

# Operationalizing climate justice in the implementation of Boston's Building Performance Standard

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## Abstract

Cities are moving to implement more just urban climate actions, but the politics and processes of operationalizing climate justice in practice remain understudied. Here, we examine the implementation of climate justice through Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO), a landmark Building Performance Standard reflecting a transformative shift towards carbon neutrality in cities. We utilize a rich mixed-methods research design rooted in five months of participant observation within the City of Boston's Environment Department, twenty expert interviews, and a systematic content analysis of hundreds of policy documents. We find that implementing BERDO entails political contestation over differing conceptions of resistance and power relations around climate justice. Justice becomes subject to scope and scale discrepancies, the processes of bureaucratization, and even weaponization. In documenting these tensions, we provide insights into the complex challenges that cities may face as they begin to operationalize climate justice on the ground.

Cities are now taking the lead in implementing just urban transitions – fair and equitable transitions toward low-carbon and resilient urban societies<sup>1,2</sup>. Given the global push towards urbanization into metropolitan areas<sup>3</sup>, and the devolution of some authority in climate decision-making to subnational actors, cities have been leaders in climate action for over two decades<sup>4–6</sup>. More recently, city governments are increasingly recognizing the connections between climate change and social justice, and making headway in the integration of justice and equity concerns into climate plans and implementation tools<sup>7–9</sup>. However, these actions have been met with questions about whether and how cities will take just climate action from planning into practice.

Scholars have repeatedly criticized the gaps between the rhetoric and reality of urban climate action<sup>10–13</sup>, which we define here as policies and programs to mitigate and adapt to climate change. However, existing literature has focused primarily on either analyzing the development of plans, policies, and targets, or evaluating the post-facto outcomes of cities' programs<sup>2,11,12,14–18</sup>. This collective scholarship has revealed multiple barriers to urban climate action, from funding constraints and limited capacities, to lack of political will and issues of authority<sup>16,19,20</sup>. These barriers result in, at best, insufficient greenhouse gas emissions reductions<sup>21</sup>, and at worst, the exacerbation of climate vulnerabilities and injustice in cities<sup>22–25</sup>.

Although cities purportedly continue to underdeliver on climate action and justice, the politics and dynamics of policy implementation – the process through which city governments translate goals and plans into operational and enforceable programs – remain understudied<sup>14,15,26</sup>. Rather than recognizing the complexities of operationalizing climate action, existing theory suggests that either unique “configurations” of enabling factors<sup>16</sup> or the mere removal of barriers should enable cities to successfully implement climate policies<sup>19,27</sup>. This thinking obscures the “politics and contested nature of low carbon urbanism”<sup>28</sup> and hinders the analysis of policy implementation through political and justice lenses<sup>15,27</sup>, with scholars ultimately failing to address how the “recognition of socially vulnerable groups either carries through or drops out of the policy implementation process”<sup>18</sup>.

Here, we examine the politics and processes through which city governments operationalize climate action and climate justice (see definition in Methods) through a case study of Boston's Building Performance Standard (BPS), one of the latest policy approaches in building decarbonization. Buildings are often one of the largest source of greenhouse gas emissions in urban areas<sup>29,30</sup>, accounting for about 37% of global energy-related carbon emissions and more than 34% of direct energy consumption<sup>31</sup>. Energy efficiency is one of the most common climate interventions across cities worldwide<sup>6,32</sup>, and the mitigation sector where

U.S. cities articulate justice concerns the most<sup>7</sup>. Existing policies, however, have produced only marginal improvements in building energy intensity<sup>33</sup>. Energy demand and emissions from buildings have continued to increase globally, and few local efforts are aligned with achieving net-zero operational emissions from buildings<sup>33</sup>.

As one the first BPS adopted in the U.S., Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO) represents a radical shift in building decarbonization. BERDO is an ordinance (local law) adopted in 2021 that mandates large residential buildings ( $\geq 15$  units) and commercial buildings ( $\geq 20,000$  ft<sup>2</sup>) in Boston to progressively reduce their greenhouse gas emissions until reaching net-zero by 2050. BERDO requires building owners to (i) report their annual energy and water use, (ii) verify reported data through a third party on a regular basis, and (iii) reduce their annual emissions below an emissions standard corresponding to their building use type(s). Reporting and third-party verification are required for all buildings since 2022. Emissions compliance begins in 2025 for larger buildings ( $\geq 35$  units or  $\geq 35,000$  ft<sup>2</sup>) and in 2030 for smaller buildings (15-34 units or 20,000-34,999 ft<sup>2</sup>). BERDO is lauded for being one of the few existing BPS that explicitly incorporates justice mandates within its ordinance. This includes the creation of a community-driven Review Board with significant decision-making authority over the implementation of the program, and the establishment of the Equitable Emissions Investment Fund to support building decarbonization projects that benefit environmental justice communities. While other BPS programs include committees with advisory functions (e.g., New York City has an Advisory Board for Local Law 97), BERDO is unique in its delegation of implementation powers to a resident-driven Review Board that provides permanent community oversight over the program.

We investigate the first two years of the implementation of BERDO with a particular focus on rulemaking, the process through which the City of Boston developed rules and regulations to implement and enforce BERDO. We employ a mixed-methods approach that combines five months of participant observation within the City of Boston's Environment Department, twenty interviews with city staff and community leaders involved in the implementation of BERDO, and a systematic content analysis of over 200 policy documents related to rulemaking. We find that policy implementation served as an important site of political contestation and resistance around climate justice. Contestations about justice, equity, and fairness were mobilized by different actors to advance their interests in rulemaking, ultimately shaping the implementation of BERDO itself. We provide insights into the complex challenges that cities may face as they begin to operationalize climate justice on the ground and argue for a

shift in scholarship to politicize policy implementation and reframe climate justice as a practice that continues beyond policy planning.

## Results

Based on our mixed-methods research design (see Methods), we organize our analytical insights according to three core themes: (i) the history and implementation process of BERDO, (ii) contested climate justice claims that arise during implementation, and (iii) challenges in translating climate justice from theory into practice.

### The history and implementation process of BERDO

The implementation of BERDO began shortly after the adoption of the ordinance with the launch of rulemaking (**Fig. 1a**). City officials described the goal of rulemaking as “creating clarity” for building owners on how to implement different compliance mechanisms to achieve emissions reductions (**Table 1**) and defining how justice mandates embedded in the ordinance (**Table 2**) work “not just in concept but in action”. Regulations were adopted in three phases. Each phase was dedicated to specific regulatory topics and included the engagement of multiple actors (**Fig. 1b**).

To operationalize climate justice, city staff simultaneously sought to (i) elevate community voices in regulatory decisions through the formation of a Community Advisory Group (CAG) composed of community advocates and leaders working on environmental justice, social justice, affordable housing, and climate action and (ii) maintain the buy-in of the regulated parties subject to BERDO, including real estate, hospitals, universities, and other building owners (**Fig. 1b**). The convening of a justice centered CAG for rulemaking has also unique to BERDO compared to other existing BPS. However, unlike the Review Board, which has decision-making authorities in multiple aspects of implementation, the CAG served an advisory role specifically in the rulemaking process.

CAG members met regularly with city officials to advise on how to align regulatory and implementation decisions to justice ideals and community priorities. For city staff, the CAG provided a space to “explicitly talk about equity” and enable “ground truthing” with community leaders with “true expertise and what is needed or wanted in a community”. The CAG also provided a buttress against opposition for regulatory decisions designed for justice, as stated by a city official: “we had the backup to say ‘we are talking to community members, and this is a concern that's being brought up’”. CAG members described their role as representing the needs

of their neighborhoods, ensuring that implementation “was aligned with equity” and does not disproportionately burden vulnerable communities, while making sure that BERDO “had teeth” and guardrails against “the tricks” building owners may use to circumvent obligations.

Perceptions from CAG members about this process are summarized in **Fig. 2**.

Whereas CAG members provided direction to incorporate justice in rulemaking, city staff saw engaging with regulated parties as an important component of fulfilling justice goals in the long-term. As one city official stated: “we need to bring all building owners along in this process to actually see building decarbonization happen”. Regulated parties engaged in rulemaking through public comment letters, public hearings, and ad-hoc meetings with city officials. In this regard, city officials explained that “having a clear process for hearing and responding to feedback was really important”. “People notice that, and it matters. Even if they’re not all going to be happy with exactly where you ended up, they understand how you got there and felt like they weren’t left out of the process”, and it “builds some goodwill with stakeholders, even when we weren’t taking all of their recommendations.”

Beyond rulemaking, implementing the early stages of BERDO also involved operationalizing the procedural and recognition aspects of justice in everyday decisions and practices (see definitions in Methods). This included managing reporting and third-party verification processes, a helpdesk, outreach and education for building owners, and the Review Board’s nomination and seating process. In these processes, city officials sought to implement justice by creating resources to help “getting everyone subject to BERDO across the finish line” with reporting and emissions compliance, and by giving “time, attention, and resources towards under-resourced residents and owners”.

### **Justice contestations in policy implementation**

Rulemaking not only set the groundwork for BERDO, but also provided a site for CAG members and regulated parties to contest and reinterpret the justice goals and mandates embedded in the ordinance. These justice contestations centered on (i) distributive justice, (ii) procedural justice, and (iii) justice as recognition (**Fig. 3**) (see definitions in Methods).

While BERDO may produce impacts at multiple scales, contestations about the distribution of benefits and burdens primarily centered on building owners, tenants, and environmental justice communities. CAG members generally advocated for removing perceived regulatory loopholes that would allow building owners to avoid or delay compliance, rely on compliance mechanisms that do not provide localized benefits, or pass burdens onto tenants

through increasing rents or energy bills. As explained in a comment letter from CAG members: “we are concerned that the benefits of BERDO compliance (i.e., building improvements, improved air quality, jobs) may not adequately reach those in environmental justice populations, and that the burdens of compliance (i.e., financial costs, displacement) may be inequitably shouldered by those same populations”.

Regulated parties rarely advocated for the creation of additional benefits or the distribution of existing benefits. Most of their requests were related to providing flexibility to building owners and minimizing costs and regulatory burdens, often arguing that regulations would “unfairly”, “unduly” or “overly” burden them. In some instances, regulated parties were reluctant to accept regulations mandating building owners to distribute benefits in the community. In public feedback related to conditions of approval for flexibility measures, some regulated parties argued that distributing benefits such as housing and energy affordability, health, and climate resilience “are outside the scope of emissions reductions in covered buildings” and “go beyond the intent of the BERDO ordinance”. In other cases, regulated parties mobilized the idea of environmental justice benefits to advance regulatory decisions that favor them. For example, in public comment letters regarding the Equitable Emissions Investment Fund, some regulated parties pushed for the prioritization of projects that produce larger emissions reductions as this “is the greatest benefit to environmental justice and all populations”. Such decision would have likely favored applications from larger carbon-intensive institutions as opposed to more holistic projects that benefit the community in other ways.

Contestations about procedural justice largely revolved around the Review Board, which has significant authority in the implementation of BERDO (**Table 2**). Regulated parties sought to strengthen their representation in the Review Board by urging the city to select members with technocratic expertise and expand the definition of “community-based organizations” (which can nominate two-thirds of the Review Board) to include the business community. Unsuccessful in these efforts, regulated parties then advocated for regulations that would limit the Review Board’s discretion, provide them access to the Review Board through working groups, or enable owners to easily appeal Review Board decisions.

In contrast, CAG members supported giving power to the Review Board, although it proved challenging to balance maintaining the Review Board’s discretion versus outlining decision-making processes with prescriptive justice measures. CAG members also advocated for tenants and residents to have a voice in Review Board processes and regulatory decision-making, which led to additional meetings with Boston residents during rulemaking. While both

regulated parties and CAG members supported some monitoring and disclosure requirements, only the CAG focused on tracking environmental justice metrics and implementing outreach and education efforts beyond building owners.

Contestations about distributive and procedural justice revealed underlying debates about *who* is recognized as vulnerable and deserving of justice under BERDO. Although BERDO regulates all types of building owners, CAG members largely focused on restricting the behavior of *landlords* and *large institutions*, sometimes overlooking burdens placed on other building owners. Some CAG members pushed for more nuanced discussions and highlighted how certain owners are also vulnerable. As stated in a CAG meeting: “if we want justice, justice is not just displacing burdens on private owners”. This statement frames building owners as subjects of justice and challenges the assumption that protecting tenants at the expense of owners is always just. While CAG members generally agreed on prioritizing benefits to environmental justice populations, communities of color, tenants, and low- and moderate-income residents, specifics about how to operationalize such priorities were oftentimes contested. For instance, when discussing the Equitable Emissions Investment Fund, some suggested money should only be directed to environmental justice neighborhoods and were wary of including “geographic equity” as a part of the Review Board’s funding criteria, fearing that this would channel resources to wealthier neighborhoods. Others argued that regulations should recognize the differences between environmental justice neighborhoods and that projects in “wealthy” communities can also serve vulnerable residents. Reflecting on issues of recognition, a city official commented: “I have a specific responsibility to even the scales for folks at the margins because they’ve historically been uncared for, but that doesn’t need to express itself as callousness or disregard to those in the middle. [...] In this role, I don’t think it is right or ethically just for me to just not care about people. That is a practice of dehumanization is a big problem within our movements too. I would like us to get to the point where we lack the ability to demonize anyone”.

Although justice contestations featured prominently in regulations related to BERDO’s justice components (**Table 2**), concerns about justice were also mobilized in regulatory topics not commonly associated with justice and/or without an explicit justice mandate emanating from the ordinance. For instance, concerns about asthma in children and air pollution in communities of color were mobilized by CAG members to support assigning an emissions factor to fossil-fuel derived district steam. This decision was opposed by some regulated parties, who argued such rule places an “unfair financial burden” and “disproportionately burdens district steam

customers". In advocating to restrict the use of Power Purchase Agreements, CAG members argued that despite existing challenges in renewable energy markets, "we cannot allow the current reality to further entrench existing inequity at the expense of environmental justice populations". Conversely, regulated parties argued that relaxing third-party verification requirements to allow for in-house data verification would be "a key workforce development opportunity" that "would create a powerful incentive for large existing buildings to hire energy efficiency experts long-term". These examples show how justice contestations appear in seemingly opaque or technical decisions and beyond spaces explicitly labelled for justice. As one city official explained, even where the ordinance does not specifically require it, "regulations can still accommodate additional thoughts on what it means to advance equity goals".

Even though CAG members and regulated parties were not always successful in influencing implementation decisions by mobilizing ideas of justice, justice contestations came to define how the City of Boston operationalized climate justice and shaped the implementation of BERDO itself. This could be seen in the evolution of the rulemaking process with the addition of meetings with Boston residents and additional public comment periods as a result of requests from the CAG and regulated parties. Contestations were also reflected in the final rulemaking language, which was drafted and revised to resonate with multiple, and sometimes conflicting, justice ideals mobilized throughout the process (**Fig. 4**).

### **Challenges in translating climate justice into practice**

Interviewees identified several common barriers to policy implementation in BERDO, including capacity and budget constraints, technical complexity, uncertainty, and data quality/availability. However, additional distinctive challenges stemmed from the pursuit to operationalize climate justice itself. We categorized these challenges into (i) scope and scale discrepancies, (ii) the bureaucratization of justice, and (iii) the weaponizing of justice.

The first challenge in implementing climate justice is that it inherently requires action at multiple *scales*, and beyond the *scope* of a single program. As stated by an interviewee, "the ordinance was reflective of some community priorities and goals that would never really be able to be addressed through just BERDO alone". In addition to legal constraints attached to any given program, scope and scale discrepancies partially originate from the multiplicity of meanings of justice. For some, operationalizing justice in BERDO meant implementing the program in a way that avoids harm and distributes benefits inherently produced by building



decarbonization. For others, justice also meant “increasing the pot of benefits that are on the table and then distributing those”, potentially crossing the legal scope of BERDO.

This issue was best exemplified in discussions about gentrification and displacement, with advocates persistently pushing for BERDO to include tenant protections. For context, the majority of Boston’s households (65%) are renters<sup>34</sup>. Across Greater Boston, 65% of Black residents and 70% of Latinx residents are renters (compared to only 33% of White residents), and more than half of the area’s renters are cost burdened<sup>35</sup>. Symptoms of green gentrification have already been reported in Boston and associated to urban greening, climate initiatives, and redevelopment strategies<sup>36,37</sup>. With over 80% of Boston’s census blocks considered “environmental justice populations”<sup>38</sup>, a great portion of BERDO buildings are located in, and impact the lives of, multiple vulnerable communities (**Appendix A**). In this landscape, the implementation of BERDO may be perceived, rightly or wrongly, as another installment in patterns of historical marginalization. Although BERDO includes a goal related to housing justice (**Table 2**), municipalities in Massachusetts lack the authority to institute rent control, and BERDO offered limited avenues to integrate rent stabilization and tenant protections. This showcases how even if a policy is explicitly designed with a justice lens and city staff and advocates agree on principles such as “*climate justice is housing justice*”, individual climate programs may not always have the scale or scope to operationalize those goals.

Scope and scale discrepancies were omnipresent throughout rulemaking, with BERDO implementation serving as a battleground for multiple issues that could not be directly or fully addressed through this program, from evictions and slow permitting processes to the marketing of renewable natural gas. This often led to tensions and some CAG members felt that they were unable to “set the agenda” during rulemaking (**Fig. 2**). Some members explained that “making the regulations was not always in line with what the group wanted to talk about” and “the response that ‘we can’t do anything about rent control because that’s a state issue’ is really unsatisfying for people and can be really disempowering”. Such frustrations were illustrated in a statement during a public meeting: “we keep talking about buildings and not people”.

The second challenge in translating climate justice into practice is that it necessitates the *bureaucratization* or standardization of justice goals into concrete processes, measures, or criteria. This creates the risk of reducing justice into box-checking or scoring exercises that do not fully reflect justice ideals. As one city official explained “[Before] I understood environmental justice as a way to dismantle power and distribute power, [but] to write policy, you have to write environmental justice in a measurable, actionable way, [...] which it’s not the way the people

really talk about it". This can be seen in environmental justice assessments that rank initiatives based on justice-oriented metrics, or in definitions and indexes of environmental justice communities, which despite compiling multiple sociodemographic variables, may not always reflect who residents perceive as vulnerable. Justice is in many ways impervious to codification. As stated by a city official: "I don't think you can 100% ever codify justice. There are some things like love, which I believe has to be a critical component to how we live in the world, and how am I supposed to write that? How do we do this with love and grace?"

The bureaucratization of justice is not only driven by the state's need to standardize rules and processes. Rather, it can be promoted by myriad actors. For instance, bureaucratization can come from well-intentioned advocates seeking to further justice when they push for blanket justice requirements that may serve a purpose in some contexts but are ill-fitting in others. It can also come from regulated parties seeking to limit justice when they demand constraining justice-oriented decision-making to "objective" or "data-based scoring systems". Both approaches bureaucratize justice, either by reducing it to for-the-sake-of-it mandates or by forcing its objectification and quantification.

Additional challenges emerge when justice is *weaponized* to stall, impede, or co-opt implementation. Throughout rulemaking, some CAG members and regulated parties pushed for implementation delays by mobilizing ideas of justice and fairness. Some interviewees questioned the value of such hold-ups, which can expose policies to political turmoil, put them at risk of being legally challenged, and ignore that "we also have a deadline from a climate perspective". Just implementation does require time to allow for meaningful engagement of community voices, particularly those who have been historically left out. As stated by a CAG member: "some of us have not historically been asked to be involved in these types of groups, so even giving people time to just mature into those roles requires more time". However, claims of procedural justice can also be strategically misused by some actors to impede implementation. A city official explained: "you have some people that are accusing [Boston] of going too slow because of equity, and other people who, from the equity perspective, are accusing [Boston] of going too fast".

Beyond implementation delays, city staff and CAG members expressed concerns that flexibility measures and funding opportunities created for under-resourced building owners could be exploited by large institutions with enough resources to navigate the system and make their case to the Review Board. A CAG member cautioned: "some of the exceptions could swallow the good intentions of the ordinance". Regulations also needed to balance ideals of procedural

justice with the risk of public participation being perversely used to challenge Review Board decisions, either to advance NIMBY claims or to redress past issues with building owners. A city official explained: “[BERDO] isn’t your opportunity to right wrongs that you perceive as being done. Everybody has to be treated in the same way for consistency [...] so that no single decision can be picked apart under the eyes of the law and overturned”.

## Discussion

Our analysis shows that contestations about justice form an inextricable component of the implementation of BERDO. On the one hand, ideals of justice, equity, and fairness were mobilized by all actors to advance their interests and influence implementation decisions. These contestations impacted how BERDO was operationalized on the ground, both in terms of process (e.g. residents’ engagement) and resulting implementation decisions (e.g., regulatory language). This was the case for many regulatory decisions, including seemingly technocratic topics without explicit justice mandates. On the other hand, policy implementation served as a site to contest and reinterpret the ordinance’s justice goals and mandates, ultimately redefining what justice means and who is deserving of justice in the context of BERDO.

The implementation of BERDO illustrates that the politics of climate justice transcend the stage of policy planning and can be used as a tool to ensure, transform, or impede implementation. This supports prior theories suggesting that climate policy is shaped by contestations over justice<sup>39</sup> and that the ways in which justice is understood in a particular place are critical determinants of how climate programs come to be developed and implemented<sup>2,39,40</sup>. Rather than settling on a single definition of justice, the multiplicity of meanings of justice under BERDO resulted in regulations that sought to resonate with multiple, and sometimes conflicting, justice ideals mobilized by different actors. This reveals climate justice not only as a principle of climate planning or as a policy outcome, as often treated in the literature<sup>14,15</sup>, but as a highly disputed political process in which competing ideals of justice are contested and translated into implementation decisions.

Our research highlights important caveats for the implementation of climate justice. First, while visions of climate justice in the city such as the “Green New Deal” and “just urban transitions” necessitate multi-sectoral and multi-level governance approaches<sup>14</sup>, implementing justice through a single climate program is inevitably subject to scope and scale constraints. To that regard, community-driven implementation approaches such as the CAG and Review Board must begin with a shared understanding of the scope and scale of the program at hand. This is

not to say that policies should be implemented in a vacuum or avoid challenging existing power relations and siloing practices within a city. However, a mismatch between goals and the reality of the legal boundaries of implementation can frustrate the operation of programs and weaken trust between city officials, advocates, and those who they aim to protect.

Second, the implementation of climate justice will inherently involve a degree of “administrative ordering of nature and society”<sup>41</sup>. Implementation requires rendering justice legible through bureaucratic tools that, for instance, standardize environmental justice communities into a legal definition or simplify justice into a checklist of regulatory requirements or a series of benefits to be distributed. On the one hand, this bureaucratization of justice can result in what we call “ordinary innovations”, or small but meaningful changes that reimagine policy tools and governing practices to steer cities toward the social, ethical, and political decisions that are needed for just urban transitions.

On the other hand, however sophisticated, bureaucratic tools are “projects of legibility”<sup>41</sup> that are never fully realized. Intangibles such as care, compassion, and understanding for others cannot be fully codified in artifacts like regulations and will need to evolve into everyday practices and “quiet acts”<sup>42</sup> of justice through the mundane decisions that implementors such as city officials and Review Board members will take moving forward. As stated by a city official: “as much as it is codified in the ordinance and supported in regulations, environmental justice is a practice as well”. This emphasizes how transformative action takes place not only through grand interventions, but also through mundane and “individually smaller actions” that can collectively shift systems over time<sup>43,44</sup>. These everyday practices often occur at “the middle space” between institutional and community action and, like BERDO rulemaking, are neither purely top-down nor bottom-up efforts<sup>43</sup>.

Finally, the prospective weaponizing of justice highlights the need for a critical lens in the implementation of justice. Policymakers should interrogate who is mobilizing justice claims, to what extent, and why, and question when, how, and who may misuse or co-opt justice measures. Well-intentioned environmental laws have been perversely used to block projects that climate policies seek to promote, as seen with lawsuits under the California Environmental Quality Act, which have been weaponized to advance economic agendas from the private sector and NIMBY claims against housing and greening projects that would serve people of color and diversify communities<sup>45</sup>. Under the National Environmental Policy Act, indigenous justice concerns have been co-opted by other groups to oppose offshore wind development, thereby perpetuating colonial relations<sup>46</sup>. Even community-led initiatives can be “later discovered to

create more problems, more injustices”, with policies often focused on finding the “path of least resistance” in the near-term, rather than environmentally sound and just solutions in the long-term<sup>47</sup>. New climate justice measures run the same risk of exacerbating environmental and social vulnerabilities if co-opted by actors to advance their own interests or used in bad faith or in ways that undermine participatory processes.

Our research furthermore highlights what is lost when policy implementation is omitted from studies of climate governance, or when it is over-simplified into combinations of barriers and enabling factors, without recognition of the inherent political complexities of the policy process. As cities increasingly integrate justice into climate action<sup>7–9,48</sup>, scholars, advocates, and practitioners should look at policy implementation as key site of political contestation and resistance, where opposing conceptions of justice are fought out and translated into action. Future scholarship should examine climate justice not only as a goal or outcome of policies, but as a set of often mundane and “quiet”<sup>42</sup> practices and acts of care and resistance that continuously unfold throughout the implementation of climate action.

## Methods

We use a mixed-methods approach that combines participant observation, semi-structured interviews, and content analysis to analyze the politics and process of implementing urban climate justice through BERDO.

**Defining urban climate justice.** Drawing from existing scholarship, we define urban climate justice as a concept and social movement that (i) recognizes the inequitable impacts of climate change in cities<sup>52,53</sup>, (ii) acknowledges that climate change is driven by the historical and structural processes of environmental racism, settler colonialism, heteropatriarchy, and racial capitalism, all of which structure human-environment interactions<sup>50,51,54,55</sup>, (iii) highlights the inequitable impacts of urban climate action<sup>39,49,56</sup>, and (iv) advances the pursuit of justice through climate action in cities<sup>26,39</sup>.

The study of urban climate justice has evolved from and alongside environmental justice scholarship<sup>1,52,57–60</sup>. This literature has documented how communities of color, Indigenous communities, and historically marginalized populations have been disproportionately exposed to environmental hazards, denied from environmental benefits, and excluded from decision-making processes. Environmental justice scholars have also exposed the connections between environmental vulnerabilities and structural issues such as environmental racism, white supremacy, settler colonialism, and heteropatriarchy<sup>47,52,53,61–64</sup>. Climate justice expands on this

scholarship by analyzing how these inequities and structural issues are also manifested through climate change and climate policy across geographies and at multiple scales<sup>1,52,57</sup>.

Although justice has been conceptualized in several distinct ways, we understand justice as composed of three dimensions or tenets: (i) distributive justice, (ii) procedural justice, and (iii) justice as recognition. Distributive justice refers to the fair allocation of the benefits and burdens of climate change and climate policy<sup>39,65</sup>. Procedural justice refers to inclusive participation, engagement, transparency, and accountability in decision-making processes<sup>39,63,65,66</sup>. Finally, justice as recognition refers to the respect and valuing of all people in climate governance and requires the acknowledgement of historic and ongoing inequities as well as the pursuit of efforts to reconcile these inequities<sup>39,65,67</sup>. Some scholars also add “restorative justice” to highlight the need for healing, reconciliation, and rebuilding of relationships, communities, and the environment<sup>63,68</sup>.

One additional conceptual clarification underlies our understanding of urban climate justice. There is no single agreed definition of “urban” or “the city” in the literature. Different scholars delineate cities based on population size, population density, political boundaries, boundaries of mass transit systems, percentages of vegetation and impervious surface area, as well as residents’ own perception and experience of place<sup>3,69</sup>. Here, we consider “urban” as “an area with legally defined boundaries with recognized urban status and their own local government”<sup>3</sup>.

**Defining policy implementation.** We understand implementation as the *process* of translating public policies into operational and enforceable programs<sup>70</sup>. We primarily investigate implementation through the process of rulemaking. Through rulemaking, city governments develop and issue specific regulations that establish rules and parameters to implement and enforce a policy<sup>71</sup>. In this way, rulemaking is one of the first and most critical steps of the policy implementation process. Rulemaking is also a critical site to analyze the operationalization of climate justice on the ground. Rulemaking is where issues of politics and power most clearly intersect with policy implementation by providing an arena for city governments and other actors to contest and re-interpretate the justice goals and mandates that were already embedded in climate policies during the policy planning process<sup>72</sup>.

**Participant observation.** [The first author] conducted participant observation by working as a Policy Fellow at the City of Boston’s Environment Department. In this role, [the author] actively participated in the implementation of BERDO, with a particular emphasis on the rulemaking

process. [The author] worked directly with city staff to (i) engage with community advocates (Community Advisory Group), Boston residents, and regulated parties throughout the regulations process; (ii) prepare materials for public meetings; (iii) review and analyze public feedback; (iv) draft and revise regulations language; and (v) support other implementation activities as needed. [The first author] conducted over 580 hours of participant observation over five months, from June to December 2023. This period covered the majority of Phase 3 of the rulemaking process (**Fig. 1**). During participant observation, [the first author] took detailed notes focused on the justice themes that emerged during rulemaking, whether and how different actors articulate, contest, and re-interpret justice concerns, and how said concerns were translated (or not) into a specific regulatory or implementation decision. All notes were anonymized and transcribed into a digital format for analysis. Participant observation provided us with an in-depth insight into the social, cultural, and political context in which BERDO unfolds and enabled us to directly track and experience the *process* through which the justice goals and mandates embedded in BERDO were contested, re-interpreted, and ultimately translated into a specific regulatory and implementation decisions. Participant observation also enabled us to add nuance to the data collected through interviews and content analysis and facilitated the identification of “subtleties of meaning”<sup>73</sup> among city staff and community advocates.

**Interviews.** We conducted twenty semi-structured interviews with city staff and community advocates and leaders involved in the implementation of BERDO. Interviews are well suited for tracing the chronology of events and movement of policy ideas<sup>74</sup> and building understanding of how “certain events, practices, or knowledges are constructed and enacted within particular contexts”<sup>75</sup>, making them effective tools to analyze both the history and politics of policy implementation and situated views on climate action and justice. We used a semi-structured interview approach to ensure all interviews covered key topics, while allowing a conversational approach that enables respondents to tell their own stories and allows for new topics to emerge. While the exact wording and order of questions were tailored to each respondent, all interviews consisted of a series of open-ended questions that solicited information about the respondent’s role, influence, and perceptions on the BERDO implementation process. This included respondents’ perceptions about the justice implications of BERDO, the successes and challenges of the implementation process, justice concerns that have been addressed during implementation, justice concerns that remain unaddressed, and opportunities and challenges for the future implementation of BERDO. Sample interview scripts can be found in the Supplementary Information (**Appendix B**).

Respondents were identified through participant observation. Our final interview sample included ten city staff involved in the rulemaking process and/or other implementation activities for BERDO and ten community advocates who were part of the Community Advisory Group during rulemaking. Some respondents had been involved with BERDO since the policy planning process, while others became involved at different phases of the rulemaking process and implementation of BERDO. Interviews ranged between 30 and 65 minutes, but most lasted 50 minutes. Interviews were conducted in-person or over Zoom. All interviews were audio recorded and transcribed for analysis.

Quotes from interview respondents are identified in the main text as coming from a “city official”, “city staff”, or “CAG member”. The term “interviewee” is also used sporadically to grant additional anonymity to respondents.

**Content analysis.** We conducted a content analysis of relevant policy documents, records from public meetings, and public comments related to the rulemaking process. We used this data to complement and triangulate our analysis from participant observation and interviews, as well as to confirm the elements of the regulations that were explicitly linked to equity and justice at different stages of the rulemaking process. We gave special attention to justice controversies related to the implementation of BERDO and the role and positions of regulated parties, community advocates, and other actors in proposing specific regulations language or implementation decisions and strategies. This analysis included the final regulatory language adopted through the rulemaking process, minutes and materials from 15 public hearings of the Boston Air Pollution Control Commission, minutes and materials from 12 public hearings of the Review Board, minutes and materials from 11 Community Advisory Group meetings, minutes and materials from 12 public meetings held by the City of Boston’s Environment Department, 134 public comment letters received as part of the rulemaking process, and 9 documents including city staff responses to public comment letters. A list of public meetings included in this analysis can be found in the Supplementary Information (**Appendix C**).

**Data analysis.** We coded all participant observation, interview, and content analysis data using an iterative qualitative process of inductive coding. We first coded data according to emergent themes revealed by each source independently (i.e., participant observation notes, interview transcripts, and policy documents). We then conducted multiple iterative rounds of focused coding to homogenize our analysis across all data sources. The final coding protocol included the following themes: (i) justice contestations; (ii) implementation process; (iii) implementation decisions and outcomes; and (iv) implementation challenges. The final coding protocol can be



found in the Supplementary Information (**Appendix D**). We used NVivo 20 software for all coding.

**Ethics and confidentiality.** This research was approved by the Boston University Institutional Review Board (Exempt Research #6907X) and complies with all relevant ethical regulations. City staff and community advocates that were part of the Community Advisory Group received a letter explaining the goals and scope of the research project prior to the beginning of the participant observation process. All interview respondents received a letter of informed consent prior to participating in an interview. Participants were offered no compensation. We took all reasonable measures to protect confidentiality of participants, including reporting findings from participant observation and interview responses anonymously.

#### **Data availability**

Participant observation, interview transcripts, and analyzed data are not publicly available because they contain information that would compromise the research participants' confidentiality and undermine the process of informed consent.

#### **Code availability**

No custom algorithms or code were used in the collection or analysis of the data. All data was analyzed using NVivo 20 software.

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#### **Author contributions**

Claudia V. Diezmartínez: Writing – Original Draft, Conceptualization, Methodology, Data Collection, Data Analysis, Interpretation, Visualization, Funding Acquisition

Benjamin K. Sovacool: Writing – Writing – Review and Editing, Methodology, Interpretation, Project Supervision (Supporting)

Anne G. Short Gianotti: Writing – Review and Editing, Conceptualization, Methodology, Interpretation, Funding Acquisition, Project Supervision (Lead)

### Competing interests statement

Claudia V. Diezmartínez continues to be an employee of the City of Boston's Environment Department. The co-authors declare no competing interests.

### Tables

**Table 1.** BERDO compliance mechanisms.

Compliance mechanism	Description
Direct emissions reductions in buildings	Owners may directly reduce emissions from electricity and fossil fuel consumption through building retrofitting and fuel switching. This includes improvements such as upgrading to high-efficiency electric appliances and lighting, electrification of heating, cooling, and cooking systems, insulation, and building envelope improvements.
Enrollment into Boston's municipal aggregation program	Owners and tenants may reduce emissions from electricity consumption by enrolling into Boston's Community Choice Electricity (BCCE) Program, a municipal aggregation program through which the City of Boston purchases MA Class I RECs on behalf of customers.
Local renewable energy generation	Owners may reduce emissions from electricity consumption through renewable energy generation located onsite (e.g. rooftop solar) or off-site (e.g., community solar, Power Purchase Agreements in ISO New England grid).
Eligible Renewable Energy Certificates (RECs)	Owners may mitigate emissions from electricity consumptions by purchasing and retiring unbundled MA Class I RECs; or purchasing and retiring bundled MA Class I RECs as part of a Power Purchase Agreement in the ISO New England grid.
Eligible Power Purchase Agreements (PPAs)	Owners may mitigate emissions from electricity consumption by entering into a long-term energy contract with a generator of non-emitting renewable energy located outside the ISO New England grid. The PPA must meet an "additionality" requirement and associated RECs must be retired as part of the PPA.
Alternative Compliance Payments (ACPs)	Owners may mitigate emissions from electricity and fossil fuel consumption through ACPs. ACPs are priced at \$234 for every metric ton of CO <sub>2</sub> e emitted above the emissions standards. ACPs are not fines, but rather a compliance pathway.

**Table 2.** Key justice components embedded in the BERDO ordinance.

Component	Description
Goal	To "reduce the emissions of air pollutants, including greenhouse gases, from building energy production and consumption, and thereby to encourage efficient use of energy and water, develop further investment in building a green economy, including by encouraging the hiring and training of green jobs, protect public health, and promote equitable access to housing".
Review Board	A nine-member independent board that provides community oversight over the implementation of BERDO. Two-thirds of the Review Board (six members) must be nominated by community-based organizations. One seat is reserved by the Chair of the Boston City Council's Environmental Justice, Resiliency, and Parks Committee. Two seats may be nominated by anyone. The Review Board has the authority to make funding decisions for the Equitable Emissions Investment Fund, approve and set conditions for flexibility measures requested by owners, enforce the ordinance, issue penalties and fines, propose updates to emissions standards and the price of Alternative Compliance Payments, and recommend revisions to regulations and compliance mechanisms.

Equitable Emissions Investment Fund	A special purpose fund that collects all Alternative Compliance Payments (see Table 1) and fines made pursuant to BERDO. The Review Board makes funding decisions, provided that the fund must be used to support local building carbon abatement projects and must prioritize projects that benefit environmental justice communities and populations disproportionately affected by air pollution.
Flexibility measures with conditions of approval	Owners may apply to obtain flexibility in complying with emissions standards. Flexibility measures must be approved by the Review Board and the Review Board may set conditions of approval, including conditions related to environmental justice. Flexibility measures include: <ul style="list-style-type: none"> <li>• Building Portfolios, which enable owners to comply with a single emissions standard across a group ("portfolio") of buildings that share the same owner or Institutional Master Plan (a development plan approved by the Boston Planning &amp; Development Agency).</li> <li>• Individual Compliance Schedules, which enable owners to request an alternative emissions reduction based on a baseline year. Individual Compliance Schedules must establish absolute emissions limits that decline every five years on a linear or better basis. Based on their selected baseline year, owners must achieve a 50% reduction in absolute emissions by 2030 and a 100% reduction by 2050.</li> <li>• Hardship Compliance Plans, which enable owners to request alternative emissions standards and/or emissions reduction schedule if facing an eligible hardship in complying with the default emissions standards.</li> </ul>

## Figure legends

**Fig. 1. BERDO rulemaking process and key actors.** **a**, Rulemaking consisted of three phases. Phase 1 set rules for reporting and third-party verification. Phase 2 set rules related to the Review Board, emissions factors, compliance mechanisms associated with renewable energy, and other administrative regulations. Phase 3 set rules related to flexibility measures, the Equitable Emissions Investment Fund, and penalties and fines. Symbols are used to represent public comment periods and different engagement components that were part of the rulemaking process. **b**, Key actors in the implementation of BERDO include the Community Advisory Group (CAG), regulated parties, and the Review Board. All CAG members are community-based organizations and some are also regulated parties. Community-based organizations nominate at least two-thirds of the Review Board.

**Fig. 2. Perceptions of Community Advisory Group Process.** Summary of perceptions from members about the process and approach of the CAG. Data comes from interviews with CAG members.

**Fig. 3. Justice contestations in the rulemaking process of BERDO.** Different actors framed and mobilized multiple contestations around ideals of justice, equity, and fairness to advance their interests and shape implementation decisions. Contestations focused on issues of distributive justice, procedural justice, and justice as recognition.

**Fig. 4. Examples of the impact of justice contestations in rulemaking.** Examples of how justice contestations are reflected in regulatory language. [2-column figure]

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