6. Inclusive urban energy futures?
Unveiling justice conflicts in the European vision for Positive Energy Districts

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Introduction: Positive Energy Districts as a European policy concept for urban decarbonization

Acknowledging the significant role of urban areas in climate change, with urban activities responsible for approximately 70% of the world's consumption-based energy-related carbon dioxide (CO_2) emissions (Luqman et al., 2023), it becomes clear that cities are at the forefront of the global emissions dilemma. Their significant contribution to CO_2 emissions signifies that cities are central to the success of international emission reduction efforts. Therefore, they demand dedicated strategies and actions to mitigate the impacts of climate change (Solecki et al., 2018). Emissions primarily stem from households and arise from three domains (Druckman and Jackson, 2016): the transport, housing, and energy sectors; accordingly, a successful low-carbon transformation of urban areas requires a comprehensive phase-out of fossil fuels across all three sectors, the promotion of sustainable mobility modes, retrofitting of buildings for improved energy efficiency, and the adoption of renewable energy sources (Bazaz et al., 2018).

In the European context, the Positive Energy Districts (PEDs) framework has been developed by the European Commission to address this cross-sectoral urban energy transformation challenge holistically (SET Plan Working Group, 2018). PEDs are defined as 'energy-efficient and energy-flexible urban areas or groups of connected buildings that produce net-zero greenhouse gas emissions and actively manage an annual local surplus production of renewable energy' (JPI Urban Europe and SET Plan Action 3.2, 2020). PEDs aim to reduce transport-related emissions by facilitating electrification, promoting

the retrofitting of buildings for energy efficiency, and supporting the transition to a decentralized energy system by emphasizing local renewable energy production and consumption (Derkenbaeva et al., 2022; Sareen et al., 2022). The framework is a crucial element of the European Union's strategy for sustainable urbanization, with an ambitious target to establish 100 such districts across the different member states of the EU by 2025 as part of the European Strategic Energy Technology Plan (SET Plan) (SET Plan Working Group, 2018; Bossi et al., 2020). So far, 20 European countries have joined this initiative, which is carried out through the Joint Programming Initiative (JPI) Urban Europe, which acts as a multi-stakeholder platform for developing implementation frameworks for PEDs and offers funding for relevant projects (JPI Urban Europe, n.d.). As of early 2024, over 80 related projects have received funding; however, the majority of PEDs are currently in planning (e.g. through neighbourhood energy assessment studies) or early implementation (e.g. through local living labs and small-scale experimentation) phases rather than fully operational (Gollner, 2020; PED EU NET, 2024).

However, alongside the environmental imperative to reduce emissions and the technical challenge of rapidly scaling up low-carbon solutions such as PEDs, there is a need to ensure that urban energy transformations unfold justly and equitably (Broto and Westman, 2019). Cities today have frequently become spaces where structural injustices manifest and profoundly shape the everyday lives of many citizens (Routledge, 2010; Anguelovski and Connolly, 2021). Structural injustices refer to the deep-rooted and systematic disparities in access to resources, opportunities, and decision-making processes that disproportionately disadvantage certain groups, often based on socioeconomic status, ethnicity, or gender, leading to persistent inequality and exclusion (Browne and McKeown, 2024). Such structural injustices extend to the unequal exposure to environmental hazards, which disproportionately affects minority and low-income communities as a result of historical and ongoing social and economic disparities (Pellow, 2023). For instance, neighbourhoods predominantly inhabited by racial minorities often have less access to green spaces and are more likely to be located near polluting industries or waste disposal sites, leading to higher exposures to pollutants such as dust and air pollution (Kotsila et al., 2023; Motairek et al., 2023).

An illustrative consequence of these entrenched injustices in the context of the energy transition is double energy vulnerability, wherein individuals face the simultaneous challenges of energy poverty (inability to afford adequate energy services) and transport poverty (lack of access to efficient and

affordable transportation), which significantly hampers their quality of life and ability to engage in civic life (Robinson and Mattioli, 2020; Simcock et al., 2021). Previous research has indicated that ongoing low-carbon transformations frequently fail to address pre-existing structural drivers of injustice or the resulting vulnerabilities and may even lead to new injustices (Sovacool et al., 2019; Anguelovski and Connolly, 2021). Adding to that, current geopolitical and economic crises exacerbate existing vulnerabilities and make it difficult for disadvantaged groups to cope with additional burdens, such as increased energy costs, rendering the pursuit of environmental sustainability a distant concern compared to immediate survival needs (Streimikiene and Kyriakopoulos, 2023). Therefore, approaches towards sustainable urbanization must not only address the pressing concerns of rapid decarbonization but also consciously integrate justice and equity principles to rectify and avoid the perpetuation of structural injustices (Ahvenniemi et al., 2017; Sovacool et al., 2019; Anguelovski and Connolly, 2021).

While the PEDs concept emphasizes holistic development that integrates social concerns with ongoing citizen involvement (Casamassima et al., 2022; Koutra et al., 2023) in alignment with the overall ambition of the EU to have a 'just transition' (European Commission, 2020), a definitive strategy ensuring that such districts contribute to rectifying – or at the very least, not exacerbating – existing structural injustices has yet to be clearly defined (Hearn et al., 2021; Nguyen and Batel, 2021). As a first step towards filling this gap, this chapter presents a comprehensive analysis of the justice implications in the emerging vision of how PEDs can be developed and implemented in Europe, specifically focusing on aspects of restorative justice (Heffron and McCauley, 2017; Ibrahim, 2024). Analysing conflicts in urban future-making from a restorative justice perspective allows us to prioritize the recognition and reconciliation of present-day and historical injustices in the context of the energy transition, such as inadequate access of inhabitants of certain urban areas to clean, affordable energy. The restorative justice lens thus enables us to acknowledge the vulnerabilities, such as energy poverty, that stem from such injustice and to propose practices that built environment professionals can leverage to ensure the active participation and representation of all citizens, especially those who have experienced marginalization, in co-creating their urban futures.

Our results highlight how PEDs, despite the holistic development ethos exhibited in their policy framework, risk overlooking the intricate realities of structural injustices. They reveal the conflicts urban future-makers may face when planning and implementing PEDs, such as the tension between realizing

truly sustainable urban transformations and simply enacting technocentric decarbonization efforts that may inadvertently reproduce and reinforce unjust incumbent structures. To assist urban future-makers in addressing these conflicts, we put forth strategies for leveraging PEDs for environmental sustainability and the restoration of justice within urban areas.

Theoretical background: Applying restorative justice principles to the analysis of PEDs

The concept of restorative justice, originally rooted in the fields of criminology and social justice, has since been applied to address a wide range of societal issues, including energy justice concerns (Hazrati and Heffron, 2021). Historically, restorative justice emerged as an alternative to traditional punitive justice systems and focused on repairing harm and fostering reconciliation between the offender and the victim (Zehr, 2015). In recent years, the concept has become a vital principle of the energy justice framework; restorative justice aims to rectify both existing and potential future injustices caused by energy-related activities, and to address structural injustices within energy systems (Heffron and McCauley, 2017; Hazrati and Heffron, 2021; Heffron, 2023). Restorative justice is thus regarded as the operational principle within the energy justice framework, allowing for implementing energy justice in practice (Heffron and McCauley, 2017; Wallsgrove, 2022). With its focus on restoring equity and community well-being, restorative justice can be conceptualized along three dimensions. First, it considers who is affected and how they are affected, which aligns with recognition justice. Second, it advocates for inclusive, participatory decision-making, reflecting procedural justice. Third, it emphasizes equitable benefit distribution and remediation of adverse effects, corresponding to distributive justice (Wallsgrove, 2022; Ibrahim, 2024).

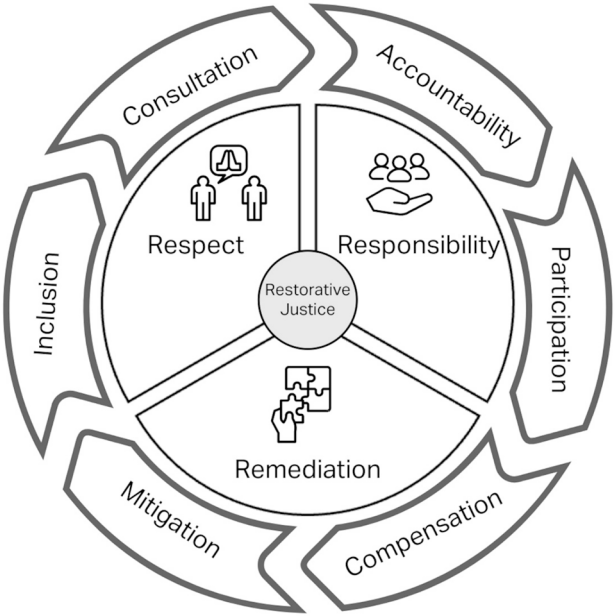
In order to operationalize restorative justice to analyse the emerging lines of conflict in PEDs, we build on previous work that proposes that this justice tenet can be broken down into three core concepts: *respect*, *responsibility*, and *remediation* (Wallsgrove, 2022; Ibrahim, 2024). In the rest of this section, we outline each of these core concepts and their associated practices as well as integrate them into an analytical framework (see Figure 1). First, *respect* acknowledges the unique impacts of energy decisions on different groups and, thus, underscores the recognition of diverse community needs and perspectives that must be consulted and calls for inclusiveness in the development processes. It

therefore relates to practices of consultation and inclusion, ensuring all community segments are heard and considered (Ibrahim, 2023). To actualize this practice, a city council might, for example, hold town hall meetings to gather input from various community members on the placement of new solar energy installations in a particular neighbourhood.

Responsibility entails practices related to ethical decision-making processes, during which democratic accountability necessitates the consideration of a wide range of issues and actions to mitigate or prevent injustices, and the participation of a broad range of stakeholders is emphasized (Ibrahim, 2023). In the energy transition context, for example, a city might create a public oversight committee composed of residents, business leaders, and research experts. This committee could oversee the deployment of a housing retrofitting programme, ensuring transparency and enabling direct community feedback and participation in decision-making processes.

Lastly, *remediation* involves corrective actions to repair existing injustices or mitigate future ones (Wallsgrove, 2022). This consequently includes practices to mitigate negative outcomes and compensate for past harms; for instance, a city might implement a subsidized energy retrofitting programme for economically disadvantaged neighbourhoods to reduce higher energy costs associated with transitioning from fossil fuels while also compensating those disproportionately affected by prior energy policies. The entire restorative justice framework that will guide our analysis and interpretation of the results can be seen in Figure 1.

Figure 1: Restorative justice framework.



Source: Authors. Substantially adapted from Ibrahim (2024) and Wallsgrove (2022).

This restorative justice framework offers a critical lens for analysing the justice implications of planning and implementing Positive Energy Districts (PEDs). Its application as an analytical framework enables examining how PEDs could impact various community groups, particularly those historically marginalized, ensuring their active involvement and representation in planning and decision-making. The framework also allows for a thorough analysis of how the PED concept may address immediate injustices that emerge from its implementation and how it plans to overcome entrenched systemic barriers. Additionally, it enables a comprehensive evaluation of both the distribution of benefits, such as enhanced energy efficiency and environmental sustainability, and the allocation of burdens, including the impacts of infrastructural changes. This ensures that vulnerable groups do not disproportionately bear the costs of progress. In essence, through its emphasis on respect, responsibility, and remediation, restorative justice provides a

comprehensive analytical lens, ensuring that the PED framework is not just technologically innovative and environmentally sustainable but also socially just and inclusive – effectively addressing existing power dynamics and deep-rooted disparities present in today's built environment.

Methodology: Critical thematic analysis of emerging visions of PEDs

For this study, we conducted a document-based critical thematic analysis (Lawless and Chen, 2018) to identify the emerging vision of how Positive Energy Districts (PEDs) can be planned and implemented in Europe.[1] The choice of critical thematic analysis was motivated by the fact that beyond identifying the emerging vision of PEDs, it also allows for the critical evaluation of how that vision may reproduce or challenge existing social-material structures and power dynamics that influence structural injustices. However, at this point, it is also important to acknowledge the potential limitations of our approach, including its reliance on available documents on PEDs, which, given their nascent stage of development, may lack comprehensiveness or accuracy. Additionally, a critical thematic analysis heavily depends on researchers' interpretations, thus entails subjectivity in theme identification and potential analytical bias, which may lead to overlooking alternative interpretations (Braun and Clarke, 2021).

To build a text corpus for the analysis, documents were identified through targeted searches in databases for EU policy, such as Eurostat, and scientific publications (articles, conference papers, reviews, book chapters) related to PED projects through Scopus and Web of Science using 'positive energy district' as a search term in titles, abstracts, and keywords. The search was conducted in January 2024 and limited to work published after the PED concept was established as part of the Implementation Working Group on Positive Energy Districts and Neighbourhoods for Sustainable Urban Development in 2018 (European Commission, 2018). Additionally, we included project reports,

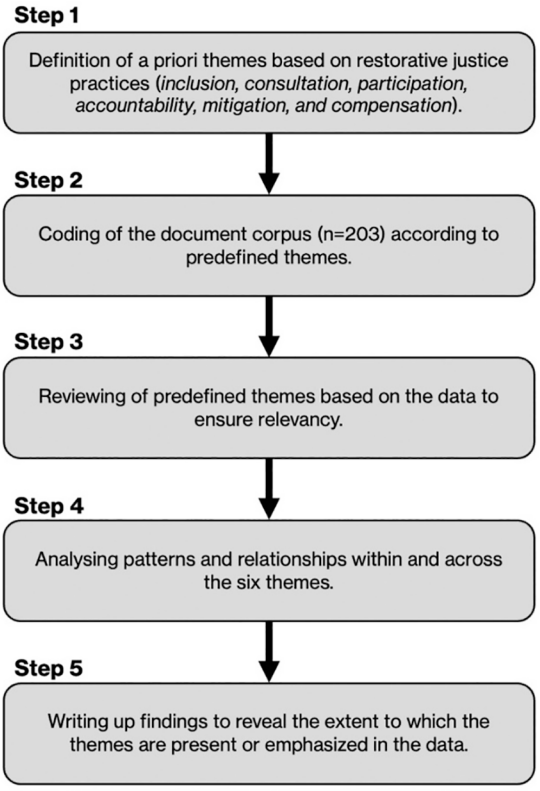
1 Document-based critical thematic analysis is a qualitative research method that involves identifying, analysing, and reporting patterns (so-called themes) within a sample of documents. It aims to critically examine the content to uncover underlying ideas, assumptions, and conceptualizations (Lawless and Chen, 2018). Compared to other forms of qualitative research, it is a non-linear and reflexive method that prioritizes depth over breadth, engaging with documents' context, meaning, and implications (Braun and Clarke, 2021).

evaluations, and white papers from real-life PEDs in our review. This information was obtained through the PED-EU-NET database (PED-EU-NET, 2024) and the JPI Urban Europe project catalogue 'Europe Towards Positive Energy Districts – A Compilation of Projects Towards Sustainable Urbanisation and the Energy Transition' (Gollner, 2020). After removing duplicates and conducting an initial screening based on analysing the documents' titles, abstracts, and project summaries, a total of 203 documents were selected. This sample of research articles on PEDs, policy documents related to the development of the PED framework, and reports and evaluations of real-world implementations of PEDs provided a comprehensive understanding of how the planning and implementation of PEDs are envisioned in Europe.

In the next step, we performed a deductive thematic analysis (Boyatzis, 1998; Fereday and Muir-Cochrane, 2006), utilizing our analytical framework based on the restorative justice framework, with a deliberate focus on critically evaluating how instances within the data might reflect the PED vision's capacity to either challenge or perpetuate structural injustices. The restorative justice framework and its related practices as outlined in the previous section of this chapter (see Figure 1) therefore informed the initial coding schema, which was composed of six a priori themes: inclusion, consultation, participation, accountability, mitigation, and compensation. Each document was methodically screened for instances and discussions corresponding to these themes, and coding was assisted through the MAXQDA software. Figure 2 outlines the methodological steps undertaken throughout the thematic analysis.

By employing this deductive stance, we actively searched for evidence within the data that would either confirm or challenge the presence of these restorative practices within the emerging vision for PEDs. This approach not only provided a systematic method for data analysis but also anchored our investigation in the established theoretical constructs, ensuring that our findings were rigorous and that our analysis was tailored to reveal how the PED concept may address or neglect key restorative justice concerns.

Figure 2: Methodological process for the deductive thematic analysis of the document corpus.



Source: Authors.

Results: Justice implications in PEDs

This results section is structured around the six main practices of the restorative justice framework: inclusion, consultation, participation, accountability, mitigation, and compensation.

Starting with the practice of inclusion, our thematic analysis revealed that the emerging vision for planning and implementing Positive Energy Districts in Europe, while ambitious in achieving environmental sustainability through

technological solutions, exhibits significant limitations when it comes to the inclusion of diverse social groups (Hearn et al., 2021; Nguyen and Batel, 2021; Sareen et al., 2022; Sassenou et al., 2024). The primary focus of real-world PED projects has been on newly-built districts, often sidelining existing urban areas, with only a handful of exceptions of retrofitting initiatives amongst funded projects (Bossi et al., 2020; Gollner et al., 2020). This approach has inadvertently limited the breadth of citizen inclusion, especially among socio-economically vulnerable residents. Social housing is frequently only part of PED planning or implementation projects in countries with national regulations that require a certain percentage of social housing in new developments (e.g. Spain and Germany) (Hearn, 2022).

Adding to that concern, while the involvement of multiple private partners in PED projects is considered a critical success factor by JPI Urban Europe (JPI Urban Europe and SET Plan Action 3.2, 2020; Slotte, 2021), the engagement of these private partners is often motivated by profitability (Zhang et al., 2021; Koutra et al., 2023). In the emerging visions for PEDs, this market-driven approach carries the risk of defaulting to development in economically profitable areas, such as high-end commercial zones or upscale residential neighbourhoods (Hearn, 2022), where the return on investment is most assured. Our analysis did not reveal strategies for how these economic drivers can be complemented with measures for social inclusion. This potentially leads to PED implementations that reinforce existing structural injustices, such as the concentration of high-quality housing and economic opportunities in affluent neighbourhoods, rather than mitigate them. There is an inherent risk that this approach of planning and implementing PEDs creates exclusive cases with progressive technology to meet climate challenges yet increases the number of 'left behind places' (MacKinnon et al., 2022) with both high social deprivation and an underdeveloped capacity to meet climate change.

Furthermore, when coding for consultation practices, we found a lack of initiatives aimed at developing an understanding and integrating knowledge of the lived experiences of residents, particularly those who are vulnerable or marginalized in the PED planning and implementation process (Sareen et al., 2022). No guidelines or principles were identified that would allow consulting citizens on the variety of energy needs and practices prevalent among different residents to be adequately considered when planning PEDs. In the PED-ID project report, only a short sentence points towards the need to collect data on 'citizen preferences' in the planning phase (Slotte, 2021), with Mihailova et al. (2022) putting forward a discrete choice experiment method to better un-

derstand citizen preferences for PEDs. Moreover, the current planning framework, shaped by a combination of municipal and private entities (Slotte, 2021; Larsson Kolessar, 2022), consequently risks overlooking the diverse and complex realities of urban living. While energy poverty alleviation and access to affordable housing can be regarded as core pillars of the emerging vision for PEDs (European Commission, 2018; JPI Urban Europe and SET Plan Action 3.2, 2020; Gouveia et al., 2021; Hearn, 2022), a wider spectrum of social and economic inequalities are yet to be addressed comprehensively in the PED planning and implementation process. This oversight can result in PEDs failing to reflect the actual needs and preferences of the communities they are intended to serve.

Related to participation practices, our thematic analysis further highlighted that while, in theory, as outlined in policy documents, PEDs are intended to be developed in a participatory, citizen-centric fashion (JPI Urban Europe and SET Plan Action 3.2, 2020), it appears that in practice, engagement with citizens or forms of co-creation are not that common (Hearn, 2022; van Wees et al., 2022). This can partly be attributed to the fact that in the implementation of newly built PEDs, no residents exist with whom co-creation can be facilitated (Bossi et al., 2020; Zhang et al., 2021). However, not even theoretical, delineated strategies of how to involve a broad spectrum of citizens were found during the analysis (see Larsson Kolessar, 2022 for lack of citizen considerations). Consequently, the emerging vision for PEDs does not adequately consider the barriers to participation that certain community segments might face, which may prevent them from contributing to PED planning and implementation. Such barriers inhibiting a more inclusive citizen engagement process might range from socio-economic constraints to language barriers, digital divides, or lack of trust in authorities. The failure to recognize and actively work towards dismantling these barriers means that the potential for a genuinely collaborative and co-created PED, one that reflects the diverse needs and insights of its residents, remains largely unrealized (Nguyen and Batel, 2021; Mihailova et al., 2022).

In addition, regarding accountability practices in decision-making, our findings suggest a lack of processes that track and evaluate the contributions and outcomes of PEDs concerning social aspects. Focus within the emerging vision for PEDs is primarily placed on measuring energy performance, efficiency, and greenhouse gas emissions (Angelakoglou et al., 2020; Civiero et al., 2021; Fichera et al., 2021; Williams et al., 2022). Hence, there is a need for transparent guidelines that hold decision-makers accountable for the inclu-

sivity and equity of PED projects. However, such guidelines are currently not part of the emerging vision. Accountability measures should ensure that the commitments made during the planning phases are actualized and that communities have recourse if PEDs fail to deliver on their promises of inclusivity and sustainability. However, measures or sets of principles such as setting up independent bodies to oversee the development of PEDs and ensuring that the impacts of PEDs are monitored and reported back to the community in a transparent and accessible manner were not found in the analysed documents. Moreover, the financing measures currently in place to support the few retrofitting PED projects often do not account for the economic diversity of urban populations (Gouveia et al., 2021). Our analysis came across limited forms of inclusive financing options (e.g. loans payable through financial savings on utility costs), which would allow for broader community investment in PEDs (Hearn, 2022). Without such mechanisms, there is a risk that PED planning and implementation becomes the purview of a select few, often those already economically advantaged, rather than a collective endeavour that benefits the entire community.

Compounding these issues is the lack of mitigation and compensation practices that we were able to identify in the emerging vision for PEDs. While affordability is put forward as a key principle by JPI Urban Europe (JPI Urban Europe and SET Plan Action 3.2, 2020), existing PED design and implementation frameworks do not sufficiently offer measures of how to apply this principle to mitigate adverse effects on existing communities, specifically with regard to concerns such as affordability of retrofitting, energy, and housing (Hearn, 2022). The financial implications of upgrading buildings to comply with PED standards are a significant barrier, with no clear solutions for managing these costs (Desvallées, 2022; van Wees et al., 2022). Similarly, the ongoing affordability of energy within PEDs is a contentious issue. While the aim is to reduce long-term energy costs through efficiency and renewables (Gollner et al., 2020; Fichera et al., 2021), how the immediate financial impact of investing in renewable energy technologies and battery storage should be managed so as not to create challenges for residents remains unaddressed. How to ensure the affordability of housing in PED projects is also inadequately considered, particularly with regard to concerns about the potential for increased housing costs and the risk of gentrification (Sareen et al., 2022). Without explicit measures to control property prices, there is a danger that PED initiatives may contribute to the displacement of current

residents rather than include those residents in the benefits of the urban energy transformation (Checker, 2011).

In addition, our thematic analysis did not uncover any concrete plans or policies aimed at compensating those who may be adversely affected by the shift towards PEDs. This oversight suggests a lack of comprehensive planning to support residents who may face financial burdens due to the transition, whether through increased housing costs, energy bills, or the necessity of retrofitting (Hearn et al., 2021). Lastly, the analysis has identified a lack of strategies or models for developing PEDs in a manner that can rectify existing structural injustices. The emerging vision for PEDs does not entail propositions on how to leverage the concept to compensate for and alleviate historical and systemic disparities within the urban environment. Instead, there is a risk, as outlined in this results section, that without intentional and strategic planning, PEDs may reinforce or even deepen such injustices.

Discussion: Emerging lines of conflict in the PED vision

The results of our critical thematic analysis, guided by the restorative justice framework and its related practices, reveal multiple lines of conflict embedded in the vision for Positive Energy Districts prevailing in Europe, posing challenges for built environment professionals aspiring to harness this concept for urban energy transformations. In the sections below, we will elaborate on three specific conflicts that arise in urban planning for PEDs and discuss potential strategies for addressing these conflicts in urban future-making: first, *technocentric decarbonization versus citizen inclusion and consultation*, then, *economic viability versus enhancing participation and mitigating vulnerabilities*, and lastly, *new building developments versus energy-positive retrofitting*.

Technocentric decarbonization versus citizen inclusion and consultation

Built environment professionals are caught between the need for rapid decarbonization to meet climate goals through advanced technologies and the imperative to ensure these urban transformations are also carried out in an inclusive manner that consults a broad range of citizens. The PED framework, entailing a variety of technological innovations, is at the forefront of this transformation and, thus, offers these professionals a portfolio of smart and efficient energy solutions. However, the real-life planning and implementa-

tion of PEDs, as revealed by the results of our thematic analysis, demonstrate significant limitations when it comes to including diverse social groups, as well as a lack of comprehensive consultation processes. If built environment professionals continue to follow this trajectory, certain sections of society could be inadvertently marginalized, particularly those who are socio-economically disadvantaged and thus cannot experience the immediate benefits (e.g. reduced energy costs) these technologies provide (Ahvenniemi et al., 2017; Sovacool et al., 2019). Additionally, our thematic analysis specifically points to a lack of initiatives to understand and integrate the varied energy needs and practices of different residents, which could be considered critical when planning inclusive PEDs. Applying the restorative justice practices within this context therefore requires professionals to develop a balanced approach to urban decarbonization efforts that not only focuses on the quantitative numbers of emission reductions but also emphasizes qualitative aspects of social inclusion.

Therefore, overcoming this line of conflict must entail understanding the lived experiences of all urban citizens, particularly those who may be historically marginalized. Integrating more explicit practices of citizen inclusion and consultation is thus not just a matter of addressing social justice but also a proactive way for built environment professionals to address PED project efficacy and long-term sustainability. Increased consultations, particularly with marginalized groups, could ensure that PED projects are grounded in the lived experiences of different communities and can thereby avoid reinforcing existing inequalities and structural injustices. Integrating diverse perspectives can help create a more resilient, adaptable, and inclusive urban energy transformation. Additionally, it will be critical to supplement the existing performance evaluation measures to assess energy efficiency and CO_2 emissions of PEDs (e.g. Angelakoglou et al., 2020; Jepsen et al., 2022; Pignatta and Balazadeh, 2022) with metrics that track the inclusivity outcomes of PEDs over time. Such measures, for example, could assess the extent to which PEDs contribute to enhancing community well-being, social cohesion, and community resilience. By considering the points above, built environment professionals can ensure that the required urban energy transformations, facilitated through PEDs, lead to significant emission reductions that benefit a broad layer of society.

Economic viability versus enhancing participation and mitigating vulnerabilities

A second line of conflict emerges for built environment professionals in ensuring the economic viability of PED projects as well as meaningful citizen participation. Our results highlight how the pursuit of making low-carbon modes of transportation, clean energy, and housing affordable and accessible to all urban residents may be at odds with the prevailing profit-driven development model of PEDs. Hearn (2022: 9) sums up this dilemma that professionals face as follows: 'If PEDs are to be a continuation of the existing modus operandi of profit-led capitalism, these may provide exclusive green living spaces for the wealthy but may not contribute to a sustainable and fair society.' From a restorative justice perspective, it is therefore paramount to establish planning and implementation frameworks that allow for the participation of a variety of different citizens, particularly given that our analysis has highlighted that most real-world PED projects are newly developed areas or business parks, thus lack participatory practices and co-creation with citizens altogether (Sassenou et al., 2024). A starting point for built environment professionals to overcome this participation gap while being mindful of the economic complexities of turning existing neighbourhoods into PEDs might be to strategically implement incremental development and piloting. This could involve selecting specific areas within a neighbourhood to introduce PED-related improvements, such as retrofitting buildings with energy-efficient technology or installing community-owned renewable energy sources. By starting small in existing neighbourhoods, these projects can demonstrate the economic viability of PEDs (e.g. reduced energy costs and creation of local jobs) as well as allow for the involvement of and co-creation with residents. Such citizen involvement in these pilots would provide valuable feedback and help tailor solutions that meet the community's needs. Built environment professionals could utilize the incremental successes from these pilots to secure broader buy-in from private investors or funding agencies and justify further governmental investments, thereby gradually transforming existing neighbourhoods into economically viable PEDs.

Moreover, especially as energy affordability is becoming a pressing issue for citizens across Europe, there is a growing need for mitigation practices that can enable equitable access to the benefits of PEDs, such as affordable clean energy. Otherwise, there is a risk that 'unaffordable energy costs and other necessities would push vulnerable populations into energy poverty and even ex-

treme poverty' (Guan et al., 2023: 305). However, our thematic analysis highlighted a lack of concrete strategies in the PED vision regarding how to mitigate energy poverty through PEDs or even measures to mitigate the upfront costs that PED solution implementation inherently carries. For built environment professionals, this reveals a need to develop financing models that enable low-income households to adopt energy-efficient technologies (Hadfield and Coenen, 2022). Cross-subsidization strategies could further complement such models (Leitheiser and Follmann, 2020), wherein a portion of the economic profit from newly developed PEDs is used to finance the deployment of similar districts in disadvantaged urban areas. These cross-subsidies would relate to increasing participatory practices by ensuring that the PEDs established in business parks and within new housing developments contribute to the funding of retrofitting projects in neighbourhoods most in need, thereby fostering a sense of communal investment in citizens' collective well-being rather than exacerbating urban injustices. Lastly, in the context of mitigation, considerations of long-term affordability are crucial. To avoid decarbonization efforts that lead to displacement, strategies must be developed to maintain inclusivity, going beyond simply providing initial access to the benefits of PEDs. This may require safeguarding against the risk of gentrification through rent stabilization measures (Checker, 2011).

New building developments versus energy-positive retrofitting

The last line of conflict becomes evident by taking a closer look at how PEDs are currently being developed: as already outlined above, across Europe, city-level policy-makers prioritize PED implementations in the form of newly built districts (Hearn, 2022). This emphasis on new building developments is understandable to a certain extent as it allows professionals to address prevailing housing shortages experienced by many European nations while ensuring new developments align with the EU's climate goals. However, upgrading the existing building stock to meet PED standards must be recognized as a similarly important initiative not only to ensure citizen participation but also to enable PEDs to mitigate existing or emerging vulnerabilities. Europe's existing building stock is a considerable source of CO_2 emissions, with 75% of buildings classified as not energy efficient, particularly those built before 2001. Accordingly, there is a need to renovate and improve the energy efficiency of around 35 million European buildings (European Commission, 2020). The urgency is underscored by various numbers across EU nations: In Sweden, for example,

this means that 1,875,000 apartments will need to be renovated in total (Palm and Reindl, 2016), while in Germany approximately 240,000 residential buildings would need to undergo renovation each year until 2050 (Federal Ministry of Economic Affairs and Climate Action, 2024) to reach the climate neutrality targets of the EU. However, studies find that demolishing existing buildings is still too frequently a preferred method (BRE, 2016).

Therefore, this specific line of conflict is not about overcoming a divide but rather finding a balance between new building developments and energy-positive retrofitting while firmly embedding practices of restorative justice related to compensation and accountability within both. For new developments of PEDs, accountability might imply the development of a specific quota at the EU level for the mandatory inclusion of low-cost and social housing (Hearn et al., 2021) to avoid exacerbating the increasing income segregation that frequently shapes new urban development (Van Ham et al., 2021). For energy-positive retrofitting, restorative justice might entail built environment professionals developing a compensation framework that offsets residents' retrofitting expenses and incentivizes energy-efficient behaviours. Such a framework could provide targeted financial assistance, such as retrofitting grants and energy-efficiency vouchers, which directly assist low-income renters often beset with precarious living conditions, including excessive cold and dampness, as well as the resultant negative health implications (Curl and Kearns, 2017). Addressing accountability proactively may require built environment professionals to craft positive energy retrofitting programmes that allocate resources directly to renters, enabling them to improve their living conditions without the looming threat of post-retrofitting rent increases (Desvallées, 2022). Shifting the focus away from subsidies that predominantly benefit landlords, additional compensation mechanisms could also be structured as tax benefits or rebates linked to the actual energy savings achieved post-retrofitting. Furthermore, by actively involving tenants in the retrofitting projects' planning and decision-making processes, built environment professionals can safeguard the occupants' interests, fostering a collaborative environment that promotes a collective commitment to energy efficiency and broader urban climate goals.

Conclusion

This chapter offered a critical thematic analysis of the emerging vision for Positive Energy Districts in Europe through the lens of restorative justice, identify-

ing a variety of shortcomings and embedded conflicts within the current planning and implementation framework. While acknowledging that PEDs are still in the early stages of development, thus limiting the breadth of our analysis, we believe our results become particularly valuable as they underscore the need for embedding restorative justice principles in this nascent phase. This ensures that, rather than simply be an afterthought or omitted entirely, these practices can become integral to the PED development model.

As a final remark, we would like to acknowledge that despite the concrete strategies proposed in this chapter on how the integration of restorative justice principles into the PED framework may enable the mitigation of prevailing injustices, it is crucial to recognize the inherent limitations of these efforts in the sense that some injustices might be beyond repair (Spelman, 2002). This understanding then requires an approach to planning and implementing PEDs that can distinguish between what can be rectified and what remains irreparable in the context of urban energy transformations. For reparable structural injustices, built environment professionals can actively pursue restorative measures, such as equitable resource access and inclusive community engagement, as outlined above. However, for injustices that are deeply entrenched in historical and socio-material structures, complete rectification may not be possible. In such instances, the focus should shift from attempting to repair the unrepairable to acknowledging that certain historical injustices cannot be undone, understanding these injustices, and learning from them so that they can guide more equitable and just practices in the future. It also calls for creating spaces for dialogue and healing, recognizing the trauma and loss experienced by affected communities.

The challenge for built environment professionals, therefore, lies in balancing the aspiration to restore prevailing injustices with a pragmatic acceptance of the limits of what can be achieved, especially within the scope of implementing PEDs. Acknowledging the limits of restoration, nevertheless, should not imply resignation to structural injustice but rather help build an awareness of the complexity of addressing long-standing urban disparities. While recognizing the historical depth and complexity of injustices and structural injustices that urban inhabitants face, we assert that PEDs, though unlikely to resolve these issues entirely, present a considerable opportunity to address these challenges. Built environment professionals should, therefore, aspire to utilize the PED concept to foster an urban environment that is environmentally sustainable and socially just. The inherent lines of conflict identified in this chapter offer tangible opportunities for urban future-makers to reflect on concerns re-

garding social justice and citizen well-being at a stage where they can still significantly influence the trajectory of PED planning and implementation.

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