Overcoming Barriers to BPS: A Collaborative, Grassroots Approach to Building Performance Standards

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ABSTRACT

Like many other U.S. cities, Ohio's major cities—Columbus, Cleveland, Cincinnati, and Dayton—have each set goals to significantly reduce or eliminate greenhouse gas (GHG) emissions by 2050. Achieving these goals will require rapidly reducing emissions from existing buildings, which account for 42-49% of total emissions in these cities. Building Performance Standards (BPS) can achieve large emissions reductions , but currently face several barriers to adoption, including limited political appetite for broad mandates, a lack of BPS alignment with energy equity, legal restrictions, and limited municipal resources to support BPS implementation. These barriers are not unique to Ohio, but also exist in many other cities that have yet to adopt a BPS. To overcome these barriers, a new approach to BPS is currently being developed in Ohio through a project funded by the U.S. Department of Energy. This paper provides an overview of the project. First, we describe the current policy landscape in Ohio and summarize relevant existing initiatives. Second, we discuss the project's key innovations compared to current BPS approaches: a collaborative, statewide multi-city partnership model, and the development of cost-optimal methods that prioritize buildings with the greatest potential savings and equity-centered methods that lead with equity metrics. The partnership consists of a large network of Ohio-based organizations, and we highlight the importance of a local, grassroots approach to BPS. Finally, we conclude by discussing how the model developed in this project can be replicated elsewhere and scaled to smaller cities, as well.

Introduction

Like many jurisdictions across the U.S., four of Ohio's major cities—Columbus, Cleveland, Cincinnati, and Dayton—have set ambitious goals to reduce or eliminate greenhouse gas (GHG) emissions by 2050. To achieve their goals, these cities must rapidly and efficiently reduce emissions from existing buildings, which account for a significant portion of their total emissions. The scale and urgency of these goals requires looking beyond traditional energy efficiency programs, such as energy codes and utility-sponsored incentive programs, to more innovative policies that can produce a large-scale transformation of the building stock.

Building Performance Standards (BPS) offer such transformative potential. BPS are policies that set limits on energy consumption (or GHG emissions) for existing buildings.

Buildings that exceed their limit must take action to improve performance. BPS typically apply to large commercial and multifamily residential buildings—size thresholds vary by jurisdiction but are commonly ≥50,000 ft^2—and therefore can impact a large proportion of a city's building-related emissions, since larger buildings use more energy. As a result, BPS can produce substantial energy and GHG emissions savings, with total reductions estimated between 25-45% (Webb and McConnell 2023; Nadel and Hinge 2020). Recognizing this potential, an increasing number of cities, states, and counties are adopting BPS, with 13 U.S. jurisdictions having enacted BPS to date (Institute for Market Transformation 2024), and over 40 jurisdictions committed to advancing BPS as part of the National BPS Coalition (Institute for Market Transformation 2021; Building Energy Codes Program 2023).

However, BPS currently face several barriers to adoption in Ohio. These include limited political appetite for broad mandates, a lack of BPS alignment with local priorities (especially energy equity), and limited resources to support BPS implementation. These barriers are not unique to Ohio, but also exist in many other jurisdictions that have yet to adopt a BPS, especially cities in the Midwest and Rust Belt. So, while BPS have the potential to produce large emissions reductions, they are unlikely to be enacted in Ohio and many other jurisdictions until these barriers are fully understood and BPS are adapted accordingly.

What is needed in Ohio is an approach to BPS rooted in a deep understanding of the needs of our region. This bottom-up, grassroots approach to policy development can be contrasted with the prevailing top-down approach to BPS, which champions the use of model ordinances and centralized technical assistance (Hart, Majersik, and Eagles 2022). While a top-down approach is helpful in advancing the BPS concept across the U.S., a bottom-up approach is ultimately required to make a BPS that is fit-for-purpose for Ohio's cities.

To meet this need, a new approach to BPS is currently being developed in Ohio through a project funded by the U.S. Department of Energy (DOE). The project is focused on four of Ohio's largest cities: Columbus, Cleveland, Cincinnati, and Dayton. This paper provides an overview of the project and its key innovations compared to current BPS approaches. First, we describe the current energy policy landscape in Ohio and relevant prior efforts. Second, we identify the barriers to BPS in Ohio and describe how this project is designed to address them. We highlight the project's two main features: the development of cost-optimal and equity-centered BPS methodologies, and the formation of a collaborative, statewide, multi-city partnership. Finally, we conclude by discussing how the approach developed in this project can be scaled to mid-sized and smaller cities and replicated in other parts of the country.

Background

Ohio Energy Policy Landscape

Ohio has the 5th largest CO_2 emissions among U.S. states (U.S. Energy Information Administration 2024b). Reducing emissions in Ohio is therefore important for meeting overall U.S. climate targets, in addition to meeting Ohio cities' goals. However, Ohio cities, like many of their peers throughout the Midwest, have limited control over ways they can reduce emissions

from buildings. In particular, three areas stand out: energy codes, energy efficiency programs, and a heavy reliance on fossil fuels.

Building energy codes provide an energy efficiency floor for new construction and major renovation projects. While energy codes do not affect most existing buildings due to the slow rate of renovation and the level of renovation needed to trigger energy code enforcement, they can be an indicator of a jurisdiction's approach to energy performance. Ohio energy codes currently use older versions of the model energy codes. The most recent version of the Ohio commercial energy code requirements was amended to be 13.4% less efficient than the model commercial energy codes (2012 IECC and 2010 ASHRAE 90.1). As of March 2024, the Ohio Commercial Energy Code (Ohio Department of Commerce 2023) will be a weakened 2021 IECC, an upgrade from the previous version but still not as stringent as the most recent model codes. The Ohio Residential Energy Code (Ohio Department of Commerce 2023) is currently the 2018 IECC, with amendments that weaken it by 11%, essentially to the 2009 IECC levels (U.S. Department of Energy 2023). The efficiency levels of the state code impact Ohio's cities, as Ohio is a min-max state, meaning local jurisdictions cannot adopt a more stringent code requirement than the state energy code.

Many states have energy efficiency portfolio standards (EEPS) that require utilities to offer rebates and incentives that help building owners finance energy efficiency. In 2019, Ohio House Bill 6 (HB6) removed Ohio's EEPS, effectively ending electric utility-sponsored energy efficiency programs in Ohio. As of February 2024, energy efficiency programs have not yet been enabled by new legislation, and the Public Utilities Commission of Ohio (PUCO) has not approved any proposed voluntary programs (Midwest Energy Efficiency Alliance 2023).

In the absence of utility-sponsored programs, two state agencies are a primary source of energy efficiency incentives and financing in Ohio: the Ohio Air Quality Development Authority (OAQDA) and the Ohio Department of Development (ODOD). OAQDA is a non-regulatory, independent state agency that identifies and funds projects that improve Ohio's air quality. OAQDA provides bond financing and tax benefits to buildings investing in clean and efficient technologies through its Clean Air Improvement Program (CAIP) for large projects and its Clean Air Resource Center (CARC) for small businesses (Ohio Air Quality Development Authority 2024). OAQDA has had a significant positive impact in the state of Ohio in part by eliminating over 367 million pounds of CO_2, improving public health, and supporting job creation and retention through their programs. ODOD is a cabinet-level agency supporting the growth of communities and businesses in Ohio. ODOD offers technical assistance to building owners through its Energy Efficiency Program and low-interest financing for energy efficiency measures through its Energy Loan Fund (Ohio Department of Development 2024).

Ohio relies heavily on fossil fuels for heating and electricity generation. Over 70% of Ohio households use fossil fuels for space heating, and well over half of Ohio's electricity generation comes from fossil fuels (particularly natural gas and coal) (U.S. Energy Information Administration 2024a). As a result, Ohio's GHG emissions from electricity generation are above the national average (U.S. Environmental Protection Agency 2024). This statewide dependence on fossil fuels is unlikely to change significantly in the near future, as HB6 also reduced the

requirement in Ohio's renewable energy portfolio standard from 12.7% renewable generation down to 8.5% (Midwest Energy Efficiency Alliance 2019).

Prior Local Initiatives

At the local level, four of Ohio's largest cities—Columbus, Cleveland, Cincinnati, and Dayton—are demonstrating leadership through their climate action plans and related initiatives. Columbus and Cincinnati have both set a goal of 100% GHG emissions reduction by 2050 (City of Columbus 2021; City of Cincinnati 2023), Cleveland has targeted an 80% reduction by 2050 (City of Cleveland 2018), and Dayton has committed to achieving 100% clean, renewable electrical energy by 2050 (City of Dayton 2021) . Existing buildings are a critical component of meeting these goals in each city, making up 43-49% of total GHG emissions. This is illustrated in Figure 1, which shows cities' climate goals, proportion of total emissions from buildings, and current existing buildings policies.

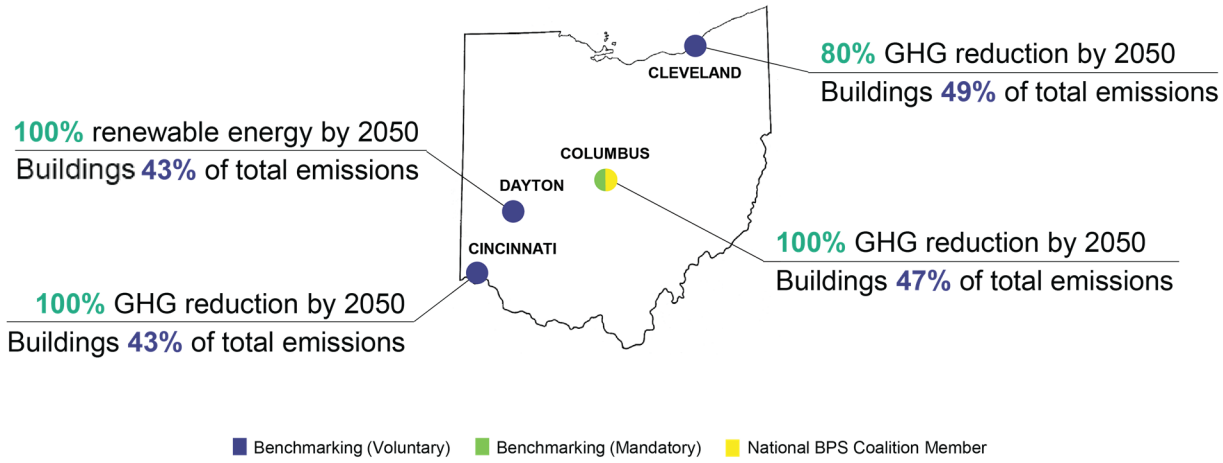

Figure 1. Map of cities' GHG reduction targets and buildings as a share of total GHG emissions in each city. *Source*: Filiatraut (2022), City of Cincinnati (2023), City of Cleveland (2018), d'Aversa (2022).

To date, support for reducing building emissions in these cities has been primarily through voluntary programs. Cleveland formed a 2030 District in 2011 and Cincinnati established one in 2017. These are local networks in which members make a collective commitment to reduce building energy use, water consumption, and transportation emissions by 50% across the District by the year 2030. As part of their commitment, members benchmark and track their building's energy use using the U.S. Environmental Protection Agency's ENERGY STAR Portfolio Manager. District membership in both cities is currently robust, with over 400 buildings totaling 73 million square feet committed in Cleveland (Cleveland 2030 District 2023), and over 300 buildings totaling 28 million square feet committed in Cincinnati (Cincinnati 2030 District 2022). This represents about 26% of Cincinnati's commercial building floor area (Webb and Moore 2020), and demonstrates the considerable voluntary commitment to building decarbonization that has already been made in Cincinnati. In 2015, Dayton Regional Green

(DRG) launched the "Bring Your Green" challenge to motivate and track sustainability achievements among organizations in the Dayton area (Dayton Regional Green 2024). The program is based around a custom web-based software platform that tracks building utility data and uses gamification to engage organizations in sustainability competitions. The platform has engaged over 400 businesses, schools, and other organizations to date.

In 2020, Columbus became the first and is the only city in Ohio to adopt a mandatory energy benchmarking and disclosure ordinance. The policy applies to all commercial and multifamily residential buildings over 50,000 square feet and requires building owners to track and report their energy use via ENERGY STAR Portfolio Manager. Like many other jurisdictions with mandatory benchmarking, Columbus' data are shared publicly on an interactive transparency map (City of Columbus 2024).

Recently, the four Ohio cities have also started to prioritize energy equity as part of their climate action plans. Cincinnati, Cleveland, and Columbus rank 9th, 11th, and 16th, respectively, among U.S. cities with the worst median energy burden (Drehobl and Ross 2016). To begin to address this issue, the four Ohio cities (plus Lucas County, which contains Toledo) recently completed a project called Shining a Light, with financial support from Energy Foundation (Go Sustainable Energy 2022). The goal of this project was to collect, analyze, and understand utility data sources available to cities and how this data could be used to inform energy equity programs and policy for residential buildings. Cincinnati is also among a handful of cities in the U.S. to have set a formal goal around energy equity: reduce the number of households experiencing energy poverty by 10% from 2022 levels by 2028 (City of Cincinnati 2023). Cincinnati has also developed local programs to support this goal, including WarmUp Cincy, which is dedicated to improving energy efficiency in low-income multifamily buildings (City of Cincinnati 2024).

These initiatives in each of the four cities have made valuable progress towards reducing building emissions in Ohio. However, they are not enough to enable the cities to meet their climate goals. BPS can build on this foundational work and fill the gap that remains to help cities meet their goals. Columbus has joined the National BPS Coalition, which commits the city to adopting BPS. The other Ohio cities have not yet joined the National BPS coalition but have a foundation of initiatives to build on to adopt and implement BPS. However, each of the cities faces significant barriers to BPS adoption.

Barriers to BPS in Ohio

In theory, BPS are a flexible policy tool. The key components of a BPS—which include the performance metric and targets, building types and sizes included, and compliance timeframes, pathways, and penalties—can all be customized to meet a jurisdiction's needs. Yet, despite this flexibility, the BPS enacted to date largely look quite similar: they are all mandatory legislation, they focus on the largest buildings in a jurisdiction (size thresholds vary from 10,000 square feet to 50,000 square feet), they are based on environmental performance metrics (either site energy use intensity [EUI], ENERGY STAR score, or GHG emissions intensity), and they often leverage data from an existing energy benchmarking program.

Although there is interest in BPS among Ohio's large cities, there are currently four barriers to adopting BPS in Ohio that look similar to the BPS developed elsewhere:

Barrier 1: Limited political appetite for broad mandates. At both the state and local level, Ohio governments are generally more interested in incentivizing action than mandating it. BPS, as they have been enacted elsewhere in the U.S., are broad mandates, requiring improvements to large segments of the building stock.

Barrier 2: Lack of BPS alignment with local priorities. Improving energy equity and reducing utility costs holds equal (or even greater) importance to reducing emissions for Ohio's large cities. BPS, as they have been enacted elsewhere in the U.S, focus on environmental impact first. Prior work has even raised concern that BPS could exacerbate energy insecurity, especially for low-income multifamily buildings (Hart et al. 2020). There is growing recognition of the need to prioritize equity within a BPS, and this is currently an evolving area of work (U.S. Environmental Protection Agency 2022).

Barrier 3: Limited resources to support BPS. Ohio's cities have limited staff capacity to support the development and implementation of BPS. BPS, as they have been enacted in much larger cities like New York City and Washington, D.C., have been accompanied by increased staff to assist with compliance and enforcement, and companion programs that provide financial and technical assistance for building owners.

Barrier 4: Challenges accessing utility data with investor-owned utilities. Ohio law encourages creativity to advance competitive markets including in ancillary services like energy efficiency and demand side energy services. This has been codified in the Ohio Revised Code, which states that utility companies must share energy data with aggregators and power brokers. An aggregator can be a city government that is going to market to lower energy costs for their citizens. Even so, some utilities make it difficult to obtain the data by charging for the data or outright denying access to it even though the request is legally valid.

A New Approach to BPS

Project Overview

To overcome these barriers, a new approach to BPS is currently being developed in Ohio. The goal of the project is to develop and implement cost-optimal and equitable BPS in Ohio's large cities. The project is led by the University of Cincinnati (UC) in collaboration with Go Sustainable Energy, Power a Clean Future Ohio (PCFO), and the Midwest Energy Efficiency Alliance (MEEA), and it establishes a unique statewide network of partners to advance BPS. This network includes OAQDA (an Ohio state agency), local governments in Columbus, Cleveland, Cincinnati, and Dayton, community-based organizations (CBOs), such as Community Action Agencies and environmental justice organizations, and building owners and design professionals. The project is funded through DOE's Resilient and Efficient Codes Implementation (RECI) opportunity and will run for three years, from 2024 through 2026.

The project has been specifically designed to address the barriers to BPS in Ohio, as shown in Table 1. The project has two main features that distinguish it from existing approaches to BPS: the development of cost-optimal and equity-centered BPS methodologies, and the formation of a collaborative, statewide, multi-city partnership. These new BPS methodologies

are intended to provide better alignment with the political realities and local priorities in Ohio. The multi-city partnership is intended to bring together knowledge and resources from across Ohio. It will maximize limited capacity by leveraging existing efforts in each city towards a common goal. An additional feature is the project's approach to overcoming utility data access barriers. Working simultaneously with multiple cities on data access will accelerate and focus discussions with utilities and the PUCO and will enable cities to share utility data best practices.

Table 1. Barriers to BPS in Ohio and the solutions developed in this RECI project

Barrier	Solution
Limited political appetite for broad mandates	Develop a cost-optimal approach to BPS with strong incentives that focuses on a relatively small number of buildings with the greatest savings potential.
Lack of BPS alignment with local priorities	Develop an equity-centered approach to BPS that is based on an equity metric, rather than an environmental metric.
Limited resources to support BPS	Establish a collaborative, statewide, multi-city network of partners that shares knowledge and resources.
Challenges accessing utility data with investor-owned utilities	Collaborative approach to creating a seamless flow of data for cities and building owners.

The project consists of the following major tasks: (1) Analyze each city's building stock and develop pathways for cost-optimal and equity-focused BPS; (2) Identify legal pathways, financial incentives, and workforce development opportunities for BPS in Ohio; (3) Engage diverse stakeholder groups and local government in BPS policy development; (4) Support BPS implementation in each city by identifying data collection needs and developing data collection solutions and infrastructure; (5) Launch a BPS cohort for small- and medium-sized cities in Ohio to share lessons learned from the larger cities. The first four tasks occur concurrently, with work beginning at the start of the project. The final task will occur in the final year of the project.

Cost-Optimal and Equity-Centered BPS

BPS, as they have been enacted elsewhere, can be viewed as a high effort, high reward policy tool. Prior work by one of the authors analyzed BPS across 10 U.S. cities and found that, depending on the jurisdiction, 65-85% of covered buildings do not meet their performance target and would require improvement (high effort), but that an overall energy use reduction of 25-45% could be achieved if all buildings complied with the BPS (high reward) (Webb and McConnell 2023). However, this same study also showed that the overall energy savings resulting from a BPS follows the Pareto principle (i.e., 80-20 rule), in which most of the total savings could be achieved by retrofitting a comparatively small number of buildings. This means that BPS, as currently designed, do not deliver a return proportional to the level of investment: they require improvement in many buildings that will contribute only a negligible amount to the overall energy savings. This approach to BPS is not likely to be viable in Ohio, given the antipathy to

broad mandates. To enhance the viability of BPS in Ohio, there is a need to develop a cost-optimal approach to BPS that focuses on the buildings where the greatest gains can be achieved.

BPS also offer an important opportunity to help Ohio's cities achieve their energy equity goals. Viewed through a BPS lens, an energy equity goal can provide the metric and target needed for a BPS. For example, the city of St. Paul, Minnesota has set a goal that no household will spend more than 4% of its income on energy bills (Drehobl, Ross, and Ayala 2020). This specifies a metric (energy burden) and performance target (no more than 4% of household income), similar to how a traditional BPS might specify an environmental metric (e.g., site EUI) and performance target (e.g., a specific kBtu/ft^2). A BPS that focuses on an equity metric, rather than an environmental metric, can provide a framework for requiring action towards energy equity goals. While energy burden is a frequently used equity metric in the residential sector, developing equity metrics for commercial buildings is an ongoing area of research that will be explored in this project. Pacific Northwest National Laboratory has assembled an initial list of equity metrics that will serve as a starting point for this work (Tarekegne et al. 2021).

This project is developing methodologies for cost-optimal BPS and equity-centered BPS and will demonstrate them using data from the four Ohio cities. The methodologies will be developed in three steps. First, datasets will be compiled for each city that include metered utility data, building stock characteristics, and sociodemographic data. Since only one of the four cities currently has mandatory benchmarking, alternative utility data collection pathways will be explored. Second, estimates for typical retrofit capital costs in Ohio will be generated to inform the development of the cost-optimal BPS methodology. These will be developed by convening a group of energy auditors in Ohio, and will be supplemented using data from mandatory audit ordinances and utility-sponsored incentive programs in other states. Third, this data will be used to analyze cost-optimal and equity-centered BPS pathways for each city. Several potential equity metrics will be evaluated and discussed with each of the cities to identify which metrics align best with local goals. Each pathway will specify the scope, metric, target(s), and timeframe. The cost-optimal and equity-centered pathways represent two distinct and independent approaches to BPS, and cities could use either or both methodologies as appropriate to their needs.

Figure 2 provides an initial illustration of this concept for a theoretical BPS in Columbus. Benchmarking data for office buildings in Columbus from the year 2023 were analyzed relative to the site EUI target from ASHRAE Standard 100-2018 (ASHRAE 2018). This standard has been used as the basis for a BPS in the states of Washington and Oregon. For office buildings in ASHRAE climate zone 5A (where Columbus is located), the standard specifies a target of 53 kBtu/ft^2. Each of the 106 office buildings in the data was compared to this target, and 84 buildings were found to not meet the target. For these 84 buildings, the total energy savings (in kBtu) that would result from meeting this target was computed, and then expressed as a percentage of the total energy savings that would result from all buildings meeting their target.

Figure 2A (left) plots each of the 84 buildings exceeding the target as a bar along the x-axis. The buildings are ordered by the percent of the total energy savings from the BPS that each building would produce (left y-axis). The black curve represents the cumulative percent savings (right y-axis). The results show that a majority of savings from the BPS for this set of buildings could be achieved through making improvements in a comparatively small number of buildings:

50% of the savings could be achieved through meeting the BPS target in just 11 buildings, and 80% of the savings could be achieved through meeting the BPS target in 32 buildings. As further illustration, Figure 2B (right) plots these same 84 buildings as a function of site EUI (x-axis), building floor area (y-axis), and percentage of total savings (indicated by size and color of points). The results show that considerable savings can result from both low EUI and high EUI buildings. The buildings that contribute a large percentage to the overall savings from the BPS form a curve (or frontier) in the plot, with some low EUI and high floor area buildings producing large savings, and some high EUI and low floor area buildings also producing large savings. This basic concept of optimizing a BPS will be expanded in this project to include emissions profiles, retrofit capital costs, and estimated retrofit potential, among other variables.

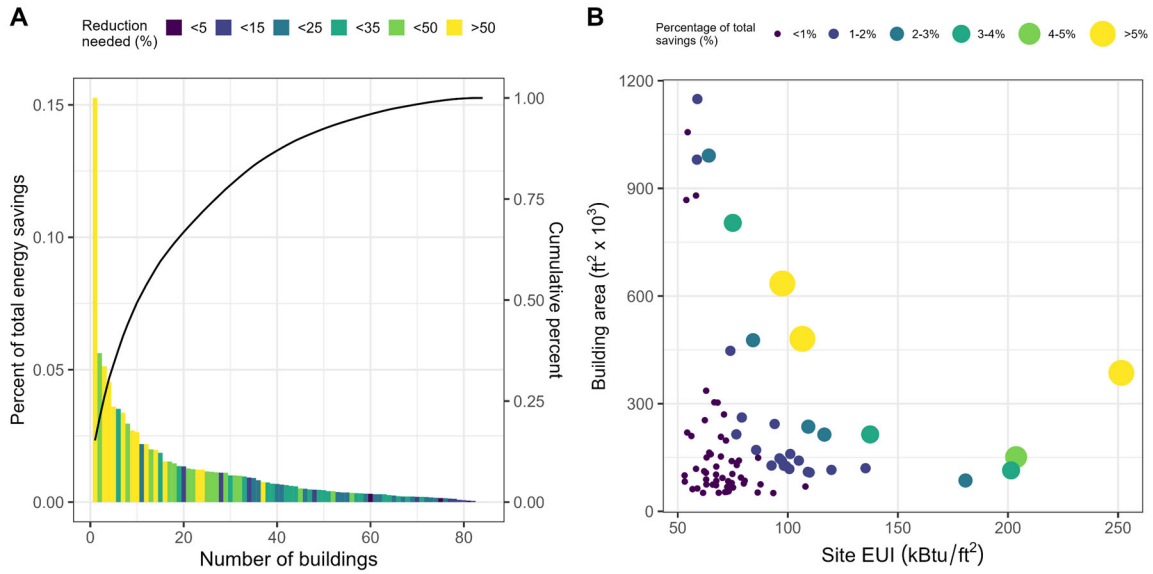

Figure 2. Contribution of each building to the total energy savings that would result from a theoretical BPS for office buildings in Columbus. Relative contribution shown as cumulative (Figure 2A) and as a function of both site EUI and floor area (Figure 2B). *Source*: City of Columbus (2024).

The results of the analysis will be discussed with each city towards developing a data-informed BPS policy. The project team anticipates that cities will not view these methodologies as either/or, but will instead take a hybrid approach to BPS, using a cost-optimal methodology to address some segments of the building stock, and an equity-centered approach to address others. Both approaches will help cities prioritize which buildings to retrofit to meet their goals. We expect that an equity-centered approach will be most relevant for multifamily buildings and a cost-optimal approach will be most relevant for large commercial buildings.

Concurrent with the data analysis, the project is conducting qualitative research to evaluate legal and legislative pathways for implementing a BPS in Ohio. The project takes a flexible approach to what a BPS might look like in each city, recognizing that each city's BPS will likely be different, and that strong incentives may be more feasible than strong mandates in some cities. The project team will confer with Ohio legal experts to examine a variety of legal

pathways for BPS, including: zoning ordinances, local- and state-level policies, energy codes, tax abatements, administrative procedures, and rulemaking.

A Collaborative, Grassroots Partnership

Recent efforts elsewhere have sought to create networks of support at the national level for advancing BPS. For example, the Building Performance Partnership, recently launched by the Institute for Market Transformation (IMT) and Building Energy Exchange (BE-Ex) connects energy efficiency resource hubs in cities across the U.S. (Building Energy Exchange 2023). The National BPS Coalition creates a partnership of jurisdictions that have committed to developing BPS (Institute for Market Transformation 2021). The DOE's BPS Technical Assistance Network supports local jurisdictions through the Building Technologies Office and National Laboratories.

In contrast to national models, this project develops a network of partners across a single state. The idea is that Ohio-based and Ohio-serving organizations are best positioned to facilitate the relationships and gain the community buy-in necessary to advance BPS in Ohio. This local approach to BPS support provides several advantages over national networks:

Advantage 1: Dialogue occurs within a shared context. A localized network facilitates peer-to-peer dialogue between jurisdictions operating in the same political and regulatory setting. This shared context is critical for identifying common needs and sharing lessons learned between cities. It also creates an environment for focused problem-solving by remaining limited to Ohio.

Advantage 2: Technical support is provided by local organizations. All of the organizations involved in this project are Ohio-based or Ohio-serving. This allows the project to be rooted in an understanding of local community needs as well as statewide limitations. It also means that Ohio's needs are, by default, prioritized.

Advantage 3: Resources are shared across jurisdictions. Given the limited capacity in each partner city, shared resources offer a more cost-effective approach to BPS development and implementation than an individual approach in each jurisdiction.

Advantage 4: Local capacity is strengthened. A localized network strengthens local and regional capacity for reducing GHG emissions in ways that relying on an external network of partners cannot. This can provide a platform for Ohio's cities to pursue additional funding opportunities together, and forge partnerships that grow beyond the scope of this project.

The network of partners committed to this project consists of 17 organizations across the state of Ohio, plus one regional organization that serves Ohio. The current list of partners is shown in Figure 3 and broken down by stakeholder type. The project partners encompass a diverse range of expertise and perspectives, which speaks to the broad support and enthusiasm for this work across Ohio. The technical providers include a public academic institution (UC), a Regional Energy Efficiency Organization (MEEA), an energy consultant (Go Sustainable Energy), a nonprofit that engages with local governments across Ohio (PCFO) and a statewide environmental advocacy organization (Ohio Environmental Council). Governmental partners include local governments in four large cities in Ohio (Columbus, Cleveland, Cincinnati, and Dayton), and a state agency that helps finance projects that improve Ohio's air quality (OAQDA). Networks of building owners and design professionals are represented by the Cleveland 2030 District, the Cincinnati 2030 District, Dayton Regional Green, and the Cleveland

ASHRAE Chapter. CBO partners include a Community Action Agency (IMPACT Community Action), an environmental justice organization (Groundwork Ohio River Valley), and a community development intermediary (Cleveland Neighborhood Progress), plus a local community college to help advise on workforce development (Cincinnati State).

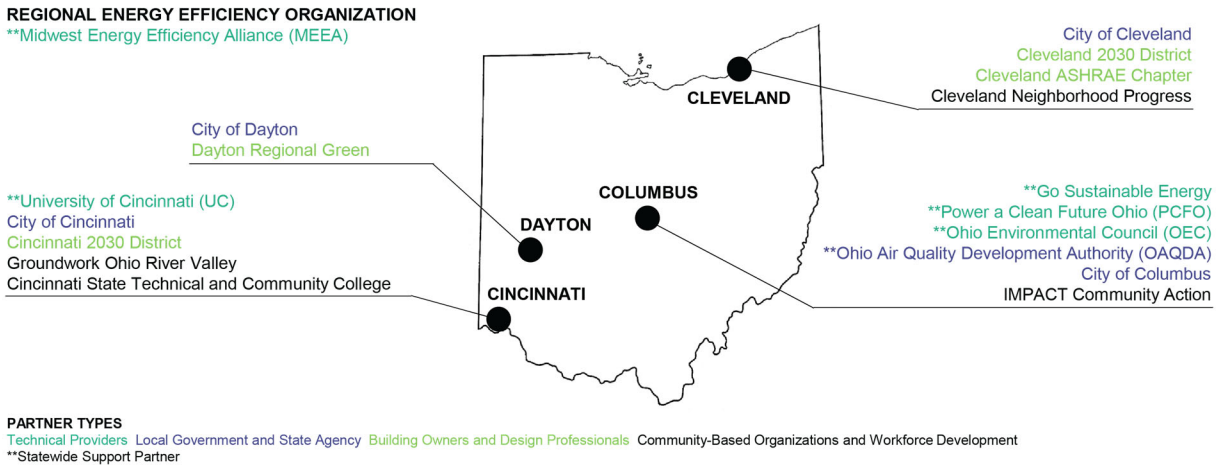

Figure 3. Map of committed project partners

Many of the project partners serve on a Technical Advisory Group (TAG), which provides a formal structure for the partnership within the project. The TAG provides a mechanism for regular peer-to-peer dialogue across cities and stakeholder types, and acts as a feedback channel for the technical providers. The TAG met once in person for an initial day-long kickoff meeting and continues to meet virtually approximately monthly. The TAG meetings are in addition to individual and small group meetings with the project partners on an as-needed basis. TAG members are not directly compensated for their time, but the partner organizations have been allocated funds in the project budget according to their various roles and needs.

While the TAG is engaged in all aspects of the project, stakeholder engagement is a critical point of collaboration. Project partners in each of the four cities are working to develop a Stakeholder Engagement Plan that will guide the outreach and engagement in each city. Each plan will identify key stakeholder groups—including building owners and property managers, design professionals and contractors, local residents (especially those in frontline communities), and policymakers—in each city and will create a timeline for engaging each of them in BPS development. The CBOs are expected to play an important role in the stakeholder engagement process, and the project budget has allocated funds accordingly for the CBOs efforts and to compensate local residents for their time engaged in the project.

Addressing Utility Data Barriers

BPS, as they have been enacted elsewhere, typically build on data and practices from mandatory benchmarking ordinances. While there are examples of jurisdictions who have

enacted BPS in the absence of benchmarking data, e.g., Duer-Balkind et al. (2022), the current lack of mandatory benchmarking in Ohio (with the exception of Columbus) means that utility data collection infrastructure and reporting practices will need to be established as part of this project. We are exploring several possible approaches to obtaining this data: (1) directly from the utility companies, (2) through building owners, or (3) through a Certified Retail Energy Supplier (CRES) and Competitive Retail Natural Gas supplier (CRNG) aggregator or broker. The first two options are commonly used in other jurisdictions but are limited when dealing with the entire building stock in a city. Obtaining the data directly from either the investor-owned utility (IOU) or the municipal-owned utility (MOU) is only viable on an account-by-account basis where the building owner authorizes the utility to share their usage. Alternatively, the building owner can provide the usage from their bills, but this puts a reporting burden on the building owner and their staff and places a training and education burden on jurisdictions to teach building owners how to benchmark.

The third option was used previously for the Shining a Light project and is being examined further in this project. Obtaining utility data through a CRES/CRNG has been codified into the Ohio Revised Code (ORC) and the process has been detailed in the Ohio Administrative Code (OAC), but there are often barriers encountered when the data is requested. For some utilities the process of getting the data is straightforward and reasonable, for other utilities the process can be onerous either though charging a significant fee for the data or outright denying the sharing of the data. To address this potential barrier, an in-depth study of the laws in Ohio that govern the sharing of the data has begun to be undertaken. This will result in a legal document that can be shared with the utilities in Ohio to clarify this pathway for sharing data.

Once the data is obtained from the various sources, the datasets will need to be merged. The size of the dataset will be in the millions of data points and to handle this a database will be utilized. The database will also need to store ancillary data and to track BPS goals and targets. It will need to be accessible by the cities through a front-end. We are exploring different software solutions, from leveraging existing solutions to creating our own in situ solution.

Support for Ohio's Smaller Cities

While most of this project is focused on the four large cities, many mid-sized and smaller municipalities within Ohio have also established climate action plans and may be interested in BPS. Project partner PCFO currently has 48 member communities, and 25 of these could be classified as small (20,000 to 50,000 people) or mid-sized (50,000 to 130,000 people). Twelve of these cities have articulated a goal to reduce greenhouse gas emissions. Nine of these cities have also established or are currently developing sustainability or climate action plans. Municipalities of all sizes across Ohio have a clear appetite for climate action and its associated health and economic benefits for their residents, and this includes smaller cities, as well.

The final year of this project will feature a BPS cohort for small- and medium-sized cities, to disseminate and adapt the lessons learned from the larger cities into a new context. A cohort approach seeks to convene related stakeholders around a shared area of interest.

Typically, cohorts convene individuals or teams in a series of educational sessions and workshops, culminating in an expanded network for participants, increased subject matter knowledge, and some sort of final work product or deliverable. The cohort approach allows for the sharing of best practices amongst stakeholders and can be used to leverage collective impact towards a shared goal. For example, the National BPS Coalition effort functions as a cohort in the sense that participating cities can learn from each other and from technical assistance provided while they work towards broader adoption of BPS across the country. Like a local version of this national effort, our project will create a cohort of municipalities within Ohio that are smaller than the large metropolitan areas but could still benefit from BPS.

PCFO's prior experience convening cohorts has highlighted the need to correctly scope the content and target it to similarly positioned participants, i.e. designing policy education materials and convenings specifically for small- to mid-sized cities with similar budgets and capacities. While bringing varying municipalities together allows for networking and thinking outside of each city's own set of circumstances, too much variability between cities in a cohort makes it difficult to ensure that the curricula and deliverables are appropriate for each city's needs. On one hand, it is important to optimize differences within a cohort for peer-learning, while on the other hand, cohort participants must have enough shared experience and characteristics to benefit from a shared curriculum. This project will leverage existing relationships and networks around the state to thoughtfully recruit participants to optimize the cohort's success. We will implement pre-cohort surveying and research to more fully understand current perspectives on building decarbonization and BPS in Ohio's small- and mid-sized cities.

In keeping with the grassroots, bottom-up approach of the project, BPS educational content will be adapted to fit the unique needs smaller communities have around decarbonization. Smaller jurisdictions in Ohio operate in a different context than the larger cities and both have unique opportunities and challenges in adopting decarbonization solutions. Smaller communities' building stocks may be older than metropolitan areas with newer development and are generally smaller in size. Smaller jurisdictions also encompass a wide range of geographies, from metropolitan suburbs to rural areas. Like urban areas, these communities also include low-income and disadvantaged communities; poverty is not just an urban reality. The cost-optimal and equity-centered BPS concepts developed in this project are just as relevant to these smaller communities but will be adapted to their unique needs.

In our examination of BPS implementation in other cities it is clear that greater sharing of information and best practices will increase the opportunities for success in other jurisdictions. By scaling BPS implementation to small and medium size cities in Ohio and building on lessons learned from the large cities, we expect to create even more fertile grounds for helpful learnings to emerge that could be shared with jurisdictions across the country. We hope to work collaboratively with DOE to ensure this collection of lessons learned can be shared broadly.

Conclusion

BPS hold great promise for helping Ohio's large cities meet their climate targets. Yet, they currently face several barriers to adoption. This project seeks to overcome those barriers by advancing new cost-optimal and equity-centered approaches to BPS, and by developing a collaborative multi-city partnership that leverages local knowledge and networks throughout the state. Initial work on the project has already demonstrated successes from this model, including expanded city-to-city dialogue, strong statewide momentum, and increased education and literacy about benchmarking and BPS. Several challenges have also emerged, including the need to balance all project partners' perspectives, and varying local government structures and legislative processes. The project team is working to address these challenges by facilitating internal project stakeholder engagement—taking time to intentionally build relationships and trust amidst our coalition. We are mapping the ordinance and policy development processes across our four local jurisdictions to supplement our research and communications as well.

As BPS continue to be adopted in diverse jurisdictions across the U.S., new models will be needed. Creative strategies for developing and implementing BPS will help adapt this powerful policy tool to individual jurisdictions' needs and capacities. In that context, this project provides a new model for a multi-city approach to BPS within a shared statewide context. This approach may be useful in other jurisdictions facing similar challenges to Ohio. Throughout the project, we will be learning lessons that will help us better understand the advantages and disadvantages of this model. Future work will document and disseminate those lessons to other jurisdictions and the broader building policy community.

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References

ASHRAE. 2018. *ASHRAE Standard 100-2018, Energy Efficiency in Existing Buildings*. Atlanta: ASHRAE.

d'Aversa, J. 2022. *City of Dayton 2019 Greenhouse Gas Inventory*. Power a Clean Future Ohio. https://www.daytonohio.gov/DocumentCenter/View/12291/City-of-Dayton-OH-GHG-Inventory-12-8-2022.

Building Energy Codes Program. 2023. "Building Performance Standards." December 29, 2023. https://public.tableau.com/app/profile/doebecp/viz/BuildingPerformanceStandards/BuildingPerformanceStandards.

Building Energy Exchange. 2023. "Our Network." 2023. https://be-exchange.org/our-network/.

Cincinnati 2030 District. 2022. *2021 Progress Report*. https://2030districts.org/cincinnati/.
City of Cincinnati. 2023. *Green Cincinnati Plan*. Cincinnati, Ohio. https://www.cincinnati-oh.gov/oes/climate/climate-protection-green-cincinnati-plan/.
City of Cincinnati, Office of Environment and Sustainability. 2024. "Energy Equity Programs." 2024. https://www.cincinnati-oh.gov/oes/energy-equity/energy-equity-programs/.
City of Cleveland. 2018. *Cleveland Climate Action Plan - 2018 Update*. Cleveland, Ohio. https://www.sustainablecleveland.org/climate_action.
City of Columbus. 2021. *Columbus Climate Action Plan*. Columbus, Ohio. https://www.columbus.gov/sustainable/cap/.
———. 2024. "Energy and Water Benchmarking and Transparency." 2024. https://maps.touchstoneiq.com/columbus/.
City of Dayton. 2021. *Declaration of a Climate Emergency, Including a Commitment to Renewable Resources, and Declaring an Emergency*. *Resolution No. 6572-21*. https://www.daytonohio.gov/DocumentCenter/View/12270/Climate-Emergency-Ordinance.
Cleveland 2030 District. 2023. *2022 Progress Report*. https://2030districts.org/cleveland/.
Dayton Regional Green. 2024. "Bring Your Green." 2024. http://bringyourgreen.com/.
Drehobl, A., and L. Ross. 2016. *Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities*. Washington, DC. https://www.aceee.org/research-report/u1602.
Drehobl, A., L. Ross, and R. Ayala. 2020. *How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden across the United States*. Washington, DC: American Council for an Energy-Efficient Economy (ACEEE). https://www.aceee.org/research-report/u2006.
Duer-Balkind, M., A. Paleshi, R. Desai, K. Leung, L. Westerhoff, and M. Lang. 2022. "Setting Building Performance Standards with Limited Local Data." In *Proceedings of the 2022 ACEEE Summer Study on Energy Efficiency in Buildings*. Pacific Grove, California.
Filiatraut, B. 2022. *City of Columbus Greenhouse Gas Inventory 2021*. Department of Planning, Mid-Ohio Regional Planning Commission. https://www.columbus.gov/Templates/Detail.aspx?id=2147519329.
Go Sustainable Energy. 2022. "Shining A Light – Illuminating Energy Data." 2022. https://www.gosustainableenergy.com/our-projects-1/shining-a-light-%E2%80%93-illuminating-energy-data.
Hart, Z., R. Gahagan, C. Majersik, J. Miller, and B. Neely. 2020. "Understanding the Housing Affordability Risk Posed by Building Performance Policies." In *Proceedings of the 2020 ACEEE Summer Study on Energy Efficiency in Buildings*. Virtual.
Hart, Z., C. Majersik, and J. Eagles. 2022. "Leveling Up Building Performance Regulations: How Governments Can Craft Equitable, Effective Building Performance Standards to Drive Widespread Market Transformation." In *Proceedings of the 2022 ACEEE Summer Study on Energy Efficiency in Buildings*. Pacific Grove, California.
Institute for Market Transformation. 2021. "National BPS Coalition." 2021. https://nationalbpscoalition.org/.

———. 2024. “Comparison of U.S. Building Performance Standards,” February. https://www.imt.org/resources/comparison-of-u-s-building-performance-standards/.
Midwest Energy Efficiency Alliance. 2019. “6 Things You Need to Know About Ohio’s Energy Efficiency Rollback.” August 14, 2019. https://www.mwalliance.org/blog/6-things-you-need-know-about-ohios-energy-efficiency-rollback.
———. 2023. “Ohio.” 2023. https://www.mwalliance.org/initiatives/policy/ohio.
Nadel, S., and A. Hinge. 2020. *Mandatory Building Performance Standards: A Key Policy for Achieving Climate Goals*. Washington, DC: American Council for an Energy-Efficient Economy (ACEEE). https://www.aceee.org/white-paper/2020/06/mandatory-building-performance-standards-key-policy-achieving-climate-goals.
Ohio Air Quality Development Authority. 2024. “Incentives & Financing.” 2024. https://ohioairquality.ohio.gov/incentives-and-financing.
Ohio Department of Commerce. 2023. “2024 Ohio Building Code Rules Effective March 1, 2024.” https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards/building-codes-and-interpretations/2024-ohio-building-mechanical-and-plumbing-code-rules.
Ohio Department of Development. 2024. “Revelopment.” 2024. https://development.ohio.gov/community/redevelopment.
Tarekegne, B., G. Pennell, D. Preziuso, and R. O’Neil. 2021. *Review of Energy Equity Metrics*. Pacific Northwest National Laboratory. https://www.pnnl.gov/publications/review-energy-equity-metrics.
U.S. Department of Energy. 2023. “State Portal, Building Energy Codes Program.” December 28, 2023. https://www.energycodes.gov/state-portal.
U.S. Energy Information Administration. 2024a. “Ohio State Energy Profile.” 2024. https://www.eia.gov/state/data.php?sid=OH.
———. 2024b. “Rankings: Total Carbon Dioxide Emissions, 2021.” 2024. https://www.eia.gov/state/rankings/?sid=OH#series/226.
U.S. Environmental Protection Agency. 2022. “Section 2: Building Performance Standards: Overview for State and Local Decision Makers.” In *Benchmarking and Building Performance Standards Policy Toolkit*. https://www.epa.gov/statelocalenergy/benchmarking-and-building-performance-standards-policy-toolkit.
———. 2024. “EGrid Power Profiler.” 2024. https://www.epa.gov/egrid/power-profiler#/.
Webb, A., and C. McConnell. 2023. “Evaluating the Feasibility of Achieving Building Performance Standards Targets.” *Energy and Buildings* 288 (June):112989. https://doi.org/10.1016/j.enbuild.2023.112989.
Webb, A., and D. Moore. 2020. *Understanding Cincinnati’s Multifamily Housing Stock: An Analysis to Improve Access to Energy Efficiency for Low-Income Households*. University of Cincinnati. https://doi.org/10.13140/RG.2.2.27877.01761.