Building Performance Standard Module: Resiliency

Policy Brief

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Buildings are where we work, send our children to learn, and buy food to feed our families; the built environment touches on almost all aspects of our lives. However, when building policies are created in silos, the results are one-dimensional solutions that miss a critical opportunity to do smarter, more holistic thinking. The Social Priorities BPS Modules work began in 2020, as an effort to dive deeper into how building performance standard (BPS) policies could serve as a platform to regulate more than energy performance and carbon emissions, and include aligned social issues such as health, housing affordability, and resilience. The goal of the project is to come up with creative, impactful policy toolkits that allow jurisdictions—mainly cities, counties, and states—to add dimensions to a BPS that holistically address complex societal challenges

We are also actively looking to reshape the process by which policy is created, so that voices traditionally excluded from building conversations can be heard. Our team is working to help jurisdictions undertake deep community engagement processes when beginning the policy design process, so that the policy can incorporate solutions that address locally defined concerns and the policy itself is built by community-based practitioners. It's important to note that "community" is meant to encompass, in particular, people who have been traditionally excluded from decision making, such as people of color and residents of low-income and disinvested communities. Business stakeholders are also critical, but residents, especially those described above, have been too long excluded from real estate decisions that affect their health, their energy costs and job opportunities, and their ability to manage climate risks.

This project provides a starting point for dialogue between all community stakeholders, and an opportunity to both expand the definition of building performance policy and to be more inclusive in how we actualize it. The briefs are living documents that will be shaped, strengthened, and added to through our community engagement work. It is in this way that building performance can start to inspire a shift where we all define building performance in the broadest sense, recognizing the interconnectedness of the issues we face as a global community.

This topic, resiliency, is one of several BPS resources, and we will continue to publish additional Social Priorities BPS modules as we identify additional opportunities for building policies to simultaneous address community concerns. The full collection can be found at www.imt.org/bps.

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INTRODUCTION

Ambitious building performance standards—policies that set and enforce performance requirements for buildings—have the potential to generate massive energy and carbon savings critical to addressing the climate crisis. However, it is increasingly imperative that performance-based policy look beyond carbon and energy.

The summer of 2021 was the hottest on record in the United States,[1] and recently released data suggests the last seven years have been the hottest in recorded history.[2] The most recent IPCC Sixth Assessment Report finds that much of what has changed in our weather patterns already–including in the frequency of heat extremes, heavy participation in some areas, droughts in others, and the increase in tropical cyclones–is irreversible.[3] This means we must go beyond climate mitigation measures to ensure that robust adaptation approaches move forward in parallel, and that we particularly target solutions which will serve historically marginalized people and communities.

The focus on who policy solutions serve is important because the costs of our changing climate do not affect everyone equally. Extreme weather can be costly for governments, business owners, and residents. In 2019 alone, 14 climate disasters resulted in $1 billion or more in damages each, leaving affected communities struggling to recover.[4] These climate disasters are more likely to affect low-income communities of color[5], and are predicted to worsen existing vulnerabilities in marginalized communities[6] and populations such as persons with disabilities.[7] Studies have shown that predominantly white counties in the United States hit by natural disasters see an average wealth increase in the recovery stages after the event, while counties with a majority of non-white residents see a wealth decrease.[8] This further exacerbates recovery efforts for low-income communities of color, with lower levels of reinvestment following a disaster event further compounding the effects of inequity.[9]

> "In a study done by Rice University and the University of Pittsburgh, it was found that white counties saw an increase in average wealth after natural disasters while predominantly minority counties saw a wealth decrease. The study notes that white communities saw higher levels of reinvestment in their communities after natural disasters in comparison to their minority counterparts.

Source: Aneesh Patnaik et. al, "Racial Disparities and Climate Change," Princeton University

Building performance standards (BPS) can be designed to integrate requirements that improve both the climate-resilient performance of individual buildings and community resilience. This policy brief outlines how interested jurisdictions can integrate resilience into a BPS and start to build a more holistic, equitable policy.

Buildings play an essential role in climate and community resilience in four ways.

1. The occupants of durable, high-performing buildings are less affected by extreme temperature and weather events due to the building's ability to maintain safe indoor temperatures and conditions for longer periods.
2. High-performing buildings requires less energy and water to maintain survivable conditions, which lowers demand and decreases the risk of utility outages during disasters due to excess strain on the grid. Highly energy-efficient and electrified buildings play a vital role in resiliency because electrification and building energy management systems can enable grid-interactivity and backup power, such as virtual micro grids in the case of an extreme weather event. During the Texas winter storms in January 2021, an unreliable energy grid caused hundreds of thousands of people to lose power, while some of those who maintained power were hit with utility bills in the tens of thousands of dollars. In the aftermath, 246 residents lost their lives because of the blackouts.[10] Without a plan to mitigate these outcomes, extreme weather events will exacerbate existing inequities for years to come.[11] This reality cements the idea that resilience must be tied to both physical and social infrastructure of a community in order to ensure its well-being.
3. Certain buildings or spaces within larger buildings, with the right technology can be used as "resilience hubs" to provide heat, cooling, shelter or other services to community members if the power goes out, particularly in energy-burdened communities.
4. Buildings can serve as a space for education and awareness of community resilience strategies, and to strengthen social cohesion and build relationships among community members.

Policy Planning Considerations

While energy efficiency is a critical mitigation approach and, therefore, part of a climate resilience strategy in itself, BPS policy can be used as a platform to integrate additional mitigation and adaptation strategies which local residents from frontline communities identify as local priorities. Many resilient building upgrades are complementary to energy retrofits. Planning investments in tandem can result in construction efficiencies and cost savings. Further, jurisdictions can incentivize the building owners to make investments that improve community resilience in exchange for jurisdictions granting BPS compliance flexibility.

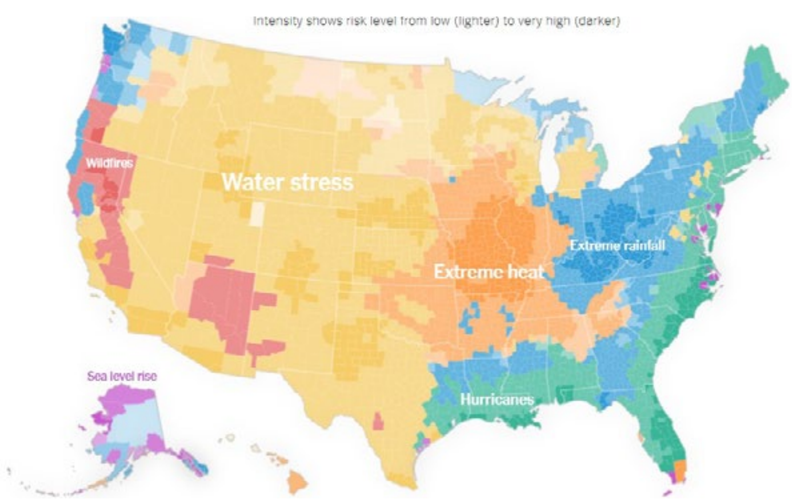
As with all potential policy components, deep stakeholder engagement, in particular with disinvested communities, should inform how and what measures are incentivized. The jurisdiction should undertake an analysis process, if it hasn't already, to determine the most appropriate resilience measure categories and what gaps exist in the current landscape of programs and services.

Risk Assessment

A critical first step in thinking through how to integrate resilience approaches into a BPS is to conduct a climate risk assessment. This assessment works to identify area-specific future climate hazards as well as their impacts on jurisdictions and communities. Assessment should identify the most frequent, severe and widespread hazards and those likely to cause the greatest impact. Jurisdictions can then identify where to prioritize climate action and adaptation.[12]

Climate threats and impacts vary by climate zone, state, region, and can even vary within the same city, so the role buildings play in resilience looks different for each community. For example, Phoenix may prioritize cool roofs as a means to reduce urban heat island effect while Chicago may prioritize storm water management in order to reduce flood risk. Approaches may even vary within the same city; storm surge management may be a focus for buildings located adjacent to a body of water, while flooding strategies may not be relevant to buildings further inland. Figure 1, below, illustrates the dominant climate risks by location in the U.S.

Climate Risk Map of the US from the New York Times, "Every Climate Has its Own Risk, What is it Where You Live?"[13]



Note: "water stress" reflects the change in drought-like conditions as well as water demand. The methodology does not consider distant water supply, so in countries where that may play a larger role, we have selected the second-highest climate risk. Risk levels reflect climate impacts from today to 2040. The "wildfire" label applies to counties where at least part of the region contains the highest risk rating in Four Twenty Seven's data. Other terms are assigned using the highest percentile scores among the remaining climate risks.

Source: Four Twenty Seven

Risk assessments focused on infrastructure can help jurisdictions identify which regions and buildings are most vulnerable to the effects of climate change as well as what their specific vulnerabilities are. Assessments can help policymakers develop plans to both mitigate these issues before disaster strikes and to prepare targeted resources and strategies for recovery. These assessments are most valuable if they look at both present and future climate risks. As climate change worsens, new and more significant risks may arise, and having a long-term plan may be necessary to adequately prepare.

Resilience approaches may need to vary depending on property type. Property types that are granted the option to pursue a resilience strategy through an alternative compliance path (described as Building Performance Action Plan process below), should be defined in line with the property typologies used to set the performance standards, to minimize confusion. The local community may deem it important to encourage hospitals to take actions towards having islandable power sources to provide electricity in case of power outages. Similarly, in areas with increased flood risks, buildings that provide critical supportive services should ensure that critical equipment is not in basements. Access to potable water during emergencies is particularly important in multifamily buildings, regardless of type of climate risk.

Risk assessments must also identify the risks and vulnerabilities that the communities' social infrastructure will face. Social vulnerability can be determined using age, race, income, gender, disability, language, literacy, and family status as indicators.[14] This approach allows jurisdictions to offer services and direct aid to community members who will be disproportionately impacted by disaster and are likely to have the fewest resources for recovery. Social risk assessments can be conducted through community-based approaches in data collection and participatory-action research where the community itself is involved in conducting the research.

While many jurisdictions may already have undertaken some level of climate risk and site analysis, governments should consider more targeted analysis frameworks that focus on a jurisdiction's existing building stock. For example, the City of Boston completed a resilience-focused study of its existing building stock in 2013, which identified 30 discrete recommendations including many related to energy-related systems.[15] Resources to conduct such social assessment will vary by jurisdictions, so leveraging existing resources such as the U.S. Census, Center for Disease Control, and the National Climate Assessment[16] can assist in that analysis.

RECOMMENDED RESOURCES

Recommended Resources: Climate Change Risk Assessment Guidance and Screening Template

This guide from C40 Cities provides jurisdictions instructions for launching and conducting climate change risk assessments.

Recommended Resources: Social Vulnerability Assessment Tools for Climate Change

This guide from the United Nations Development Programme provides tools and approaches for conducting social vulnerability assessments related to climate change risks.

Recommended Resources: Community Resilience Benchmarks

The Alliance for National and Community Resilience has developed a methodology for benchmarking the resilience of a community's building stock, as well as housing and water infrastructure.

Recommended Resources: Social Vulnerability Index

The Center for Disease Control's index of social vulnerability metrics helps identify communities that may need support, before, during, and after extreme events

Leveraging BPS for Resilient Community Priorities

Once resiliency risks and community priorities are understood, policymakers have several avenues for addressing these priorities in or alongside a building performance standard. The following section outlines four separate approaches that could be implemented separately or in tandem.

1. Using the Building Performance Action Plan to Push Building-Level Resilient Upgrades

One approach to incentivizing building owners to invest in resilience measures as part of a BPS is to utilize the alternative compliance process, named the Building Performance Action Plan (BPAP), in IMT's Model BPS Ordinance. The BPAP is a key feature of the IMT model that allows owners seeking additional flexibility to meet BPS requirements by proposing a customized compliance plan for their buildings. These compliance plans include proposed adjustments to the building's interim and final performance standards. Jurisdictions can also require that BPAPs include commitments from the owner to implement specific community priority actions.

In IMT's forthcoming BPS Implementation Guide will explore the functioning of the BPAP and its administration in more detail. IMT believes that the BPAP can serve many functions including as a mechanism to advance community priority actions. In IMT's model, jurisdictions can use BPAP to encourage owners to take actions that meet community needs in the near term, while working towards achieving BPS performance requirements in the longer term. Building owners wishing for their BPAP to be approved would first have to commit to performing designated community priority actions established by a Community Accountability Board (CAB) representative of environmental justice communities.

These community priority actions should be chosen by the community themselves, as represented by the CAB, and may include any number of local social priorities on public health, equity, housing affordability, sustainability, transit access, and climate resiliency. This should be an iterative dialogue, starting with owners proposing BPAPs that address certain community priorities and then the CAB responding with recommendations that the owner should take to further community priorities. In other cases, owners might ask to meet with the CAB to better understand community priorities and inform the owner's development of the BPAP proposal. Since each property and community is different, there should not be a set number of required actions. Each BPAP will need to address the unique circumstances of the building and the priorities of the community.

As this process is designed to be open-ended and community driven, there are a number of potential climate resiliency community priority actions that can be incorporated into the BPAP process. These community resilience priority actions should be customized to meet the local climate risks identified in the assessment process. The following section details a selection of potential resilience approaches that align well with a BPS.

Example Resilience Approaches for Buildings by Major Climate Risk

Wildfires: Implement a Smoke Readiness Plan

As wildfires increase in frequency and severity in certain geographies, especially in the West, commercial property owners and managers can take action to protect building occupants from breathing in harmful smoke byproducts, including particulate matter (PM 2.5). ASHRAE has developed a comprehensive planning tool, called Planning Framework for Protecting Commercial Building Occupants from Smoke During Wildfire Events. This tool outlines clear steps for buildings with central HVAC systems with air handling units and the tool is appropriate for commercial properties, multifamily buildings, and even schools. Building owners seeking compliance flexibility through the BPAP process could be required to develop a Smoke Readiness Plan and implement actions recommended in the plan.

The EPA has published a number of resources on wildfires and their impact on indoor air quality as well as strategies tailored to single-family homes.

Water stress: Conduct a Water Audit and Install Efficient Fixtures

Similar to energy efficiency, improving a building's water efficiency can help improve the quality and accessibility of water resources and ease the impacts of drought in those geographies at risk. Water audits allow property owners to understand how water is used in their building and identify opportunities to reduce usage and save money on water bills. Installing water-efficient fixtures is a low-cost opportunity that can make a big impact, especially in multifamily and commercial properties. The EPA's WaterSense program includes resources on water efficiency as well a product certification that property owners can look for when replacing fixtures. In water-stressed regions, property owners seeking compliance flexibility could be required to conduct a water audit in order to identify and then remediate leaks and install efficient fixtures, as they work towards meeting their BPS requirements. Note that the IMT Model BPS Ordinance also recommends including a water metric, discussed in more detail below, that would neutralize the importance of this type of approach in the BPAP.

Extreme Heat: Make Space Available for Public Cooling Centers

Prolonged exposure to extreme heat can cause illnesses like heat stroke, heat exhaustion, heat cramps, and sunburn, and it can result in heat-related death.[17] Geography and demographics both play a role in the risks related to extreme heat. Certain populations are more vulnerable because they are more affected by changes in temperature and/or lack access to adequate air conditioning. These populations include people without housing, elderly people, young children, people with chronic conditions, people who work outdoors, and low-income socioeconomic groups.[18] Cooling centers are places in a community where residents can cool down during hot weather, especially when they do not have access to air conditioning.[19] While ensuring that all residences can provide adequate cooling in a crisis should be a priority, public accessible cooling centers can be a critical backup. Cooling centers are facilities that are temporarily opened in events of extreme heat, and/or during power outages amid extreme heat to provide public information, charging stations, and power for medical equipment. To improve public health, policymakers can consider flexibility on BPS compliance for buildings that may be well-positioned to create cooling centers, such as publically accessible community centers and places of business.

Power Supply Strain: Support Grid Resilience

An increase in extreme heat puts strain on the electric grid as air conditioning use creates increased energy demand. Additionally, the combination of greater building and vehicle electrification with climate-change-induced polar vortex events means that electric grids are coming under increasing strain in the winter. Extreme heat and cold can cause power brownouts and blackouts as the local grid struggles to keep up, or requires that utility companies bring "peaker" power plants online to provide additional capacity. Peaker plants are typically less efficient, more carbon emissions intensive, and are disproportionately located in low-income neighborhoods, and they release harmful pollutants that are associated with negative health effects.[20]

To support grid resilience, property owners seeking compliance flexibility could be required to sign up for utility-run demand response programs including time-based rate programs and direct load control programs or participate in similar services from third-party providers. Demand response programs ask participants to reduce or shift electricity use during peak periods in exchange for reduced rates or other financial incentives. Demand response programs also contribute to grid resilience during extreme cold weather events.

Building owners can also support grid resilience by investing in Distributed Energy Resources like on-site solar and storage, independent to the building or part of a virtual microgrid.

IMT's Model BPS Ordinance recommends a suite of performance metrics including maximum coincident peak electric demand. The most direct way for a BPS to address grid reliability is to incentivize lower totals for peak demand; however, many jurisdictions lack the infrastructure needed to implement peak demand metrics or may choose different strategies to address grid reliability. In such cases, policymakers can leverage the BPAP process to encourage creation of on-site renewable and energy storage resources if building owners cannot meet the performance standards by the compliance cycle deadline. Building location, type, and size are important considerations. Many buildings are tall and have small roof areas, have roofs shaded by neighboring structures or vegetation, or require an unreasonable amount of on-site storage to support grid resilience.

BPS and the BPAP can also be used as a forward-looking tool to help create a feasible path for grid-interactive efficient buildings (GEB), which are buildings that have the ability to proactively communicate with the grid and adapt to changing conditions in real time.[21] One possible compliance path through a BPAP could be installing GEB-ready technology, equipment with communication technology that can be controlled by a smart BAS system.[22] The U.S. General Services Administration (GSA) is striving to achieve GEB in federal buildings, and recently provided guidance on integrating GEB technology into performance contracts; GSA may serve as a good model for how to achieve GEB through a BPAP.[23]

Hurricanes: Resilient Roofs

In hurricane-prone areas, a resilient roof may be the difference between displacement and recovery for community members. In addition, for businesses, it can be the difference between prolonged or short economic disruption. Well-constructed roofs can better withstand severe weather by keeping the roof on and keeping water out. Roof performance is a key determinant of how intensely disasters affect buildings, and they can contribute to passive survivability when the power goes out, allowing people to shelter in place. In particular, roof performance supports quick recovery after heavy winds and rain. To reduce damage to commercial structures and help businesses re-open more quickly following severe weather, the Insurance Institute for Business & Home Safety, a non-profit 501(C)3 organization, developed FORTIFIED Commercial™, a voluntary construction standard and designation/compliance program. Building owners seeking BPS compliance flexibility that may have roof maintenance work planned in the near-term, could be required to meet the FORTIFIED standard as part of their BPAP.

Sea Level Rise: Storm Surge Protections

As climate change progresses, sea level rise is becoming a larger risk for coastal jurisdictions.[24] With higher sea levels also comes increased flooding during king tides and storm surges.[25] Jurisdictions should engage in regional, neighborhood, and citywide resiliency planning for sea level rise and storm surge wherever possible, but individual buildings can also assist in those efforts. Many existing buildings were built for sea levels and weather conditions that are now rapidly changing. Existing building resiliency retrofits for flooding can include raising first floors wherever possible, installing pumps into basement facilities, moving critical building systems to high floors, installing exterior features and vegetation to resist erosion, wave action, and rising water, and deploying temporary barriers where needed.[26] Promoting resiliency and adaptation retrofits for existing buildings at risk for coastal flooding can be an important community benefit from the BPAP process.

For additional resilient building approaches, the RELi Rating System, launched in 2018, contains a thorough list, covering several more climate hazards, including hurricanes, hail, tornadoes, and winter storms in a requirement labeled Hazard Mitigation and Adaption 4.0.

RECOMMENDED RESOURCE

Boston Climate Resilient Design Guidelines

The City of Boston's guidelines for climate resilient design provide a number of best practices for coastal resilient buildings.

2. Community Accountability Board Resources to Support Community Level Resilience

The adoption of a BPS policy is more equitable when the communities affected by issues of climate risk and energy inequity are brought into the conversation as early as possible. Meaningful community engagement fosters co-creation and co-ownership of the policy design. Community leadership of the process is essential in the development of equitable BPS policy, allows for the priorities and needs of the community to be built into the policy, and ultimately fosters stronger and more sustainable solutions. Community engagement should inform research initiatives and risk assessments; the community can provide the lived experiences and perspectives needed to tell the full story and to protect and prepare all residents.

As described in **IMT's Model BPS Ordinance Summary**, the Community Advisory Board (CAB) is responsible for developing a plan to distribute assistance funds to disinvested communities, evaluating the ordinance's impacts on equity, and recommending actions to repair the legacy of disinvestment in low-income communities and communities of color. Depending on community-determined priorities, the CAB may choose to invest funds in broad projects that improve the resilience of the community rather than investing in individual buildings. The section below outlines some projects for CAB consideration that may improve community resilience.

Example Resilience Approaches

Resiliency Hub

Resilience hubs are an emerging concept, envisioned as community-serving facilities designed to support residents, coordinate communication in the event of an emergency, distribute resources, and reduce carbon pollution while enhancing quality of life.[27] The idea is for these hubs to operate at all times and provide needed community services, but to design and program them to operate in the event of climate emergencies. The hub could be housed in an existing community space but would likely require enhancement in order to ensure the site was operational in the event of a weather emergency, power outage, etc. Community leaders and the CAB should have the power to influence the location of and strategy for the hub. One option for funding such a hub is to invest revenue generated by BPS non-compliance fees to upgrade a building to serve as a resilience hub.

RECOMMENDED RESOURCE

Urban Sustainability Directors Network Resilience Hubs Resource Center

This USDN webpage contains essential resources for developing and implementing resiliency hubs.

MicroGrids

A microgrid is any system that has the ability to disconnect from and reconnect to the greater utility-scale grid while maintaining its ability to power local loads. This ability is called "islanding." Microgrids can scale from single systems within a building to campuses to entire neighborhoods.[28] The value of microgrids is that if the wider grid goes down during disasters, the microgrid can disconnect and continue to operate. Most microgrids use battery power to provide temporary power during the period of disconnection. Microgrids are most common for hospitals, military bases, data centers, campuses and are increasingly being deployed in government buildings, smart cities/ neighborhoods, and businesses

Deploying microgrids in underserved neighborhoods can be an opportunity for reparative justice, if those historically harmed by lack of access to affordable energy are able to assume ownership of the assets. A CAB could prioritize the development of a microgrid in an underserved neighborhood as a way to improve community resilience. One model for funding the project might be through the emerging field of virtual microgrids—where decentralized solar and batter storage are deployed throughout a community.

RECOMMENDED RESOURCE

Microgrids for Resiliency

This Voice of Experience white paper from the US Department of Energy captures insights and lessons from utilities implementing microgrids with resiliency in mind.

3. Looking Forward: Resilience Metrics to Watch

The **IMT Model BPS Ordinance** recommends a suite of metrics that allow jurisdictions to regulate building performance in multiple ways, leaving room to include additional metrics that speak to community priorities. Resilience is a broad topic that in itself would require the use of multiple metrics to capture performance even at the individual building scale. Jurisdictions should balance the need to measure and monitor resilience metrics with the reality that adding additional metrics in turn creates additional layers of complexity both for compliance and implementation, and may result in the need for additional resources to monitor compliance and support owners. Moreover, many of the metrics that speak to resilience are nascent in their current development—compliance methodologies may require specific training or the installation of technologies that could make BPS implementation overly burdensome, both to jurisdictions and to property owners.

As outlined above, different regions experience different mixes of climate risks. Jurisdictions interested in including resilience-related metrics in their BPS should select metrics that address dominant risks first. Building performance plays a critical role in community resilience and so merits urgent attention from jurisdictions.

The recommended BPS metrics below vary in their current readiness for adoption, but we predict that the metrics will be more widely adopted in the next decade. Jurisdictions should consider adding metrics to their BPS as methodologies develop and as the necessary measurement technologies become more widespread. When analyzing resiliency metrics, it is important to disaggregate data collected on criteria such as race and income to ensure a clearer picture on equitable outcomes for marginalized communities.

RECOMMENDED RESOURCE

Portfolio Protect | Enterprise Community Partners

The nonprofit Enterprise Community Partners developed this high level climate and flooding hazard risk scoring system for individual affordable housing property addresses.

Passive Survivability

As climate changes increases frequency and severity of weather events, more buildings and their occupants will be cut off from basic services like heating, cooling, and water, so it is important for buildings to protect occupants even in these conditions. Exposure to extreme indoor temperatures can lead to a host of health issues including hypothermia, hyperthermia, increased blood pressure leading to increased heart attacks, and heat stroke. To lower the risks of these outcomes, buildings should be designed for greater passive survivability, which the International Code Council defines as the ability for a building to remain habitable after the loss of energy, water, or sewer services.[29]

The U.S. Green Building Council's LEED rating system includes a pilot credit, titled Passive Survivability and Back-up Power during Disruptions, which could serve as a framework for how to incorporate a resilient building metric into a BPS. The LEED pilot credit details three metrics and associated modeling methodologies, to demonstrate that a building will maintain safe thermal conditions passively: psychrometry, standard effective temperature, and Passive House certification. If included in a BPS, these three metrics could provide an important market signal, as well as critical information for a jurisdiction to analyze in the aggregate regarding the resilience of its building stock in the face of power outages. The pilot credit also includes an option to provide backup power to critical loads, measured using a time-based metric in order to communicate how long back-up power can ensure thermal safety. Using this metric, jurisdictions could include in BPS requirements that critical buildings be able to provide sufficient backup power to serve critical loads for specified numbers of hours. Following the trajectory approach, BPS could require increasing time durations of backup power be met at the compliance intervals. Critical buildings subject to such requirements could include hospitals, long-term care facilities, and even residential properties.

Grid Flexibility Metrics

As smart metering becomes more widespread, jurisdictions should consider including metrics directly in the BPS to require demand flexibility and support electric grid reliability. IMT's Model Ordinance already creates a standard for a property's maximum coincident peak electric demand and a standard for a property's maximum coincident peak local electric demand. These metrics address the need for buildings to be able to shift peak loads in order to avoid brownouts, minimize or eliminate the use of polluting peaker plants, and contribute directly to a jurisdictions resilience in the face of increasing temperatures. However, because these metrics are reliant both on access to specific utility data and the presence of advanced building controls, jurisdictions should consider including these metrics in future compliance cycles and, in the short term, focus on the steps needed to be successful later. For instance, New York City's BPS enables the City to offer an optional time-of-use carbon metric as a compliance path starting in 2030 and requires that the City publish an investigatory report on the topic by 2023.[30]

In line with the BPS suite of resources, IMT also published a document titled Opportunities to Advance Demand Flexibility with Building Performance Standards, which includes additional metrics that could be considered to support demand flexibility. These metrics include demand response capability, peak demand, and time of use.

Water Efficiency

For jurisdictions experiencing water stress, including a water efficiency metric as part of the BPS is an important tool to act on the need to reduce water usage in buildings. Similar to energy utilization intensity, water use benchmarking analyzes a property's water use over an annual period, accounting for building type and size. To date, every state and local energy benchmarking ordinance and BPS policy uses EPA's ENERGY STAR Portfolio Manager Tool as the reporting platform. The platform also enables properties to track and submit water usage data. In fact, water use tracking is included in close to 30 benchmarking laws already on the books.[31]

IMT's forthcoming BPS Implementation Guide will include additional discussion around how to include water efficiency metrics in a BPS.

4. Complementary Policies to BPS

Building Codes

Broadly speaking, climate resilience touches and connects with almost all areas of public policy. Social policies support the ability of residents and communities to thrive both in everyday life as well as in the face of emergencies. IMT believes that BPS policy can be used as a platform to bring interconnected policy initiatives to the table to maximize community benefit and minimize compliance and administrative costs.

Jurisdictions should consider building code improvements in tandem with resilient BPS design. Building codes are jurisdictions' primary tool for regulating the design and construction of new buildings and renovation projects. If a jurisdiction is considering prioritizing resilient building strategies with a BPS, it is critical that building codes align with these requirements. New buildings will be required to meet BPS targets typically starting about a year after construction. So, integrating similar requirements into the building code will alleviate potential conflict and create efficiencies for project teams.

Building energy codes themselves plays a huge role in climate resilience. Simply put, efficient buildings put less strain on the grid; a critical attribute during extreme heat or cold events when energy systems may face significant stress. Strong energy codes can contribute to a building's passive survivability as described above, allowing buildings occupants to shelter in place for longer periods, thus reducing strain on limited community resources. There are multiple parts of the energy code that support passive survivability, including building enclosure provisions, pipe insulation requirements, and even daylighting.[32]

In some areas, codes discussions are starting to lay out specific requirements for new and renovated buildings to be resilient in the face of extreme weather.

RECOMMENDED RESOURCE

NYC Building Resiliency Task Force

In the wake of Superstorm Sandy, Unban Green Council released comprehensive guidelines for going above code-required minimums in order to enhance the ability of the building stock to withstand natural disasters. The report includes 33 detailed proposals broken up by building type and resilience goal (building upgrades, backup power, and occupant safety).

Zoning Codes

While climate resiliency can touch on all buildings in a jurisdiction, many climate risks are locally specific. Certain neighborhoods, census tracks, and even individual buildings, can be more susceptible to climate risks than others even within the same city or county. Sea level rise, coastal storm surges, heat island effects, and wildfires can affect certain parts of a jurisdiction more than others, requiring more calibrated approaches.

Zoning codes are the most direct tool for jurisdictions wishing to meet the different climate resiliency needs of different areas. Jurisdictions should consider zoning code updates in tandem with resilient BPS design. Because zoning codes are in fact many jurisdictions' chief tool in regulating the urban space and the relationship between buildings, infrastructure, and community layout, it is critical that zoning planning align with any BPS resilience requirements.

By creating zoning overlay districts with specific requirements related to differing climate risks, jurisdictions can help better cater their climate resiliency response to the respective needs of different areas. A zoning overlay district for a neighborhood more at risk of sea level rise and storm surges can require moving critical building systems to higher floors while a separate zoning overlay district for a neighborhood with severe heat island strain can require certain shading measures.

One type of measure that jurisdictions can require as part of zoning or other regulatory structure is a building site-level climate risk assessment. While community-level climate risks assessments are invaluable for jurisdictions in planning for resiliency, individual building-level climate risks can help to augment and improve community preparedness. Every property owner within a high-risk area should have a thorough understanding of the climate risks their property may be subject to, a list of measures they can take to prepare and defend against for those risks, and an emergency response plan for when those disasters may occur. Requiring building-level climate risk assessments through zoning can assist in creating a more resilient community overall.

RECOMMENDED RESOURCE

Boston's Coastal Resiliency Overlay District

Article 25A of the Boston Zoning Code establishes a Coastal Flood Resilience Overlay District which includes areas anticipated to be flooded with a 1% chance storm event in 2070 with 40-inches of sea level rise. Newly constructed or renovated buildings in the Overlay District must complete a resiliency review and demonstrate alignment with the City's coastal flood resilience design principles.

BPS Policy Implementation Considerations

Jurisdictions will have to invest significant resources in monitoring owners through the BPAP process to ensure compliance with above recommendations. Monitoring, enforcement, and compliance support infrastructure are key elements to the success of any policy, and this is doubly so for new types of requirements. Jurisdictions will need to develop data collection systems to work in parallel with energy and water benchmarking portals, such as ENERGY STAR Portfolio Manager. Jurisdictions that are considering expanding the purview of their performance standard must ensure they have adequate staff capacity, resources, and technical capabilities to implement these requirements successfully. To assure successful implementation jurisdictions will also need to ensure that the local workforce is trained and has capacity to support building owner compliance. One way to assure sufficient workforce is to provide sufficient time between policy adoption and improvement deadlines to enable service providers to staff up and train to meet the resulting demand. Jurisdictions should engage with technical services firms that specialize in the types of resilience measures identified locally to help owners to use locally-based contractors to make improvements required by BPS.

Summary Recommendations

A BPS can be an opportunity to address more than just energy and carbon reductions in existing buildings and geographically urgent resilience measures are a clear intersection point for jurisdictions to consider when designing regulatory approaches. By gathering data and input on local resilience priorities, leveraging alternative compliance pathways such as the proposed BPAP, and considering additional metrics or aligned policies, jurisdictions can utilize a BPS to have a greater impact on climate resiliency as well have a significant impact on decarbonization.

Summary Recommendations

- **Engage** with frontline communities and local environmental justice organizations to learn ways to best address their concerns and climate risks.
- **Perform** a comprehensive climate risk assessment of the jurisdiction to root understandings of climate risk in the local situation.
- **Incorporate** a BPAP alternative compliance structure in the BPS to allow for buildings to comply through implementing social priorities like resiliency strategies. Empower a Community Accountability Board made up of representatives of environmental justice communities to define appropriate social priorities on resiliency and other issues.
- **Look** to resilient social priorities that are tailored to the local climate risks including wildfires, water stress, extreme heat, power supply strain, hurricanes, and sea level rise.
- **Encourage** the deployment of community level resiliency approaches such as resiliency hubs and micro grids.
- **Design** the BPS to incentivize buildings deploying energy efficiency and onsite renewable retrofits that improve passive survivability and grid flexibility.
- If the jurisdiction is in water stressed climate zones, **incorporate** water performance standard metrics in the BPS.
- **Explore** other complementary policies to BPS to assist resiliency, including building codes and zoning codes.

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