the law. When LL97 was passed in 2019, observers seemed to have expected that it would impose large costs on the owners of commercial office buildings in Manhattan. For example, a caption under a photo in the April 2019 *New York Times* article about the law explained that "[b]uildings like the Freedom Tower and the Empire State Building could face fines of up to millions of dollars per year if they do not significantly reduce emissions by 2030."[81] City lawmakers carefully drafted the law to exempt many affordable housing buildings in the city from the law's GHG caps.[82] However, other residential buildings that met the law's size threshold had their GHG emissions capped, notwithstanding the potential cost impacts on these buildings.[83]

Reflecting the expected impacts of the state's CLCPA targets, the Carbon Trading Study found that residential buildings will face more challenges in general meeting their caps than commercial buildings. As mentioned above, in 2024, when LL97's caps take effect, the vast majority of buildings are predicted to be below their caps. However, there is a noticeable disparity between the share of residential and commercial buildings that will exceed their 2024 emissions limits based on their 2018 emissions. By square footage, 8% of commercial buildings will be emitting more than their 2024 emissions limits based on their 2018 emissions, while 17% of residential properties will exceed their building limits.[84]

The disparity increases over time. By 2040, "only 7% of commercial square footage would be emitting more

74. *Id.*
75. Neuman, *supra* note 57.
76. *Id.*
77. CTS Report, *supra* note 7, at 50. This includes the costs of making retrofits, purchasing RECs, purchasing offsets, and paying penalties. For more on how the study calculated compliance costs, see *id.* at 48.
78. *Id.* at 51. It is important to emphasize that these estimates are for buildings on average. Some buildings will bear high compliance costs in meeting their building limits. In particular, buildings whose 2018 emissions are more than 40% above their 2024 emissions limits will incur significant compliance costs. *See id.* at 52, tbl.7 (per-square-foot gross compliance costs).

    Notably, a prior study of LL97 conducted by the Urban Green Council (UGC) predicted that the law would impose much more substantial costs on owners. The discrepancy in our findings is due to key methodological differences. Of particular importance, the UGC study did not adjust the carbon coefficients for grid-tied electricity over time to reflect the decarbonization of the grid, which significantly impacts the difficulty of meeting the LL97 caps, and assumed that all owners would meet their obligations through energy-efficiency retrofits rather than by purchasing RECs or offsets, installing DG, or paying penalties. Moreover, the UGC study only provided an estimate of owners' upfront compliance costs, without considering the energy cost savings that retrofits would generate thereafter.

    Additionally, our study focuses only on the compliance costs of properties covered under LL97 Article 320 and subject to emissions caps, which excludes tens of thousands of properties covered under Article 321 that had been included in UGC's higher-level calculation. *See* UGC, Retrofit Market Analysis (2019), https://www.urbangreencouncil.org/sites/default/files/urban_green_retrofit_market_analysis.pdf. A subsequent study published by the Citizens Budget Commission incorporated UGC's retrofit cost estimates. CBC Report, *supra* note 67, at 17-19.
79. Only about 9% of square feet subject to emission caps are expected to be over their emission caps in 2024 if they maintain emissions at 2018 levels. CTS Report, *supra* note 7, at 49.
80. *Id.*
81. Neuman, *supra* note 57.
82. Indeed, the city initially exempted all residential buildings with one or more rent-regulated units from meeting the LL97 emissions caps due to a concern that landlords would raise rents in order to pay for the upgrades that they would have to make to meet the caps. *See* Press Release, New York City Council, Council Votes to Strengthen the Green New Deal for New York City (Oct. 29, 2020), https://council.nyc.gov/press/2020/10/29/2033/.
83. N.Y.C. Admin. Code §28-320.1 (2022) (defining "covered buildings" within the meaning of LL97).
84. CTS Report, *supra* note 7, at 58.

than its LL97 caps, compared to 73% of residential square footage."[85] The disparity is due to the fact that electricity provides a greater proportion of the total energy used in commercial buildings than residential buildings.[86] Because of this greater reliance on electricity to meet energy needs, the commercial sector benefits more from electricity grid decarbonization mandated by the CLCPA.

In sum, as a result of New York State's mandate to decarbonize electricity supplies, which was announced after LL97 was passed, LL97 seems unlikely to have much impact on the commercial real estate sector; most of the covered commercial buildings will see their emissions dramatically fall without them having to take any action. While the emissions of residential buildings will also decline because of the decarbonization of electricity, residential buildings tend to burn more fossil fuels, such as oil and natural gas, on-site than commercial buildings, and this higher level of on-site combustion will make it harder for residential buildings on average to achieve their caps.

Since environmental justice communities have fewer capped commercial properties, this also means the costs will shift toward environmental justice communities.[87] Given the city's concern with housing costs,[88] especially in environmental justice communities, it is doubtful that policymakers intended for the residential sector to bear the brunt of the compliance burden. More likely, this is yet another unintended consequence of the state's passage of the CLCPA.

C. *Implications for Designing BPSs*

Overall, the Carbon Trading Study's modelled findings regarding the impacts of LL97 underscore the drawbacks to developing local GHG standards, as opposed to energy-efficiency standards. If the grid decarbonizes as mandated by the CLCPA, the LL97 mandates will prove quite lax, especially for the commercial sector, which calls into question whether the city should have invested all the political capital and budgetary resources into negotiating, implementing, monitoring, and enforcing LL97. If the grid does not decarbonize on time, compliance will be considerably more expensive. Faced with this dichotomy, the city has to choose between making projections about the carbon intensity of the grid that could prove to be wildly off base or delaying such projections and subjecting owners to lingering uncertainty about the usefulness of their investments.

A 2021 report by the Citizens Budget Commission (CBC) suggests that regulators should deal with the problem of uncertainty by setting carbon coefficients for grid-supplied electricity that assume the CLCPA is met.[89] Doing so, the report argues, would incentivize "buildings to electrify building systems as systems reach the end of their lifecycles in anticipation of a cleaner downstate electric grid."[90] This suggestion is problematic. First, as noted above, the modelling for the Carbon Trading Study suggests electrification will still not be a cost-effective compliance strategy for many owners even if coefficients are set to assume the grid decarbonizes at pace with the CLCPA. So, there is a question of whether this approach would even achieve the CBC's stated aim.

Second, the carbon intensity of electricity delivered to New York City is currently *worse* than the carbon intensity of natural gas, once transmission and distribution losses are accounted for.[91] While there are promising signs that the local New York City grid will become less carbon-intensive in the not-too-distant future,[92] there is certainly no guarantee that decarbonization will occur at the pace or to the extent that the state envisions. And if the city sets coefficients that are overly optimistic, owners will get credit for fictional GHG reductions. One might even argue that coefficients that substantially deviate from reality were arbitrary and capricious and thus vulnerable to legal challenge.[93] Setting the coefficients at a level that assumes the CLCPA is met would also not help to rebalance the compliance burden between the commercial and residential sectors—and, by extension, between environmental justice communities and other areas of the city.[94]

LL97 might have sidestepped these outcomes if it had sought to spur buildings to decarbonize by regulating total energy use instead of setting GHG caps that include emissions from grid-supplied electricity. For example, like Washington, D.C., the city might have established minimum ENERGY STAR energy use intensity scores that buildings would have to achieve. These measures targeting energy efficiency would effectively complement the state's decarbonization efforts without being directly pegged

85. *Id.*
86. *Id.* at 59.
87. *Id.*
88. *See supra* note 82 and accompanying text.
89. *See* CBC Report, *supra* note 67. Note that the CBC Report presents the suggestion in slightly different terms: it states that LL97 authorizes owners to receive a credit for beneficial electrification and that in setting the rules for such credits DOB should assume the grid decarbonizes at pace with the CLCPA. But this is not exactly what the law says. Instead, the law says that an advisory board is supposed to provide a report to DOB that includes, among many other things, a proposed methodology for setting metrics for providing credits for beneficial electrification. *See* N.Y.C. Admin. Code §28-320.2 (2022). The law further instructs DOB to consider beneficial electrification in setting coefficients for grid-supplied electricity. *See id.* §28-320.3.2.1. As of today, then, the law does not incorporate a means of crediting owners for beneficial electrification, and seems to envision that such credits, if they were to be developed, would be realized through the coefficients that are set for grid-supplied electricity.
90. CBC Report, *supra* note 67, at 30.
91. Kate Konschnik & Ari Peskoe, Harvard Environmental Law Program Policy Initiative, Minimizing Constitutional Risk: Crafting State Energy Policies That Can Withstand Constitutional Scrutiny (2014).
92. *See*, *e.g.*, Press Release, NYSERDA, During Climate Week, Governor Hochul Announces Major Green Energy Infrastructure Projects to Power New York City With Wind, Solar, and Hydropower From Upstate New York and Canada (Sept. 20, 2021), https://www.nyserda.ny.gov/About/Newsroom/2021-Announcements/2021-09-20-Governor-Hochul-Announces-Major-Green-Energy-Infrastructure-Projects-to-Power-New-York-City-With-Wind. *See also* James Barron, *Ending a Tale of Two Power Grids*, N.Y. Times (Nov. 30, 2021), https://www.nytimes.com/2021/11/30/nyregion/clean-energy-nyc.html.
93. In New York State, Article 78 of the New York Civil Practice Law and Rules would provide a basis for the challenge. N.Y. C.P.L.R. art. 78 (Consol. 2021).
94. CTS Report, *supra* note 7, at 10 (highlighting the implications of the burden on residential buildings for environmental justice communities).

to them. Indeed, as noted above, even if one were confident that the grid would decarbonize on pace with the CLCPA, there is still a benefit to developing complementary energy efficiency at the local level because lowering peak demand will help limit the buildout of the electricity grid and restrain electricity prices.[95] Tying the LL97 targets to energy use intensity would also create greater coherence with the city's benchmarking laws, thus providing building owners with a more consistent appraisal of their environmental performance.[96]

IV. Conclusion

It is often said that the "institutions" responsible for regulating an environmental problem should have the jurisdiction to address that problem; "match[ing]" the jurisdiction and "the scope of a problem" ensures that the governing institution considers both the costs and the benefits of regulating and the failure to regulate.[97] Our intuition that governments should seek to regulate building energy use under their jurisdiction is a variation of this matching principle: we are suggesting that governments should take on problems that they can control to avoid subjecting themselves—and actors within their borders—to the vicissitudes of other governments' decisions.

In arguing for using energy efficiency, rather than GHG emissions, as the metric for BPSs, this Comment addresses only one of the choices that policymakers must make in designing BPSs, albeit a key one. Even if governments decide to base their standards on energy efficiency, they must still determine how they will measure energy efficiency for the purposes of the BPS. Moreover, regardless of what metric they adopt, policymakers must determine what buildings will be covered (commercial and residential buildings? only buildings of a certain size?), how stringent the standards will be, how they will deal with concerns about the cost impacts of BPSs on affordable housing, and how they will enforce the BPS, among other matters.[98] Policymakers also might wish to consider whether building owners should be allowed to reallocate responsibility for making the changes required to comply with a BPS to other buildings that can achieve these changes at lower cost.[99]

As of this writing, there is little rigorous analysis of existing BPSs to provide policymakers with an evidentiary basis for making these design choices. Hopefully over time, more analyses of existing BPSs will be undertaken to guide policymakers in developing this nascent form of regulation to reduce GHG emissions.

95. *See*, *e.g.*, Element Energy & E4Tech, Cost Analysis of Future Heat Infrastructure Options, Report for National Infrastructure Commission 4 (2018), https://nic.org.uk/app/uploads/Element-Energy-and-E4techCost-analysis-of-future-heat-infrastructure-Final.pdf.

96. N.Y.C. Local Law No. 84 (2009), *amended by* N.Y.C. Local Law No. 133 (2016).

97. Jonathan H. Adler, *Jurisdictional Mismatch in Environmental Federalism*, 14 N.Y.U. Env't L.J. 130, 133 (2005) (citing Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 Mich. L. Rev. 570, 587 (1996)).

98. For a discussion of key design choices in establishing a BPS, see EPA BPSs, *supra* note 6.

99. *See* Danielle Spiegel-Feld & Katrina M. Wyman, *Toward Tradeable Building Performance Standards*, 52 ELR ____ (forthcoming May 2022).