Building Energy Performance Standards Policy Considerations

Introduction to BEPS

Buildings account for approximately 40 percent of total emissions in the Unites States according to the International Energy Agency (IEA)[1]. Climate goals, many which revolve around reducing carbon emissions, can only be met with a heavy emphasis on building energy efficiency. Cities that aim to reduce their carbon footprint must put their efforts towards engaging with the building stock and its owners to achieve their emissions targets.

Building energy performance standards, or BEPS, are policies which require building owners to meet certain energy targets in order to reach city-wide emissions goals and to disclose their building data publicly. BEPS policies can incorporate a variety of standards which target specific building components or entire building types. Over time, the standards become stricter, which drives continuous and long-term improvement within the building stock of the city[2]. These types of policies can be very successful in reducing carbon emissions in cities. For example, Tokyo managed to create a 23 percent reduction in CO_2 emissions from the baseline year. Additionally, 93 percent of the covered facilities reduced more than to which they were obligated[3]. In order to make the greatest impact, cities must take into account a number of considerations when developing their own BEPS.

Before developing a new policy, it is key to first have quality data, including metrics such as energy use intensity, Energy Star scores, emissions data, and more, on city building stock through benchmarking. It is crucial that the data collected matches exactly that which will be measured for compliance in the developed BEPS, so as not to over or under estimate the building stock's starting emissions values and to ensure proper compliance standards are created that will be stringent enough, but also reasonable.

Developing Climate Goals

There are a number of different BEPS structures, most of which involve compliance goals set over multi-year windows, which compensate for economic, weather, and occupancy fluctuations. In order to set compliance goals for BEPS, the city or state should have an overarching climate goal for the area. Many climate goals aim to reduce total carbon emissions or energy use, but can also include goals around renewable energy, zero energy, and more. For the overarching climate goal, a long-term goal should be set, typically for 2050, with interim goals for 2030 and 2040.

BEPS Compliance Goals

In order to establish the compliance goals for BEPS, the city or state needs to understand the emission or energy use that comes from buildings. An understanding of how much emissions or energy reduction is

[1] https://www.iea.org/reports/tracking-buildings-2019
[2] https://www.imt.org/the-abcs-of-bps-what-you-should-know-about-building-performance-standards/
[3] Building Performance Standards: Lessons From the Carbon Markets by Véronique Bugnion and Karen Palmer; unpublished draft 2020.

needed can be gleaned from benchmarking data and a long-term building energy or carbon reduction goals can be set.

Once the long-term goals are set, shorter term targets can be developed for buildings compliance. If targets are too short-term, those required to comply will not be able to take into account long-term pricing for worthwhile efficiency investments. Targets that are too long-term, on the other hand, may have certain economic and political uncertainties. After determining the timeline of compliance targets, the next question to answer is how aggressive the actual improvement targets should be. This is a delicate balance between targets being not tough enough to reach climate goals but too tough that compliance costs are too steep and unaffordable.

Compliance Thresholds

After determining the timeline of targets and climate goals, the next step is to govern which buildings will comply, and by what means they can do so. The two main outputs for compliance are building size and building emissions (greenhouse gases, liters of oil, etc.). Program regulations should design either by building size or emissions, keeping in mind a goal of capturing as much of the city's emissions as possible and keeping the number of participating buildings to a practical number. Size-based thresholds and emissions-based thresholds each have their pros and cons.

Size thresholds can be manipulated to cater to the needs of the building stock. For example, Washington D.C.'s BEPS is planning to gradually lower their size threshold from 50,000 square feet in 2021 to 10,000 square feet in 2026. This allows for larger buildings, with likely higher emissions and an established facility or building manager, to be targeted first. Smaller entities can prepare financially to make energy efficiency upgrades (if necessary) in order to comply. In addition, size-based thresholds remain consistent through compliance periods and affect the building stock equally. With a sized-based threshold, a number of low-emitting buildings may be captured. Requiring already low-emitting buildings to comply can adds to the total number of buildings involved and can increase program management costs. With a size-based threshold it may benefit the program to add an exemption energy use or carbon emission threshold. It is crucial to analyze building stocks before determining size thresholds because, depending on selection, the emissions can greatly vary. In some cases, a smaller threshold could actually encompass more overall emissions than a larger size threshold.

Emissions-based thresholds, on the other hand, inherently target the highest emitters, which makes it easier to implement and cost-effective to manage. In order to have an emissions-based threshold it is crucial to have a good set of historical data on which to base the values, and it is important to note that the disclosing buildings will vary between years. In addition, the threshold must be continuously lowered or else buildings that made efficiency upgrades and met compliance values will not be required to disclose the following year, and thus will not need to make further upgrades.

Compliance Methods

There are a variety of ways buildings can comply with the energy standards set forth by their governing policy. The policy may dictate the method of compliance or may present a list of options. Compliance can be driven by codes, data, or prescriptive measures, among other methods. Code-driven compliance

involves requiring buildings to fulfill and sustain continuous update of stretch codes or building code standards. Data-driven compliance involves a series of increasingly rigorous emission intensity or consumption thresholds that buildings must meet based on their building type. Buildings individually report their data and must prove that they continue to meet targets determined through the BEPS. Prescriptive measures involve buildings improving their efficiency measures in order to meet BEPS goals. Some helpful policies, such as Tokyo's, include a list of possible upgrades along with their cost-effectiveness in order to educate building owners with valuable information on how to meet compliance goals.[4]

BEPS Designs

After city goals are defined, targets are determined, and building thresholds for compliance are set, a decision on the type of BEPS to implement must be made. There are two main types of BEPS: cap-and-trade and baseline. Cap-and-trade programs allow buildings to buy and sell excess energy from building to building in order for buildings to comply. This incentivizes buildings to remain below the energy threshold so that they can sell the excess for profit. Baseline programs hold each building responsible for meeting the reduction goal individually from the determined baseline year, and do not allow selling or trading. The baseline value is typically represented as consumption or emissions per determined amount of building space. If there are building owners with multiple buildings, BEPS design can make things easier for them by allowing compliance on a portfolio level as opposed to an individual building level.

Working to improve building energy efficiency not only decreases cities' harmful effects on the environment, it also creates local jobs, reduces utility bills, improves resiliency, increases property values, and makes buildings healthier for occupants. The following table outlines BEPS policies of three cities. In addition to these, Boston, Cambridge, and Seattle are also studying BEPS designs and considering how to move forward.

[4] Building Performance Standards: Lessons From the Carbon Markets by Véronique Bugnion and Karen Palmer; unpublished draft 2020.

Case Studies

City	*Tokyo, Japan*	*Washington, D.C.*	*New York, New York*
Law	Energy Conservation Law Japan	Title III of the Clean Energy DC Omnibus Act of 2018	NY Int. 1253 (Climate Mobilization Act)
Preparation	CO_2 Emission Reporting Program (for existing buildings) and Green Building Program (for new buildings) beginning in 2002 (eight years before compliance period).	The Clean and Affordable Energy Act of 2008 established that all private buildings >50,000 gross square feet must measure and disclose their energy and water consumption to DOEE[5].	Local Law 84 (2009) requires owners of large buildings to annually measure and report their energy and water consumption (building energy benchmarking).
Climate Goals	25% reduction in GHG emissions and 20% reduction in energy consumption by 2020 from baseline 2000	50% reduction in GHG emissions by 2032; carbon neutrality by 2050; 50% reduction in District-wide energy use by 2032; 100% renewable electricity in the District by 2032	40% reduction in GHG emissions by 2030 and 80% reduction by 2050
Threshold	CO_2 emissions	Local median Energy Star Score (energy use intensity metric) by property type[6]	Carbon emissions per square foot of building space (targets vary with building category)
Compliance	Flexible prescriptive measures[7]	Choice of either data (demonstrating >20% decrease in normalized site energy use intensity) or equivalent prescriptive measures from DOEE list[8]	Primarily data driven, but allows prescriptive measures for certain building categories, and provides list of allowable prescriptive measures[9]
Compliance Period	2010-2019 with two five-year compliance periods	Rolling compliance schedule based on building type and size ranging from 2021-2033 with five-year compliance cycle	2024-2029 (buildings >25,000 square feet); 2030-2034 as the second compliance period[10].
BEPS Design	Cap-and-trade: excess compliance can be banked for future use and allowances can be traded	Baseline compliance based on start year: not tradable units	Baseline compliance based on start year: not tradable units

[5] https://www.dcseu.com/commercial-and-multifamily/benchmarking-in-dc#:~:text=Benchmarking%20in%20DC,efficiency%20to%20its%20peers%20nationwide.
[6] https://ghtltd.com/beps/
[7] https://www.eu-japan.eu/sites/eu-japan.eu/files/Nishida.pdf
[8] https://ghtltd.com/beps/#:~:text=The%20Building%20Energy%20Performance%20Standard,required%20to%20meet%20by%202026.
[9] https://www.brightpower.com/nycs-climate-mobilization-act-what-building-owners-need-to-know/
[10] https://www.greenbiz.com/article/what-you-need-know-about-bold-new-building-laws-new-york-and-dc#:~:text=D.C.%20focuses%20on%20energy%20reductions,invest%20in%20boosting%20energy%20performance.