# CARBON EMISSIONS AND ENERGY BENCHMARKING

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## INTRODUCTION

In 2015, the Paris Agreement was adopted by one-hundred and ninety-six (196) Parties at the United Nations Climate Change Conference establishing the goal to limit global warming temperatures to below 2°C and to pursue steps to limit temperature increase to 1.5°C above pre-industrial levels.[1] The Paris Agreement acted as catalyst for countries to amplify their efforts at achieving net zero carbon emissions, and significant energy reductions by 2050.[2] Countries, states, cities, and municipalities (collectively, "Region" or "Regions") have acted to reduce carbon emissions and energy consumption by implementing policies, statutes, and regulations to combat the climate crisis.[3] However, tangible progress across the globe has varied significantly, from some Regions that merely have broad-sweeping policy statements, to those that enact concrete regulations and penalties for non-compliance of climate change regulations and laws, such as progressive cities like New York City, Boston, and London. As discussed below, these cities have created a web of regulations covering both energy and carbon emission reduction. Their regulations contain mandatory energy consumption and carbon emission benchmarks for building owners, and impose weighty fines for non-compliance.[4] Further, New York City and Boston offer Property Assessed Clean Energy (PACE) financing programs to help owners comply with these regulations.[5] Contrastingly, Regions like New Jersey and Canada have failed to regulate past the infancy stages, having merely announced broad policy goals concerning energy and carbon emission reduction.[6] Unfortunately, most Regions have simply focused legislation on

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1. 3156 U.N.T.S. 54113.

2. *See id.*

3. Lamia Kamal-Chaoui & Alexis Robert (eds.), *Competitive Cities and Climate Change* (Org. for Econ. Coop. & Dev., Regional Development Working Papers N° 2, 2009).

4. *Id.*; *City of Boston Finalizes Regulations to Ensure Large Buildings Achieve Carbon Neutrality by 2050*, CITY OF BOSTON (Dec. 22, 2023), https://www.boston.gov/news/city-boston-finalizes-regulations-ensure-large-buildings-achieve-carbon-neutrality-2050 [https://perma.cc/2Z4B-KU3T].

5. Kamal-Chaoui & Robert, *supra* note 3.

6. Canada, Climate Action Tracker, https://climateactiontracker.org/countries/canada/#:~:text=The%20%E2%80%9CInsufficient%E2%80%9D%20rating%20indicates%20that,to%20modelled%20domestic%20emissions%20pathways [https://perma.cc/6JDH-35R7] (last visited Oct. 7, 2024); N.J. Dep't Env't Prot., New Jersey's Global Warming Response Act 80 x 50 Report (2020).

energy reduction but have failed to implement similar concrete measures relating to carbon emissions.[7]

While many of these Regions across the globe legislate with respect to the Paris Agreement, this Article examines and compares the policies, laws, and regulations each Region has implemented to comply with their obligations under the Paris Agreement. In conclusion, this Article proposes that the strict approach by progressive cities like New York City is better to effectively reduce energy consumption and meet the stringent carbon emission deadlines of the Paris Agreement. Ultimately, it will be clear that Regions across the globe must actively work on their respective efforts to halt increasing global temperatures by aggressively limiting energy consumption and carbon emissions.

## I. POLICIES AFFECTING ENERGY CONSUMPTION AND BENCHMARKING

A critical component to addressing the climate crisis is to reduce and ultimately eliminate the production and insatiable use of fossil fuels (i.e., coal, oil, and natural gas) across the globe.[8] Fortunately, many Regions have acknowledged the harmful effects of poor energy production and have taken initial steps to track and reduce such consumption.[9] Their efforts are seen through policy-making and legislative measures which implement energy benchmarking programs and converting to cleaner energy sources.[10] Energy Benchmarking is the process of measuring and comparing a building's energy performance against the building's past performance, similar buildings, or modeled simulations of a reference building at a certain standard.[11] Legislation throughout Regions typically requires property owners to benchmark and report their energy and water use for the purpose of improving overall efficiency and in reducing Green House Gas (GHG) emissions.[12] For example, New York City has implemented a series of local laws that not only use benchmarking to track energy use but also require green roofing and limiting energy utilized for heating to electricity.[13]

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7. Caroline George et al., *How US cities are finding creative ways to fund climate progress*, BROOKINGS INST. (Feb. 22, 2023), https://www.brookings.edu/articles/how-us-cities-are-finding-creative-ways-to-fund-climate-progress/ [https://perma.cc/8P2W-GM9F].

8. Kamal-Chaoui & Robert, *supra* note 3, at 152.

9. Antonious Mickael, *Energy Benchmarking: A Comprehensive Guide to Benefits, Process and Tools*, CIM (Mar. 5, 2024), https://www.cim.io/blog/a-comprehensive-guide-to-energy-benchmarking-benefits-process-and-tools [https://perma.cc/29A7-ARLJ].

10. *Id.*

11. *Id.*

12. George et al., *supra* note 7.

13. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 84 § 1 (2009); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. No. 92 (2019); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 94 (2019); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 154 (2021).

### *A. United States*

*1. New York*.—New York City has taken an early and aggressive approach in grappling with the climate crisis by implementing a variety of energy-based local laws since 2009. Notably, Local Law 84 of 2009, as amended by Local Law 133 of 2016, requires owners of "covered buildings" to annually measure their energy and potable water consumption.[14] Furthermore, Local Law 33 of 2018, in conjunction with Local Law 95 of 2019, requires covered buildings to not only benchmark their energy and water usage, but also obtain and display energy efficiency scores for public view.[15] Each of these three Local Laws pertaining to energy and water efficiency are explained individually below.

*a. Local Laws 84 and 133*.—Beginning in 2009, Local Law 84, and Local Law 133 later in 2016, required building owners to generate and submit annual reports of their energy and water consumption annually via the Energy Star Portfolio Manager.[16] Failure to submit these reports would result in a fine against the building owner of $500 per quarter for noncompliance.[17] Local Laws 84 and 133 apply to buildings that: (i) exceed 25,000 gross square feet; (ii) are comprised of two or more buildings on the same tax lot that together exceed 100,000 gross square feet; and (iii) include two or more buildings held as a condominium that together exceed 100,000 gross square feet.[18] Some buildings are excluded from needing to comply with Local Laws 84 and 133 (e.g., one-, two-, and three-story residential dwellings, as well as certain real property under four stories where each owner or occupant controls and is responsible for the maintenance of the heating, ventilation, and air conditioning (HVAC) systems and hot water systems).[19]

*b. Local Laws 23 and 95*.—In 2018 and 2019, respectively, Local Laws 33 and 95 required covered buildings to display an energy efficiency score in the entrance of the building.[20] Energy efficiency scores are based on annual energy reports that are required to be reported by May 1 of each year. Energy Efficiency scores are given grades based on their energy usage:

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14. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 84 § 1 (2009); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 133 (2016) (covered buildings include buildings between 25,000 and 50,000 square feet).

15. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 33 (2018); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 95 § 1 (2019).

16. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 84 (2009); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 133 § 2 (2016) (amending Administrative Code of City of N.Y. § 28-309.4.1).

17. *Benchmarking and Energy Efficiency Rating*, N.Y.C. DEP'T OF BUILDINGS, https://www.nyc.gov/site/buildings/codes/benchmarking.page [https://perma.cc/ZH33-THA7] (last visited Oct. 26, 2024).

18. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 133 § 1 (2016).

19. *Id.*

20. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 33 § 1 (2018).

1) Energy score ≥ 85 à A
2) Energy score ≥ 70 but < 85 à B
3) Energy score ≥ 55 but < 70 à C
4) Energy score < 55 à D
5) Non-compliance w/opportunity to be heard à F
6) Not feasible to obtain score or subject to 28-309.8 à N[21]

Buildings required to display energy efficiency scores are the same as those applicable under Local Laws 84 and 133.[22] Buildings excluded from this display requirement are: (i) city owned buildings that participated in the tenant interim lease apartment purchase program; (ii) real property classified as class one pursuant to subdivision one of § 1802 of the Real Property Tax Law; and (iii) certain real property under four stories where ownership and responsibility for maintenance of the HVAC systems and hot water systems is controlled by each individual dwelling unit owner or occupant.[23] If a required building does not follow the display requirement, it will be subject to a penalty of at least $500.[24] The exception to this requirement is when a building owner requests, from the department or another agency pursuant to section 28-309.11, benchmarking assistance, and (i) makes such request at least 60 days before the due date of the benchmarking report for which such a violation was issued, and (ii) corrects such violations within 60 days after the date of the violation notice.[25]

*2. Massachusetts*.—In August 2022, the State of Massachusetts passed the "2022 Climate and Clean Energy Bill," which is a comprehensive plan to grapple with global climate change.[26] The bill enables and establishes: (i) a statewide building energy benchmarking requirement;[27] (ii) offshore wind investments;[28] (iii) transportation decarbonization;[29] and (iv) authority to ban natural gas hookups.[30] Regarding energy benchmarking, all large buildings over 20,000 square feet must report their energy consumption by June 30th of each year.[31] This is a critical data gathering step that may better inform the State in formulating future building decarbonization regulations. The 2022 Climate and Clean Energy Bill became effective July 1, 2024, however, the Massachusetts Department of Energy has until July 1, 2025, to draft implementation

21. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 95 § 1 (2019).
22. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 33 § 3 (2018).
23. *See id.*
24. N.Y.C., N.Y., ADMIN. CODE OF THE CITY OF N.Y. § 28-202 (2024).
25. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 33 (2018); N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 95 (2019).
26. 2022 Mass. Acts ch. 179.
27. *Id.* § 32.
28. *Id.* § 4.
29. *Id.* § 1.
30. *Id.* § 67.
31. *Id.*

regulations and parameters of the program.[32] Although this statewide program is still in its preliminary stages, cities like Boston have established their own energy benchmarking regulations that have since been amended to incorporate building emission standards.[33] Due to its evolution via amendments focused on carbon emissions, Boston's benchmarking regulation Building Emissions Reduction and Disclosure Ordinance (BERDO), is explored further under Carbon Emissions Limits.

*3. New Jersey*.—In New Jersey, the "Clean Energy Act" has brought the State into the energy reduction regulation space.[34] The Clean Energy Act applies to commercial buildings of more than 25,000 square feet and generally requires benchmarking the building's energy and water use for the prior calendar year.[35] Enforcement of this program began October 1, 2023. However, the Clean Energy Act fails to clearly delineate any penalties for non-compliant building owners.[36] New Jersey commercial building owners pushed to track the progress of this legislation to keep up to date with future amendments that may include further requirements or penalties for non-compliance.[37]

*4. Texas*.—Texas leads the nation in energy consumption, accounting for more than one-tenth of total U.S. energy use.[38] The state has enacted building code standards which require reporting energy and water use by both residential and non-residential buildings.[39] The "Texas Building Energy Performance Standard" laid the groundwork for minimizing energy consumption by generally adopting the 2009 International Residential Code.[40] Texas cities have expanded upon these efforts by implementing their own ordinances and plans. For example, Dallas has enacted various ordinances and a Green Building Program to increase efficiency standards by requiring new buildings to comply with green building rating systems such as Leadership in Energy and Environmental Design (LEED).[41] It also has adopted the Dallas Comprehensive Environmental and Climate Action Plan detailing broad policy goals.[42] Similarly, Houston has also adopted the Houston Climate Action Plan establishing general goals and

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32. *See Massachusetts Clean Energy and Climate Plan for 2025 and 2030*, COMMONWEALTH OF MASS., https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2025-and-2030 [https://perma.cc/X49B-XJDB] (last visited Nov. 20, 2023).

33. Ben Silverman, *Massachusetts Adopts Statewide Building and Transparency Law*, INST. FOR MKT. TRANSFORMATION, (Aug. 11, 2022), https://www.imt.org/news/massachusetts-adopts-statewide-building-benchmarking-and-transparency-law/ [https://perma.cc/8DVJ-8V67].

34. N.J. STAT. §§ 48:3-87.8-48:3-87.12 (2019).

35. *Id.* § 48:3-87.10(4).

36. *See id.* § 48:3-87.8.

37. *Id.*

38. *Texas State Profile and Energy Estimates*, U.S ENERGY INFO. ADMIN. (last updated Jul. 18, 2024), https://www.eia.gov/state/analysis.php?sid=TX [https://perma.cc/F3BU-VA6U].

39. *Id.*

40. TEX. HEALTH & SAFETY CODE ANN. § 388 (2021).

41. DALL., TEX., CODE OF ORD. CH. 61 (2012).

42. DALL., TEX., RES. 20-0827 (2020).

strategies to comply with the Paris Agreement.[43] Lastly, the State of Texas has implemented a PACE financing program to enable property owners to pay for eligible water conservation and energy efficiency projects, which would result in lowering their operating costs.[44] Commercial property, industrial property, and residential real property with five or more dwelling units are eligible for PACE financing.[45] Each regulation is explored more fully below.

*a. City of Dallas Green Building Program*.—The Dallas Green Building Program comprises four ordinances that each have strategically placed energy requirements for new construction. The purpose of the Green Building Program is to reduce the use of natural resources, create healthier and more sustainable living environments, and minimize the negative environmental impact of developments in Dallas.[46] The program was implemented in two major phases and applies to all new construction work in the city for both residential and commercial projects.[47]

Phase One became effective on October 1, 2009.[48] It included requirements for energy efficiency, water conservation, and cool roofs for proposed projects affecting less than 50,000 square feet of floor area for projects lasting greater than a year.[49] Proposed projects, lasting greater than a year, affecting 50,000 or more square feet of floor area must meet the requirements of Section 4304.4 of the Dallas Building Code.[50]

Phase Two became effective on October 11, 2011, and applies to all proposed projects, requiring them to be LEED certifiable, Green Built North Texas certifiable, or certifiable under an equivalent green building standard.[51] Phase Two requires that: (a) building owners must agree that utility companies may release their annual energy consumption data to the city; (b) owners must submit a checklist from a green building standard, though a minimum number of points is not required; (c) proposed projects must use 15% less energy than the minimum provisions of the Dallas Energy Conservation Code; (d) proposed projects must use 20% less water than the water use baseline calculated for the buildings total interior water fixture as required by the Dallas Plumbing Code; and (e) all roof surfaces with a slope of 2:12 inches or less (as defined in ASTM E 1918-97) must meet the specifications of the United States Environmental Protection Agency's (EPA) Energy Star qualified low-slope roof product

43. *City Launches Houston's First-Ever Climate Action Plan on 50th Anniversary of Earth Day*, GREENHOUSTONTX.GOV (Apr. 22, 2020), http://greenhoustontx.gov/pressrelease20200422.html [https://perma.cc/4HCJ-RDSL].

44. TEX. LOC. GOV'T CODE ANN. §§ 399.001-399.019 (2013).

45. *PACE for Property Owners*, TEX. PACE AUTH., https://www.texaspaceauthority.org/for-property-owners/ [https://perma.cc/4A8U-CYQV] (last visited Oct. 7, 2024).

46. DALL., TEX., RES. 12-2428 (2012).

47. *Id.* at 1.

48. *Id.*

49.DALL., TEX., ORD. 28813 (2012).

50. *Id.* § 1.

51. *Id.* § 4.

requirements.[52] Dallas has not implemented any penalties or fines for violations, such as failure to report or for falsely reporting information.

*b. Dallas Comprehensive Environmental and Climate Action Plan*.—This is a sweeping policy enactment that aims to increase energy efficiency and reduce GHG emissions set by the Paris Agreement, with a target of carbon neutrality by 2050, and an interim goal of a 43% reduction below 2015 levels by 2030.[53] This policy is a guideline for the city to implement different methods to reach certain goals; however, it lacks the necessary compliance penalties to enforce the deadlines it aims to achieve. The strategies the plan aims to implement are: (i) expanding participation in PACE financing and identifying other funding sources and incentives for building energy retrofits; (ii) developing a building electrification program for replacing gas-powered equipment in existing buildings; (iii) developing ordinances addressing commercial building energy performance, including energy benchmarking and disclosure, audits, retrofits, and emissions targets; (iv) adopting a net zero energy building code by 2030 for new construction and substantial renovations; (v) adopting building codes that include solar-ready and electric vehicle-ready requirements; (vi) establishing urban greening requirements for new construction.[54]

*c. Houston Climate Action Plan*.—Similar to Dallas' Climate Action Plan, Houston has developed a comprehensive guide to achieving carbon neutrality by 2050 by reducing GHG emissions, with interim targets of: (i) 40% below 2014 emissions by 2030; and (ii) 75% below 2014 emissions by 2040.[55] It has a primary focus on energy transition and reduction; however, it is only a guide on how the city plans to achieve its goals and fails to establish proper enforcement to verify that goals are met. The primary focus of this plan is to: (i) reduce building energy use by adopting the 2021 International Code Council (ICC) model building code by 2025 and update every five years; (ii) establish a plan to achieve 85% energy code compliance by 2030; (iii) expand investments in energy efficiency by doubling the number of PACE projects by 2025; and (iv) require 70% of commercial buildings to be operated by building operators trained in relevant building systems by 2030.[56]

*5. California*.—California is taking significant steps to combat climate change in line with the commitments made in the Paris Agreement. Two crucial codes have been implemented: the "California Green Buildings Standards Code" and the "2022 Energy Code," which focus on reducing energy and water usage.[57] The state's cities are also doing their part by creating local regulations to address climate change. For instance, Los Angeles implemented its "Green

52. *Id.*
53. DALL., TEX., COMPREHENSIVE ENVIRONMENTAL AND CLIMATE ACTION PLAN, xvi (2020).
54. *Id.* § 2.
55. HOUS., TEX., CLIMATE ACTION PLAN, 20 (2020).
56. *Id.* at 20.
57. CAL. CODE REGS. tit. 24, pt. 11 (2022); CAL. CODE REGS. tit. 24, pt. 6 (2022).

New Deal Program," which aims to create more sustainable buildings, reduce greenhouse gas emissions, and mitigate the impacts of climate change.[58]

*a. California Green Buildings Standards Code*.—The "California Green Building Standards Code", also known as "CALGreen," is a set of mandatory regulations designed to reduce the environmental impact of buildings.[59] CALGreen aims to reduce the environmental impact of buildings throughout a building's lifecycle, from construction to occupancy, and all the way to eventual demolition[60]. CALGreen applies to all new construction and renovation projects that require a building permit.[61] This includes both residential and non-residential buildings, as well as state-owned buildings, and applies to existing buildings undergoing alterations or additions that meet certain criteria.[62]

CALGreen sets requirements for buildings in the areas of energy efficiency, water conservation, waste reduction, indoor air quality, commissioning, and green materials.[63] As for energy efficiency, the code requires buildings to meet specific energy efficiency standards for lighting, HVAC systems, insulation, and other components which helps to reduce energy consumption and lower greenhouse gas emissions.[64] The water conservation requirements include buildings obtaining water-efficient landscaping, low-flow plumbing fixtures, and other measures to reduce water usage in buildings.[65] As for waste reduction, CALGreen mandates that a minimum percentage of construction waste must be diverted from landfills through recycling or reuse.[66] Indoor air quality requirements are set to provide ventilation, filtration, and other measures to ensure healthy indoor air quality for occupants.[67] CALGreen also requires that buildings undergo a commissioning process to verify that systems are installed and operating as designed, which helps to ensure optimal performance and energy efficiency.[68] Finally, CALGreen encourages the use of sustainable and environmentally preferable materials in construction and renovation projects.[69]

*b. 2022 Energy Code*.—The California "2022 Energy Code" is a set of mandatory regulations that establish energy efficiency standards for new and existing residential and non-residential buildings.[70] The code was developed by the California Energy Commission and took effect on January 1, 2023.[71] The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-

58. L.A., CAL., GREEN NEW DEAL (2019).
59. CAL. CODE REGS. tit. 24, pt. 11, § 101.1 (2022).
60. *Id.* § 101.5.1.
61. *Id.* § 101.3.1.
62. *Id.*
63. *Id.* §§ 4.101-5.508.
64. *Id.* §§ 4.201, 5.201.
65. *Id.* §§ 4.301-4.304, 5.301-5.304.
66. *Id.* § 5.401.1
67. *Id.* §§ 4.506, 5.506.
68. *Id.* § 703.1.
69. *Id.* §§ A4.4, A5.4.
70. CAL. CODE REGS. tit. 24, pt. 6 (2022).
71. *Id.*

ready requirements for new homes, expands solar photovoltaic and battery storage standards, strengthens ventilation standards, and more.[72] Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code.[73] The code is extremely intricate and specific, even when it comes to what appliances and lighting can be used.[74] The code demands higher efficiency standards for building envelopes, with increased insulation and airtightness to reduce energy losses, lighting, HVAC systems, and other components to reduce energy consumption.[75] It also encourages the use of electric appliances and equipment, as well as the installation of electric vehicle charging infrastructure.[76] The code also requires the installation of solar photovoltaic systems on new residential and non-residential buildings, but there are exemptions for certain building types and situations.[77] Finally, the code requires the use of demand response technologies to manage energy consumption during peak periods and reduce strain on the electrical grid.[78]

The specific fines and penalties for violating the California Energy Code can vary depending on the severity and nature of the violation, as well as the jurisdiction and agency responsible for enforcement. For example, in Los Angeles, violations of the energy code may result in a citation and fines ranging from $100 to $500 for each violation.[79] Repeat offenders may face higher fines, and in some cases, may be required to stop work on the project until the violation is corrected.[80]

*c. Los Angeles's Existing Building Energy and Water Efficiency Program*.—The purpose of the "Existing Building Energy and Water Efficiency Program" (Program) is to reduce energy and water consumption in existing buildings in Los Angeles.[81] The efficiency improvements addressed in the Program are deigned to lower the use of energy, water, and greenhouse gas emissions citywide. The Program applies to: (i) all Los Angeles-owned buildings that are 7,500 square feet or more; (ii) all privately owned buildings that are 20,000 square feet or more; and (iii) all buildings owned by a local agency of the state that are required to comply with the city's building ordinances pursuant to Government Code Section 53090, et seq., or successor legislation, and are 20,000 square feet or more.[82] Exceptions to the Program

72. *Id.* §§ 110.0-110.12.
73. *Id.* § 100.0(a).
74. *See id.* § 141.0.
75. *Id.* §§ 110.0-110.12.
76. *Id.* § 110.1.
77. *Id.* § 140.10.
78. *Id.* §110.12.
79. L.A., CAL., ORDINANCE 930 § 10 (2023); L.A., CAL., ORDINANCE 903 § 11 (2020); L.A., CAL., ORDINANCE 865 § 27 (2015); L.A., CAL., ORDINANCE 838 § 12 (2011).
80. *Id.*
81. L.A., CAL., MUN. CODE, div. 97, art. 1, ch. IX, § 91.9702.
82. *Id.* § 91.9703.

include one and two-family dwellings, hotels, broadcast antennas, vehicle charging stations, utility pumping stations, treatment facilities, sound stages, structures primarily used for the production and post-production of motion pictures and television, and other similar uses as well as other buildings that do not meet the purpose of this division as determined by the Department of Building and Safety.[83]

The benchmarking requirements and scheduling varies depending on the type of building. For buildings owned by the city with gross floor area of 7,500 square feet or more, the city must complete and submit the initial benchmarking report on or before December 1, 2017, and annually no later than June 1 thereafter.[84] For a privately owned building or a building owned by a local agency of the state with gross floor area of 100,000 square feet or more, the state agency must complete and submit the initial benchmarking report on or before December 1, 2017, and annually no later than June 1 thereafter.[85] For a privately owned building or a building owned by a local agency of the state with gross floor area of 50,000 square feet or more but less than 100,000 square feet, the state agency must complete and submit the initial benchmarking report on or before June 1, 2018, and annually no later than June 1 thereafter.[86] For a privately-owned building or a building owned by a local agency of the state with gross floor area greater of 20,000 square feet or more, but less than 50,000 square feet, the owner shall complete and submit the initial benchmarking report on or before June 1, 2019, and annually no later than June 1 thereafter.[87]

In addition to the benchmarking requirements, there are other requirements set by the Program. Owners of buildings over 20,000 square feet must conduct energy and water audits every five years, which began in June 2019.[88] The audits must be conducted by a certified energy auditor, and must identify opportunities for energy and water savings.[89] Building owners must disclose the results of their audits to the city and then make certain energy and water efficiency improvements to their buildings based on their building's energy use intensity (EUI).[90] Buildings with a high EUI must implement more extensive efficiency measures, such as lighting upgrades, HVAC system improvements, or building envelope improvements while buildings with a lower EUI may only need to make minor improvements or upgrades. The Program provides resources to help building owners comply with the regulations and make the necessary improvements.[91]

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83. *Id.*
84. *Id.* § 91.9708.1(1).
85. *Id.* § 91.9708.1(2).
86. *Id.* § 91.9708.1(3).
87. *Id.* § 91.9708.1(4).
88. *Id.* § 91.9706.
89. *Id.* § 91.9706.1.2
90. *Id.*
91. The program provides various guides, benchmarking services, and resource centers to assist in compliance. *Id.*

If a building owner does not comply with the Program, they may be required to pay a $202 fee for each building not in compliance.[92] Additionally, if the fee invoice is not paid within thirty days after receipt, a late fee of "two (2) times the Code Violation Inspection Fee plus a 50 percent (50%) collection fee for a maximum total of $1,176.00"will be imposed.[93] Building owners should also be aware that payment of the non-compliance fee does not result in compliance and exemption; rather, the building will continue to be considered non-complying, and the status of each building ("Complied" or "Not Complied") is posted publicly.[94] Thus, in addition to the fines, non-compliance with the Program can also result in negative publicity and damage to a building owner's reputation.

*6. Illinois*.—Illinois has taken action to address the climate emergency by enacting the "Illinois Energy Efficient Building Act" (EEBA).[95] The EEBA generally has adopted the International Energy Conservation Code and applied it to the state. However, the city of Chicago has taken further action and applied a structured energy benchmarking system for building owners to follow under the "Building Energy Use Benchmarking Ordinance."[96] Beneficial to property owners, Illinois offers PACE financing for owners who want to make energy efficiency or renewable energy improvements to their buildings.[97] This is a critical component in ensuring that building owners can comply with the sustainability requirements of the state and local municipalities. The key points of each regulation are detailed further below.

*a. Illinois Energy Efficient Building Act*.—The EEBA was created to promote and encourage the construction and renovation of energy-efficient buildings, reduce energy consumption, lower energy costs, and improve the quality of the indoor environment in the building.[98] The EEBA requires that the building envelope—which includes walls, roofs, windows, doors, and foundations—must meet specific insulations and air leakage requirements to limit heat loss or gain.[99] The EEBA imposes lighting protocols to reduce consumption by requiring buildings to use energy-efficient lighting fixtures and controls, such as occupancy and sensors or timers.[100] HVAC systems must meet specific efficiency requirements, including minimum equipment efficiency ratings and controls that optimize energy use.[101] Buildings must also use energy-efficient water heaters that meet certain efficiency requirements and incorporate

92. *Id*. § 91.9709.
93. *Id.*
94. *Id.*
95. 20 ILL. COMP. STAT. 3125 (2004).
96.CHI., ILL., BUILDING ENERGY USE ORDINANCE (2013).
97. *Overview*, ILL. ENERGY CONSERVATION AUTH. NFP, https://www.iecapace.org/ [https://perma.cc/97HW-PDUS] (last visited Sept. 9, 2024).
98. 20 ILL. COMP. STAT. 3125 (2004).
99. *Id.*
100. *Id.*
101. *Id.*

temperature controls to optimize energy use.[102] Finally, the EEBA encourages the use of renewable energy sources, such as solar or wind power, to help reduce energy consumption and greenhouse gas emissions.[103]

The EEBA applies to any new building, existing building, or structure in the state that requires a building permit application, and for any addition, alteration, renovation, or repair.[104] Some buildings are exempt from the act, including those that that do not use electricity or fossil fuel for comfort conditioning, historic buildings listed on the National Register of Historic Places or the Illinois Register of Historic Places, and other buildings that are specified as exempt under the "International Energy Conservation Code."[105]

Penalties and violations for failure to comply to the code differ depending on the building type. For state-funded buildings, the "Illinois Capital Development Board" (CDB) is responsible for enforcing the energy efficiency standard.[106] If the CDB determines that a building is not in compliance with the EEBA, it may withhold payment for the construction or renovation of the building until the building is brought into compliance.[107] For commercial and residential buildings, the Illinois Department of Commerce and Economic Opportunity (DCEO) is responsible for enforcing the energy efficiency standards. If the DCEO determines that a building is not in compliance with the EEBA, it may issue a notice of violation and impose a penalty of up to $10,000 per violation.[108]

*b. Building Energy Use Benchmarking Ordinance*.—The "Building Energy Use Benchmarking Ordinance" requires public buildings and privately owned commercial and high-rise multifamily buildings to track their annual energy consumption and water use in the Energy Star portfolio manager.[109] The reports must be submitted annually by June 1 each year, and data verification is required once every three years.[110] Further, their ratings must be publicly available on the Chicago Energy Benchmarking webpage and by posting the rating within the building.[111] Any violation of the reporting requirements may subject a building owner to a fine of up to $100 for the first violation, and an additional fine of up to $25 for each day that the violation continues.[112]

The ordinance applies to all buildings within the city of Chicago larger than 50,000 square feet.[113] The benchmarking ordinance does not apply to buildings with more than 10% or more of gross square footage classified as Class D open

102. *Id.*
103. *Id.*
104. *Id.* § 20(a).
105. *Id.* § 20(b)(3).
106. *Id.* § 30.
107. *Id.*
108. ILL. DEP'T OF FIN. & PRO. REGUL., ILLINOIS CODE ENFORCEMENT MANUAL (2004).
109. CHI., ILL., BUILDING ENERGY USE ORDINANCE (2013).
110. *Id.* § 18-14-102.1.
111. *Id.* § 18-14-102.3.
112. *Id.* § 18-14-101.5(b).
113. *Id.* § 18-14-101.3.

air assembly units, Class G industrial units, Class H storage units, Class I hazardous use units, or Class J miscellaneous buildings and structures.[114]

*c. Chicago's Energy Transformation Code*.—Chicago implemented the "Energy Efficient Building Act" with the goal of improving energy efficiency in all new commercial and residential buildings by 40% above 2001 levels.[115] The city plans to achieve this goal through its "Energy Transformation Code" by requiring: (i) the window placement in new buildings to minimize energy demands due to solar heat gain in the summer; (ii) that new low-rise commercial buildings be designed with roofs that can support the future installation of solar panels; (iii) the installation of improved insulation to reduce heat loss through the exterior walls of those buildings with projecting balconies or parapets; (iv) that new residences with gas-fired appliances be built with the appropriate electrical capacity and wiring necessary to switch to electric appliances in the future, without the necessity of opening walls; and (v) that where indoor plant growing facilities exist, for them to use energy efficient lighting.[116]

*7. Pennsylvania*.—Pennsylvania has implemented their state-wide policy named the "Pennsylvania Climate Action Plan of 2021," which encompasses strategies aimed at reducing energy consumption and GHG emissions.[117] Although this state act has lofty goals, cities within the state have acted in a more stringent manner with legislation to tackle the climate crisis. For example, the city of Philadelphia has enacted the Building Energy Performance Policy that requires non-residential building owners to perform "tune-ups" to their building's energy and water systems, as well as submitting energy performance certificates.[118] Moreover, the city of Pittsburgh has enacted the "Pittsburgh Climate Action Plan 3.0," which identifies strategies to achieve goals set by the Paris Agreement, and the "Building Benchmarking Ordinance" requiring owners to report their annual water and energy consumption.[119] Although a very promising start, most climate crisis action taken within the state of Pennsylvania is limited to energy and water benchmarking, and there lacks any standards for limiting carbon emissions. Pennsylvania's PACE program allows building owners to borrow up to 100% financing to reduce energy and potable water consumption, which is repaid as a property tax to business property owners interested in pursuing clean energy and water projects.[120] Eligible participants for PACE are owners of existing or new properties zoned for commercial,

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114. *Id.*

115. *Chicago Energy Transformation Code*, CHICAGO.GOV, https://www.chicago.gov/city/en/depts/bldgs/supp_info/chicago-energy-conservation-code.html [https://perma.cc/98W6-6RU9] (last visited Oct. 27, 2024).

116. *Id.*

117. *Pennsylvania Climate Action Plan*, PA. DEP'T OF ENV'T PROT., https://www.dep.pa.gov/citizens/climate/Pages/PA-Climate-Action-Plan.aspx [https://perma.cc/C87B-95W7] (last visited Oct. 27, 2024).

118. PHILA., PA., CODE § 9-3404 (2019).

119. PITTSBURG, PA., CLIMATE ACTION PLAN 3.0 (2018).

120. 12 PA. CONST. STAT. §§ 4301-4310 (2018).

industrial, and/or agricultural use.[121] However, residential properties, including multi-family residential, are not eligible for this type of financing.[122] Details of each piece of legislation or policy are set forth more fully below.

*a. City of Philadelphia: Benchmarking Energy and Water Use*.—In Philadelphia, benchmarking energy and water use is required with the purpose of tracking and assessing a building's energy and water use with the goal of ultimately reducing energy and water consumption, and GHG emissions.[123] Covered buildings are required to submit complete building energy use, water use, and building characteristics as required by the EPA's Energy Star Portfolio Manager.[124] No later than June 30 of each year, owners must upload the building's energy and water use of the previous year to the "portfolio manager" created by the EPA.[125] Failure to timely comply with the regulation will result in a $300 fine for the first 30 days of non-compliance, and $100 a day for every day thereafter.[126]

This benchmarking requirement applies to any building with indoor floor space of 50,000 square feet or more and any building participating in the Commercial Property Assessed Clean Energy (C-PACE) program.[127] Buildings not required to report are those that are exempt by the Office of Sustainability's regulations, which include (i) less than 50,000 square feet; (ii) residential buildings including residence halls, dormitories, and other non-transient large lodging places; and (iii) parking lots and parking garages, or the portions of otherwise-Covered Buildings that are used for parking.[128]

*b. City of Philadelphia: Building Energy Performance Policy*.—The "Building Energy Performance Policy" ("Policy") was created in Philadelphia with the purpose of making "tune-ups" and repairs to existing buildings' energy and water systems resulting in reduced energy usage and GHG emissions.[129] The Policy applies to any non-residential building with indoor floor space of at least 50,000 square feet and requires inspection of systems or subsystems that use energy or impact energy consumption.[130]

Exceptions to the Policy include: (i) systems/subsystems owned by tenants, (ii) condo/co-ops, and (iii) industrial processes that occur within a covered building.[131] Additionally, buildings that have received LEED Gold certification

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121. *Id.* § 4301.
122. *Id.* § 4302.
123. PHILA., PA., CODE § 9-3402 (2019).
124. *Id.* § 9-3402(1).
125. *Id.* § 9-3402(2).
126. *Id.* § 9-3402(6).
127. *Id.* § 9-3402(1).
128. *Building Energy Performance FAQs*, PHILA., PA. OFF. OF SUSTAINABILITY, https://www.phila.gov/media/20210405123946/Building-Energy-Performance-Program-FAQs_Final.pdf [https://perma.cc/2F2C-82LT] (last visited Oct. 27, 2024).
129. PHILA., Pa., CODE § 9-3404(2) (2019).
130. *Id.* § 9-3404(1)(c).
131. *Id.* § 9-3404(3).

are exempt from the Policy.[132] Reporting deadlines for building owners differ depending on the size of the buildings:

1) For buildings of at least 200,000 square feet: September 30, 2021.
2) For buildings of at least 100,000 square feet and less than 200,000 square feet: September 30, 2022.
3) For buildings of at least 70,000 square feet and less than 100,000 square feet: September 30, 2023.
4) For buildings of at least 50,000 and less than 70,000 square feet: September 30, 2024.[133]

Building owners who fail to timely file a report will be subject to a $2,000 fine.[134] After thirty days of non-compliance, the building owner will then be subject to an additional $500 fine per day.[135]

*c. City of Pittsburgh: Building Benchmarking Ordinance*.—In Pittsburgh, the "Building Benchmarking Ordinance" was implemented to assess building energy and water use to ultimately guide legislation towards reducing energy use and GHG emissions.[136] The Ordinance applies to any non-residential building with indoor floor space of 50,000 square feet and all non-residential portions of any mixed-use building where a total of at least 50,000 square feet of indoor floor space is devoted to any non-residential use.[137] Covered buildings are required to submit complete building energy use, water use, and building characteristics as required by the EPA's Energy Star Portfolio Manager.[138] Owners must submit the report by June 1 of each year beginning in 2018.[139] If owners believe they are exempt from the Ordinance, they must apply for an exemption no later than April 1 annually.[140]

A covered building owner or city facility operator who successfully complies with the ordinance benchmarking requirements will be publicly posted as "participating" on the online platform described in Section 629.07.[141] Those who are exempt from benchmarking requirements, pursuant to Section 629.03, will be publicly posted as "exempted" on the online platform described in Section 629.07.[142] Any building owner or city facility operator who fails to comply with the ordinance benchmarking requirements will be publicly posted as "eligible and non-participating" on the online platform described in Section

132. *Id.*
133. *Id.* at § 9-3404(4).
134. *Id.* at § 9-3404(6).
135. *Id.*
136. PITTSBURGH, PA., CODE OF ORDINANCES ch. 629 (2016).
137. *Id.* § 629.01(b).
138. *Id.* § 629.02.
139. *Id.* § 629.08.
140. *Id.* § 629.03.
141. *Id.* § 629.07.
142. *Id.*

629.07.[143] Pursuant to Section 629.04, a property owner, or city facility operator, of a building that is not a covered building, yet successfully complies with the benchmarking requirements of the ordinance anyway, will be publicly posted as "voluntarily participating" on the online platform described in Section 629.07.[144]

*8. Maryland*.—Maryland's "Climate Solutions Now Act" was created with the goal of reducing carbon emissions in covered buildings by requiring them to reduce net direct greenhouse gas emissions by 20% by 2030.[145] A covered building under the Act includes any commercial, multifamily residential, or state-owned building that is 35,000 square feet or larger, excluding the building's parking garage.[146] Covered buildings are subject to reporting requirements each year after 2025.[147] The building owner is required to collect and enter all benchmarking data into the EPA's Energy Star Portfolio Manager, where the owner will have to report the building's (i) gross floor area, (ii) occupancy, (iii) year of construction, (iv) operating hours, and (v) energy use based on meter readings from electric and gas companies.[148] Buildings in Maryland that are not subject to the Climate Solutions Now Act are some historic properties, public and non-public elementary and secondary schools, manufacturing buildings, and agricultural buildings.[149]

*9. Colorado*.—In Denver, Colorado, the City Council passed the "Energize Denver Ordinance" with the goal of ensuring that the City reduces GHG emissions by 2030 by implementing energy performance standards for both commercial and multifamily buildings.[150] The ordinance creates mandatory energy usage targets for buildings 25,000 square feet or greater.[151] Smaller buildings between 5,000 and 24,999 square feet will be required to reduce energy use through compliance with new lighting standards.[152] Ordinance requirements will be implemented by the Office of Climate Action, Sustainability, and Resiliency (CASR).[153]

Buildings 25,000 square feet or larger must report the building energy use annually while meeting energy targets periodically in 2024, 2027, and 2030.[154] These energy performance targets will be measured by CASR using the EUI index, which compiles the building's different types of energy usage data into

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143. *Id.*
144. *Id.*
145. 2022 Md. Laws 38.
146. *Id.*
147. *Id.*
148. *See generally Benchmark Your Building With Portfolio Manager*, ENERGY STAR, https://www.energystar.gov/buildings/benchmark [https://perma.cc/V4GS-7LTP] (last visited Oct. 27, 2024).
149. 2022 Md. Laws 38.
150. DENVER, COLO., CODE OF ORDINANCES §§ 10-400-10-407 (2016).
151. *Id.* § 10-404.
152. *Id.* § 10-405.
153. *Id.* at § 10-404.
154. *Id.*

one single metric.[155] The building's energy efficiency is measured by a building's EUI; the lower the EUI, the more efficient the building is.[156] Using benchmarking data starting in 2019, CASR will establish energy targets for each building type and set goals for each reporting year.[157] If 2019 benchmarking data does not exist for a building, then CASR will use benchmarking data from previous years to set baseline target numbers.[158] Building owners are responsible for reducing their building's energy usage in order to reach target goals and must use the EPA's Energy Star Portfolio Manager to report the building's energy usage for each year no later than June 1.[159] The report must show the building details, including (i) gross floor area and (ii) monthly and annual energy usage. If the owner does not have this information, they must request it from tenants.[160] With approval from CASR, building owners can report compliance with these energy requirements through methods other than the EPA's Energy Star Portfolio Manager, including Electrification Bonuses; Renewable Credits; Compliance Timeline Adjustments; Performance Target Adjustments; and options for buildings designated as Manufacturing, Agricultural, or Industrial.[161] Buildings between 5,000 and 24,999 square feet must demonstrate that all lights in the building use LED bulbs, or that the building has achieved an alternate, but equivalent, lighting power density.[162]

If a building owner fails to report accurately, CASR may issue Notices or Orders for data errors and non-compliance with the regulations.[163] The Denver municipal code allows CASR to fine the building owners seventy cents ($0.70) per year for each required kBtu reduction that the owner's building fails to achieve.[164] Further, the city may implement a $2,000 fine for non-compliance with reporting requirements.[165] If the building owner fails to pay the fine, the City may then place a lien on the property until the fine, plus any interest, is paid in its entirety.[166]

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155. *Id.* § 10-400.
156. *Id*.
157. *Id*. § 10-404.
158. *Id.* § 10-400.
159. *Id.* § 10-404
160. *Id*. § 10-403.
161. Diana C. Jenkins & Danielle DeSantis, *Energize Denver Benchmarking and Energy Performance Requirements*, OTTEN JOHNSON, https://www.ottenjohnson.com/news/energize-denver-benchmarking-and-energy-performance-requirements/ [https://perma.cc/V6A3-BMBK] (last visited Oct. 27, 2024).
162. DENVER, COLO., CODE OF ORDINANCES § 10-405 (2016).
163. *Id*. § 10-407.
164. *Id*.
165. *Id.*
166. *Id.*

### *B. International*

*1. England and Wales*.—The United Kingdom has taken a significant step in addressing energy efficiency in buildings through its enactment of the "Minimum Energy Efficiency Standard" legislation (MEES).[167] MEES applies to England and Wales, and it sets a minimum energy efficiency standard that must be met by privately rented buildings, with the aim of reducing energy consumption and carbon emissions.[168] With the growing global concern over climate change, the MEES is a crucial piece of legislation that seeks to ensure that buildings are more energy-efficient, cost-effective, and sustainable. Although financing was available to homeowners and businesses for energy efficiency upgrades under the "Green Deal," that regulation was closed to new applications in 2015.[169] Detailed information on MEES regulation is listed below.

*a. Minimum Energy Efficiency Standard*.—MEES was implemented to reduce carbon emissions by 78% by 2035 compared to 1990 levels.[170] UK regulations made it unlawful for landlords to renew or grant new leases if their commercial properties held a substandard MEES energy rating scale (A–G).[171] The "Energy Rating Scale" (ERS) is determined by an Energy Performance Certificate (EPC) which is an analysis/report that provides a theoretical rating to a building based on its method of construction, insulation, the services for heating or cooling it, and some standardized assumptions about how it will be used.[172]

The ERS applies to non-domestic property (a term which covers "most, but not all, commercial property"), requiring the property to have an EPC rating of "E" or above to be in compliance with regulations.[173] Non-domestic property covers all property situated in England and Wales rented under a qualifying type of non-residential tenancy.[174] Domestic property (a term which covers "some, but not all, residential property") must have an EPC rating of "E" or above to

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167. The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015, SI 2015/962.

168. *MEES: minimum energy efficiency standards toolkit*, WESTLAW PRAC. L. PROP., https://www.westlaw.com/8-578-9565?transitionType=Default&contextData=(sc.Default)&VR=3.0&RS=cblt1.0 (last visited Oct. 27, 2024).

169. *The GB Green Deal*, WESTLAW PRAC. L. ENV'T, https://www.westlaw.com/1-509-4823?transitionType=Default&contextData=(sc.Default)&VR=3.0&RS=cblt1.0 (last visited Oct. 27, 2024).

170. HOUSE OF COMMONS LIBRARY, THE UK'S PLANS TO PROGRESS TO REACH NET ZERO BY 2050, 2024, at 4 (UK).

171. *MEES: minimum energy efficiency standards toolkit*, *supra* note 168.

172. *Energy performance certificates (EPCs)*, WESTLAW PRAC. L. PROP., https://www.westlaw.com/3-259-4960?transitionType=Default&contextData=(sc.Default)&VR=3.0&RS=cblt1.0 (last visited Oct. 27, 2024).

173. *Id.*

174. *Id.*

be in compliance with regulations.[175] A domestic property falls under the scope of the regulation if the property is rented under a qualifying type of tenancy that is not an excluded type of property and is not rented by an excluded landlord.[176]

There are many exceptions to MEES, some of which include industrial sites, workshops, non-residential agricultural buildings with a low energy demand, certain listed buildings, and temporary properties.[177] Furthermore, buildings where the EPC is more than ten years old, or where there is no EPC, have no obligation to follow the standard.[178] Finally, tenancies of less than six months (with no right of renewal) and tenancies of over ninety-nine years are not required to comply with the standard.[179]

In addition to the property-specific exceptions, there are some exemptions to the standard.[180] For example, if an independent assessor determines that all relevant energy efficiency improvements (that either have already been or could be made to the property) would not pay for themselves through energy savings within seven years, they will not be required under MEES.[181] Similarly, where an assessor determines that the relevant energy efficiency improvements that could be made to the property are likely to reduce the market value of the property by more than 5%, these are also not required.[182] Finally, relevant energy efficiency improvements are not required where consent from persons such as a tenant, a superior landlord, or planning authorities has been refused or has been given with conditions with which the landlord cannot reasonably comply.[183]

Beginning April 1, 2018, landlords are not permitted to renew existing tenancies, or grant new tenancies in their building, if the building has less than the minimum EPC rating of "E."[184] Beginning April 1, 2020, the renewal of existing leases of a sub-standard building that has less than the minimum EPC rating of "E" is prohibited.[185]

A building owner who rents property for less than a three-month term will be subject to a fine of 10% of the property's ratable value (a minimum of £5,000

175. *Id.*

176. *Id.*

177. *MEES: minimum energy efficiency standards for commercial property*, WESTLAW PRAC. L. PROP., https://us.practicallaw.thomsonreuters.com/w-013-0480 (last visited Oct. 27, 2024).

178. *Id.*

179. *Id.*

180. Exceptions to the requirement are the standards that would normally apply but are excluded for various reasons, while exemptions are where the rule does not apply at all.

181. *MEES: minimum energy efficiency standards for commercial property*, *supra* note 177.

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

and a maximum of £50,000).[186] If the property is leased for a term greater than three months, the fine will be 20% of the property's ratable value (a minimum of £10,000 and a maximum of £150,000).[187]

*2. Canada*.—Canadian provinces have also embraced energy efficiency and consumption regulations. For example, Ontario passed regulation 506/18, known as the "Reporting of Energy Consumption and Water Use" regulation.[188] It requires large buildings in Ontario to report their energy and water consumption data on an annual basis.[189] The regulation was introduced as part of the government's efforts to reduce greenhouse gas emissions and combat climate change. By requiring large buildings to report their energy and water use, the government aims to increase awareness of energy consumption and encourage building owners to invest in energy-efficient technologies and practices. This regulation applies to a range of building types, including commercial, industrial, multi-unit residential, and institutional buildings, and it sets specific reporting requirements and deadlines for building owners.[190] Currently, there is no PACE financing equivalent in Canada; however, the Canadian federal government offers the "Canada Greener Homes Grant Program," which provides up to $5,000 in grants to all eligible homeowners for energy-efficient retrofits.[191]

*a. Ontario Regulation 506/18: Reporting of Energy Consumption and Water Use*.—The Ontario Regulation 506/18 ("506/18") was created to measure energy use and water consumption in various large buildings that would result in the reduction in energy and water consumption, and to efficiently address the climate emergency. 506/18 became effective January 1, 2019, and before July 1 of each year, building owners must report the gross floor area of their property and certain information regarding the property, including performance metrics and information about energy consumption and water use.[192]

Beginning on July 1, 2023, property owners were required to report their water and energy consumption if the following criteria applies:

> 1. Any part of the building or structure is situated on a property classified by the Municipal Property Assessment Corporation by way of a code listed in the Guide.
> 2. Electricity or gas is consumed at the building or structure.

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186. *MEES: minimum energy efficiency standards for commercial property*, *supra* note 177. Ratable value means the estimated annual rental value of a commercial property, which is calculated by a valuation officer.

187. *Id.*

188. Electricity Act, S.O. 1998, c 15, sched A. (Can.).

189. *Id.* § 2.

190. *Id.* § 3.

191. *Canada Greener Homes Grant*, GOV'T OF CAN., https://natural-resources.canada.ca/energy-efficiency/homes/canada-greener-homes-initiative/canada-greener-homes-grant/24833 [https://perma.cc/4ZJX-QT9Q] (last modified July 5, 2024).

192. Reporting of Energy Consumption and Water Use, O. Reg. 506/18 § 9 (Can.).

> 3. Electricity or gas consumption information for the building or structure is available from a distributor.
> 4. The building or structure at which electricity or gas is consumed has a gross floor area of at least 50,000 square feet.
> 5. In the case of a multi-unit residential building, it contains more than 10 units.[193]

Buildings that are owned by a public agency are exempt from the reporting requirements.[194] Furthermore, if 10% of the property's gross floor area (i) functions as a data center, television studio, or trading floor, or (ii) is used for manufacturing processing, commercial processing, agricultural processing, or industrial processing, there is no obligation to report.[195] Currently, the regulations do not specifically designate any penalties or fines for violations, such as failure to report or falsely reporting information.

*3. Germany*.—Germany has been at the forefront of promoting energy efficiency and sustainability in the built environment. With the aim of reducing energy consumption and greenhouse gas emissions, the country has implemented various regulations and initiatives. One such initiative is the "New Buildings Energy Act," which was introduced in November 2020, and sets energy efficiency standards for new buildings.[196] In addition, Germany has also been promoting energy benchmarking as a means of improving energy efficiency in existing buildings. Through the implementation of energy benchmarking regulations, the country has been able to track and report energy consumption, identify areas for improvement, and incentivize building owners to invest in energy efficiency measures. Fortunately, for property owners, Germany has several financing programs for energy efficiency upgrades. One of the most well-known programs is the Kreditanstalt für Wiederaufbau (KfW) program, which offers low-interest loans to homeowners, businesses, and public institutions for a variety of energy efficiency upgrades, including insulation, heating systems, and renewable energy installations.[197] Another financing program is the "Federal Ministry of Economics and Energy's Energy-Efficient Refurbishment Grant Program," which provides grants to homeowners and landlords who carry out energy efficiency improvements on their buildings.[198] The New Buildings Energy Act is explored more fully below.

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193. *Id.* § 3.

194. *Id.* § 2(1).

195. *Id.* § 5.

196. *Finally: The new German Buildings Energy Act (Gebäudeenergiegesetz, GEG) has been adopted*, DELOITTE, https://www2.deloitte.com/dl/en/pages/legal/articles/gebaeudeenergiegesetz.html [https://perma.cc/H48W-GY2B] (last visited Oct. 27, 2024).

197. *Responsible banking*, KFW, https://www.kfw.de/About-KfW/ [https://perma.cc/8FPP-V8UT] (last visited Aug. 17, 2024).

198. *Federal Ministry for Economic Affairs and Climate Action sets new incentives for refurbishments and introduces a bonus for serial investments*, FED. MINISTRY FOR ECON. AFF.

*a. New Buildings Energy Act*.—The "New Buildings Energy Act" replaces old legislation named EnEG and EnEV and establishes a new, uniform, coordinated set of rules for the energy requirements of new buildings and the use of renewable energy for heating and cooling them.[199] Specifically, it will aid in the application and enforcement of the provisions now brought together in the New Buildings Energy Act.[200] The ultimate goal of the Act is to achieve climate-neutral building stock by 2050, which will entail reducing primary energy demand in buildings by 80% from 2008 levels.[201]

The "New Buildings Energy Act" applies to all new buildings for which the building application is submitted after November 1, 2020.[202] For existing buildings, the energy requirements of the "German Buildings Energy Act" (GEG) apply when a major renovation is planned or carried out, or when a change of use of the building occurs.[203] It is the responsibility of the building owner to comply with the energy efficiency requirements set forth in the GEG at the time of construction or renovation.[204] Fines and penalties for noncompliance depend on the nature and severity of the violation.[205]

*4. Netherlands*.—In 2015, the Netherlands committed to the Paris Agreement.[206] In addition, the Dutch government has set the target to achieve a 49% reduction in carbon emissions from 1990 levels by 2030 and a 95% reduction by 2050.[207] To achieve this, the Netherlands has implemented various measures, including the enactment of the "Dutch Buildings Decree" (Buildings Decree).[208] The Buildings Decree sets out minimum requirements for a building's energy performance and aims to reduce their energy consumption and

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AND CLIMATE ACTION (Sept. 12, 2022), https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2022/12/20221209-federal-ministry-for-economic-affairs-and-climate-action-sets-new-incentives-for-refurbishments.html. [https://perma.cc/UBM2-ENZA].

199. Gebäudeenergiegesetz [Buildings Energy Act], Aug. 8, 2020, BGBl. I S. at 1728, revised Oct. 16, 2023, BGBl. at 97 (Ger.).

200. *Id.*

201. *5 Global Building Emissions Regulations Affected Property Owners*, BRAINBOX AI, https://brainboxai.com/en/articles/5-global-building-emissions-regulations-affecting-property-owners#:~:text=To%20address%20this%2C%20the%20German,(Geb%C3%A4udeenergiegesetz%2C%20or%20GEG) [https://perma.cc/S3VP-T4JV] (last visited Oct. 10, 2024).

202. *Finally: The new German Buildings Energy Act (Gebäudeenergiegesetz, GEG) has been adopted*, *supra* note 196.

203. Gebäudeenergiegesetz [Buildings Energy Act], Aug. 8, 2020, BGBl. I S. at 1728, revised Oct. 16, 2023, BGBl. at 97 (Ger.).

204. *Id.*

205. For example, in some instances, if a building emits more CO2 than covered by emission allowances, the owner may face a fine of 100 euros per excess ton. *See id.*

206. *Climate policy*, GOV'T OF THE NETH., https://www.government.nl/topics/climate-change/climate-policy#:~:text=To%20combat%20climate%20change%2C%20the,a%2095%25%20reduction%20by%202050 [https://perma.cc/2B42-FW6Y] (last visited Oct. 10, 2024).

207. *Id.*

208. *Rules for Construction*, NETH. ENTER. AGENCY, RVO, https://business.gov.nl/regulation/building-regulations/#art:building-decree-2012 [https://perma.cc/PS5E-BESP] (last visited Aug. 17, 2024).

CO2 emissions.[209] The Buildings Decree applies to: (i) both new and existing buildings; (ii) includes requirements for building insulation, ventilation, and heating systems; and (iii) aims to promote sustainable construction practices and improve a building's energy efficiency.[210] All of these are designed to achieve the Netherlands' commitment under the Paris Agreement.[211]

*a. Dutch Buildings Decree*.—The Buildings Decree sets out technical regulations for new buildings and renovations in the Netherlands.[212] It aims to promote the safety, health, accessibility, and energy efficiency of buildings, and to ensure that they meet minimum standards for sustainability and the environment.[213] The Buildings Decree applies to all new buildings and renovations in the Netherlands, including residential and non-residential buildings, as well as public buildings and facilities.[214] It covers a wide range of technical requirements, including those related to structural safety, fire safety, ventilation, and indoor climate.[215]

The Buildings Decree is updated periodically to reflect changes in building codes and standards. The most recent version of the Decree went into effect on July 1, 2020, and includes new provisions for energy performance and sustainability.[216] The Buildings Decree requires that all new buildings meet minimum energy performance standards and that renovations of existing buildings achieve a minimum level of energy efficiency.[217] The Dutch government enforces compliance with the Buildings Decree through inspections and audits, and can impose fines and penalties for noncompliance.[218] The exact fines and penalties depend on the severity of the violation, but can range from warnings and required corrective actions, to fines of several thousand euros.[219] Repeat offenders may face higher fines or legal action.[220]

*5. Australia*.—Australia is a signatory to the Paris Agreement and has set its own ambitious goals for improving energy efficiency in the built environment.[221] Australia's efforts include energy benchmarking via the "Building Energy Efficiency Disclosure Act 2010," (BEED Act) which requires

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209. *Id.*

210. *Netherlands Planning and Environmental Issues*, BAKER MCKENZIE, https://resourcehub.bakermckenzie.com/en/resources/global-corporate-real-estate-guide/europe-middle-east-and-africa/netherlands/topics/planning-and-environmental-issues [https://perma.cc/H62J-ZYTH] (last visited Oct. 10, 2024).

211. *Rules for Construction*, *supra* note 208.

212. *Id.*

213. *Id.*

214. Bouwbesluit van 29 augustus 2011, Stb. 2011, 416 (Neth.).

215. *Id.*

216. *Id.*

217. *Id.*

218. *Id.*

219. *Id.*

220. *Id.*

221. *Status of Paris Agreement*, U.N. TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en [https://perma.cc/ZQW5-49AC] (last visited Oct. 28, 2024).

building owners to obtain and disclose the energy efficiency rating of their buildings to potential buyers or lessees.[222] Furthermore, Australia has implemented a mandatory energy rating system called the "National Australian Built Environment Rating System" (NABERS).[223] NABERS measures the energy efficiency, water usage, and indoor environment quality of buildings on a scale of zero to six stars, with six being the highest rating.[224] Building owners are required to obtain a NABERS rating for their building, and to disclose it when selling, leasing, or subleasing.[225] The act applies to commercial buildings over 1,000 square meters, and the rating must be obtained by a qualified assessor using a prescribed methodology.[226] The BEED Act aims to improve transparency relating to energy performance, encouraging building owners to invest in energy efficiency upgrades, thereby leading to a more sustainable built environment.[227] Further details on the BEED Act are listed below.

*a. Building Energy Efficiency Disclosure Act 2010.*—The BEED Act is designed to improve the energy efficiency of Australia's commercial office buildings by requiring building owners, or lessors, to obtain and disclose energy efficiency information through a Building Energy Efficiency Certificate (BEEC).[228] This aims to enable prospective tenants and buyers to make informed decisions about the energy efficiency of a building before purchasing or leasing.[229] The BEED Act applies to commercial office buildings with a net rentable area of 1,000 square meters or more that are offered for sale, lease or sublease.[230] It also applies to any part of a building with a net rentable area of 1,000 square meters or more that is leased or subleased separately.[231]

Since November 1, 2010, the Beed Act requires building owners or lessors to disclose energy efficiency information through a BEEC when offering their building for sale, lease or sublease.[232] They must also provide an up-to-date BEEC to any prospective tenant or buyer upon request.[233] The BEEC is valid for up to twelve months from issuance, and must be renewed thereafter if the building is still being offered for sale, lease or sublease.[234] There are varying levels of offenses that may be levied against building owners for noncompliance

222. *Building Energy Efficiency Disclosure Act 2010* (Cth) (Austl.).

223. *What is NABERS?*, NAT'L AUSTRALIAN BUILT ENV'T RATING SYS., https://www.nabers.gov.au/about/what-nabers [https://perma.cc/56B4-2RVB] (last visited Aug. 17, 2024).

224. *Id.*

225. *Id.*

226. Scott Beauman, *Everything you ever wanted to know about NABERS rating*, CIM (Mar. 6, 2024), https://www.cim.io/blog/nabers-rating-everything-you-need-to-know [https://perma.cc/UM5Z-5T3H].

227. *Building Energy Efficiency Disclosure Act 2010* (Cth) s 2A (Austl.).

228. *Id.* at ss 10-11.

229. *Id.* at ss 12.

230. *Id.* at pt 2.

231. *Id.*

232. *Id.* at s 12.

233. *Id.*

234. *Id.*

with the Act. Australian law assigns Civil Penalty Units for such offenses which may lead to varying fines dependent upon the violation and its severity.[235] A penalty unit (PU) is a standard amount of money used to compute penalties for many breaches of law in Australia at both the federal, state, and territory level.[236] Fines are calculated by multiplying the value of a PU by the number of units prescribed for the offense.[237]

## II. POLICIES AND REGULATIONS AFFECTING CARBON EMISSION LIMITS

Although many Regions have benchmarking for energy reduction, very few have concrete carbon emission limits pertaining to buildings and construction. The most thorough regulations concerning carbon emissions are seen in New York City and Boston, both of which have each enacted strict requirements that are clearly defined with Carbon emission limits. Furthermore, noncompliance with these limits results in a scheduled penalty system that levies large fines as a method to deter violators. On the other hand, many international cities seem to just be starting the process of regulating building carbon emissions. For example, although Montreal is establishing a benchmarking system for building carbon emissions, the regulation is still in its infancy stages and will only be used to track data rather than placing true restrictions on emissions. Ultimately, most countries and cities have focused their efforts primarily on energy benchmarking and are still grappling with regulating building carbon emissions.

### *A. United States*

*1. New York City, New York.*—New York City has taken extensive measures to combat the climate crisis with a complex integration of multiple regulations concerning GHG emissions. A package of regulations was implemented under Local Law 97, 96, 92, and 94. Collectively, these laws created clear standards, deadlines, and penalties for noncompliance regarding GHG emissions from both commercial and residential buildings. Lastly, New York City's Local Law 96 established a building PACE financing program to pay for sustainability efforts. Each Local Law is explained more fully below.

*a. Local Law 97.*—Local Law 97 applies to any building in New York City: (i) that exceeds 25,000 square feet; (ii) where two or more buildings on the same tax lot that together exceed 50,000 square feet; or (iii) where two or more buildings held in condominium ownership that are governed by the same board of managers that together exceed 50,000 square feet.[238] Exceptions to Local Law 97 include:

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235. *Id.* at s 11.

236. *Penalty Units*, GOTOCOURT.COM.AU, https://www.gotocourt.com.au/criminal-law/penalty-units/ [https://perma.cc/HAX9-JYYW] (last visited Oct. 10, 2024).

237. *Id.*

238. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 97, § 28.320.1 (2019).

(i) Power generating facilities;
(ii) City-owned property;
(iii) NYC Housing Authority property;
(iv) Rent Regulated accommodation (Although, this classification must implement prescriptive measures by 12/31/24);
(v) Property owned by a Housing Development Fund Corporation;
(vi) Dedicated places of worship; and
(vii) Certain types of condominiums of no more than three stories.[239]

Carbon emission limits under Local Law 97 are as follows:

**2024–2029 Limits[240]**

| Row | Building Occupancy Group(s) | Multiply the building emissions intensity limit below by the corresponding gross floor area (sf) |
|---|---|---|
| 1 | A | 0.01074 $tCO_2e/sf$[241] |
| 2 | B, other than as described in row #6 | 0.00846 $tCO_2e/sf$ |
| 3 | E and I-4 | 0.00758 $tCO_2e/sf$ |
| 4 | I-1 | 0.01138 $tCO_2e/sf$ |
| 5 | F | 0.00574 $tCO_2e/sf$ |
| 6 | B civic administrative facility for emergency response services; B non-production laboratory; B ambulatory health care facility; H; I-2; I-3 | 0.02381 $tCO_2e/sf$ |
| 7 | M | 0.01181 $tCO_2e/sf$ |
| 8 | R-1 | 0.00987 $tCO_2e/sf$ |
| 9 | R-2 | 0.00675 $tCO_2e/sf$ |
| 10 | S and U | 0.426 $tCO_2e/sf$ |

239. *Id.*
240. *Id.* § 28-320.3.1.
241. Total carbon dioxide emissions per square foot.

**2030–2034 Limits**[242]

| Row | Building Occupancy Group(s) | Multiply the building emissions intensity limit below by the corresponding gross floor area (sf) |
|---|---|---|
| 1 | A | 0.00420 $tCO_2e$/sf |
| 2 | B, other than as described in row #6 | 0.00453 $tCO_2e$/sf |
| 3 | E and I-4 | 0.00344 $tCO_2e$/sf |
| 4 | I-1 | 0.00598 $tCO_2e$/sf |
| 5 | F | 0.00167 $tCO_2e$/sf |
| 6 | B civic administrative facility for emergency response services; B non-production laboratory; B ambulatory health care facility; H; I-2; I-3 | 0.001330 $tCO_2e$/sf |
| 7 | M | 0.00403 $tCO_2e$/sf |
| 8 | R-1 | 0.00526 $tCO_2e$/sf |
| 9 | R-2 | 0.00407 $tCO_2e$/sf |
| 10 | S and U | 0.00110 $tCO_2e$/sf |

Beginning May 1, 2025, covered buildings are required to annually report emissions each May 1 for the previous calendar year. The report must represent that their buildings are either: (i) in compliance with the emissions limits; or (ii) not in compliance, and provide the amount by which the building exceeds the prescribed limit.[243] Building owners will be assessed a civil penalty of not more than an amount equal to the difference between the building emissions' limit for a given year, and the actual building emissions for that year, multiplied by $268.[244] Building owners who fail to file a report will be liable for a penalty of not more than an amount equal to the gross floor area of such covered building, multiplied by $0.50 for each month that the violation is not corrected within the 12 months following the reporting deadline.[245] However, a covered building owner will not be liable for a penalty for a report demonstrating compliance with the requirements if the report is filed within 60 days of the date on which the report is due.[246] A violation will also be imposed if a building owner knowingly makes a false statement in a report or submission, and makes them subject to (i) a misdemeanor, and (ii) for a fine of not more than $500,000.[247]

*b. Local Law 96*.—Local Law 96, provides for loans to the owners of real property located within the city to finance (i) the installation of renewable energy systems and energy efficiency improvements; (ii) related energy audits

242. *Id.* § 28-320.3.2.
243. *Id.* § 28-321.3.
244. *Id.* § 28-320.6.
245. *Id.* § 28-320.6.2
246. *Id.* § 28-320.6.2.
247. *Id*. § 28-320.6.3.

and renewable energy system feasibility studies; and (iii) the verification of the installation of such systems and improvements.[248] It applies to any commercial or multifamily (3 units and larger) building, including tax-exempt non-profit and religious facilities, health care facilities, and industrial properties.[249]

*2. Massachusetts*.—

*a. Massachusetts PACE*.—Massachusetts has implemented a PACE financing system that is available for renovations or retrofits of existing buildings that are either commercial, industrial, or multifamily (5 or more units).[250]

*b. Boston, Massachusetts*.—The City of Boston has also addressed the climate crisis, specifically with carbon emissions reductions by implementing the "Building Emission Reduction and Disclosure Ordinance" (BERDO).[251] BERDO's goal is to reduce GHG emissions from all large buildings to achieve net zero emissions by 2050.[252] Additionally, this regulation simultaneously addresses energy reduction by requiring the submission of energy use as a benchmarking tool.[253] To meet its goal, the City has enacted strict emission standards, compliance deadlines, and penalties for noncompliance. An interesting caveat to the application of BERDO is that there are various alternative ways a building owner could comply with the regulation's requirements.[254] For example, a building owner can request an Individual Compliance Schedule, Hardship Compliance plan, Renewable Energy Certificates as well as others.[255] Whether these alternative methods of compliance are an effective way to achieve the goal of net zero emissions remains to be seen; however, they pose an interesting path that could be replicated in other cities where ordinary compliance can be initially difficult.

BERDO applies to: (i) nonresidential buildings that are 20,000 square feet or larger; (ii) residential buildings that are 20,000 square feet or larger or have 15 or more units; (iii) parcels with multiple buildings that are at least 20,000 square feet or 15 units; and (iv) buildings between 20,000 and 35,000 square feet or residential buildings between 15 and 35 units, all of which needed to begin reporting their energy use in 2022.[256] Building owners may apply for hardship exemptions relating to an individual compliance schedule or hardship compliance plan if confronted with issues such as: (i) historic building

248. N.Y.C., N.Y., LOCAL L. OF THE CITY OF N.Y. NO. 96 (2013).

249. *Id.*

250. MASS. DEV. FIN. AGENCY & MASS. DEP'T OF ENERGY RES., MASSACHUSETTS COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY PROGRAM GUIDELINES (2023).

251. BOS., MASS., MUNICIPAL CODE §§ 7-2.1-7-2.2 (2021).

252. *Id.* § 7-2.2(a).

253. *Id.* § 7-2.2(e).

254. *Id.* §§ 7-2.2(k)-(m).

255. *Id.*

256. *Id.* §§ 7-2.2(d)-(e).

designations; (ii) affordable housing refinancing timelines; (iii) long-term energy contracts; and (iv) financial hardship.[257]

**Carbon Emission Standards/Limits[258]**

| Building use | Emissions standard ($kgCO_2e/SF/yr.$[259]) | | | | | |
|---|---|---|---|---|---|---|
| | 2025–2029 | 2030–2034 | 2035–2039 | 2040–2044 | 2045–2049 | 2050– |
| Assembly | 7.8 | 4.6 | 3.3 | 2.1 | 1.1 | 0 |
| College/ University | 10.2 | 5.3 | 3.8 | 2.5 | 1.2 | 0 |
| Education | 3.9 | 2.4 | 1.8 | 1.2 | 0.6 | 0 |
| Food Sales & Service | 17.4 | 10.9 | 8.0 | 5.4 | 2.7 | 0 |
| Healthcare | 15.4 | 10.0 | 7.4 | 4.9 | 2.4 | 0 |
| Lodging | 5.8 | 3.7 | 2.7 | 1.8 | 0.9 | 0 |
| Manufacturing/ Industrial | 23.9 | 15.3 | 10.9 | 6.7 | 3.2 | 0 |
| Multifamily housing | 4.1 | 2.4 | 1.8 | 1.1 | 0.6 | 0 |
| Office | 5.3 | 3.2 | 2.4 | 1.6 | 0.8 | 0 |
| Retail | 7.1 | 3.4 | 2.4 | 1.5 | 0.7 | 0 |
| Services | 7.5 | 4.5 | 3.3 | 2.2 | 1.1 | 0 |
| Storage | 5.4 | 2.8 | 1.8 | 1.0 | 0.4 | 0 |
| Technology/ Science | 19.2 | 11.1 | 7.8 | 5.1 | 2.5 | 0 |

For all covered city and non-city buildings, owners must report the previous year's emissions, energy, and water use no later than May 15 each year.[260] They must also report owner contact information, building uses, renewable energy certificates, energy purchased via a power purchase agreement, and any CO2e Emissions Factors for Energy (Emissions Factors) used by the building if different from the Emissions Factors in BEDRO.[261] The penalties for failure to comply with reporting requirements versus failure to comply with emissions standards, although similar, are different. Failure to timely comply with the reporting requirements will result in a $300 a day fine for (a) non-residential properties that are (i) equal to or greater than 35,000 square feet or (ii) 2 or more buildings on the same parcel that are equal to or greater than 100,000 square feet; and (b) for residential properties equal to or greater than 35 units or 35,000

257. *Id.* § 7-2.2(l).
258. *Id.* § 7-2.2(i).
259. Kilograms of carbon dioxide per square foot per year.
260. *Id.* § 7-2.2(e).
261. *Id.*

square feet.[262] There is a $150 a day non-compliance fine for non-residential properties that are equal to or greater than 20,000 square feet, but less than 35,000 square feet; and for residential properties that are equal to or greater than 15 units or 20,000 square feet, but less than 35 units or 35,000 square feet.[263] If a building owner submits an inaccurate report, the owner may be met with a fine ranging from $1,000-$5,000.[264] Additionally, failure to comply with emission standards will result in a $1,000 per day fine for (x) non-residential properties that are (1) equal to or greater than 35,000 square feet or (2) two or more buildings on the same parcel that are equal or greater than 100,000 square feet; and (y) for residential properties equal to or greater than thirty-five units or 35,000 square feet.[265] Furthermore, there is a $300 non-compliance fee for non-residential properties that are equal to or greater than 20,000 square feet, but less than 35,000 square feet; and for residential properties that are equal to or greater than 15 units or 20,000 square feet, but less than thirty-five units or 35,000 square feet.[266]

*3. New Jersey*.—Although just next door to the heavily regulated state of New York, New Jersey has taken a "wait-and-see" approach concerning limiting carbon emissions by only implementing policies and surface-level regulations. New Jersey has enacted two major policies: "The Global Warming Response Act"[267] and "The 2019 Energy Master Plan."[268] Broadly, each policy conveys goals affecting new and existing commercial and residential buildings of varying sizes to ultimately reduce GHGs. However, the legislation remains in its infancy as data is still being collected before the state proposes more stringent standards and deadlines. Further, PACE financing remains to be implemented by the New Jersey Economic Development Authority.[269] Each policy's goal is further explained below.

*a. The Global Warming Response Act*.—"The Global Warming Response Act" requires the reduction of GHG emissions to 80% of 2006 levels by 2050. A New Jersey report indicated that in order to achieve these levels, the commercial and residential building sectors must: (i) reduce GHG emissions by 89%; (ii) convert 90% of buildings to 100% clean energy systems; and (iii) use net zero emissions standards for new construction.[270]

The 2019 Energy Master Plan set the goal to achieve 100% clean energy and reduce GHG emissions to 80% of 2006 levels by 2050. Strategies to reach

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262. *Id.* § 7-2.2(r)(i).

263. *Id.*

264. *Id.* § 7-2.2(r)(iii).

265. *Id.* § 7-2.2(r)(ii).

266. *Id.*

267. N.J. REV. STAT. §§ 26:2C-37-26:2C-68 (2023).

268. *Energy Master Plan*, N.J. DEP'T ENV'T PROT., https://www.nj.gov/emp/index.shtml [https://perma.cc/LEV4-S4DK] (last visited Sept. 9, 2024).

269. N.J. REV. STAT. §§ 34:1b-374-34:1b-382 (2023).

270. N.J. Dep't Env't Prot., New Jersey's Global Warming Response Act 80 x 50 Report (2020).

these results include improving building codes, increasing energy efficiency in existing buildings, developing regulations for net zero carbon new construction, providing incentives for the transition to electric heat pumps, water heaters, and appliances, and transitioning to a fully electrified building sector.[271]

*4. Miami, Florida*.—Miami, Florida, has taken only preliminary steps in tackling the climate crisis as it pertains to limiting carbon emissions and reducing energy consumption. Miami's sole initiative to accomplish this is called "Miami Forever Carbon Neutral, City of Miami Greenhouse Gas Reduction Plan and Pathway to Carbon Neutrality by 2050" (Plan).[272] The Plan identifies strategies for Miami to meet Paris Agreement targets and an interim goal of a 60% reduction from 2018 levels of GHG emissions by 2035.[273] Beginning in 2024, the plan requires all new and existing buildings to be solar-ready and storage-ready when substantially retrofitted.[274] Further, LEED Silver certification will be required for new construction that is more than 50,000 square feet.[275] The Plan provides for expedited permitting and other incentives for green buildings and rooftop solar installations.[276] Finally, for buildings more than 20,000 square feet, a program requiring energy benchmarking and disclosure and adoption of performance standards will be implemented.[277] The Plan's objectives are broad and aspirational as they pertain to new and existing commercial and residential buildings yet lack any mechanisms that impose any penalties to implement and enforce the regulations upon building owners.

*5. Texas*.—Although Texas has begun to regulate energy consumption and its reduction, there is a material lack of concrete state legislation directly concerning reducing building carbon emissions. However, along with this statewide dearth of laws, some cities have enacted their own laws.[278]

*a. Austin, Texas*.—Austin has implemented the "Austin Climate Equity Plan" (Plan).[279] The Plan focuses on sustainability in buildings with basic goals such as achieving net-zero carbon for all new buildings by 2030 while reducing carbon emissions by 25% for existing buildings.[280] The Plan provides guidance on how to achieve these results such as offering financial incentives to owners,

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271. *Id.* at 73.

272. CITY OF MIA., MIAMI FOREVER CARBON NEUTRAL: CITY OF MIAMI GREENHOUSE GAS REDUCTION PLAN AND PATHWAY TO CARBON NEUTRALITY BY 2050 (2021).

273. *Id.* at 3.

274. *Id.* at 15.

275. *Id.* at 36.

276. *Id.*

277. *Id.* at 36-37.

278. According to the U.S. Energy Information Administration, Texas produced 624 million metric tons of carbon dioxide in 2020, which was more than double the amount emitted in California, the second largest carbon producer. *See Climate in the Northwest-central United States*, EARTH@HOME, https://earthathome.org/hoe/nwc/climate/ [https://perma.cc/946E-2JRG] (last visited Oct. 30, 2024).

279. AUSTIN CLIMATE EQUITY PLAN STEERING COMM., AUSTIN CLIMATE EQUITY PLAN (2020–21).

280. *Id.* at 8.

and by amending building codes.[281] However, the Plan lacks enforcement provisions and fails to call on legislators to enact tangible regulations.

*6. California*.—California has taken broad measures to address the climate issue presented in the Paris Agreement. As discussed *supra*, the state has enacted the "California Green Buildings Standards Code" and the "2022 Energy Code," which concern energy and water efficiency. However, regulations directly relating to tracking and placing strict limits on building carbon emissions are less common. Statewide, California has just scratched the surface of regulating buildings carbon emissions with the passage of: (i) Senate Bill 1477, Low emissions buildings and sources of heat energy (adopted September 13, 2018);[282] (ii) Assembly Bill 2446, Embodied carbon emissions: construction materials (approved and filed September 16, 2022);[283] (iii) Building Initiative for Low-Emissions Development (BUILD);[284] and (iv) Senate Bill No. 253, "The Climate Corporate Data Accountability Act" (CCDAA).[285] Generally, these legislative efforts lay the groundwork for further regulation that may place strict limits on carbon emissions going forward, but nothing more. Many cities in California have also enacted their own legislation, such as San Francisco's Ordinance 237-20 regulating the use of natural gas in new buildings.[286] And although significant progress has been made, individual city regulations that place caps on buildings' carbon emissions remain to be seen. However, the State of California does offer PACE financing for building owners to finance energy efficiency, water reductions, and other environmentally beneficial improvements paid through their property taxes.[287] Key elements of each piece of legislation referenced herein are detailed below.

*a. Senate Bill 1477: Low-emissions buildings and sources of heat energy*.—Senate Bill 1477 focuses on building decarbonization and allocates $50 million annually through June 2023 for development and funding of different programs and initiatives.[288] The Building Initiative for Low-emissions Development (BUILD) program requires gas corporations to provide incentives to eligible applicants for the deployment of near-zero-emission building technologies to significantly reduce the buildings' emissions of greenhouse gases.[289] Senate Bill 1477 also introduces the "Technology and Equipment for Clean Heating Initiative" (TECH), which is a statewide market development initiative aimed to drive market-wide adoption of low-emission space and water heating

281. *Id.* at 40-78.

282. S.B. 1477, 2017–2018 Reg. Sess. (Cal. 2018).

283. Assemb. B. 2446, 2021–2022 Reg. Sess. (Cal. 2022).

284. S.B. 1477, 2017–2018 Reg. Sess. (Cal. 2018).

285. S.B. 253, 2022–2023 Reg. Sess. (Cal. 2023).

286. S.F., CAL., ALL ELECTRIC NEW CONSTRUCTION ORDINANCE, No. 237-20 (2020).

287. *PACE (Property Assessed Clean Energy): What Homeowners Need to Know*, CAL. DEP'T OF FIN. PROT. & INNOVATION, https://dfpi.ca.gov/pace-program-administrators/pace/#faq [https://perma.cc/75HS-ZHDL] (last visited Oct. 10, 2024).

288. S.B. 1477, 2017–2018 Reg. Sess. (Cal. 2018).

289. *Id.* § 921.1.

equipment for new and existing residential buildings.[290] At least 30% of these funds are reserved for new low-income residential housing.[291]

*b. Assembly Bill 2466: Embodied carbon emissions: construction materials*.—Assembly Bill 2446 (Bill) is designed to reduce the embodied carbon emissions associated with the production and transportation of building construction materials used in California by requiring the state to set embodied carbon reduction targets, and to develop a methodology for measuring and reporting embodied carbon emissions.[292] The ultimate goal of the Bill is to achieve a 40% reduction in GHG emissions of building materials by 2035, with an interim target of 20% reduction by 2030, and using 2026 GHG levels as a baseline.[293] To achieve this result, the State Air Resources Board established carbon reduction targets for January 1, 2023, and a mandate to develop a methodology for measuring and reporting carbon emissions by January 1, 2024.[294] On December 15, 2022, the State Air Resources Board approved the carbon reduction target that aims to cut GHG emissions by 85% and achieve carbon neutrality by 2045.[295] Beginning January 1, 2025, the bill requires that the state set carbon emissions performance standards for building construction materials. The bill applies to the new construction of non-residential buildings of 10,000 square feet or greater, and residential buildings of five or more units.[296] The bill does not specify any penalties or fines for noncompliance but does require the state to use existing resources to enforce the requirements and to take steps to encourage compliance.[297]

*c. San Francisco Ordinance 237-20*.—San Francisco Ordinance 237-20 (Ordinance) was presented to reduce energy consumption and greenhouse gas emissions from large buildings in San Francisco by identifying and implementing cost-effective energy efficiency measures and applies to all new buildings constructed after June 1, 2021.[298] The Ordinance requires applications for permits submitted after June 1, 2021, for new building construction to be designed and built with only electric space conditioning, water heating, cooking,

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290. *Id.* at art. 13.

291. *Id.* § 921.1(c)(1).

292. Assemb. B. 2446, 2021–2022 Reg. Sess. (2022).

293. *Id.* § 38561.3(a)(2).

294. *Prepare to Disclose: California Legislature Declines to Extend AB 1305 Voluntary Carbon Market Disclosure Deadline, Leaves Existing SB 253 and SB 261 Climate Disclosure Timelines in Place*, MORRISON FOERSTER (Sept. 9, 2024), https://www.mofo.com/resources/insights/240909-prepare-to-disclose-california-legislature-declines [https://perma.cc/92ZU-ZCRV].

295. *CARB approves unprecedented climate action plan to shift world's 4th largest economy from fossil fuels to clean and renewable energy*, CAL. AIR RES. BD. (Dec. 15, 2022), https://ww2.arb.ca.gov/news/carb-approves-unprecedented-climate-action-plan-shift-worlds-4th-largest-economy-fossil-fuels#:~:text=The%20California%20Air%20Resources%20Board,achieves%20carbon%20neutrality%20in%202045 [https://perma.cc/6LA7-NRYV].

296. Assemb. B. 2446, 2021–2022 Reg. Sess. (2022).

297. *Id.*

298. S.F., CAL., ALL ELECTRIC NEW CONSTRUCTION ORDINANCE, No. 237-20 (2020).

and clothes drying systems, and prohibits installation of infrastructure, piping systems, or piping for distribution of natural gas or propane to such uses.[299] Buildings are not subject to the ordinance if: (i) an all-electric project is demonstrated to be physically or technically infeasible; (ii) applications for permits for new construction proposing the installation of gas piping systems, fixtures, and infrastructure exclusively for cooking equipment within the area designated for commercial food service; or (iii) where application of San Francisco Building Code Section 106A.1.17 would violate the terms of an existing development agreement or other contract with the City.[300]

*d. Senate Bill 253: the Climate Corporate Data Accountability Act*.—The "Climate Corporate Data Disclosure Act" (CCDDA) requires public and private companies doing business in California to disclose Scope 1, 2, and 3 emissions beginning in 2026, on a date not yet determined.[301] Reporting on Scope 3 will not be required until 2027, when companies must report on 2026 data.[302] The California State Air Resources Board (CARB) will house a digital registry containing company reports that will be available to the public.[303]

The CCDAA impacts all large public and private companies in California with an annual excess of at least $1 billion in revenue.[304] If a company fails to comply with the regulations set out in the CCDAA, CARB will be able to bring civil actions against the company in an attempt to seek civil penalties for violations of the act.[305] The maximum fine CARB can collect in a reporting year is $500,000.[306]

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299. *Id.* § 106A.1.17.

300. *Id.*

301. S.B. 253, 2022–2023 Reg. Sess. (Cal. 2023). Scope 1 emissions are those that result directly from a company's activities. Scope 2 emissions are those that are released indirectly, like electricity purchased by the company. Scope 3 emissions are those that are indirectly produced from a company's entire supply chain. *See* Cynthia Faur, *California's New Climate Disclosure and GHG-Related Claims Laws*, QUARLES (Mar. 13, 2024), https://www.quarles.com/newsroom/publications/californias-new-climate-disclosure-and-ghg-related-claims-laws#:~:text=SB%20253%20requires%20U.S.%20based,2027%20for%20Scope%203%20emissions [https://perma.cc/9SYM-WDLB] ("Additionally, the compliance date for the law, which became effective on January 1, 2024, is not express. One of the bill's sponsors obtained unanimous consent of the California Assembly to have a letter published in the California Assembly Daily Journal clarifying that the intended "applicability date" for AB 1305 is January 1, 2025. This letter, however, does not amend the law.").

302. S.B. 253, 2022–2023 Reg. Sess. § 2(c)(1)(A)(i)(II (Cal. 2023).

303. *Id.*

304. *Id.* § 2(b)(2).

305. *Id.* § 2(f).

306. *Id.*

### *B. International*

*1. United Kingdom*.—The United Kingdom (UK) drafted the "Climate Change Act" (CCA) in 2008, which helped them achieve their goals and obligations set forth in the later signed Paris Agreement.[307] CCA established the Committee on Climate Change (CCC), an independent statutory body.[308] The CCA is a comprehensive piece of legislation that establishes a legally binding framework to reduce the UK's greenhouse gas emissions and address the risks of climate change.[309] One of the key elements of the CCA is the establishment of carbon budgets, which are legally binding targets for reducing greenhouse gas emissions in the UK.[310] Carbon budgets are set for five-year periods, and cover all sectors of the economy, including buildings, transportation, and industry.[311] Ultimately, the goal is to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline.[312]

Similar to NYC's Local Law 97 on carbon emission caps, the CCA's carbon budget is a cap on the amount of greenhouse gases emitted in the UK over a five-year period.[313] The budgets are set twelve years in advance to allow proper preparations by all parties involved and affected.[314] Below is a chart of the allowable levels.[315]

| **Budget** | **Carbon budget level** | **Reduction below 1990 levels** | **Met?** |
|---|---|---|---|
| 1st carbon budget (2008 to 2012) | 3,018 MtCO2e[316] | 25% | Yes |
| 2nd carbon budget (2013 to 2017) | 2,782 MtCO2e | 31% | Yes |
| 3rd carbon budget (2018 to 2022) | 2,544 MtCO2e | 37% by 2020 | On track |
| 4th carbon budget (2023 to 2027) | 1,950 MtCO2e | 51% by 2025 | Off track |
| 5th carbon budget (2028 to 2032) | 1,725 MtCO2e | 57% by 2030 | Off track |
| 6th carbon budget (2033 to 2037) | 965 MtCO2e | 78% by 2035 | Off track |
| Net Zero Target | At least 100% by 2050 | | |

307. Climate Change Act 2008, c. 27 (UK).

308. *A Legal Duty to Act*, CLIMATE CHANGE COMM., https://www.theccc.org.uk/what-is-climate-change/a-legal-duty-to-act/ [https://perma.cc/8SQ5-37R3] (last visited Aug. 21, 2024).

309. *Id.*

310. Climate Change Act 2008, c. 27, § 4 (UK).

311. *Id.* § 10.

312. *Id.* § 1.

313. *Id.* § 4(1)(a).

314. *Id.* § 4(2)(b).

315. HOUSE OF COMMONS LIBRARY, *supra* note 170, at 8-9.

316. Million tons of carbon dioxide equivalent.

The CCA imposes a duty on the CCC to provide an annual statement to Parliament for each year, starting in 2009.[317] The statement must report the amount of GHG emissions in the UK, UK Removals,[318] and identify the methods used to measure or calculate those amounts.[319] Additionally, the statement must show whether any of those amounts represent an increase or decrease, compared to the equivalent amount for the previous year.[320]

However, since this regulation applies to a multitude of sectors that generate carbon emissions for the entire UK, it is not exactly targeted towards carbon emissions of buildings specifically.[321] Further, this regulation does not impose any penalties or fines if the carbon budgets are exceeded.[322] Therefore, it truly acts as a guide on the trajectory of carbon emissions as a whole in the UK.

*2. Canada*.—Canada is taking significant steps to reduce its greenhouse gas emissions and meet the targets set under the Paris Agreement. Specifically, there is a focus on reducing carbon emissions from buildings, which are responsible for a significant portion of Canada's emissions.[323] To achieve this result, Canada implemented various policies and initiatives aimed at promoting energy-efficient buildings and reducing emissions from existing structures.[324] One such initiative is the "Pan-Canadian Framework on Clean Growth and Climate Change," which includes a commitment to develop and implement a national model building code to improve the energy efficiency of new buildings.[325] In addition, several provinces and cities have implemented their own regulations and by-laws to reduce building carbon emissions.[326] An example of this is the "Montreal Building Emissions By-Law," (By-Law), which aims to reduce the carbon footprint of buildings in Montreal by requiring owners to measure and report their building's energy consumption and greenhouse gas emissions.[327] Although the regulation is still in its infancy stages, some of the details are listed below.

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317. Climate Change Act 2008, c. 27, § 12 (UK).

318. DEP'T FOR ENERGY SEC. & NET ZERO, ANNUAL STATEMENT OF EMISSIONS FOR 2022, 2024 (UK).

319. *Id.*

320. *Id.*

321. Climate Change Act 2008, c. 27, § 12 (UK).

322. *Id.* § 17.

323. *Building Climate Solutions*, CAN. GREEN BLDG. COUNCIL, https://www.cagbc.org/why-green-building/building-climate-solutions/#:~:text=A%20proven%20path%20to%20lower%20carbon%20emissions&text=Today%2C%20residential%2C%20commercial%2C%20and,Canada's%20third%2Dhighest%20carbon%20emitter [https://perma.cc/XEW2-WSUS] (last visited Oct. 29, 2024).

324. *Canada Green Buildings Strategy Released*, INT'L INST. OF BLDG. ENCLOSURE CONSULTANTS (July 29, 2024), https://iibec.org/canada-green-buildings-strategy-released/#:~:text=The%20CGBS%20aims%20to%3A,carbon%20building%20materials%20and%20technologies [https://perma.cc/YB5G-GDPX].

325. GOV'T OF CAN., PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE: CANADA'S PLAN TO ADDRESS CLIMATE CHANGE AND GROW THE ECONOMY (2016).

326. *Id.* at 1.

327. MONTREAL, CAN., BUILDING EMISSIONS BY-LAW (2021).

*a. Montreal Building Emissions By-Law*.—The purpose of the Montreal Building Emissions By-Law is to reduce greenhouse gas emissions and energy consumption from buildings in Montreal.[328] The By-Law aims to improve the energy efficiency of existing buildings and reduce emissions from new buildings by benchmarking & gathering GHG emissions to construct rating systems and implementing mandatory displays of GHG emission performance on each building.[329]

To be implemented periodically, beginning in 2022, buildings greater than 160,000 square feet are to be assessed for fossil fuel consumption.[330] In 2023, the regulation will expand to include buildings greater than 50,000 square feet, including residential buildings of fifty dwellings or more.[331] Finally, in 2024, the regulation will include buildings greater than 20,000 square feet and residential buildings of twenty-five dwellings or more.[332] Currently, the regulation is unclear on the violations and penalties that may be assessed for noncompliance.

*3. European Union (EU)*.—The EU's 2030 Climate Target Plan is ambitious in its goal to reduce GHG emissions by at least 55% of 1990 levels by 2030, and to reach a net-zero emission balance by 2050.[333] The European Commission has since adopted a series of legislative proposals, called the "Fit for 55" package to reach this goal.[334]

*a. Carbon Border Adjustment Mechanism*.—The "Carbon Border Adjustment Mechanism" (CBAM) will place a tax on the importation of carbon intensive goods.[335] Thus, CBAM will impact any importer of goods containing cement, electricity, fertilizers, iron, steel, aluminum, and hydrogen.[336] Importers of covered products will be required to purchase CBAM certificates, which will correspond to what an EU producer of the same product would have to pay in carbon allowance under the EU Emissions Trading System (ETS).[337] If the importer of the affected goods can demonstrate that a carbon price has already been paid, the price of the CBAM certificate will be deducted to reflect what

328. *Id.* at art. I.

329. *Id.*

330. *Id.* at art. III.

331. *Id.*

332. *Id.*

333. *2030 climate targets*, EUR. COMM., https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework_en#:~:text=In%20July%202021%2C%20the%20European,climate%2Dneutral%20continent%20by%202050 [https://perma.cc/3CMM-NPA5 ] (last visited Sept. 9, 2024).

334. *Commission Welcomes Completion of Key "Fit for 55" Legislation, Putting EU on Track to Exceed 2030 Targets*, EUR. COMM. (Oct. 9, 2023), https://ec.europa.eu/commission/presscorner/detail/en/IP_23_4754 [https://perma.cc/G4VE-CURL].

335. Commission Regulation 2023/956 of May 10, 2023, Establishing a Carbon Border Adjustment Mechanism, 2023, (L 130/52).

336. David J. Ross et. al., *EU adopts the Carbon Border Adjustment Mechanism Regulation*, WILMERHALE (June 6, 2023), https://www.wilmerhale.com/insights/client-alerts/20230606-eu-adopts-the-carbon-border-adjustment-mechanism-regulation [https://perma.cc/XFN2-2KJL].

337. *Id.*

has already been paid.[338] The price of the CBAM certificates will be calculated weekly, based on the average auction price of EU ETS allowances.[339]

The charge on affected imported goods will be gradually phased in from 2026 through 2034. [340] The implementation of CBAM will begin with a transitional period from October 1, 2023, through December 31, 2025.[341] During this transitional period, importers will only be subject to reporting obligations without being required to purchase CBAM certificates.[342] Furthermore, importers will be required to submit a quarterly CBAM report that includes: (i) the total quantity of each covered good that was imported during the quarter; (ii) the specific total emissions and indirect emissions imbedded in the goods; and (iii) the carbon price due, if any, in the country of origin for the embedded emissions, taking into account discounts or other forms of compensation.[343]

Starting January 1, 2023, only those importers with CBAM certificates will be able to import CBAM goods into the EU.[344] CBAM importers will be required to submit an annual CBAM declaration beginning in 2027 and no later than May 31.[345] These declarations must include: (a) the total quantity of each type of covered good imported in the previous year; (b) the total emissions embedded in the good; (c) the number of CBAM certificates to be surrendered, after adjusting for EU ETS; and (d) a copy of the verification report of embedded emissions by an accredited verifier.[346] Importers must use an accredited verifier to confirm the total emissions declared in the CBAM declaration.[347] Importers must then purchase their CBAM certificates from their EU Member State of establishment, with certificates priced at the weekly average of EU ETS allowances.[348] Importers must also ensure that their account reflects certificates corresponding to 80% of emissions embedded in all of their goods that fall under CBAM since the beginning of the year.[349] Finally, importers will be required to surrender CBAM certificates no later than May 31 each year.[350] This will need to reflect the emissions previously verified in the importer's annual declaration or the previous year.[351]

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338. *Id.*
339. *Id.*
340. *Id.*
341. *Id.*
342. *Id.*
343. *Id.*
344. *Id.*
345. *Id.*
346. *Id.*
347. *Id.*
348. *Id.*
349. *Id.*
350. *Id.*
351. *Id.*

## CONCLUSION

The Paris Agreement has provided a global framework for combating climate change, but the actual progress towards reducing energy consumption and carbon emissions has varied widely among different Regions. Although some progressive cities have adopted concrete policies and regulations that impose mandatory benchmarks and heavy fines for non-compliance, many Regions have only announced broad policy goals, without implementing specific measures or penalties. As the deadline for meeting the Paris Agreement's stringent carbon emission targets approaches, Regions must increase their efforts to reduce energy consumption and carbon emissions by adopting stricter policies and regulations.

Furthermore, it is clear that Regions must not only focus on reducing energy consumption, but must also pay close attention to buildings carbon emissions. The approach taken by cities such as New York City, which has implemented a comprehensive set of regulations covering both energy and carbon emission reduction, is better suited to achieve the Paris Agreement's goals of limiting global warming temperatures to 1.5°C above pre-industrial levels. Moreover, Regions should explore financing options such as PACE programs to assist building owners in complying with these regulations.

In sum, there will always be the argument as to whether carrots or sticks are more effective in modifying behavior and, in this case, reducing energy consumption and meeting the stringent carbon emission deadlines of the Paris Agreement. Although the numbers are not finalized as to how many property owners will be penalized for failing to satisfy the imposed carbon limits, the statistics of those property owners that have performed retrofits provide some insight into the effectiveness of the legislation.

In New York City alone, "[n]ine in ten buildings already comply with their 2024 LL97 limits."[352] Furthermore, the New York City Department of Buildings estimated that "88% of NYC buildings meet 2024 limits, 89% of multifamily buildings meet 2024 limits, and 92% of office buildings meet 2024 limits."[353] However, there are those who believe that, although "evidence suggests carbon taxes do reduce emissions," the tax "rate and the scope" affects the impact.[354] In his article "Carbon Taxes in Theory and Practice," Alex Muresianu argues that the various factors determining the effectiveness of a carbon tax include: (a) whether the "electric sector was already heavily decarbonized,"[355] (b) whether

352. *See Local Law 97 Progress*, URBAN GREEN, https://www.urbangreencouncil.org/what-we-do/explore-nyc-building-data-hub/local-law-97-progress/ [https://perma.cc/Q897-YZYS] (last visited May 28, 2024).

353. *Id.*

354. *See* Alex Muresianu, *Carbon Taxes in Theory and Practice*, TAX FOUND. (May 2, 2023), *available at* https://taxfoundation.org/research/all/global/carbon-taxes-in-practice/#:~:text=Carbon%20taxes%20will%20reduce%20emissions,to%20avoid%20bearing%20the%20tax [https://perma.cc/633D-MHVZ].

355. *Id.* (looking at Sweden's tax).

the tax is "a high tax applied to a narrow base" or "a low-to-moderate tax to a broad base,"[356] (c) if the tax was effective against "the power generation section, which is much more responsive to taxation."[357] Muresianu postures that if the "power sector" was non-fossil fuel reliant prior to the implementation of the carbon tax, as it was in Sweden and British Columbia, the "carbon taxes led to modest reductions in carbon emissions," but in the United Kingdom, where it was still fossil-fuel reliant, there was "a significant decline in emissions."[358] However, this research shows that, in many cases, "the most powerful response to the carbon tax occurs in the power sector."[359]

There are other studies that see carbon taxes as a very effective method to reduce energy consumption,[360] and "the commercial buildings sector appears to respond quickly to a carbon tax."[361] The Georgia Institute of Technology team concludes that, "carbon taxes would have significant impacts on the [carbon dioxide] emissions attributable to commercial buildings sector."[362] The ultimate question though, and the point made clear in the above-reference research, is that the carbon taxes may not be enough to meet the desired goals.[363]

As a result, it is essential that Regions continue to prioritize and implement concrete measures aimed at reducing energy consumption and carbon emissions. By doing so, they can effectively combat the global climate crisis and meet the strict carbon emission targets set forth by the Paris Agreement.

356. *Id.* (looking at British Columbia's tax).

357. *Id.* (looking at the United Kingdom tax).

358. *Id.*

359. *Id.*

360. *See* MARILYN BROWN ET AL., MODELING THE IMPACT OF A CARBON TAX ON THE COMMERCIAL BUILDINGS SECTOR, GEORGIA INST. OF TECH (2012).

361. *Id.*

362. *Id.*

363. *Id.*