LEED and Building Performance Standards: Working Together towards Sustainable and Low-Carbon Buildings

Cities and states are taking the lead in climate action by making ambitious pledges to reduce greenhouse gas emissions (GHGs) economy - wide and to reduce overall energy demand. Before the U.S. rejoined the Paris climate agreement in 2021, hundreds of mayors signed pledges to reduce their cities' emissions to meet Paris-level standards.[1] States also took bold steps to reduce causes of climate change, with 25 Governors joining the U.S. Climate Alliance to commit to meeting the terms of the agreement at the state level.[2]

To meet these goals, jurisdictions must accelerate carbon reductions from building operations. Buildings are a significant consumer of energy, including on-site fuels and drawing electricity from power grids. In the U.S., buildings account for 12% of energy-related carbon emissions from direct on-site energy use, and 38% including emissions associated with electricity use.[3] Building materials and construction activities, as well as end-of-life disposal, add even more to the buildings industry contribution to carbon emissions. Across the country, energy consumption by buildings remains a large contributor to climate change - but much of this could avoided through enhanced performance.

With enhanced performance comes reductions in fossil fuel consumption (on-site and through power grids) and their associated operational carbon emissions. Many cities and states are taking action to achieve this by increasing the stringency of building codes and implementing efficiency and solar-ready requirements for new construction.

These steps are important, so that we "get it right" with new buildings, but in many places across the U.S., the volume of new buildings constructed each year is minimal compared to a jurisdiction's total building stock. Thus, improvements must be made to the overall performance of existing buildings to enact transformational reduction in GHGs.

To address existing buildings, more and more jurisdictions are considering and adopting building performance standards, sometimes called "BPS." When buildings are required to meet defined levels of performance, the jurisdiction has increased certainty of progress towards its goals, and the market can plan to meet the increased retrofit demand. The

[1] *Member Cities*, Climate Mayors.
[2] *See* U.S. Climate Alliance.
[3] Energy Information Administration (EIA).

'performance' is most commonly defined by the energy use intensity (EUI) or GHG emission, but can include any number of metrics prioritized by the community (such as water use). The resulting building performance improvements offer numerous benefits for building owners, operators, users, and the surrounding environment, as well, and these co-benefits are important considerations.

Building performance standards are a promising approach aiming to achieve a highly effective, long-term, technology-neutral method to reduce operational carbon emissions. This brief explores the power and potential of performance mandates to make transformational changes in building performance, and the relationship between green buildings and BPS.

What are Building Performance Standards?

Building performance standards at a minimum encompass three elements:

1) establishing a measurable standard of performance, which may be based on energy intensity, carbon intensity, or other metric, and is typically determined by property type;

2) requiring certain buildings to achieve the standard within a set period or deadline, and

3) providing for reporting and compliance.

Some building performance standards include additional elements. For example, some may specify the steps to be taken if a building doesn't meet minimum performance targets, such as undergoing audits and retrofits. Some performance standards including provisions for targets to become more stringent over time, resulting in long-term impact on building performance. And most include significant outreach programs to provide resources to empower early action, connect building owners with available incentives and assist with compliance.

What are some of the ways BPS vary?

Standards. While building performance policies can target carbon emissions and water use, they most often specify energy consumption using an energy intensity metric.

Scope. Building performance policies are most frequently mandated for state-owned facilities, in leadership policies. Increasingly, states and cities are adopting a performance standard for private sector commercial buildings as well, to have a greater impact on the building footprint across the jurisdiction. BPS most commonly include covered buildings that are 50,000 square feet or larger, and some require smaller buildings, ranging from 5,000 to 10,000 square feet to comply over time.[4]

Figure 1: The American Geophysical Union building in Washington, DC underwent a major renovation enabling it to achieve net zero energy status and LEED Platinum.

[4] *Implementing Building Performance Standards: Consistency is Key*, New Buildings Institute.

How do Building Performance Standards relate to LEED and Green Building?

For over 20 years, the Leadership in Energy and Environmental Design (LEED) green building rating system has been pushing buildings towards better performance. LEED began as a tool for market transformation – and just as the private sector embraced LEED, so did government agencies. Federal, state, and local governments were attracted to LEED's systematic approach, the ability to use LEED to convey the agency's sustainability goals to its contractors, as well as internal staff, and the results they saw.

The growth in LEED certifications, even as the system has evolved with increasingly stringent versions, shows that improving the quality and performance of our buildings, including existing and historical buildings, is achievable. In this way, LEED and improved building codes have helped move the industry to a point where increased building performance is expected, and now building performance standards are more likely to be accepted. In fact, we've seen a nexus between jurisdictions' use of green building standards and the adoption of benchmarking and beyond benchmarking requirements, including establishment and utilization of GHG emission inventories and transparent reporting practices.[1]

In the context of the current suite of building performance standards, LEED provides a valuable and complementary tool for building owners and operators to achieve sustainable and low-carbon buildings.

First, LEED is a proven system for achieving goals, and building teams can apply its integrated process and best practice strategies to enable meeting a BPS requirement. Project teams can rely upon the mature support systems, extensive resources and education, system updates reflecting emerging practices, use of performance measures, and market feedback.

Secondly, LEED provides added value beyond the energy or carbon intensity reduction that is the sole focus of the building performance standards. For owners with interest in more holistic sustainability – for example, considering beneficial outcomes for habitat and water quality – or in ensuring a healthy indoor environment for occupants, LEED is a valuable companion to any upgrades being undertaken to meet a building performance standard. Moreover, these "other" outcomes often come with their own carbon emissions reductions as well. In fact, according to a 2014 University of California-Berkeley study, buildings built to LEED standards contributed 50% fewer GHGs than conventionally built buildings due to water consumption, 48% fewer GHGs due to solid waste and 5% fewer GHGs due to transportation. Such GHGs are not accounted for in the building performance standards currently in place.

In terms of a direct connection between LEED and building performance to a particular standard, there is no shortcut or substitute for the actual standard. Also, it is important to keep in mind that levels matter. Data have demonstrated that LEED buildings at the higher tiers of certification have lower energy and carbon intensity. Additionally, LEED as well as many performance standards evolve with increasingly stringent versions or requirements over time.

LEED can be used to reach the highest level of building performance – net zero energy and carbon. Jurisdictions considering new or revised building performance standards in the future might consider ways to incorporate LEED, recognizing the value of its additional carbon reductions and other valued outcomes such as healthy indoor environmental quality requirements. Potentially, a jurisdiction could provide an incentive to achieve LEED for Existing Buildings certification along with achieving the specific building performance standard metric. Incentives could be related to a longer timeframe for compliance, financial incentive, or others.

How does ENERGY STAR Portfolio Manager® support BPS?

The ENERGY STAR Portfolio Manager system, developed and supported by the U.S. Environmental Protection Agency (EPA), enables building owners and operators to measure and then benchmark their building portfolio's energy usage online. Around 25% of commercial building space in the U.S. is already actively using ENERGY STAR Portfolio Manager to benchmark energy usage.

Thus far, all of the state and local building BPS in the U.S. utilize ENERGY STAR Portfolio Manager for reporting. In a few cases such as in Washington, DC, the BPS uses the ENERGY STAR Score as the key performance metric.[5]

Figure 2: Entegrity headquarters in Little Rock, Arkansas was the first LEED Zero building in the United States.

How do Building Performance Standards Affect Building Owners?

Performance standards trigger owners and operators of under-performing buildings to implement operational improvement measures over time, The reduced operating costs provide payback to the owner, while providing benefits for the surrounding environment. Owners usually have flexibility in determining what changes to make in order to meet the standard, including retrofits and behavioral changes. By having a degree of flexibility, owners can better meet the standard, while government entities can reduce political backlash as well as a large number of unnecessary exemptions that could be associated with a more prescriptive approach.[6]

Why are Performance Mandates Important?

Building performance standards represent a step up from incremental policies like lighting upgrades and building tune-ups, which are beneficial yet not tied to a specific ongoing performance outcome. By mandating certain performance(s) by buildings, cities and states can ensure that building portfolios are demonstrating long-term efficiency success.[7]

By implementing minimum performance standards, jurisdictions can ensure that the average building in their jurisdiction will improve and their community will reach specific targeted levels of energy efficiency or carbon emissions.

Community-Scale Benefits

By implementing minimum standards of building performance, cities and states can experience various benefits beyond energy savings. Reduced on-site fossil fuel combustion, for example, can improve localized air quality and indoor air quality, which can alleviate adverse health impacts and environmental outcomes.

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[5] *Building Energy Performance Standards (BEPS)*, Department of Energy and Environment, Washington, DC.

[6] *Raising the Standard: Building Performance and the Reshaping of City and State Energy Regulation*, David Cohan, Institute for Market Transformation, and Kimberly Cheslak and Jim Edelson, New Buildings Institute, 2020 ACEEE Summer Study on Energy Efficiency, American Council for an Energy-Efficient Economy.

[7] *Building Performance Standards: A Powerful New Tool in the Fight Against Climate Change, Institute for Market Transformation.*

How Arc Supports Enhanced Performance in Buildings

Arc is a platform providing operational performance-based scores for buildings and spaces. Taking a holistic view, these scores factor in data on multiple aspects of building performance including energy, water, waste, indoor air quality, occupant comfort, building-related transportation, and other attributes.

The multi-category scores, along with the platform's tools to measure and benchmark, provide a valuable complement to energy use benchmarking. Arc also integrates tools that building owners can use to better understand risks and opportunities.

- **Financial impact tools** – integrated Autocase tools allow scenarios analysis and communication of financial impacts of building performance
- **Arc Climate Risk** – includes transition risk scores and site-specific physical climate risk data in partnership with Moody's ESG Solutions and Coastal Risk Consulting
- **Arc Re-entry** – benchmark infection-control policies and procedures, collect occupant experiences, and track indoor air quality.
- **Advanced Scoring** – compares a building's actual performance to selected building performance standards, currently including over a dozen city and global standards such as NYC, Boston, and Seattle, as well as calculating ENERGY STAR score.

Arc is available for *all* projects to track improvement and the basic level is available to all users at no-cost. The platform seamlessly supports projects in initial LEED certification and recertification as well.

Jurisdictions with, or considering, benchmarking programs and building performance standards can leverage Arc to support building owners and create added value.

For example, a city could use ENERGY STAR Portfolio Manager as the base reporting tool but provide an incentive for owners using Arc. This would benefit the jurisdiction in several ways. First, more buildings engaged in understanding and improving additional performance metrics, such as indoor air quality, better supports community health. Second, as owners and operators use the tool to track performance on waste and transportation, these oft-neglected carbon emission sources will decline, helping the jurisdiction make progress towards climate goals.

A city could also include Arc in its information materials as an independent tool for owners to gauge and plan for compliance. Many building owners have concerns about their building's status with respect to BPS, and may be nervous about noncompliance. Arc can be a tool to help them understand where their building stands and pathways to compliance. For BPS that ratchet down over time, Arc includes these compliance tiers giving owners a long term view of improvement needs.

Another model is that a city could partner with Arc to offer Arc as the reporting platform.

Learn more at https://arcskoru.com/

A buildings performance standard can also support the local economy, by creating opportunities for the expansion of energy efficiency and clean energy sectors, and local job creation. Additionally, improved performance can support energy cost savings, increased building asset values, and enhanced resilience at the building and community levels.[8] With the average life span of a building exceeding 100 years, one can realize the benefits both immediately and long-term.

Performance Mandates in Practice

By adopting a BPS policy, cities and states establish their priorities for building performance and their long-term goals. States adopting building performance standards have most frequently done so for state-owned or state-operated facilities. Others have started with policies for state buildings and expanded to mandate a performance standard for commercial buildings as well.

Developing and adopting a building performance standard can take several years. Typically, the jurisdiction undertakes extensive analyses and stakeholder engagement to understand the current levels of performance. Models are used to evaluate different targets and scopes, and to estimate potential costs.

Buildings can't become "high-performing" immediately, thus making a BPS a long-term, forward-thinking commitment towards building performance that often achieves incremental targets for efficiency and carbon reductions.[9]

Audit & Retrofit Requirements

A precursor to building performance standards, mandatory audit and retrofit policies have been used in some jurisdictions to make strides in improving performance of public facilities. These policies require the actions, but not a specific outcome performance level. The audit typically identifies cost-effective energy conservation measures, and the retrofit implements some or all of the measures.

These policies are advantageous because they decrease building energy costs borne by the government entity, and as a result, alleviate taxpayer burden. In some cases, a policy started as an audit requirement, with the retrofit requirement added later. States or cities that mandate audits and retrofits in tandem may be more effective by reducing the possibility for audit recommendations to become "stale" or otherwise not be acted upon.

In a few places, such as Seattle, Washington, audit and retrofit requirements have been adopted for private sector buildings as well as public facilities.

[8] *Benchmarking and Building Performance Standards Policy Toolkit*, Energy Resources for State and Local Governments, U.S. Environmental Protection Agency.

[9] *Building Performance Standards: A Powerful New Tool in the Fight Against Climate Change*, Institute for Market Transformation.

Examples of Building Performance Standards

For a map and links to all BPS in the U.S., see the Institute for Market Transformation's (IMT) Building Performance Standards Map. Below, we provide representative examples of BPS in practice in the U.S. Note this is not an exhaustive list of BPS.

Washington, DC (2018)

Washington, DC's Building Energy Performance Standards policy includes mandates for both privately-owned and DC-owned buildings. The standard uses EPA's ENERGY STAR as its performance metric, requiring that buildings receive an ENERGY STAR score, or an equivalent metric. For buildings eligible to receive an ENERGY STAR score, the building energy performance standard in DC is no lower than DC's median ENERGY STAR score for buildings of each property type. For buildings not eligible to receive an ENERGY STAR score, they must still benchmark and report their data to the Department of Energy and Environment (DOEE) via the Portfolio Manager platform. DOEE is to issue new performance standards every six years.

New York City (2019)

New York City's Buildings Mandate (Local Law 97) was passed as part of the NYC Climate Mobilization Act in 2019. The mandate requires that commercial and multifamily residential buildings over 25,000 square feet to reduce their emissions, including those associated with grid power usage, by 40% by 2030 and by 80% by 2050. Buildings account for 71% of NYC greenhouse gas emissions, and the large existing buildings impacted by this law alone account for about 30% of citywide emissions.

Building owners face fines of $268 per ton of emissions above their designated cap beginning in 2024. Fines could reach as high as $5 million annually for individual buildings. Building owners can avoid fines and stay under their emissions caps by investing in energy efficiency and clean energy.

The law included a provision authorizing the establishment of property-assessed clean energy (PACE) financing in New York City. Building owners may use PACE financing to finance the upfront costs of installation of energy-saving equipment or onsite renewable energy. Loans are paid back over the life of the equipment, usually 20 years or more.

Washington State (2019)

Washington's Clean Buildings Bill was signed into law in 2019. The law required the Department of Commerce to develop and implement an energy performance standard for commercial buildings greater than 50,000 square feet, and to provide incentives to encourage energy efficiency improvements. Industrial and agricultural buildings are exempt from the standard. The law directed Commerce to adopt ASHRAE Standard 100-2018 as a base, and to establish energy use intensity targets specific to Washington state for different building occupancy types.

In July 2021 the Early Adopter Incentive Program started, and buildings, depending on their size, must start complying with the new standards by June 2026.

Washington's energy performance standard must be updated by 2029 and every five years thereafter. Buildings that fail to meet the targets will be subject to an administrative penalty, but buildings that comply early may be eligible for incentives.

St. Louis, Missouri (2020)

St. Louis, Missouri Mayor Lyda Krewson signed a law in 2020 establishing a mandatory Building Energy Performance Standard in the city. The standard requires large commercial, multi-family, institutional, and municipal buildings (50,000 square feet in size and larger) to reduce energy use in order to meet an energy performance

standard by May 2025. The standard is to be reviewed and updated every four years.

Performance standards are set by the Building Energy Improvement Board and measured in the amount of energy used per square foot at the building (site energy use intensity or EUI) and based on building type.

Figure 3: Located in St. Louis, the Mid-Campus Center of Washington University and the Barnes-Jewish Center for Outpatient Health was certified LEED Gold in 2020. The project has already started reporting energy data, showing it is on track to meet the city's Building Energy Performance Standard.

Building owners will be required to comply with standards using ENERGY STAR's Portfolio Manager. Along with enacting the performance standard, the law created the Office of Building Performance to oversee the implementation, compliance and enforcement of the existing Building Energy Awareness ordinance and any future ordinances related to building energy improvement and performance.

Example of a Building Benchmarking and Tune Up Policy

Not all jurisdictions are ready to enact a performance standard, and as noted above, having a benchmarking policy is an important first step to understand the energy intensity of local buildings and ensure high quality data is available on which to establish performance standards. Below is an example of a recent policy that combines benchmarking with a requirement for periodic audit and/or prescriptive measures.

Chula Vista, California (2021)

The City of Chula Vista adopted its Building Energy Savings Ordinance in 2021 to support its 2017 Climate Action Plan. Buildings 20,000 square feet or larger are required to comply with the regulations, which include annual benchmarking reporting using ENERGY STAR Portfolio Manager and conservation measures. All properties over 20,000 square feet must complete certain conservation measures every five years. The ordinance also requires buildings to "measurably improve" their performance over each five-year period or undertake an audit, and it requires prescriptive updates for buildings that have not improved in two five-year increments.

Resources

American Council for an Energy-Efficient Economy (ACEEE)
- Mandatory Building Performance Standards: A Key Policy for Achieving Climate Goals (2020)

Institute for Market Transformation (IMT)
- Building Performance Standards Are a Powerful New Tool in the Fight Against Climate Change (2020)
- Comparison of U.S. Building Performance Standards (2021)

New Buildings Institute (NBI)
- Implementing Building Performance Standards is Key (2020)

Northeast Energy Efficiency Partnerships (NEEP)
- Building Energy Performance Standards Policy Considerations (2020)

U.S. Environmental Protection Agency (EPA)
- Benchmarking and Building Performance Standards Policy Toolkit (2021)
- Building Performance Standards: Overview for State and Local Decision Makers (2021)