

1 **Operationalizing climate justice in the implementation of Boston's Building Performance  
2 Standard**

3 Claudia V. Diezmartínez<sup>1\*</sup>, Benjamin K. Sovacool<sup>2</sup>, Anne G. Short Gianotti<sup>3</sup>

4 <sup>1,2,3</sup> Department of Earth and Environment, Boston University, Boston, MA, USA

5 <sup>1</sup> [cvdiezm@bu.edu](mailto:cvdiezm@bu.edu); <sup>2</sup> [sovacool@bu.edu](mailto:sovacool@bu.edu); <sup>3</sup> [agshort@bu.edu](mailto:agshort@bu.edu)

6 \* Corresponding author

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11

12 **Abstract**

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

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

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

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

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

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

67 As one the first BPS adopted in the U.S., Boston's Building Emissions Reduction and  
68 Disclosure Ordinance (BERDO) represents a radical shift in building decarbonization. BERDO is  
69 an ordinance (local law) adopted in 2021 that mandates large residential buildings ( $\geq 15$  units)  
70 and commercial buildings ( $\geq 20,000$  ft<sup>2</sup>) in Boston to progressively reduce their greenhouse gas  
71 emissions until reaching net-zero by 2050. BERDO requires building owners to (i) report their  
72 annual energy and water use, (ii) verify reported data through a third party on a regular basis,  
73 and (iii) reduce their annual emissions below an emissions standard corresponding to their  
74 building use type(s). Reporting and third-party verification are required for all buildings since  
75 2022. Emissions compliance begins in 2025 for larger buildings ( $\geq 35$  units or  $\geq 35,000$  ft<sup>2</sup>) and in  
76 2030 for smaller buildings (15-34 units or 20,000-34,999 ft<sup>2</sup>). BERDO is lauded for being one of  
77 the few existing BPS that explicitly incorporates justice mandates within its ordinance. This  
78 includes the creation of a community-driven Review Board with significant decision-making  
79 authority over the implementation of the program, and the establishment of the Equitable  
80 Emissions Investment Fund to support building decarbonization projects that benefit  
81 environmental justice communities. While other BPS programs include committees with  
82 advisory functions (e.g., New York City has an Advisory Board for Local Law 97), BERDO is  
83 unique in its delegation of implementation powers to a resident-driven Review Board that  
84 provides permanent community oversight over the program.

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

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

98 **Results**

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

103 **The history and implementation process of BERDO**

104 The implementation of BERDO began shortly after the adoption of the ordinance with the launch  
105 of rulemaking (**Fig. 1a**). City officials described the goal of rulemaking as “creating clarity” for  
106 building owners on how to implement different compliance mechanisms to achieve emissions  
107 reductions (**Table 1**) and defining how justice mandates embedded in the ordinance (**Table 2**)  
108 work “not just in concept but in action”. Regulations were adopted in three phases. Each phase  
109 was dedicated to specific regulatory topics and included the engagement of multiple actors (**Fig.**  
110 **1b**).

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

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

127 of their neighborhoods, ensuring that implementation “was aligned with equity” and does not  
128 disproportionately burden vulnerable communities, while making sure that BERDO “had teeth”  
129 and guardrails against “the tricks” building owners may use to circumvent obligations.  
130 Perceptions from CAG members about this process are summarized in **Fig. 2**.

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

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

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

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

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

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

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

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

187 In contrast, CAG members supported giving power to the Review Board, although it  
188 proved challenging to balance maintaining the Review Board’s discretion versus outlining  
189 decision-making processes with prescriptive justice measures. CAG members also advocated  
190 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

327 **Discussion**

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

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

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

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

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

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

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

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

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

#### 401 **Methods**

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

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

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

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

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

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

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

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

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

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

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

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

495 **Content analysis.** We conducted a content analysis of relevant policy documents, records from  
496 public meetings, and public comments related to the rulemaking process. We used this data to  
497 complement and triangulate our analysis from participant observation and interviews, as well as  
498 to confirm the elements of the regulations that were explicitly linked to equity and justice at  
499 different stages of the rulemaking process. We gave special attention to justice controversies  
500 related to the implementation of BERDO and the role and positions of regulated parties,  
501 community advocates, and other actors in proposing specific regulations language or  
502 implementation decisions and strategies. This analysis included the final regulatory language  
503 adopted through the rulemaking process, minutes and materials from 15 public hearings of the  
504 Boston Air Pollution Control Commission, minutes and materials from 12 public hearings of the  
505 Review Board, minutes and materials from 11 Community Advisory Group meetings, minutes  
506 and materials from 12 public meetings held by the City of Boston’s Environment Department,  
507 134 public comment letters received as part of the rulemaking process, and 9 documents  
508 including city staff responses to public comment letters. A list of public meetings included in this  
509 analysis can be found in the Supplementary Information (**Appendix C**).

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

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

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

#### 527 **Data availability**

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

#### 531 **Code availability**

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

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#### 540 **Author contributions**

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

543 Benjamin K. Sovacool: Writing – Writing – Review and Editing, Methodology, Interpretation, Project

544 Supervision (Supporting)

545 Anne G. Short Gianotti: Writing – Review and Editing, Conceptualization, Methodology, Interpretation,

546 Funding Acquisition, Project Supervision (Lead)

547 **Competing interests statement**

548 Claudia V. Diezmartínez continues to be an employee of the City of Boston's Environment Department.

549 The co-authors declare no competing interests.

550 **Tables**

551 **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.

552

553 **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	<p>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:</p> <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>

554

555 **Figure legends**

556 **Fig. 1. BERDO rulemaking process and key actors.** **a**, Rulemaking consisted of three phases. 557 Phase 1 set rules for reporting and third-party verification. Phase 2 set rules related to the Review 558 Board, emissions factors, compliance mechanisms associated with renewable energy, and other 559 administrative regulations. Phase 3 set rules related to flexibility measures, the Equitable Emissions 560 Investment Fund, and penalties and fines. Symbols are used to represent public comment periods 561 and different engagement components that were part of the rulemaking process. **b**, Key actors in the 562 implementation of BERDO include the Community Advisory Group (CAG), regulated parties, and the 563 Review Board. All CAG members are community-based organizations and some are also regulated 564 parties. Community-based organizations nominate at least two-thirds of the Review Board.

565 **Fig. 2. Perceptions of Community Advisory Group Process.** Summary of perceptions from 566 members about the process and approach of the CAG. Data comes from interviews with CAG 567 members.

568 **Fig. 3. Justice contestations in the rulemaking process of BERDO.** Different actors framed and 569 mobilized multiple contestations around ideals of justice, equity, and fairness to advance their 570 interests and shape implementation decisions. Contestations focused on issues of distributive 571 justice, procedural justice, and justice as recognition.

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

574

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