Raising the Standard: Building Performance and the Reshaping of Urban Energy Regulation

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ABSTRACT

As leading cities seek to meet their aggressive climate decarbonization goals, they are turning increasingly to mandatory policies that require improved energy and emissions performance across their building stock. The most comprehensive of these is the building performance standard (BPS), in which performance thresholds are set that building owners must meet at a specified time or when a triggering event occurs. Washington, DC; New York City; Washington State; and St. Louis have passed (though not yet implemented as of July 2020) versions of a BPS, but thinking on how to maximize the effectiveness of BPS is still in its early stages and rapidly evolving.

A BPS can address a range of emissions, energy, and grid-related goals. While energy efficiency has been the go-to metric for building energy policies for a generation, the rapid greening of the grid, the penetration of renewable energy, the importance of load management, and the larger goal of a decarbonized energy system is changing that focus. The authors are actively working with almost a dozen cities crafting BPS ordinances and providing analyses that inform standard setting. This paper provides an overview of BPS policies and explore key considerations for policymakers as they develop and implement impactful and practical BPS policies that can facilitate and balance electrification, demand reduction, and grid interactivity strategies.

Overview of Building Performance Standards

As cities seek to meet their aggressive climate goals, they are turning increasingly to mandatory policies that require improved energy and emissions performance across their building stock. The most comprehensive of these is the building performance standard (BPS), in which performance thresholds are set that building owners must meet at a specified time or when a triggering event, such as equipment replacement or building sale, occurs. The requirement for action differentiates a BPS from past policies, such as benchmarking and audits, which provide information to the market but do not directly improve building performance.

Beyond its mandatory aspect, the power of a BPS derives from its ability to impact all buildings, not just new construction. Since new construction represents only 1–3% of the building stock in any given year, it's clear that any policy addressing carbon reduction in buildings must focus strongly on existing buildings. For the vast majority of cities, however, this is new territory as they have historically only thought in terms of influencing the design and construction of new buildings through energy codes.

A BPS policy establishes a definition for high-performance buildings and drives all buildings to achieve it over time, making clear the city's priorities. From a building owner and

occupant perspective, a BPS provides flexibility: they can use whatever technologies and operational strategies they decide are most effective and economical to meet both interim and final standards. A high-performance building is one which: (1) uses the minimum amount of energy necessary to meet its functional requirements and the needs of occupants; (2) has the lowest electrical peak demand that meets its functional requirements and the needs of occupants; (3) uses no onsite fossil-fuel combustion equipment; and (4) responds to conditions on the grid in a beneficial way, including shifting energy use to times when system demand and/or grid emissions are lower.

Buildings can't all become high-performance immediately. A BPS is a forward-thinking policy commitment in which a city establishes a long-term, high-performance standard, with interim standards that ratchet up over time. The combination of short- and long-term goals assures that building performance improves over time, and also sends appropriate market signals to discourage investments in long-lived, inefficient, and environmentally damaging technologies. Throughout interim compliance cycles, cities will be collecting data and working with the private sector, utilities, and others to create incentive programs and provide technical assistance.

A BPS can address all aspects of high-performance buildings simultaneously, including carbon reduction, building electrification, energy efficiency, and peak demand reduction through load shifting and storage. A broadly written BPS could even address resiliency and water use. If successfully implemented, a BPS will transform a city's buildings from environmental liabilities to environmental assets. Cities and states are attracted to BPS because the potential impacts are so large:

- Based on a report it commissioned, Washington, DC, estimates that its Building Energy Performance Standard[1] will reduce energy use in buildings by over 20%, thereby reducing carbon dioxide emissions by over one million tons annually (Noori khah 2019).
- New York City projects that its standard, the Carbon Mobilization Act, will cut six million tons of carbon dioxide annually by 2030, prevent 43 premature deaths and 107 emergency room visits every year, and create at least 26,700 green jobs (Chambers 2019).
- Washington State projects that its 2019 legislative package anchored by its BPS, the Clean Buildings Act, will reduce annual carbon dioxide emissions by 14 million tons by 2035 (Inslee 2019).

Considerations for Policy Makers

Because a BPS can serve as a city's comprehensive buildings policy, and because it will impact such a large number of building owners and tenants/residents, policy makers need to ensure that compliance is feasible for everyone and that it addresses broader city priorities. These include:

[1] https://doee.dc.gov/service/building-energy-performance-standards

1. *Alignment with established commitments and long-term goals.* The BPS should support the city in its efforts to meet the building-related goals laid out in its sustainability, clean energy, climate action, or other similar plans.
2. *Social and racial equity.* The BPS ordinance should strive to ensure equitable outcomes for residents, paying special attention to at-risk populations. To ensure this, stakeholder outreach during the development of the policy should be sure to include groups representing these populations, most of whom may not have historically engaged in energy-related city processes.
3. *Jobs and economic growth.* Since a BPS requires owner action, by definition it will increase economic activity. The city should ensure that jobs and other economic benefits are spread across all sizes of businesses and all worker skill levels.
4. *Maximize regulatory certainty.* Policies should avoid standards that are adjusted after adoption as they make planning difficult for owners and tenants. Policies that present explicit standards and compliance paths to meeting them should be favored.
5. *Transparency and ease of compliance/implementation.* The policy making process, and city actions to implement and enforce the policy, should be transparent and understandable. Proving compliance should be easy for owners and enforcement should be easy for cities. Concerted stakeholder engagement with representatives of all groups who will be impacted by the policy will help ensure these goals are met.
6. *Drive early action.* Policies should incentivize owners and tenants to take early action over delayed action. Carbon saved today is more valuable than carbon saved in 20 years.
7. *Accommodate building life cycle events.* Policies that reflect natural events in the building life cycle will be significantly more cost-effective, minimize occupant disruption, and gain greater support from owner groups. Equipment change-outs, lease turnover, repositioning, and other property transactions happen infrequently and at irregular intervals but they can all be accommodated by flexible compliance requirements.
8. *Use consistent language and terms.* Since BPS are a newer policy form, there is a range of terminology being used to describe the policy in full, and in delineating components of the policy. It is important to use BPS terms consistent with one another, consistent with other local policies, and, if possible, consistent with terms in published legislation and literature.

Data is Key

Building data is the foundation of all building performance standards. The city needs data during development of an ordinance to analyze the building stock and ensure that standards are set reasonably. It needs data during implementation to determine compliance and support enforcement efforts. Whatever metrics a city uses to set standards, determining building owners' compliance will require collection of supporting data in the same units as the metric from all covered buildings over time.

If a city has a benchmarking law in place, then basic data should be available for at least the larger (usually >50,000 square feet) buildings. Compliance with the benchmarking law should be examined prior to creating a BPS. If compliance is low, either overall or for specific

building types, the data may not provide a statistically sound basis for setting a standard. If this is the case, at a minimum, the local data should be compared to regional data available from CBECS[2] to identify large discrepancies. Given the critical importance of data in achieving cities' climate goals, increased enforcement of the benchmarking law must become a high priority if compliance is low.

In the absence of any benchmarking or other city- and building-specific data, cities will need to use national or regional-level data, such as CBECS, though this has significant drawbacks. Because it will not be specific to the city's building stock, there is a legitimate concern that standards based on national or regional data will be inappropriate for local buildings, making unrealistic demands on owners. Because of this possibility, even people who are ideologically supportive of a BPS may argue for setting less-aggressive standards than would be reasonable if better data was available. An equally likely possibility is that non-city-specific building data would result in standards that are too lax, minimizing the impact of the policy.

While benchmarking data can be very valuable, it should be thought of as a beginning, rather than an end, as it provides only the most basic information on energy use and the building itself. As noted above, the more building-specific data that is available, the more targeted a BPS can be and the more effective it will be in reaching the city's goals.

All BPS ordinances should require that specific data be collected from all buildings and that resources be allocated to create and maintain a data infrastructure and analyze data on a regular basis. Of particular interest is information on system types, equipment sizes and vintages, and building construction characteristics. This data can be easily and inexpensively collected if a mandatory audit or tune-up policy is included in the ordinance. Ideally, it should be merged into a single database that includes the benchmarking data. Ordinance language should allow for flexibility so that standards can be refined as more data becomes available.

Separately from a BPS ordinance, but as a broader strategy to increase data availability over time, cities should be working with their utilities to gain greater access to billing data or pursuing regulatory remedies to ensure that that occurs.

Performance Standards and Metrics

The defining element of a BPS are the performance standards which owners and tenants must meet to comply with the law. Each performance standard has an associated metric, the "yardstick" by which compliance is measured. As mentioned above, the ideal BPS will set multiple standards (e.g. greenhouse gas (GHG) reductions, energy reductions, peak demand reductions) so that all aspects of high performance are addressed. Here we present a few of the key issues currently under discussion.

Energy and Carbon, Site and Source, and Time-of-Use (Oh, my!)

[2] CBECS is the Commercial Buildings Energy Consumption Survey conducted periodically by the U.S. Energy Information Administration. The most recent data is from 2012.

A continuing debate among BPS policy developers is whether the primary metric should be energy or carbon emissions. Using carbon aligns BPS efforts most closely with many cities' climate goals (New York City's overarching goal, for example, is to achieve carbon neutrality by 2050) but energy is more familiar to the market, particularly because ENERGY STAR® Portfolio Manager, an energy-based tool, has been the mainstay of benchmarking policies across the country. Unfortunately, the choice is even more complicated because other factors—site vs. source and time-of-use of energy—also have to be considered.

Site energy is the electricity and fuel used in buildings that is shown on utility bills; source energy takes what is on the bills and applies adjustment factors to account for energy losses in the generation and transmission of electricity, and in the delivery of fossil fuels. Site energy makes the majority of electricity seem more environmentally friendly than it really is by ignoring the fact that up to two-thirds of the energy content of the fuel used to produce it is lost in the conversion from heat to electricity.

Many jurisdictions prefer to use site energy as their metric because it is familiar to everyone, easy to measure, and is directly controlled by owners and tenants. The trade-off is that it does a poor job of accounting for carbon emissions. A source energy metric aligns better with carbon emissions; a carbon metric can be created from source energy by converting the site-to-source energy adjustment factors into carbon dioxide equivalents (CO_2e). The downside to using source energy or CO_2e as a metric is that they are both non-intuitive and unfamiliar to typical building owners and occupants.

While source energy and CO_2e metrics align with carbon emissions better than site energy, they are still only very rough equivalents because they do not account for the time when energy is used. Any metric that reduces energy will also reduce carbon as long as the grid contains some fossil fuel generation. But because the generation sources of the electricity—and therefore the emissions—from the grid can vary dramatically at different times of the day and in different seasons, knowing both how much and when energy is used is necessary to determine its associated carbon emissions. The ideal metric for electricity—typically referred to as a time-of-use carbon metric—would therefore match the energy used in a building at each hour of the year with the carbon intensity of the grid at the same time. A time-of-use carbon metric would reward building owners and tenants for minimizing energy use when the grid carbon intensity was high, the exact outcome desired for a high-performance building.

There is a good theoretical understanding of time-of-use carbon metrics among advocates and leading policy makers, but it cannot currently be applied because most buildings do not have the capability (or are not set up) to log hourly energy use, and accurate hourly information on emissions from the grid is not publicly available in most areas. A practical choice now for cities that want to use a carbon metric is to apply a carbon conversion factor to annual source energy reductions. ENERGY STAR Portfolio Manager provides that capability however its conversion factors are based on regional carbon emissions which may or may not accurately represent local grid conditions

Electrification

Electrification of buildings is a key component of a comprehensive city decarbonization strategy and BPS can be a powerful tool to help achieve it. At the grid level, replacing fossil fuel

power plants with renewable energy generation provides cleaner electricity but does nothing to lower on-site emissions from equipment that uses fossil fuels. Replacing that equipment with electric alternatives allows the buildings to take advantage of increasingly clean electricity from the grid, moving cities closer to achieving their decarbonization goals. Cities can try to promote renewables on the grid by participating in utility regulatory processes, but they are in a much more powerful position to promote or require electrification directly in buildings.

Cities have multiple options with regard to encouraging electrification but none are without challenges. The most obvious solution is to simply ban fossil fuel equipment, requiring that electric alternatives be used when equipment is replaced at the end of its useful life. This approach has been adopted for new construction in several cities, but it has never been applied to existing buildings and the legality of such a requirement is uncertain.

In general, the BPS should simultaneously encourage electrification and reduced energy use. To achieve this, a city could: establish separate metrics for electric use and on-site fossil fuels, establish a primary site energy metric and an additional electrification metric, or create a single metric, such as an energy use intensity (EUI), which is calculated in such a way as to incentivize electric and discourage gas use (for example, by using a source multiplier for gas that is adjusted upwards). A more direct, and potentially aggressive, approach is to penalize the continued use of fossil fuel equipment by applying a fee if they are not electrified. The city could use the collected fees for electrification projects in targeted building types, like affordable housing.

A BPS that encourages electrification will also have equity considerations and impacts, both positive and negative, on economically at-risk populations, including both tenants and small business owners. Because current gas prices are low, in many areas it will cost more to heat with electricity than with gas (though higher-efficiency electric systems will reduce this discrepancy). A BPS should support and protect these populations by ensuring that their out-of-pocket utility costs do not increase. This will require a mechanism for determining how much bills have increased and a process for delivering financial compensation to affected parties. Even customers who continue to use natural gas will be negatively impacted because, as more buildings are electrified, the fixed costs of maintaining the gas infrastructure will be divided over fewer customers, meaning rates will increase. Considerations of how to prevent small businesses and low-income residents from carrying the weight of the remaining costs of natural gas delivery and abandoned assets should be part of early conversations.

A positive impact of removing onsite combustion equipment is that it improves indoor environmental quality which provides documented health benefits (Mullen 2012). This is a strong reason for creating a policy that supports electrification for at-risk populations, rather than exempting them.

Grid-Interactive Efficient Buildings

Building electrification is a key step toward a decarbonized energy system, but each switch from fossil fuel to electricity places increased demands on the supply grid. To minimize the investments that will be needed to upgrade and expand the grid (which will also lead to higher electricity rates, further impacting the potential energy burden discussed above) and to ensure the grid's continued reliability, it is important that buildings become better "grid citizens," capable of responding to the needs of the overall system. In support of this transition, the U.S. Department of Energy has developed the concept of a grid-interactive efficient building

(GEB) and provided guidance on the capabilities each building needs to reduce its demands on the grid (DOE 2019).

A BPS should include requirements that support the creation of GEBs. Each building above a minimum size threshold should be required to install a building automation system (BAS) that is automatic demand response (ADR) capable for the electric provider serving the city. This will allow the grid operator to lower peak demand, avoiding the need to add new generation and transmission that might be needed only a few hours a year. Additionally, major equipment upgrades should be required to be ADR capable and interactive with both the BAS and direct signals from the grid. Requirements like these that could be adapted for use in a BPS can be found in many building codes including California's Title 24-2019, the International Green Construction Code (IgCC), and ASHRAE 189.1. The three key metrics for measuring GEBs are dispatchable flexibility, controllable flexibility, and static (passive) capacity. All three metrics contribute to a GEB, and should be accounted for in buildings so that greater grid flexibility can be measured and incentivized (Edelson 2020).

As both batteries and thermal storage technologies continue to improve and become more affordable, the BPS should include initial incentives or requirements that space be allocated to accommodate these technologies. At the same time, cities should stay informed on the rapid changes occurring in this field. In the relatively near future, electric vehicles (EV) that are plugged into building parking areas will not only be able to use building electricity for charging, they will be able to supply electricity for load shifting without a building owner needing to invest in a battery storage bank. Though these are early days for direct requirements of battery and EV control technology in commercial buildings, regulatory language for space and safety considerations can be found in most electrical and fire codes.

Additional Metrics

Current BPS policies cover only energy or carbon but they could potentially include requirements for a variety of other non-energy city priorities including:

1. *Resilience.* Cities seeking to create resilience metrics and associated standards should carefully consider the potential disasters or events that their buildings may face. Resilience metrics should be set based on a buildings capacity to assist the community's ability to restart after an event, and may require structural retrofits (in earthquake prone areas), raising critical equipment and allowing a flood level (in flood or hurricane prone areas), or measures that would make it possible to shelter in place during or after any type of disruption.
2. *Public Health.* Metrics for public health may vary based on the city, and have been identified in sustainability plans to cover everything from access to open space to proximity of grocery stores. For a BPS, public health metrics could include those directly impacted by the building: indoor air quality, rates of asthma, radon mitigation, and others.
3. *Water.* Water is already covered in some benchmarking policies, making it one of the easier metrics to consider incorporating into a BPS. Beyond reduction of water use inside the building, water metrics could also include stormwater runoff prevention.

4. *Waste.* Waste reduction is a pillar of the sustainability movement, but typically does not include a feedback loop measuring actual performance. Hauling companies regularly provide receipts that can be used to track what is recycled and what goes to a landfill.

Implementation Considerations

BPS is new policy approach that will require cities, building owners and occupants, and energy design and service providers to think and act differently. Following are several major areas that will need to be considered.

Setting Standards

A standard is a designated point on a metric that a building must meet to be compliant. It will typically vary by building type and vintage. Standards include the required level of performance and date by which it must be achieved. Once a city has determined the metrics it will use in its BPS, the next step will be to set the standard for each one.

To drive early action and give long-term certainty to the building industry, it is strongly recommended that the BPS contain a fixed, final standard that is set far in the future and represents the desired end goal of the city's climate policy. Interim standards that must be met between the time of policy adoption and the final standard will ensure buildings remain on track to meeting the final standard. Interim standards have so far been set in five-year increments, though it is unclear whether that strikes the optimum balance between allowing owners sufficient time to plan projects and making progress towards the long-term goal.

While the final standard should always be fixed, interim standards could be either fixed or recalculated for a given compliance cycle. A fixed standard is an immovable target, set and known to the stakeholders in advance. A recalculated standard is adjusted for each compliance cycle to reflect changes in the building stock or other new information. Currently, both fixed and recalculated standards have been put into place by cities. Fixed standards will allow greater certainty in planning but, because they require setting standards ten, fifteen or more years in advance, it is almost certain that they will not provide good guidance to the market in out years. Recalculated standards avoid this problem but create periods of uncertainty between compliance periods and may not drive early action, as owners are not guaranteed that actions they take now will meet a standard created in the future. There is no clear correct choice, other than to say that some flexibility will always need to be included in the policy to allow for new information.

Compliance Paths

The BPS policy must provide clear direction to building owners and tenants on how compliance will be determined. Three general pathways have emerged so far:

Type	Pros	Cons
Direct: Buildings must meet a specified energy or carbon threshold, as seen in New York City's Local Law 97.	Sends strong signal of the performance level desired by city.	May be unrealistic to achieve for low-performing buildings.

Performance: All buildings must improve by a percentage over their base performance, as seen in the District of Columbia's BPS.	Easy to communicate.	Buildings all have the same requirement, regardless of current performance.
Prescriptive: Specified measures must be implemented and buildings are then deemed in compliance.	Gives great certainty about how to comply; easy to understand and implement.	Measures have no direct tie to building performance.

Because a prescriptive path is not tied to performance, it should only be offered if politically necessary. If it is offered, it should only be for the first compliance cycle, after which compliance should revert to a performance-based approach. Any measures included in the prescriptive path should be based on solid technical analysis and customized for different building types and situations.

Regardless of the basic compliance method, all BPS policies must build in substantial flexibility. One size absolutely does not fit all when it comes to buildings. Lack of flexibility will lead to either large numbers of unnecessary exemptions or political backlash as even well-intended owners find that they cannot meet the standard. Exemptions should be avoided as much as possible because all buildings can do something to increase performance. Customized standards will inevitably be needed for special building types such as hospitals and laboratories. Also, certain categories of buildings, such as affordable housing, may have inherent legal or financial constraints that merit special treatment or extended timelines to reach compliance.

All BPS policies should have an appeals process through which owners can make a case that they cannot meet one or more of the BPS standards. Ideally, these would be presented to a technical committee that can assess the validity of the case and create an alternative set of requirements if warranted. For certain circumstances, owners should have the option of making a payment instead of complying; however, the payment levels must be set high enough to avoid being used as an economical way to get around meeting the standards. A trading option that would allow some buildings to exceed their BPS performance, and trade those excess savings to buildings that do not meet their BPS requirement levels, can result in a more overall cost-effective regulation. Such a system needs to get all of the measurement and verification details correct to ensure that energy/carbon savings are not lost. New York City Local Law 97 authorizes such a trading system and it is currently under development (Bergland 2019).

City Resource Requirements

Implementation of a policy with the complexity of a BPS is going to be difficult for cities. While the power of a BPS policy is that it requires action on the part of building owners, determining what those actions are, managing large volumes of detailed data, providing high levels of technical assistance to building owners, verifying compliance, and active enforcement all require a level of city or state resources, and a level of technical sophistication, far beyond what has been needed for previous, less-aggressive policies, such as benchmarking and audits. Jurisdictions thinking of adopting a BPS should be realistic about the resources that will be necessary for successful design and implementation. Washington DC, in planning for implementation of its BPS ordinance, allocated over $1,000,000 per year including at least five full-time staff. The law initially covers 2,000 buildings but will eventually grow to about 5,500

buildings. The budget includes $500,000–$600,000 in non-personnel costs, including funds for travel, training, and office equipment for staff and professional services, contracts, and consulting fees. If resources are limited, a city may want to increase the initial size threshold for covered buildings or otherwise constrain the initial scope of the ordinance. Properly-resourced programs will have a much higher chance of being successfully and transparently implemented which will reduce the risk of political pressure to roll back or abandon the policy. Utilities may be able to provide funding to support city implementation efforts if they are able to claim savings credit.

Private Sector Considerations

In theory, a BPS provides flexibility to owners, as they can use whatever technologies and operational strategies they decide are most effective and economical to meet the standard. In reality, the difficulties owners experienced across the country in understanding and complying with relatively simple benchmarking laws argues strongly for high levels of outreach, materials and technical assistance on the implementation of a BPS. A comprehensive website, on-line and in-person assistance and referrals for contractors will all be needed if owners are to accomplish what they are being asked to do. Aligning policy timelines and requirements with normal building lifecycles (e.g., capital planning, upgrades at times of refinancing or disposition, city intervention in permitting, replacing equipment at end of useful life, etc.) will minimize the economic burden on building owners. Following are other issues worthy of consideration.

Split incentive. Policy development and implementation can be challenging when neither building owners nor tenants have absolute control over energy consumption and are disincentivized to make building performance improvements. Conventional leases often result in a split incentive where owners are responsible for capital costs for energy efficiency and sustainability investments and tenants reap all the benefits through reduced operating expenses and better building performance, or vice versa. Solutions, such as green leases, exist and cities should explore whether ordinance language can require or encourage the use of such options.

Funding and financing. Building performance standards require unprecedented private investment in energy upgrades. What happens when a building owner doesn't have the cash or credit for the retrofit? This is not a theoretical question. In jurisdictions that have already passed a BPS, governments have had to exempt whole classes of buildings, particularly affordable multifamily housing, due to financial constraints. To realize the climate-saving potential of a BPS, cities must provide access to both direct funding and financing. Energy service companies (ESCO) proved long ago that upfront funding can be provided profitably across portfolios, but the transaction costs of working with small clients is unappealing to them. Cities, however, have different objectives (deep energy savings, equitable benefits) and may accept longer payback periods—making them potentially unique administrators for broad-scale retrofits. A wide variety of options should be explored to ensure that economics are not a barrier to compliance with the BPS, particularly if the ordinance includes small buildings that are more likely to be owned by less well-resourced owners. The trading system New York is exploring that is mentioned above is one possibility.

Funding and financing also have major equity implications. Implementation of a BPS will likely require subsidization of retrofits in affordable multifamily, small businesses and other

under-resourced buildings. Early identification of these buildings and audits to understand their needs and limitations will be critical to keeping them on track to meeting the final standard.

Workforce. In addition to concerns of building owners, there will be an increased demand for design and construction professionals to complete the tasks required by the BPS. From energy service providers equipped to complete audits and retro-commissioning, to the design, installation, operations and maintenance of replacement equipment and systems and renovation measures, the current workforce in a city will see an increase in demand from the building sector. Cities should also survey local service providers to ensure that sufficient capacity exists to serve the market when hundreds or thousands of buildings all need to improve their performance. Because the measures and renovations being put in place to meet a BPS will be higher-performing than common practice, the workforce may feel additional strain with the need for training and continuing education on best practices around high-efficiency equipment.

The current best thinking for opportunities and success in this area is to create a resource center to support the private sector (building owners and tenants as well as design and construction professionals) in the transition to a high-performance building stock. Washington DC has provided seed funding for such an entity (named the "Hub"), modeled off similar work in Copenhagen, New York City, and Vancouver, British Columbia. The Hub is envisioned as a continually evolving platform that will provide education, resources, connections, and practical interpretations of city policies to industry stakeholders. The Hub is not envisioned to be an energy service provider itself.

An Ideal BPS Ordinance

This paper is meant to provide practical, actionable information to policy makers, city staff and program implementers; however, the authors believes there is value in presenting an ideal version of a BPS ordinance that can be used as a reference point when political, economic or technical realities require trade-offs to be made. The following suite of items is based on both our own thoughts and on conversations with more than a dozen cities considering or developing BPS policies.

1. *Set a very aggressive, far-in-the-future final standard that matches a city's long-term climate goals.* An example would be for all buildings to be zero carbon by 2050. A BPS should be thought of as a long-term policy commitment, with performance requirements ratcheting up to align with a city's final policy goal (80x50, 100% renewable energy, etc.) over 20 to 30 years. Interim standards should be included to ensure constant progress toward the final standard. Goals set in the far future make it possible to incorporate requirements for equipment upgrades or electrification that align with normal equipment lifetime replacement cycles. The farther out the goal is set, the more stringent the final standard can be while still being politically acceptable. The long-term goal must go far beyond current energy code requirements to drive efficiency in new construction.
2. *Include all commercial buildings and all multifamily buildings with public interior spaces.* The minimum size should ensure that 80% or more of building-related carbon emissions are subject to the law. Exemptions should be avoided; instead, buildings with special needs should have customized requirements. All buildings can do something to

increase performance. Funding and financing assistance programs should be created to eliminate economic barriers to compliance.

3. *Require walk-through audits and building tune-ups every five years mandating:*
    - Implementation of all low cost/no recommendations within 12 months
    - Data collection (equipment inventory, vintages, function, occupancy, schedules, etc.)
    - Basic plan and schedule for major system replacements
    - Submission of audit report to the city that details planned actions over the next five years
4. *Include a suite of complementary standards that drive buildings to achieve all aspects of high performance, including:*
    - Reduce overall energy use
    - Reduce energy use at specific times of day (addresses carbon/demand/grid considerations)
    - Switch from combustion equipment to electrical equipment at time of replacement if technically and economically feasible. When not feasible, require higher levels of combustion efficiency, installation of electric ready infrastructure, or payments to support electrification projects in other buildings.
5. *Apply BPS requirements to buildings, not people.* Tenants are responsible for a large amount of the energy use and emissions in buildings so achieving aggressive BPS targets will not be possible without making changes to tenant spaces. Because of this, the ordinance should put requirements on the building, rather than specifying whether the owner or tenant has responsibility. This puts the onus on these groups to negotiate and determine the best way to meet the standards.

In a truly ideal version, the data collected in the mandatory audit with tune-up would lead to a customized long-term plan for each building with goals set as aggressively as possible while acknowledging technical and economic realities.

What's Next for BPS Policies?

As BPS policies are considered by more and more jurisdictions, they will evolve and grow. Here are two issues that need to be addressed quickly to ensure continued adoption of this powerful policy.

New Construction. The BPS policies that have been passed to date address existing buildings and leave regulation of new construction to building codes. An obvious problem with this separation is that a new building becomes an existing one the moment construction is complete. The two clearly need to be tied together because from both a legal and practical perspective, a city should not approve the construction of buildings and then penalize them soon afterwards for unacceptable performance that the code never claimed to regulate. Cities should explicitly address new construction in their BPS policies, both buildings that will be permitted after the policy is passed and buildings of recent vintage that will be subject to the BPS.

The core difficulty is that traditional building codes cover the design and construction of buildings and do not grant authority to building departments to regulate the performance of

buildings once they have received their certificate of occupancy. Depending on both the state laws and city laws, gaining that authority may only require a city rulemaking process or it may require an amendment to state statute.

In the vast majority of cases, where no building simulation modeling is submitted, the building department does not have the information needed to determine even the theoretical performance of the building. Even when simulation models are submitted, the best a building department can do is assume that if a building is constructed per design and operated according to the assumptions in the model, it should have a certain level of performance. The actual performance may vary tremendously for many reasons, including schedules, occupancy levels, and plug loads that do not match design assumptions and the fact that modeling algorithms are not completely accurate for some equipment and system types.

The remedies for this situation are all difficult and have little precedent. The fundamental change needed would be to expand the statutory authority of the energy code from design and construction to design, construction and operation. If implemented, new buildings would then be required to meet the BPS standard (or, preferably, to meet the final BPS standard rather than an interim standard) both in design and in practice.

Identifying and Addressing Equity Concerns. A handful of equity considerations have been addressed by cities passing BPS, especially as it relates to affordable multifamily buildings. As BPS policies are enforced, cities will need to develop a more complete understanding of the impact on equity across all stages of the policy. BPS policies have the potential to both exacerbate inequities (e.g., fines passed through by owners leading to higher costs for occupants, potential for displacement) and diminish them. Determining the potential impacts will require increased outreach to communities of color and others that are typically not engaged in policy discussions to ensure that their ideas and concerns are taken into consideration in crafting and implementing the policy. Identifying local and national equity partners that have the skillsets to engage in these discussions with disadvantaged groups will be critical to the success of BPS policies. As part of the development of the BPS in Washington, DC, the National Housing Trust published a comprehensive list of recommendations for implementing the policy in affordable multifamily housing (NHT 2019.)

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