Community-based Prioritization of Commercial Buildings for Equitable Implementation of Building Performance Standards

Isabel Langlois-Romero, Dr. Ardelia M. Clarke, Landan T. Taylor, Nicholas Long, Devin Brady, Andrew Parker, National Renewable Energy Laboratory

Ymbar Polanco Pino, Dr. Greses Perez, Tufts University

Berenice El Gharamti, Jose Luis Ramos, Monarca Group

Billierae Engelman, US Department of Energy

ABSTRACT

Building Performance Standards (BPS) are essential for driving building improvements and reducing energy use and greenhouse gas emissions, crucial for meeting decarbonization goals. However, implementing BPS can increase energy bills and displace residents, particularly in marginalized communities. To address these issues, research regarding BPS policies must be conducted in partnership with local communities. Involving communities in research ensures the policy recommendations reflect the needs of communities, making the policy more effective and equitable.

Our research team collaborated with a minority-, women-owned business to develop methods for co-creating BPS policy decisions. We conducted a comprehensive building stock analysis, mapping and assessing commercial buildings based on property type, condition, and their locations within disadvantaged communities. This analysis reviews outcomes from a pilot project and identifies buildings that would benefit most from BPS policies.

To ensure equitable implementation, we developed equity prioritization strategies focusing on building condition, tenant industries, and community significance. The survey analysis found 69.1% of prioritized buildings were strip malls with 61% of community members indicating that energy investments in these buildings would directly benefit them.

An important outcome is the development of a new framework, commercial building community services (CBCS), which reviews types of services that commercial buildings can provide to the community. Our findings suggest additional criteria to effectively prioritize commercial buildings using community-based participatory research (CBPR) methods. This paper discusses key areas for further research and shares lessons from a pilot project in Aurora, Colorado, United States, offering guidance for other jurisdictions in implementing equitable BPS policies.

Introduction

Across the United States (U.S.), localities and states are adopting aggressive energy and greenhouse gas emission reduction goals. As of 2023, 88% of the 18 Building Performance Standards (BPS) enacted globally target commercial buildings. In the U.S., all but one BPS policy focus on commercial buildings (Nadel and Hinge 2023). Additionally, there are approximately 6 million commercial buildings, amounting to nearly 100 billion square feet of gross floor area in the U.S. (U.S. Energy Information Administration 2022).

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Despite the broad adoption of BPS and focus of commercial buildings in these policies, equity considerations in commercial buildings remain widely understudied. As greenhouse gas emissions and energy-related inequities increase, the energy burden and insecurity in the U.S. also grow (Clarke et al. 2023). Existing research often fails to incorporate community perspectives, which are crucial for equitable policy implementation. To address this gap, jurisdictions need practical solutions grounded in the lived experiences of affected communities.

Jurisdictions often create criteria for equity inclusive policy BPS programming. These definitions prioritize buildings for BPS programming such as technical assistance, alternative compliance pathways, or financing support. One of the free federal tools used to prioritize buildings is the White House' Climate and Economic Justice Screening Tool (CEJST) which characterizes each census tract as disadvantaged (DAC) or non-disadvantaged communities (non-DAC). However, as this paper will discuss, our analysis from a pilot project found that around 30% of the poorest condition buildings would not be included if only the CEJST tool was used to prioritize buildings in Aurora, Colorado. Therefore, this paper suggests community-prioritization and stock analysis methodologies to be used in conjunction with CEJST DAC status to identify commercial buildings for BPS program support. While identifying and prioritizing commercial buildings alone does not ensure the benefits of BPS policies reach historically marginalized communities, these are necessary steps. Significant barriers remain to ensuring BPS policies benefit the communities most in need, and prioritizing buildings for policy support is a necessary starting point to assessing the needs of these buildings and the people who live and work in them.

In collaboration with the Aurora, Colorado community and the Monarca Group, a minority- and women-owned community-based organization, our research team explored the relationship between community and commercial buildings to develop methodologies for identifying and prioritizing buildings within BPS frameworks. Aurora, the third-largest metro in Colorado with a diverse population, serves as the pilot location. Although Aurora does not have a BPS enacted, it was chosen due to its demographic diversity, economic challenges, and the State of Colorado's enacted BPS. The methods and findings from this research can be applied to other jurisdictions with or without BPS policies as well.

This paper starts with background information, describes the methodology used for a stock analysis, and details the community engagement process. It then discusses the results of both the stock analysis and the engagement analysis. The paper concludes with recommendations for implementing equitable BPS policies and suggestions for further research.

Background

This research seeks to address equity considerations for Building Performance Standards. In this paper, the term "disadvantaged community" will be used to maintain alignment with governmental initiatives; however, we acknowledge that this term may carry a negative connotation for some, failing to encompass all communities in need (Haaland et al., 2022). Alternative terms such as "underrepresented," "overburdened," "structurally disenfranchised," or "equity priority" might better capture the nature of these communities. Ultimately, the adoption of any such definitions should be thoroughly vetted by the communities and Tribes themselves to ensure they accurately reflect their lived experiences and needs.

As we introduce equity considerations in the commercial building sector, it is imperative

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

to ensure that the terminology which identifies specific sections of the market are understood. Commercial buildings located in White House-defined census tracts will be referred to as DACs or non-DACs depending on whether they are within CEJST DACs or not. The Justice40 Initiative, established by President Biden's Executive Order 14008, mandates that 40% of the benefits of federal investments in climate and clean energy be directed to DACs. DAC status is thus used as a prioritization definition. Criteria and associated indicators are published for each U.S. census tract in CEJST by the White House (Council on Environmental Quality 2022).

Additionally, commercial buildings characterized based on factors such as experience, marketability, perception, and performance through the CoStar Star rating system is used as a proxy for building condition. This is a one-to-five-Star value used to describe the quality of a property based on: architectural design, structure/systems, amenities/management, site/landscaping/exterior spaces, and certifications (CoStar 2024). Although this is a new application of the Star rating in the commercial buildings space and requires further research, it provides a starting point for identifying commercial buildings for prioritization.

Methodology

Our research approach combined extensive community engagement with comprehensive data analysis to ensure equitable implementation of Building Performance Standards (BPS). By employing CBPR methods, we actively involved local communities, ensuring their perspectives and needs were integral to our study. Additionally, we conducted a detailed building stock analysis using advanced real estate data tools to identify buildings that would benefit most from BPS policies. This multi-faceted methodology enabled us to develop robust equity prioritization strategies and gather valuable community feedback.

Aurora Stock Analysis Methods

To better understand the commercial building stock and equity considerations of commercial buildings in Aurora, the research team analyzed commercial building real estate data. The main data sources for the commercial building analysis are CEJST and CoStar. CEJST DAC or non-DAC census tract status are used as a baseline for equity prioritization since this is a free tool to support the White House's initiative to direct funding to DACs. CoStar commercial building characteristics such as property type and tenant industry are used to analyze the commercial buildings in Aurora, and the CoStar's Star rating is used to understand the distribution of building quality. The rest of this section will review the tools and data used to perform a comprehensive stock analysis, including methods for a geospatial analysis of commercial properties, and the building segmentations used to compare commercial properties across the Aurora market.

In order to visualize Aurora properties, city limit information from City of Aurora Open Data Portal is used to bound other datasets. The team then analyzes the distributions of buildings from CoStar Star ratings across CEJST DAC and non-DAC census tracts. The geospatial analysis is used to identify key areas in Aurora for outreach and engagement.

A comprehensive stock analysis was performed to investigate the property type and tenant industry type of properties across building segments. The stock is segmented by Star rating distribution, CEJST DAC, and non-DAC status. The first segmentation that is performed on the commercial buildings in Aurora is by CoStar Star rating. The second segmentation of properties in Aurora is by CEJST DAC or non-DAC census tract status. Assuming jurisdictions

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

will first use free tools to enable equity prioritization, CEJST DAC status is used as a baseline for identifying properties who need additional BPS compliance support.

The commercial properties in Aurora are segmented into these three categories and each of these segments are analyzed by property type, tenant industry type, and lease type from CoStar. The key findings from the analysis suggest outreach and engagement strategies generally, and a replicable process for other jurisdictions. In the following section we will discuss the CBPR and outreach methods.

Community-Based Participatory Research Methods

Community-Based Participatory Research (CBPR) methodology supports public education of energy policy through the research process and includes community needs and perspectives to guide research to provide relevant outcomes. CBPR methodology can be used in the policy making process as well to increase public knowledge about policy development and build trust between the communities and institutions. The Aurora community and organizations were not only informing the research process but directly engaged with shaping research questions, developing CBPR instruments (i.e., surveys, outreach methods), and reflecting on lessons learned for replication. This section will review the methods and descriptions in Tables 1 and 2 describing outreach activities and materials, and engagement methods.

Monarca Group, a minority and women-owned company, began outreach by mapping the stakeholder landscape in Aurora. This process included 1) identifying prominent stakeholders like community leaders, government agencies, and nonprofits organizations, 2) assessing community assets and needs, and 3) investigating upcoming community events representing demographic groups in Aurora. Monarca Group identified prominent leaders for collaboration through consistent presence in the community like attendance at local community breakfasts in Aurora where informal conversations about community needs were discussed. These events would lead to ongoing relationships with individuals who have deep understanding of the Aurora community who provided insights on important events to attend or language needs in specific neighborhoods. The relationships with local leaders increased attendance and volunteers for upcoming events and interest in research outcomes. The stakeholder mapping phase is ongoing but was a focus at the onset of the project for two to three months prior to focused engagement. These efforts provided an important foundation for understanding characteristics of the Aurora community and connecting with key stakeholders.

The main communication methods used during the pilot project relied on a variety of formal and informal communication channels including in-person engagement, live virtual engagement, printed materials, presentations, surveys, text and WhatsApp messages, social media, emails, and phone calls. Monarca Group strategically selected events and activities in coordination with local community leaders for in-person engagement, including tabling at events, door-to-door outreach, and attendance at community meetings. Table 1 reviews the materials needed at each of the activity categories. Monarca Group coordinated with local community organizations or community members to recruit volunteers who were interested in this research as well. Volunteers were briefed on the pilot project and provided feedback on research processes or instruments. Throughout the research project community members volunteered for door-to-door outreach, tabling at public events, public event attendance and pilot project and energy efficiency information were provided in addition to relevant human service resources for DAC communities.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Table 1. Outreach activity and materials

Outreach activity category	Materials needed
Door-to-door outreach	Wi-Fi hotspots, tablets and chargers, printed materials, camera and photo release forms
Tabling at public events	Wi-Fi hotspots, tablets and chargers, map of commercial properties in Aurora with display stand, company banner, partner/utilities swag items, compensation, box of writing and crafts materials, multilingual printed materials, survey QR codes, trash and recycling bins, tent, chairs, tables, tablecloth, camera and photo release forms
Public event attendance (no tabling)	Wi-Fi hotspot, tablets and charger, gift cards, printed materials in different languages, survey QR codes and link, camera and photo release forms
Project information at public events	Displays, flyers and multilingual surveys about the project
Energy efficiency items at public events	Bring cost-effective energy-saving items that business owners/community member can implement themselves (e.g., LED lights, smart strips)

The main CBPR methods used during the pilot in Auroa were interviews, focus groups, relationship building, volunteer training, and surveys. The research team created three separate surveys to solicit feedback from building user groups: 1) community members, 2) business owners, and 3) property owners. Each survey contained questions to identify community prioritized buildings, and questions related to community preferences for building upgrades, prioritized engagement methods for energy programming, energy burden-related questions pertaining to commercial buildings, and more. The interviews and focus group responses informed how surveys were updated prior to official deployment of the research for project outcomes. Additionally, each of the surveys were translated into seven languages and each survey participant, volunteer, or partner organization compensated for their participation. Flyers for outreach of events were translated into the same languages as the surveys and at tabling events the research team showcased resources from various programs and funding opportunities that might be of interest to the community. Table 2 provides an overview of the CBPR, communication, and community mapping methods employed by the research team.

Table 2. Engagement methods and description

Method name	Description of method
CBPR methods	Surveys, 1-1 interviews, focus groups, relationship buildings, training of volunteers, volunteer-led canvassing, tabling, community meetings

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Communication methods	In-person engagement, live virtual engagement, multilingual printed materials, presentations, text, WhatsApp, social media, emails, phone calls
Community mapping methods	Identify prominent stakeholders, assessing community needs and assets, investigating upcoming community events which are representative of Aurora, determining relevant language needs

CBPR methods ensure research outcomes rooted in the lived experiences of communities. However, BPS implementors can also utilize these methods to co-create solutions related to the equitable implementation of BPS, especially to avoid or mitigate unintended consequences such as increased energy bills or displacement. Similarly, the stakeholder mapping and communication methods discussed can be included in BPS policy planning to ensure that diverse audiences are included in stakeholder engagement as well. In the next sections we review the comprehensive stock and engagement outcomes as well as lessons for the equitable implementation of BPS.

Stock Analysis and Discussion

Building Stock Analysis and Discussion

The following section reviews the main takeaways of a stock analysis of commercial buildings in Aurora, Colorado and how stock analyses can support the equitable implementation of BPS. The analysis investigates property type, tenant industry type, and lease type across commercial building segmentations. The three building segments analyzed are commercial building Star ratings, CEJST DAC, and non-DAC commercial properties. This section will begin by overviewing information about the entire commercial building stock in Aurora, and then review property type and tenant industry type in DAC and non-DAC communities. To test the efficacy of using CEJST for equity prioritization we compare the distribution of Star rating. CoStar Star rating is used to determine which of the poorest condition buildings are and are not included in CEJST equity prioritization. We will review the lowest Star rated buildings across the Aurora market to determine if similar building level characteristics to DAC properties are found. This section will review key findings related to methods for equitable engagement strategies for BPS and areas for future research.

Of the 2,879 unique Aurora commercial properties found on CoStar's platform, 53% of commercial buildings (1,527 properties) are in CEJST DAC census tracts. Strip malls, warehouses, and offices were the primary, secondary, and tertiary property type across the Aurora market. These are also the three most common property types which must comply with Colorado's BPS; however, warehouses are the most prominent commercial building property type which must comply followed by offices and then strip malls.

Of the 6,218 total tenants in CoStar's database for Aurora, 41.9% of tenants are in buildings in DACs and 58.1% are not in DACs. Retailer, services, and healthcare and social assistance were the highest tenant industry types across all commercial properties in Aurora. Of CoStar's 22 different tenant industry types, the top 5 industries for tenants in Aurora's CEJST DACs were: rental and leasing services, manufacturing, transportation and warehousing,

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

wholesaler, and construction. The next section identifies future research areas identified through the stock overviews and some of the key findings to identify buildings for prioritization.

This research also identified lease types as a key area for future research. In Aurora 68.2% leases are triple net leases, and 51.8% of all Aurora's triple net leases are in CEJST DACs in 2- and 3- Star rated buildings. In addition to rent, variable costs such as utilities, insurance, and maintenance are often a tenant's responsibility in triple net leases. Although it is out of the scope of this paper to investigate the relationship of lease type to buildings and BPS policies, additional research in this area is needed to understand how the cost of compliance can be passed onto business owners and tenants through lease types and explore the burden of variable costs in triple net leases on DAC business and property owners.

One of the key findings of the Aurora stock analysis for equity-focused prioritization are the prevalence of strip malls and warehouses and the difference in building condition between these property types in DAC versus non-DAC census tracts. Although strip malls and warehouses are two of the most common property types in CEJST DACs and non-DACS, the condition of the strip malls in DACs are worse. In CEJST DACs, nearly 90% of strip malls and warehouses received either a 2-Star rating or a 3-Star rating. However, the Star rating of strip malls and warehouses in non-DACs have a higher Star rating overall. Thus, BPS targets set by property type should be cautious of the potential difference in cost and burden of compliance in strip malls and warehouses in DACs given the same property type across DAC and non-DAC vary greatly in building condition. The tenant industry type in strip malls between DACs and non-DACs also vary. Strip malls in Aurora's CEJST DAC buildings have more retailer, services, finance, insurance, and manufacturing industries but less accommodation and food services, health care and social assistance, educational services, and recreation and entertainment industries. BPS implementors could thus prioritize the industry type within strip malls in DACs for additional equity focused outreach and programming. The difference in quality of properties between DAC and non-DAC indicate that building condition within the same property type can differ greatly, and that although the tenant industry type in DACs and non-DACs in the entire Aurora market are the same, the tenant industry types between strip malls in poor condition buildings versus strip malls in higher condition buildings vary. In the following section we will build on these findings by analyzing the spatial distribution of the commercial buildings in Aurora and discuss key engagement findings.

Table 3. Overview of Aurora, Colorado buildings

Building information	All commercial buildings	DAC buildings	Non-DAC buildings	1-Star and 2-Star rated buildings	4-Star and 5-Star rated buildings
Number of properties	2,879	1,527	1,352	1317	30
Top three most common property types	Strip Mall, Office, Warehouse	Strip Mall, Office, Warehouse	Strip Mall, Office, Warehouse	Strip Mall, Office, Warehouse	Strip Mall, Office, Warehouse

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Top three most common tenant industry types	Retailer, Services, Health Care and Social Assistance	Retailer, Services, Health Care and Social Assistance	Retailer, Services, Health Care and Social Assistance	Services, Retailer, Health Care and Social Assistance	Retailer, Accommodation and Food Services, Manufacturing

Stock Analysis: Geospatial Stock Analysis of Commercial Buildings

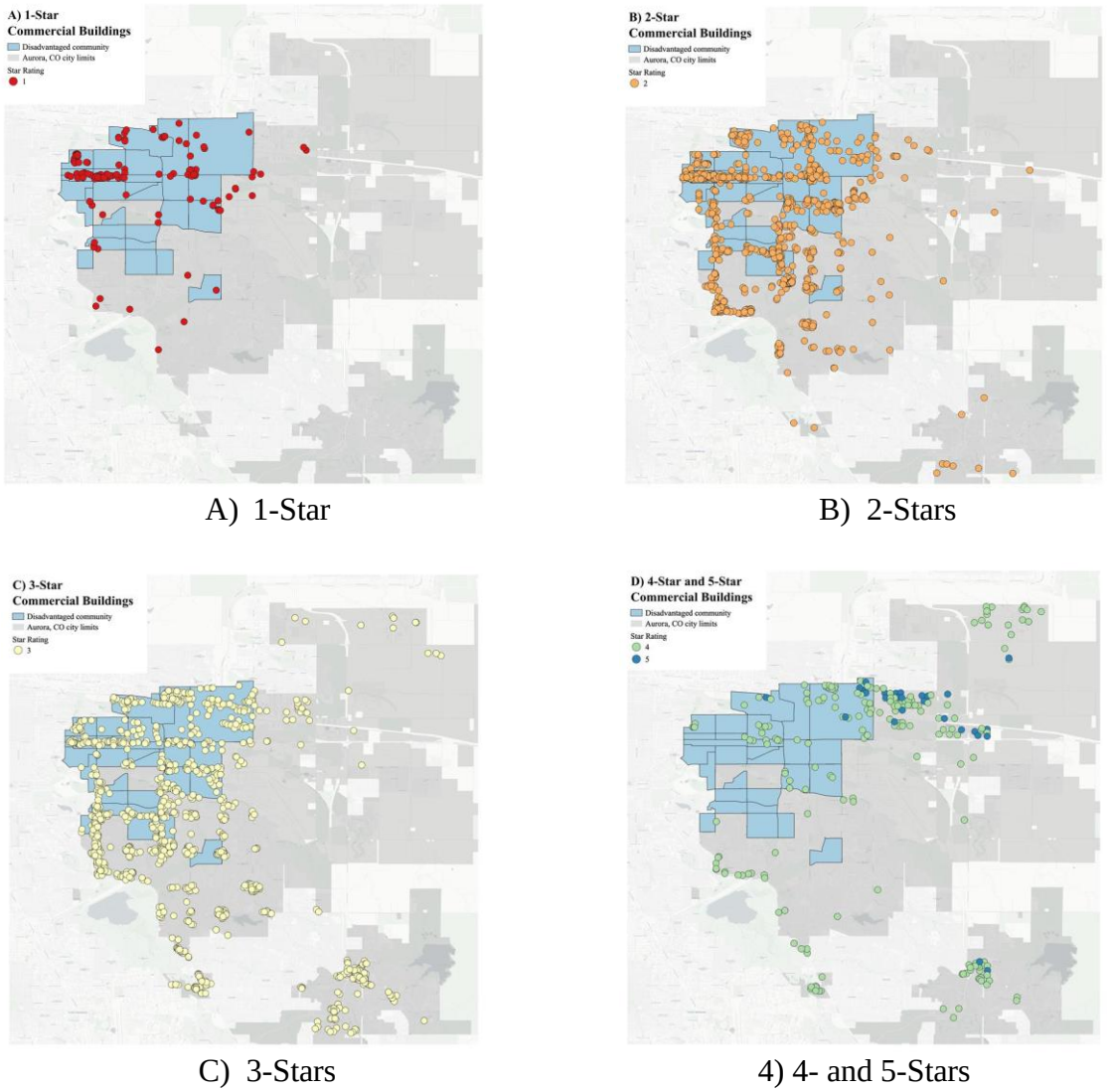
The following geospatial analysis maps all the commercial buildings in Aurora by CoStar Star rating and CEJST DAC status. Figure 1 visualizes DAC census tracts and Star rating distributions in Aurora to inform engagement strategies for the equitable implementation of BPS. The maps informed zones for prioritized outreach and engagement in the pilot, but also illuminate buildings outside of DACs which may need additional BPS compliance support. In the following sections we will review how the findings of the geospatial analysis from Star ratings and DACs were leveraged in the pilot, and how this methodology can inform equitable engagement and implementation strategies for BPS. Additionally, this analysis demonstrates how building condition and Star rating can be used alongside federal CEJST DAC status to support equity prioritization, especially to identify specific buildings outside of DACs which may need additional support.

The majority of Aurora's lowest ranked properties are in CEJST DACs while the highest ranked properties are in non-DAC CEJST communities. The areas with a concentration of low and middle ranked properties (e.g., 2- or 3-Stars) were often along key roads and business centers such as E Colfax, S Parker, and E Mississippi. During the pilot, Monarca Group organized tabling and outreach events associated with economic development centers of these business corridors and volunteers canvassed business corridors. In BPS policy outreach, engagement with economic development organizations along important business corridors to engage with building owners and tenants. Similar to engagement for the pilot, jurisdictions could host focus groups with key organizations and personnel at these locations and discuss equitable implementation strategies for BPS such as how to mitigate potential pass down costs from building to business owners or preferred outreach strategies for a Help Desk or BPS building owner technical assistance.

Although it is important to understand where the poorest condition properties are located for outreach and engagement, it is also valuable to understand where the highest quality buildings are located. Most of the higher Star rated buildings (e.g., 4-Star and 5-Star) are in non-DAC census tracts. This indicates that using CEJST DAC status as prioritization criteria for BPS policies would not capture many high rated properties. However, the geospatial analysis also illuminates that 32% of 1- and 2- Star rated commercial buildings are not in DAC census tracts. The 1- and 2-Star buildings outside of DACs have the same top three building type as all building segments analyzed; however, the most prominent industry type of tenants in 1- and 2-rated properties outside of DACs are retail, services, and health care and social assistance. Therefore, to supplement the CEJST DAC prioritization method, we would also need to perform tailored outreach to retail, services, and healthcare and social assistance businesses especially those located in older offices, strip malls, or warehouse properties to ensure the 1- and 2- Star rated properties outside of DACs are also receiving BPS compliance support.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Although the majority of the lowest Star rated buildings were located in DAC census tracts 32% of 1- and 2- Star rated buildings are not. In order to engage with these properties additional data from CoStar is used to characterize property type and tenant industries for engagement. In order to reach commercial buildings outside of DACs Aurora outreach in offices, strip malls, and warehouses associated with retail, services, health care and social assistance tenant industries could be prioritized. Additionally, the geospatial analysis highlighted key business corridors to inform pilot project outreach strategies, and the same methodology can be used to inform outreach and engagement strategies for the BPS. In the next section we will review the key findings and areas for future research.



A) 1-Star

B) 2-Stars

C) 3-Stars

4) 4- and 5-Stars

Figure 1. Distribution of Aurora's CoStar commercial building stock properties ranked A) 1-Star, B) 2-Stars, C) 3-Stars, D) 4-and 5- Stars. Disadvantaged communities shown with light blue shading.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Community-Based Participatory Research and Engagement Discussion

Surveys and interactive tabling votes were used to create a list of community-prioritized businesses, building types, and tenant industry types. Our research team engaged with over 1,000 individuals through community events, local meetings, surveys, canvassing, phone calls, volunteers, and in-depth interviews through the Aurora pilot project. Survey responses included 15 property owners, 90 business owners, and 146 community members and the research team conducted 3 in-depth interviews, and one focus group. The survey analysis finds that the primary community-prioritized buildings in Aurora are strip malls and office buildings which comprised of 69.1% and 27.9% of the prioritized buildings property type. The survey found that 61% of community member survey respondents said that energy investments in these buildings would directly benefit them.

Looking at the industry types of these tenants, the five most common tenant industry types included retailer, accommodation and food services, services, professional, scientific, and technical services, and educational services as categorized by CoStar, with retailer being the most common at 41.6%. The CPCB narrows in on specific commercial buildings which may be providing community or cultural services even if the businesses operating in the commercial building are not human service providers. For example, one of the CPCB's identified was a property which did not technically have any human service providers or non-profits but hosted a variety of inclusive and culturally significant events and services which led community members to identify this building as a CPCB.

An important outcome which came from characterizing the CPCBs is a new framework for commercial buildings – commercial building community services (CBCS). Figure 2 reviews the types of community services which commercial buildings can provide the community whether the businesses are directly providing these services or not.

Figure 2. List and description of commercial building community services (CBCS) which describe types of services that community members may receive from visiting commercial buildings.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

The CBPR and engagement outcomes from the pilot in Aurora, CO range from tangible to intangible. Tangible outcomes include CBCS framework, survey analysis, qualitative review of interviews, results from mixed methods tabling questions. The community-prioritized commercial buildings are clear outcomes for Aurora and State of Colorado to utilize in energy programming. CPCBs and the CBCS framework could be integrated into equity prioritization criteria. Analysis of the surveys also provides community-level information regarding policy outreach and education as well as barriers and opportunities for engagement. Intangible outcomes of this pilot are related to increased trust in relations, benefits from payments of engagement, public education and outreach related to energy initiatives, and lasting relationships.

Community members, business owners, and building owners each took unique surveys with questions tailored to their building user type. All three surveys also asked questions related to 1) how people define community, 2) what specific buildings they prioritize, 3) perceptions about building energy investments and 4) preferred channels of communication for energy programming and resources. Surveys results indicate that all three survey groups agree communities are defined by geographic proximity and dispersed peoples. This supports the use of CoStar Star distribution and CPCBs as criteria for identifying geographically dispersed buildings for inclusion in community-based prioritization methods because they support prioritization beyond geographic proximity. In the following sections we will review the outcomes from surveys from each building user group and outline findings related to the equitable implementation of BPS.

Community member surveys focused on the relationship between the community and the services commercial buildings provide. Surveys asked what buildings and businesses are visited most often, significance about buildings or businesses, where cooling shelters are located, impact on community members during building renovations, and more. Community members prioritized AC, heating, and windows as the top three building upgrades they find most beneficial in their community. Additionally, 62% of community members survey respondents said that they have to leave their house to cool off, and that pools and parks were the most common places they go. However, community members would also cool off at libraries, local businesses, or malls. Given the pilot project in Aurora was not initially gathering information about the services that commercial buildings provide, other questions about extreme cold events were not asked. However, Figure 2 was created based on information from survey questions, interviews, and outreach feedback about the ways commercial buildings support people.

The business owner survey included similar questions, but also asked business owners about split incentives for building upgrades, lease types, services their businesses provide to community, priorities for energy and building upgrade, utility costs, building upgrades barriers and opportunities. Some of the key findings are that 24% of business owners said they would consider moving business if rent increased and 32% of business owners said they do have concerns about the current livability or safety of the building they operate in. Half of business owners worry about whether they have enough money to afford energy bills and similarly, 50% of respondents said they keep their business at an uncomfortable temperature to afford energy. Business owners also said they provide community programs, specialty products, and discounts for locals to support the community. Business owners said that social media, community leaders, websites, and people who physically visit their business are the most valuable ways to get information about incentives, services, and energy assistance programs. Additionally small

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

business grants were the most beneficial financial assistance, over utility or city incentive programs.

The property owner and business owner survey included more specific questions to see if survey participants knew about benchmarking or building performance standards policies. The property owner survey also asked building owners about the burden of complying with BPS targets, opportunities and barriers for energy and building upgrades, and decision-making variables for upgrades. 50% of building owners said they have received an energy audit, and 100% of those respondents said they got an energy audit due to the BPS ordinance. Other, private loan, and operating expenses were the most common ways that building owners said they were planning to pay for building upgrades for Colorado's BPS. The top concerns and barriers to making energy efficiency upgrades from building owners during outreach and in surveys were difficulty in access to project financing, unaware of environmental benefits of energy efficiency upgrades, difficulties in navigating the financing process. Property owner survey participants also said that most valuable support the city or state could provide in reducing carbon emissions in their buildings were: 1) assistance in reporting energy data, 2) free energy assessments, 3) tenant outreach and education, and 4) assistance in developing action plan for retrofit, including lifecycle cost analyses. Additionally building owner respondents rated the following as the best ways to receive information about building and energy policies: 1) community gathering centers and events, 2) text messages from trusted sources, social medica, and newsletters by email.

During CBPR outreach in Aurora, research participants identified 69 CPCBs. These CPCBs were primarily in retail, healthcare and social assistance, and accommodations and food services industry types. Retail, healthcare and social assistance, and accommodations and food services are also the most prevalent industry type in 1- and 2- Star rated properties. Similar to findings in stock analysis, this demonstrates that tenant industry type can be used as criteria for inclusion into an equity prioritization methodology. Survey participants identified that the most valuable way to get energy related information was through community-based organizations or a trusted personal contact. Therefore, it may prove valuable for jurisdictions to consider community-prioritized industries for outreach and dissemination of resources for BPS compliance or other related programs such as utility incentives.

In BPS policy programming it can be difficult to engage with communities who are indirectly affected (not responsible for upgrading building, will not be fined personally) by a BPS policy. The proposed outreach methods detangle BPS-specific outreach into community-focused out engagement methods which can inform outreach methodology, prioritized building upgrades and financing mechanisms, and equity portfolio prioritization specific to BPS, but also more broadly for equitable policy development. numerous BPS-related inquiries and bring indirectly affected community members into the policy making process.

CBPR methods ensure research outcomes rooted in the lived experiences of communities. However, BPS implementors can also utilize these methods to co-create solutions related to the equitable implementation of BPS, especially to avoid or mitigate unintended consequences such as increased energy bills or displacement. Similarly, the stakeholder mapping and communication methods discussed can be included in BPS policy planning to ensure that diverse audiences are included in stakeholder engagement as well. The communication strategies implemented in the pilot project were informed by direct engagement with community organizations and individuals, and thus may also support robust engagement with diverse stakeholders during BPS outreach and engagement. In the next sections we will discuss some of

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

the findings of the comprehensive stock analysis and CBPR engagement methods.

Conclusion

Our research team, comprised of NREL researchers, the Monarca Group, and the Aurora community collaborated to investigate the equitable implementation of BPS through a combination of community engagement and comprehensive building data analyses. We employed CBPR practices to include communities in the process of research which improves the efficacy and applicability of findings and builds trust in the process. Collaborating with the Aurora community informed focus of outcomes and outreach strategies to equitably engage with communities. For example, Aurora community members identified relevant language needs in key neighborhoods, events services needed during outreach, and appropriate outreach strategies.

The stock analysis provided key insights from the pilot in Aurora which are applicable in the context of equitable engagement for BPS. Although the majority of properties of the poorest conditions were located within CEJST DACs, about 32% of the middle and lower Star rated properties in Aurora would be left out if a jurisdiction only used CEJST DAC status for equity prioritization. After analyzing the lower Star rated buildings outside of DACs, we find that major roads with business centers and retail, services, and healthcare and social assistance businesses in older offices, strip malls, or warehouse properties should be prioritized for outreach and engagement. The pilot project identified key methodologies for engagement in these regions such as engaging with economic development business centers, attendance at local events, and canvassing based on density of equity-prioritized buildings. The proposed methodologies identify regions, specific commercial buildings, and outreach strategies to inform the community-informed engagements.

Through CBPR methods the research team identified 69 CPCBs in Aurora. The tenant industry type of most CPCBs in Aurora were retail, healthcare and social assistance, and accommodations and food services and were most commonly located in DACs. These findings suggest targeted outreach to these industries in Aurora would support performed for BPS compliance and financing support would be valuable for equitable impacts. The research methodologies and instruments created in Aurora will be updated based on lessons learned to ensure scalability and applicability of this methodology in other US jurisdictions. Some of the key findings in the CBPR research indicate that characterizing commercial buildings also by the community services they provide is a meaningful way to understand the relationship between communities and commercial buildings. The services provided by building owners or business owners in a commercial building may or may not be related to the actual business operating within the buildings. For example, a local food hall may also provide culturally significant business support services to other small businesses. Findings from the Aurora surveys will not characterize commercial properties by CBCS because this model of understanding commercial buildings was developed through this pilot. However, the research team will update surveys and outreach methodology to includes these concepts and present findings back to Aurora community.

Industry type, and lease type were common characteristics of buildings in CEJST DACs and Star ratings. This suggests that the State of Colorado and City of Aurora could perform targeted outreach based on these building characteristics to ensure equitable outreach and implementation of BPS. 1) Retail, healthcare and social assistance, and accommodations and food services industry types, and 2) triple net leases could be used in conjunction with federal

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

DAC status to identify the properties which are most in need of additional resources for BPS compliance. Additionally, the pilot findings suggest that further characterization of the lessee to property owner relationship is needed. For example, although triple net leases are most common in DAC and medium to lower Star rated buildings, it is unclear if the building tenant is the lessee or if other market actors are leasing the property and renting to building tenants. This relationship is important to characterize so jurisdictions can understand how costs of compliance or non-compliance are passed through to tenants.

Commercial real estate equity analyses were guided by community perspectives to produce replicable outcomes that identify community-prioritized buildings and the commercial building community services that defined the value of these buildings to the Aurora community. By identifying and evaluating community-prioritized buildings, Star rating, and CEJST-defined disadvantaged commercial buildings we have provided numerous critical findings that the State of Colorado, City of Aurora, or other local agencies and organizations can utilize for prioritization criteria. These findings are broadly applicable beyond BPS and can be harnessed for equitable implementation of other community programming as well. Based on lessons learned in Aurora, the research team will update surveys and outreach strategies to replicate this pilot in the City of Atlanta in 2024. The Atlanta project will provide an opportunity to compare findings and methodologies, assessing their scalability and adaptability to different urban contexts. This replication aims to refine the approach further, ensuring it addresses the unique needs and challenges of Atlanta's communities while providing a model that other cities can follow for equitable BPS implementation in commercial buildings.

Acknowledgements

Our research team is deeply appreciative for the active participation of the Aurora community in this research and dedicate our findings to the communities which we serve.

This work was authored in part by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided in part by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Building Technologies Office. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government.

References

Clarke, A., Deru, M., Lockhart, E., Beshilas, L., Paranjothi, G., Wiltse, N., Belding, S., Jackson, R., Radhakrishnan, N., Egea-Casalduc, M., Grimes, K., & Engelman, B. (2023). Centering Energy and Environmental Justice in the Buildings Energy Sector. www.nrel.gov/publications.

CoStar Group. “Defining Lease Management – CoStar Real Estate Manager.” Costarmanager.com, costarmanage.com/lease-management#:~:text=Lease%20portfolio%20managment%20%E2%80%93%20also%20thought.Accessed 29 Feb. 2024.

Council on Environmental Quality. (2022). Climate and Economic Justice Screening Tool Dataset. https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings

Haaland, O., Ortiz, P., Brown, C., Lorenzo-Lee, M., & Cross, B. (2022). Disadvantaged Communities Nomenclature Within the State of California: Findings and Conclusions — A Recommendation Document.

Holkup, P. A., Tripp-Reimer, T., Salois, E. M., & Weinert, C. (2004). Community-based Participatory Research: An Approach to Intervention Research With a Native American Community. In ANS Adv Nurs Sci (Vol. 27, Issue 3).

Nadel, S., & Hinge, A. (2023). Mandatory Building Performance Standards: A Key Policy for Achieving Climate Goals. ACEEE Report, 1–102.

National Housing Trust. (2019). Recommendations for Implementing the District's Building Energy Performance Standard in Affordable Multifamily Housing.

Williams, S. (2017). Real Estate/Portfolio Strategist Naturally Occurring Affordable Housing CoStar Portfolio Strategy.

© 2024 ACEEE Summer Study on Energy Efficiency in Buildings