

Energy vulnerability in underprivileged neighbourhoods: a socio-spatial analysis through energy justice and spatial capital lenses in Ghent, Belgium

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This version is the Accepted Author Manuscript

Verlooy, L. & Devos, T. (2026). Energy vulnerability in underprivileged neighbourhoods: a socio-spatial analysis through energy justice and spatial capital lenses in Ghent, Belgium.

*This is the Accepted Author Manuscript of an article published in Planning Practice & Research. The Version of Record is available at:
<https://doi.org/10.1080/02697459.2026.2624703>*

Energy vulnerability in underprivileged neighbourhoods: a socio-spatial analysis through energy justice and spatial capital lenses in Ghent, Belgium

This research explores energy injustices in underprivileged urban neighbourhoods through the lens of spatial capital. Based on interviews and collective mapping workshops, it analyses two case neighbourhoods in Ghent, Belgium: a modernist social housing area and a dense former working-class neighbourhood. The research identifies markers of spatial capital that influence residents' access to resources, opportunities, and barriers for participating in energy transitions. The findings show how socio-spatial inequalities amplify energy injustices, emphasising the critical need for place-based policies to foster equitable energy transition. By focusing on neighbourhood-scale dynamics, the research moves beyond individualised explanations to expose structural barriers to just energy transitions.

Keywords: Energy Justice, Spatial Capital, Energy Vulnerability, Underprivileged Neighbourhoods, Positive Energy Districts

1. Introduction

Urban energy transitions are increasingly seen as key levers for achieving carbon neutrality. The link between societal goals and energy system transformation is now widely acknowledged, as policy frameworks such as the European Green Deal emphasise social welfare and the need to address socio-spatial inequalities (Bridge & Gailing, 2020). The concept of Positive Energy Districts (PEDs) has emerged as a framework for more inclusive urban energy transitions (Hearn et al., 2021). Through neighbourhood-scale

interventions, PEDs aim to integrate social, spatial, and technical dimensions of energy transitions (Koutra et al., 2023; Magnusson & Rohrer, 2022; Sassenou et al., 2024).

However, critics argue that PED frameworks often fall short of these ambitions, as they remain dominated by technical and economic logics (Nguyen & Batel, 2021), prioritising infrastructure and efficiency over social inclusion. Moreover, they are mainly implemented in greenfield developments rather than in complex, existing urban areas (Gouveia et al., 2021). Critical scholarship should therefore interrogate their relevance for underprivileged neighbourhoods, which are structurally disadvantaged by the asymmetric spatial distribution of political, economic, and symbolic resources (Golubchikov & O'Sullivan, 2020). In such contexts, PED frameworks risk reinforcing rather than alleviating energy injustices. Inaccessible and costly renewable energy services exclude those unable to afford them (Hearn et al., 2021), while injustices often remain hidden or misrecognised due to limited opportunities for participation and deliberation among residents at risk of energy poverty (Stojilovska, 2023).

While research on energy poverty and vulnerability largely focuses on individuals or households, less attention has been paid to how energy injustices are (re)produced spatially through the built environment, tenure status, and neighbourhood infrastructures (Besagni & Borgarello, 2019; Bouzarovski & Simcock, 2017; Buzar, 2007; Kraaijvanger et al., 2023; Mashhoodi et al., 2019; Robinson, 2019; Robinson et al., 2018; Simcock & Petrova, 2018). As PEDs operate at the neighbourhood scale, it is crucial to expose the spatial tensions driving these injustices and to translate policy emphasis on the local scale into genuine contributions to just energy transitions.

This paper addresses this gap by exploring spatial capital as an analytical lens to examine how spatial configurations mediate energy vulnerability and justice in underprivileged neighbourhoods. Spatial capital captures the material and social resources embedded in place and residents' capacity to access and mobilise them. Empirically, the paper operationalises this concept through an analysis of two neighbourhoods in Ghent, Belgium, identifying key markers of spatial capital and linking them to the distributional, procedural, and recognitional dimensions of energy justice. By foregrounding this lens, the paper contributes to re-spatialising energy justice, showing how spatial arrangements and place-based conditions mediate the production of energy injustices and shape

possibilities for collective agency in urban energy transitions. The subsequent sections elaborate on the conceptual link between energy justice and spatial capital, introduce the case study context, and present the empirical analysis, concluding with a discussion of how a spatial capital perspective exposes the power relations and geographic constraints underpinning just energy transitions.

2. Conceptualising energy justice and spatial capital

This paper draws on energy justice and spatial capital to understand how energy vulnerability is shaped by socio-spatial dynamics in underprivileged neighbourhoods. Energy justice provides a framework for assessing inequities in energy systems and transitions, whereas spatial capital helps explain how socio-spatial configurations shape residents' access to resources that impact their capacity to participate in and benefit from energy transitions.

Energy justice

Energy vulnerability denotes the risk factors that increase the likelihood of households or communities to experience energy poverty (Bouzarovski, 2018; Simcock & Petrova, 2018), such as low income, rising energy prices, and inefficient housing infrastructure (Großmann & Kahlheber, 2018). Neighbourhoods can be particularly prone to energy poverty due to their geographical and social characteristics (Bouzarovski & Simcock, 2017). Yet, existing literature and policy often focus on socio-economic groups, overlooking energy poverty as a socio-spatial phenomenon (Bouzarovski et al., 2017).

Energy injustice typically refers to the inequalities in energy access, use, and policymaking (Feenstra & Özerol, 2021). As a conceptual, analytical, and decision-making framework, energy justice revolves around three interconnected tenets—distributional, recognitional, and procedural justice (Feenstra & Özerol, 2021; McCauley et al., 2013; Schlosberg, 2007)—each of which has a spatial manifestation (Bouzarovski & Simcock, 2017).

Distributional injustice concerns the unequal allocation of the benefits and burdens of energy systems. Distributional injustices are strongly related to socio-spatial inequalities (re)producing energy deprivation in particular spaces and social groups (Bouzarovski &

Simcock, 2017; Simcock & Petrova, 2018; Walker, 2009). In underprivileged neighbourhoods, a higher percentage of low-income households is prevalent, facing disproportionate burdens as a consequence of enhanced energy insecurity related to the energy transition (Carley & Konisky, 2020). This results in increased energy vulnerability and energy poverty (Bouzarovski & Simcock, 2017; Bouzarovski & Thomson, 2018; Buzar, 2007; Reames, 2016). This is further compounded by the concentration of poor households living in low-quality housing (Bouzarovski & Simcock, 2017; März, 2018). Emergency buyers¹ or (social) renters face heightened vulnerability, lacking the financial resources to invest in energy efficiency measures, to access renewables (Carley & Konisky, 2020; Vanderstraeten & Ryckewaert, 2019) or to adapt to climate change impacts, for example by implementing cooling systems (Knox, 2019).

Recognition injustice arises from the failure to recognise cultural, ethnic, racial, and gender differences (Jenkins et al., 2016). As policies to stimulate energy transitions mainly benefit middle-income households, misrecognition of the daily lives of households in energy poverty widens social inequalities and may lead to reduced public support for climate policies (Carrosio & De Vidovich, 2023; Fransolet & Vanhille, 2023; Juwet, 2020). Recognition injustice also operates at the spatial level, with the misrecognition or stigmatisation of places (Walker, 2009). Certain places in the daily life of poor individuals, or certain ethnic groups, are neglected and poorly served (Hastings, 2009; Hastings et al., 2005; Walker, 2009), suffering from underinvestment and a lack of political attention. A non-prioritised status for energy and infrastructure development (Golubchikov & O’Sullivan, 2020), can reproduce vulnerabilities of stigmatised places (Bouzarovski et al., 2017).

Procedural injustice emphasises how decisions regarding the allocation, utilization, and consumption of energy often occur out of the public eye and seldom within democratic forums (Newell & Mulvaney, 2013). In underprivileged neighbourhoods, residents often lack representation in decision-making processes that affect their everyday lives (Walker & Day, 2012). For instance, ‘strategic planning exercises’ leave little room for responding

¹An emergency buyer is someone that purchased a lower-quality property out of necessity, lacking the financial means to invest to bring the property to a satisfactory standard.

directly to both climate change and social justice imperatives because they occur at a scale that is too broad for local residents to identify local impacts (Steele et al., 2019). Moreover, the technocratic nature of the energy sector, characterised by secrecy and arcane technical knowledge makes public involvement more challenging (Szulecki, 2018). Underprivileged groups can be confronted with unfair decision-making processes (Bickerstaff et al., 2013) and holding the responsible parties accountable is often challenging because they are frequently powerful elites or multinational corporations (Newell & Mulvaney, 2013).

While the energy justice framework offers valuable insights, its spatial dimensions—particularly how place-based characteristics shape energy vulnerability—remain underexplored. To bridge this gap, this paper introduces spatial capital as an analytical lens for examining how geography, material space, and neighbourhood-specific conditions shape energy injustices.

Spatial capital

Spatial capital builds on Bourdieu's (1986) capital theory, which explains how combinations of capital shape individual choices and freedoms (Bourdieu, 1986; Israel & Frenkel, 2018) and define social status and power (Ramos, 2024). Bourdieu distinguishes between economic capital (financial assets such as income, property, and investments); cultural capital (education, tastes, lifestyle preferences, knowledge, and familiarity with dominant social norms and codes); and social capital (the quality of an individual's social networks and connections) (Bourdieu, 1986; Israel & Frenkel, 2018). Although spatial capital was not explicitly defined, space was central to Bourdieu's thinking, an omnipresent medium through which capital circulates (Mace, 2017). Later, scholars have emphasised that space is not a neutral backdrop but a fundamental dimension through which resources are mobilised and power is exercised (Barthon & Monfroy, 2010; Israel & Frenkel, 2018; Séchet & Veschambre, 2006). The concept spatial capital was introduced by Lévy (1994), who defined it as both the stock of place-based resources (parks, shops, meeting places, etc.) and residents' unequal ability to access them (De Decker & Wyckaert, 2023; Lévy & Lussault, 2003; Mace, 2017; Wyckaert et al., 2023). Lévy distinguishes 'position capital' (available amenities) from 'situation capital' (capacity to access them) (Lévy, 1994). While we acknowledge the conceptual distinction

between positional and situational capital, we do not separate them analytically here. At the neighbourhood scale, these dimensions are so deeply intertwined that separating them would obscure how physical layouts and community agency together shape patterns of energy vulnerability and opportunity.

Despite ongoing debates over the definition of spatial capital (Ripoll, 2019), we follow Mace (2017) in seeing spatial capital as analytically powerful and interdependent with other forms of capital. Focusing on spatial capital helps reveal how neighbourhood characteristics—such as social composition, morphology, housing quality, infrastructure, image and available amenities (Barthon & Monfroy, 2010)—produce both barriers and opportunities for energy transitions (Juwet, 2022; Sijmons et al., 2017).

Spatialising energy justice through spatial capital

There are several reasons spatial capital is a valuable lens for analysing neighbourhood-level energy injustices. First, spatial capital can challenge the taken-for-granted nature of built form (Mace, 2017), revealing how neighbourhood-scale spatial features perpetuate energy poverty and injustice, beyond individual socio-economic traits (Mace, 2017). It helps challenge the assumption that spatial layouts constitute neutral terrains for energy infrastructure implementation (Mace, 2017). Spatial capital also moves us beyond a deficit-based logic (Mace, 2017), showing how underprivileged areas can mobilise spatial opportunities arising from shared morphologies, proximity, or public spaces to drive collective retrofit or heating projects. Second, it uncovers power imbalances embedded in spatial arrangements and exposes how domination and exclusion shape who can access, control, or benefit from space (Mace, 2017; Israel & Frenkel, 2018), so that limited spatial capital constrains conversions to other forms of capital, whether economic (e.g., rising housing values) or social (e.g., neighbourhood cohesion) (Sen & Quercia, 2018). In the context of energy transitions, spatial capital offers a lens to examine how power imbalances affect access to energy services, infrastructures, and the benefits of sustainability initiatives. It helps connect isolated urban challenges, such as the need for retrofitting outdated housing to broader injustices, promoting a holistic, rather than fragmented understanding of social disadvantage (Mace, 2017). Third, spatial capital foregrounds the mutual shaping of social and physical space, countering deterministic ‘neighbourhood effects’ (van Ham & Manley, 2015; Mace, 2017). For energy transitions,

it shows how neighbourhood dynamics, such as social networks or place-attachment, can interact with built form, shaping access to energy resources and influencing community engagement in transition processes (Boostani et al., 2024; Dekker, 2007; Süsser et al., 2017).

Empirically, spatial capital has been identified or measured both quantitatively (e.g., space-syntax accessibility indices (Marcus, 2007) or amenities within walking distance (Sen & Quercia, 2018)), and qualitatively (e.g. mobility-work perceptions (Forsberg, 2019), or power relations and public space use (Long, 2022)). Despite the rising interest in the concept, most studies focus on how individuals or certain groups can mobilise spatial capital. Our work is more in line with Barthón and Monfroy (2010), who highlight the impact of the neighbourhood as a resource or limitation. We use spatial capital to identify neighbourhood-level, socio-spatial features—so-called ‘markers’—that can signify energy injustices due to residents being (un)able to access and mobilise spatial capital.

This paper argues that coupling energy justice with spatial capital can help develop a place-sensitive understanding of injustices in underprivileged neighbourhoods. While energy justice illuminates distributional, recognitional, and procedural dimensions, spatial capital details how these injustices manifest spatially—through local, spatial configurations of neighbourhood resources and residents' capacity to access and mobilise them. Closely related, spatial justice (Harvey, 1973; Soja, 2008, 2010) provides a normative framework addressing geographic dimensions of social inequality and its reproduction through space (Bouzarovski & Simcock, 2017). Like spatial capital, it offers a place-based lens for understanding energy poverty (Bouzarovski & Simcock, 2017). Adopting spatial capital as an evaluative framework captures the interrelations between spatial configurations, human agency, and resources—key for understanding spatial inequalities and operationalising aspirational spatial justice (Chandel et al., 2025). Spatial capital is particularly operational through its connections to other capital forms—economic and social (Ramos, 2024). Since capitals function as sources of exchange and power, these interconnections reveal how spatial arrangements reproduce or challenge inequalities (Ramos, 2024) and how energy (in)justices are shaped by spatial markers that other capitals can either mitigate or deepen. For instance, social capital—through strong networks—may help residents to access energy subsidies despite spatial constraints.

3. Researching energy injustices, two case studies in Belgium

Research context

This research is situated in Ghent, a city in Belgium's Flemish region, where energy policy is shaped by a co-evolution of infrastructure networks and an individualised housing model (Juwet, 2020), positioning citizens primarily as individual energy consumers. This study focuses on two underprivileged neighbourhoods, Watersportbaan and Sluizeken-Tolhuis-Ham, both subjects of Ghent's urban renewal strategy (see Figures 1 and 2 for their geographical locations).

Watersportbaan is a modernist high-rise social housing neighbourhood, located near several large institutional campuses, such as schools and a hospital. It has a high concentration of socially disadvantaged tenants, facing poverty, psychological vulnerability and substance abuse. Despite generous green spaces, the area lacks human-scaled public amenities. The housing blocks require retrofitting. However, social housing renovation in Flanders is hindered by complex governance, budget constraints, and fragmented decision-making, leading to complex retrofitting trajectories (Dockx et al., 2023; Winters, 2023). Regarding energy transitions, there is an opportunity to develop a heating network using residual heat in this neighbourhood.

Sluizeken-Tolhuis-Ham is a dense, multicultural 19th-century belt neighbourhood with small private terraced houses and limited green or public space. It lacks a central hub and consists of fragmented quarters (Schiettecat et al., 2024). It is experiencing a surge in popularity and continuous evolution due to ongoing real estate developments, creating tensions between the existing and new residential patrimony (interview city official team urban renewal, 2024). A heat study did not outline a clear path for collective energy solutions, relying instead on local opportunities like geothermal energy under (semi)public spaces, and rooftop solar panels.

In both neighbourhoods, a large share of the inhabitants face energy vulnerabilities. Residents share socio-demographic traits, such as low incomes (Statbel, 2024), ethnic diversity, high tenancy rates, and a large proportion receiving increased reimbursements (Intermutualistisch Agentschap, 2024; Provincies in Cijfers, 2024). However, their spatial layouts and ownership structures differ significantly. While demographics explain barriers and opportunities for energy transitions, spatial indicators are equally important.

Yet, geographical differences are underexplored in research, which tends to focus more on socio-economic inequalities (Bouzarovski & Simcock, 2017).

Research Approach

This study employs a two-stage methodology. In the first stage, exploratory conversations were conducted with a diverse range of stakeholders, including social workers, neighbourhood managers, energy experts, and policy officers. These discussions aimed to understand neighbourhood dynamics, map the network of actors, and identify relevant projects. To foster an open and informal exchange, some interviews were not recorded, allowing for more spontaneous dialogue, while more formal interviews, with policy makers or social housing companies, were recorded and transcribed to ensure traceability. All interviews were analysed using a matrix characterising the case study neighbourhoods across five key dimensions: (1) spatial context, (2) energy system, (3) socio-demographic context, (4) stakeholder landscape, and (5) governance and institutional context. Interviews were conducted online or in person—either at participants’ workplaces or local community centres—and lasted approximately one hour. Table 1 gives an overview of the interviews.

Table 1. Interviewed actors (n=17, 2024-2025)

Organisation/institution	Role
Ghent municipality	City officials from environment and climate and urban renewal; Neighbourhood managers; Neighbourhood workers
High school	Neighbourhood anchor
Civil society organisation	Outreach community worker
Engineering consultancy	Research consultancy involved in the concept study for the Watersportbaan; research consultancy involved in a study on living and care in Sluizeken-Tolhuis-Ham.
Social housing company	Policy advisor for sustainability; Building manager; Advisor rent and participation services; Building superintendent
Civil society organisation	Social welfare worker that supports vulnerable inhabitants in Ghent in their renovation process
Advice centre for energy efficiency and renovation	Sustainability building advisor, supporting renovations in Ghent
Co-creative public space design atelier	Socio-cultural worker

Second, building on insights from the exploratory interviews, we organised collective mapping workshops in both neighbourhoods (see Tables 2 and 3 for an overview of the workshops, their focus and participants). To support the discussions, we developed a set of easy-to-read maps that visualised places, observations, and insights, linking energy issues to everyday social practices such as caring, maintaining, working, and feeding. This thematic framing through a form of ‘soft cartography’ made energy’s often intangible role in everyday life visible and offered participants familiar entry points into complex debates. The workshops were held in carefully chosen neighbourhood locations where people regularly gather for daily activities, work and social events—such as community centres, or the local hospital—and lasted approximately 1.5 hours.

The maps served a dual function. First, they acted as conversation starters, grounding abstract energy topics in everyday experiences. Second, they served as participatory tools for spatial data collection, enabling stakeholders to annotate and discuss specific locations directly on the maps. This approach also allowed for spatial analysis of the collected data. With each workshop, the maps were iteratively enriched, capturing new insights and building on previous discussions. Figures 3 and 4 illustrate this process and highlight the diversity of perceptions and spatial complexities that emerged through the mappings.

Table 2. Collective mapping workshops in Watersportbaan (2024)

Workshop content	Participants
1. Learning & working	Neighbourhood manager; Neighbourhood anchor high school; Outreach coordinator kindergarten (n=3)
2. Meeting & connecting	Inhabitants (n=4)
3. Feeding and meeting	City official from environment and climate; neighbourhood workers (n=3)
4. Voicing social renters	Housing support consultant; Director advice centre for energy efficiency and renovation; Outreach community worker; Building superintendent social housing company (n=4)
5. Social dimensions of the potential of district heating	City officials from environment and climate and from urban renewal; Consultants involved in the energy landscape study for Watersportbaan; Technical facility manager and director Hospital (n=5)

Table 3. Collective mapping workshops in Sluizeken-Tolhuis-Ham (2024)

Workshop content	Participants
6. Meeting & working	Personnel from poverty organisation, personnel from environmental organisation (n=4)
7. Unstructured conversations with inhabitants during the weekly open soup bars	Neighbourhood inhabitants (n=4)
8. Meeting	Neighbourhood workers (n=5)
9. Caring and connecting	Administrative and strategic personnel from a secondary school (programs within the study area Society and Welfare); Head of the hospital care department; Rental Counsellor social housing company (n=5)
10. Maintaining	Youth worker, Artist involved in a socio-cultural neighbourhood project (n=2)
11. Meeting & connecting	Director integration agency, Director cultural organisation, City official team urban renewal (n=5)

Figure 1. Location of Ghent in Belgium

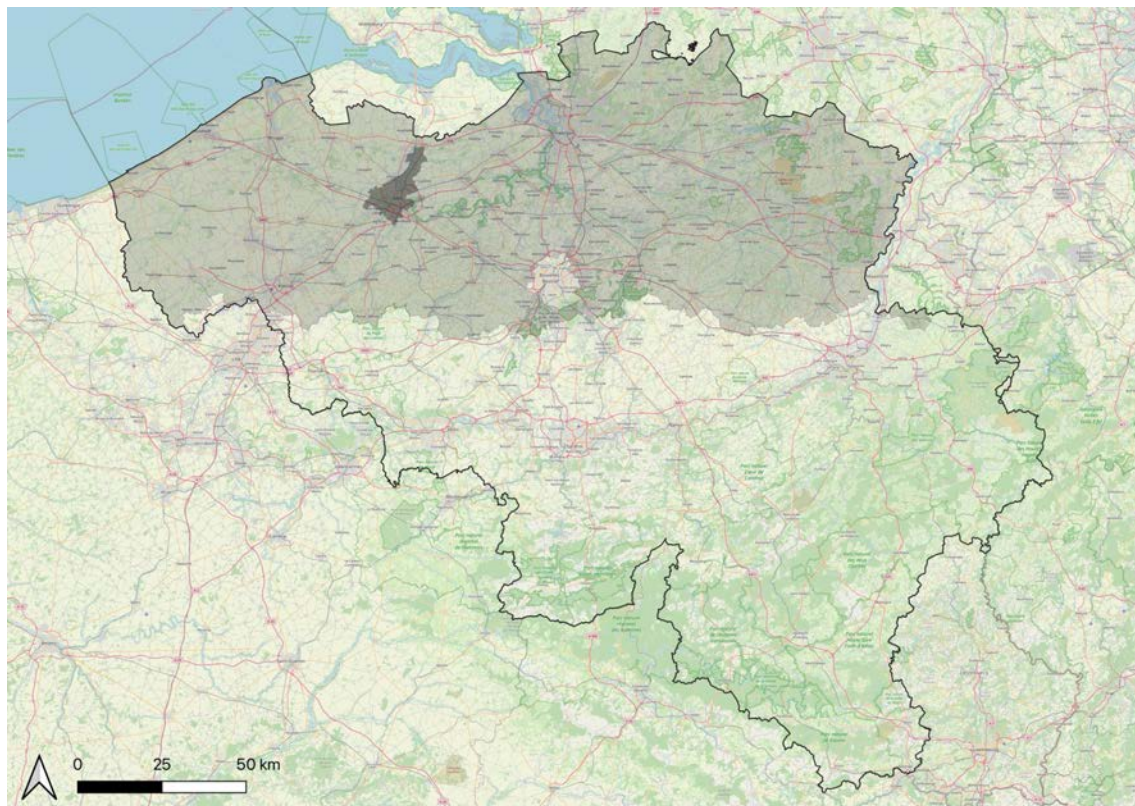


Figure 2. Location of Watersportbaan (West) and Sluizeken-Tolhuis-Ham (East) in the city of Ghent

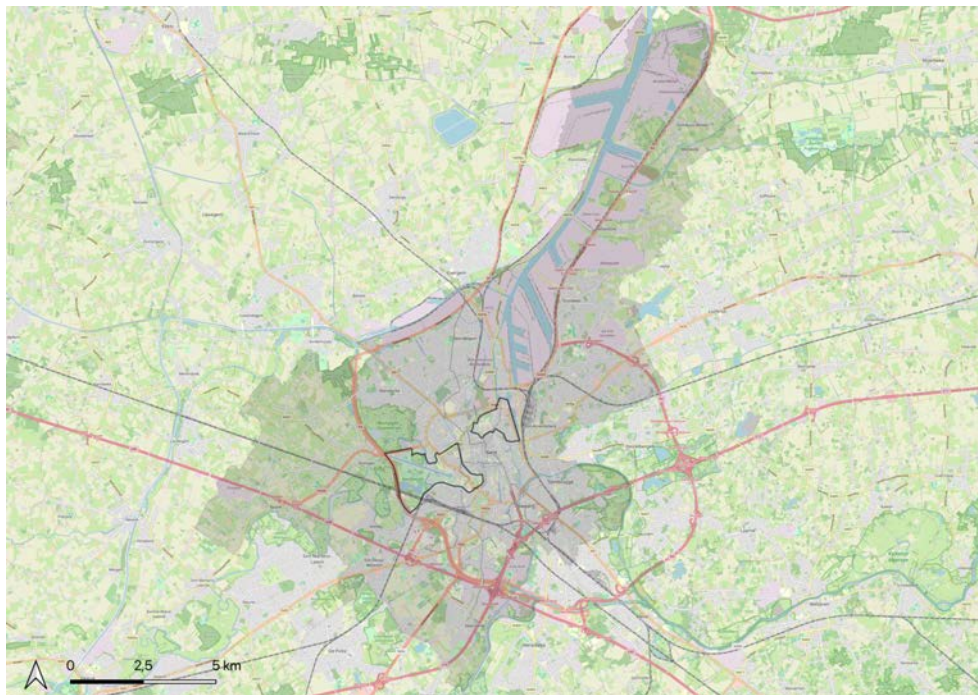


Figure 3. Watersportbaan, collective neighbourhood mapping (illustrative purposes, output of the collective mapping workshops)



Figure 4. Sluizeken-Tolhuis-Ham, collective neighbourhood mapping (illustrative purposes, output of the collective mapping workshops)



Participants for the interviews and subsequent collective mapping workshops were selected using a snowball sampling approach, beginning with neighbourhood coordinators (a municipal officer acting as a local liaison between residents and city departments) and local policymakers responsible for energy and urban renewal in the case study areas. Data analysis followed an iterative process, combining insights from the interviews and workshops. Particular attention was paid to identifying socio-spatial barriers to accessing energy resources, disparities in infrastructure quality, and uneven participation in decision-making processes. These insights were synthesised into ‘markers of spatial capital’—tangible, often place-based manifestations of spatial capital that can be empirically identified and analysed at the neighbourhood scale.

4. Results

The following sections identify key markers of spatial capital in each neighbourhood, based on empirical research and situated within existing literature. Tables 4 and 5 provide a non-exhaustive overview of how these markers relate to dimensions of energy justice, highlighting their bidirectional relationship, meaning that they may reinforce one another.

In presenting these findings, we integrate empirical observations with relevant scholarly research to build a coherent argument that links place-specific manifestations of spatial capital in the case studies to broader debates on energy (in)justice. While the primary focus here is on empirical insights, the inclusion of literature serves to contextualise local experiences within wider academic discussions. Each subsection begins with an empirically grounded description of a marker, followed by a brief theoretical contextualisation. This structure clarifies which insights originate from fieldwork and which draw on prior research, addressing the dynamic interplay between data and theory that underpins the analysis. This approach allows the empirical material to engage directly with the literature, illustrating how local experiences resonate with, challenge, or extend existing conceptual understandings.

Watersportbaan

Table 4. Markers of spatial capital and relation to energy injustice, Watersportbaan

Spatial capital – markers	Energy injustice	References
High-rise fragmentation: • Lack of social interaction¹ • Isolation¹	• Recognitional: the misrecognition of how isolation erodes trust and a sense of community, undermining ability for collaboration and collective action^{2,3}	¹ Nguyen et al., 2024 ² Derkenbaeva et al., 2022 ³ Cui et al., 2024
Marginalised tenant enclave: • Stigmatisation^{4,5} • Neglected buildings in poor condition with outdated energy installations • Limited access to spatial resources or (transition) opportunities^{4,5}	• Distributional: high energy bills; limited agency for social renters to integrate renewables⁶ • Procedural: lack of involvement social renters/social partners in neighbourhood transition processes⁷ (e.g. district heating) • Recognitional: position of social renters is not represented; dismissive discourses and ‘unburdening’⁷	⁴ DellaValle et al., 2018 ⁵ Charles et al., 2025 ⁶ Middlemiss & Gillard, 2015 ⁷ Charles et al., 2025
Living in limbo • Discourages ownership in (long-term) neighbourhood	• Procedural: limited agency to influence the social housing renovation⁹	⁸ Westbrook et al., 2024 ⁹ Charles et al., 2025

transitions and a sense of belonging⁸ • Reduces capacity to mobilise spatial opportunities	• Recognitional: the prospect of renovation leads to no more investments in the buildings/energy installations, resulting in even more decay/neglect for current inhabitants	
Local and supra-local mismatch: • Mismatch between interests and capacities of neighbourhood stakeholders¹⁰ • Large institutional stakeholders focus on their own objectives detached from neighbourhood needs/opportunities (financial, spatial, ...)	• Procedural: undervaluation and disintegration of local knowledge¹¹ from inhabitants and social partners leads to under-represented energy needs • Procedural: power imbalances between local and supra-local stakeholders concerning transition decisions	¹⁰ Breukers et al., 2017 ¹¹ Geussens et al., 2024
Abundant, but neglected public spaces • Infrastructural disinvestment¹² • Isolating public space • Little recreational spaces, public facilities or commercial services, hindering social interactions, increasing insecurity and anonymity¹³ • Spatial opportunity for geothermal heat and district heating	• Recognitional: the misrecognition of places¹⁴ is associated with stigmatisation, undermining collective action¹⁵ • Procedural: neglect of public involvement in decision-making and its impact on living conditions/environments^{16, 17} related to district heating	¹² Steele et al., 2012 ¹³ Qi et al., 2024 ¹⁴ Walker, 2009 ¹⁵ McNamara et al., 2013 ¹⁶ Charles et al., 2025 ¹⁷ Wolsink, 2018
Disconnected transition approaches • Siloed government departments create fragmented approaches to address sustainability transitions (food, mobility, energy, ...) ^{18, 19, 20} • Building-per-building renovation approach of the housing blocks without a comprehensive neighbourhood plan	• Procedural: oversight of disconnected policies and procedures	¹⁸ Schwanen, 2018 ¹⁹ Rotmans & Loorbach, 2010 ²⁰ Uytterlinde et al., 2021

The first marker, high-rise fragmentation, captures how Watersportbaan's morphological layout—characterised by compartmentalised social housing towers—creates an isolating

urban environment, and exemplifies a neighbourhood with limited spatial capital. As a socio-cultural worker described “there are few incentives for people to meet each other, you don't know the neighbour next to you. The buildings are compartmentalised by elevator shafts and there are few meeting spaces” (interview socio-cultural worker, 2024). Although the area has an abundance of open space, these public spaces are in decline and poorly integrated into the community’s social life. The built environment lacks communal infrastructure and inviting meeting places that encourage social interaction and cohesion. Theoretically, this aligns with findings by Cui et al. (2024) and Derkenbaeva et al. (2022) who show how spatial isolation can weaken trust and a sense of belonging, limiting collaboration. These spatial configurations undermine the social capital essential for collective energy initiatives (Malik, 2024), revealing that spatial capital is not merely about the presence of resources, but about residents’ ability to access and use them meaningfully. In Watersportbaan, spatial fragmentation can lead to recognitional energy injustices as it erodes trust, a sense of community, and undermines the ability for collaboration or collective action. This further undermines the above described collective engagement in energy transitions.

The second marker, marginalised tenant enclave, refers to the social and spatial clustering of low-income tenants within the social housing estate. Empirical findings show that residents experience limited agency and few opportunities to influence decisions about their buildings or neighbourhood. As the neighbourhood coordinator explained (2024), this effectively constrains their access to energy efficiency measures and renewable energy initiatives. The district heating project exemplifies this imbalance: while institutional stakeholders driving this network gain access to sustainable energy, social renters are left out of the decision-making process for the sake of ‘deburdening’ and do not see their interests represented (workshop voicing social renters, 2024; workshop dimensions district heating, 2024). This resonates with recent academic work, emphasising distributional and procedural injustices with regard to social renters in renewable transitions (Charles et al., 2025; Middlemiss & Gillard, 2015). Furthermore, living in this tenant enclave can foster stigma and a deviant self-image, discouraging social interactions and weakening community ties, further undermining collective action crucial for collective energy transitions (DellaValle et al., 2018; McNamara et al., 2013). This marker thus demonstrates how spatial power imbalances reproduce inequities in energy access and participation (Mace, 2017; Israel & Frenkel, 2018).

The third marker, living in limbo, captures the effects of underinvestment and delayed renovation in the social housing stock. Empirical findings from interviews and workshops show that the renovation backlog leaves Watersportbaan residents facing demolition or major renovations that generate uncertainty, relocations, and unstable living conditions (interview neighbourhood coordinator, 2024; workshop voicing social renters, 2024). This state of ‘living in limbo’ creates fundamental barriers to participation in energy transitions (Westbrook et al., 2024). Balancing meaningful involvement with not overburdening tenants remains a challenge. For example, within this context, the social housing company has chosen not to circulate detailed transformation plans with tenants (yet), hoping to reduce stress and prevent unrest, especially given the scale of the task ahead in renewing the social-housing stock. As a government official noted, large-scale renovations and demolitions will likely displace current tenants before changes take effect, leading institutions to question the value of participatory processes for energy transitions:

“(Resident participation in Watersportbaan) is something quite different for the energy issue (...) because it primarily concerns the buildings themselves, and tenants have very little influence on that. (...) For Watersportbaan, we know that a major transformation of the buildings is coming, which should actually solve that problem of the energy transition. So to what extent does it make sense to set up a large, participatory process with residents there? We know their impact on it is quite limited, and that a solution is already on the horizon.” (Government official urban renewal, 2025).

This perspective highlights how, in Watersportbaan, the highly technical and predetermined nature of the renovation process is perceived as too burdensome for resident consultation. In contrast, other neighbourhoods lack such clear solutions, rendering the potential gains from participation there more significant. While this institutional reasoning is understandable from an operational standpoint, it risks reinforcing a pattern of top-down decision-making that sidelines social tenants' perspectives and reproduces procedural and recognitional energy injustices. We argue that limited resident involvement in these processes can unintentionally constrain opportunities for tenants to voice their perspectives and develop a sense of belonging and ownership in neighbourhood transitions. Charles et al. (2025) describe this dynamic as a

paternalistic model of renovation that leaves little room for tenant agency. Moreover, the prospect of future renovations exacerbates existing injustices in the area: delayed maintenance and postponed energy upgrades worsen living conditions and foster resentment (workshop voicing social renters, 2024). Over time, this spatial marker of prolonged uncertainty erodes residents' sense of connection to the neighbourhood and diminishes their ability to identify and act on spatial opportunities to contribute to shaping the neighbourhood's future.

The fourth marker, local–supra-local mismatch, captures the tension between neighbourhood-level needs and the agendas of large institutional actors operating in the area. Interviews and workshops reveal how several major institutions, school campuses and a hospital campus, serve supra-local functions that significantly impact the neighbourhood's identity, mobility patterns, and public space use, yet their core objectives and activities remain largely detached from residents' everyday needs. This is also reflected in a recent spatial study on the area (Vervloesem et al., 2024). This creates a fundamental mismatch between the interests and capacities of different neighbourhood stakeholders. The district heating project, initiated by these institutions as part of their sustainability goals, exemplifies this dynamic: while institutional actors act as 'transition frontrunners,' social tenants are excluded and must rely on the housing association to represent their interests (workshop social dimensions of the potential district heating, 2024). This creates energy injustice through the undervaluation and disintegration of local knowledge, leading to under-represented energy needs. It furthermore leaves the benefits of spatial capital concentrated among institutional stakeholders. Social partners have voiced concerns about whether local interests are adequately represented and how the project will address residents' needs (workshop voicing social renters, 2024). Many tenants, as one city official noted, lack the financial or mental resources to engage with such complex transitions, often preoccupied with daily survival (interview, government official urban renewal, 2025). Yet, the fieldwork also uncovered misrecognised forms of spatial and practical knowledge: residents' practical experiences with billing issues, installation challenges, and technology-behaviour interactions remain largely untapped (workshop district heating, 2024). This finding aligns with research emphasising how equitable transitions depend on educating residents to reduce consumption, while also empowering them, and engaging with diverse forms of everyday know-how and lived realities to bridge the supra-local gap (Charles et al., 2025; Bahaj & James, 2007).

Social welfare workers, despite being well-positioned to represent marginalised voices, remain disconnected from critical energy transition discussions, which are typically framed as technical and outside their expertise. This situation highlights the need to strengthen their representation, as these actors possess valuable insights into the needs of local communities. With a clearer role and greater authority in decision-making, their contributions could significantly support the neighbourhood's transformation and help bridge the gap between institutional actors and residents (Geussens et al., 2024). This mismatch marker reveals how spatial arrangements can systematically under-represent energy needs when decision-making power is concentrated among actors detached from daily lived realities.

“The focus on the core business of the social housing company, being ‘bricks and mortar’ overlooks the growing vulnerability of the residents in the Watersportbaan area.” (interview community worker, 2024).

The fifth marker, abundant but neglected public spaces, highlights how underinvestment and poor maintenance have left Watersportbaan's open areas underused and detached from daily neighbourhood life. Despite their spatial potential, these spaces often lack facilities and social meaning, which discourages interaction and reinforces residents' sense of isolation. Theoretically, such misrecognition of public space as a social resource (Walker, 2009; McNamara et al., 2013) undermines both community cohesion and residents' capacity to mobilise spatial assets for collective initiatives, including future energy projects (Charles et al., 2025; Wolsink, 2018).

The sixth marker, disconnected transition approaches, highlights how multiple transition agendas in Watersportbaan—such as energy, mobility, and food—often operate in silos. The neighbourhood demonstrates how urban transition agendas often remain disconnected in practice, leading to energy injustices, despite requiring an integrated neighbourhood approach to generate positive spillover effects across sectors (Schwanen, 2018). This fragmentation is clearly illustrated in the renovation plans for the residential towers. It has been evident in the past building-by-building renovation strategy of the social housing company, where each tower followed its own trajectory without a clear overarching neighbourhood framework, making it difficult to achieve the critical mass needed for district-level interventions such as a collective heating network. However,

recent developments indicate a shift toward more integrated planning. A new masterplan for the social housing estate is currently being developed, aiming to coordinate future renovations more strategically. Furthermore, multiple transition agendas in Watersportbaan are insufficiently linked. Residents face issues accessing affordable and sustainable food or public transport in their direct living environments. This lack of coordination across transition agendas constrains residents' ability to mobilise spatial assets, such as proximity or accessibility to meet sustainability goals. However, recent steps by the city of Ghent signal change. An innovative programmatic approach aims to foster stronger collaboration between municipal departments, such as energy and spatial development, with the goal of aligning urban renewal more closely with social priorities (interview city official team urban renewal, 2024).

Sluizeken-Tolhuis-Ham

Table 5. Markers of spatial capital and relation to energy injustice, Sluizeken-Tolhuis-Ham

Spatial capital - markers	Energy injustice	References
Renovation divide ²¹ : • Uneven uptake of energy efficiency measures^{22, 23} • Renovictions/low-carbon gentrification	• Distributional: unequal distribution of burdens for inhabitants who cannot afford (obligatory) renovations; tenants with limited agency to implement energy efficiency measures • Procedural: regressive impact of retrofitting subsidies • Procedural: renovation measures leading to increased housing prices²⁴ • Procedural: non-transparent information about future renovation measures	²¹ Cui et al., 2024 ²² Willand et al., 2020 ²³ Bouzarovski et al., 2018 ²⁴ Weißermel & Wehrhahn, 2024
Urban density with pressured public space: • Limited (public) space for energy production²⁵	• Distributional: the lack of public and private spaces limits the ability to implement renewable energy infrastructure	²⁵ Derkenbaeva et al., 2022

'Patchwork' of neighbourhood fragments • Few neighbourhood centralities • Lack of meeting spaces	• Recognitional: the misrecognition of the need for meeting places for social cohesion and community engagement, required for collective organisation around energy²⁶	²⁶ Gaupp et al., 2023
Disconnected renewal • (Private) developments fail to address neighbourhood-specific needs, eroding community ties • Catalysts for collective energy solutions are missed	• Recognitional: the recognition of underprivileged residents' needs²⁷ is lacking in renewal projects, deepening energy poverty and displacement²⁸, leading to 'place destruction'^{29, 30} • Procedural: unevenly distributed decision-making power, with larger/wealthier actors granting a stronger voice in urban renewal	²⁷ Simcock et al., 2021 ²⁸ Kallin & Slater, 2014 ²⁹ Fullilove, 2004 ³⁰ Richard, 2024
Ambiguous heat vision • Lack of clear neighbourhood energy transition pathway	• Procedural: (currently) unclear heat vision leads to promoting individual electric solutions as no-regret options, excluding residents with limited resources (financially, technically, and spatially)³¹	³¹ Edwards et al., 2024

The first marker, the renovation divide, captures how ownership patterns and housing conditions in Sluizeken-Tolhuis-Ham shape uneven access to energy efficiency improvements. The neighbourhood is dominated by private ownership, with a high percentage of private renters at the lower end of the private rental market, and emergency buyers who are owner-occupiers. These groups often occupy poorly insulated 19th-century housing, creating a stark divide in energy efficiency access. Empirically, interviews and workshops reveal that while wealthier residents can upgrade their properties, many inhabitants face a double bind: they live in homes requiring the most extensive energy retrofitting, yet possess the least capacity to make improvements (interview social welfare worker, 2024). The limited ability to invest in upgrading a dwelling undermines the residents' use and value of spatial capital. A city official expressed concern that renovation costs can be substantial, placing financial strain on some homeowners and even leading to forced sales (interview city official environment and climate, 2024). This finding shows how socio-economic inequality directly translates

into spatial vulnerability, with limited agency to improve energy efficiency deepening the renovation divide. This aligns with academic work emphasising how upfront renovation costs create barriers for economically vulnerable households, perpetuating energy poverty, and worsening the renovation divide (Boardman, 2010; Bouzarovski et al., 2018). This inequity disproportionately affects poorer residents facing 'retrofit poverty' (Willand et al., 2020), giving rise to energy injustices. Emergency buyers especially face significant threats. The regressive nature of retrofit subsidies further widens inequalities, often benefiting wealthier households (Willand et al., 2020). Moreover, seemingly neutral policy instruments, like Energy Performance Certificates (EPC), can reinforce procedural injustices. Bouzarovski et al. (2018) show how EPCs, while intended to promote energy efficiency, indirectly increase housing costs, triggering 'low-carbon gentrification' (Bouzarovski et al., 2018) or 'renovictions' (Weißermel & Wehrhahn, 2024). Such processes lead to the contraction or destruction of spatial capital (Rerat, 2018), as displaced or financially burdened residents lose access to spatial resources, limiting their ability to mobilise spatial capital.

“The average figures about the neighbourhood may present a distorted picture; there are different ways of living. You can have a good life here, but you can also be deeply mired in misery.” (interview neighbourhood coordinator, 2024).

“I think we also have a large share of landlords who simply don't want to invest (...) They still receive rent every month, even if the dwelling is in poor condition. At the same time, there is little leverage to get these people to renovate.” (interview government official urban renewal, 2025).

The second marker, urban density with pressured public space, highlights how residents' limited access to spatial resources can weaken their spatial capital. Interviews and workshop discussions have highlighted how the dense urban form and scarcity of communal spaces complicates the integration of renewable energy technologies, which require sufficient space (interview city official environment and climate, 2024). This spatial constraint particularly affects renters and financially vulnerable residents who rely more on public spaces, not only for recreational purposes, but also for energy transitions. This scarcity of public and shared space not only limits technological deployment but also undermines the social infrastructure necessary for inclusive energy transitions.

Closely related, the third marker—the patchwork of neighbourhood fragments—captures how Sluizeken-Tolhuis-Ham's dispersed and fragmented neighbourhood centralities can limit opportunities for cross-community collaboration and collective mobilisation (interview neighbourhood coordinator, 2024). This resonates with recent research by Gaupp et al. (2023) emphasising that 'transformative agency'—the capacity for communities to enact meaningful change—requires spaces for action and interaction. Sluizeken-Tolhuis-Ham's lack of meeting spaces and community hubs (Schiettecat et al., 2024) represents a misrecognition of how social cohesion underpins successful energy transitions. Shared spaces, green areas or community hubs are key for collective engagement, resource sharing and building alliances (Gaupp et al., 2023). Their absence limits residents' ability to organise collectively and challenge dominant agendas. From a spatial capital perspective, this lack of shared infrastructure signals a deprivation of place-based resources that support the formation of social capital and empower residents to enact change. Together, these markers reveal how physical spatial constraints translate directly into energy access limitations, disproportionately burdening underprivileged groups.

The fourth marker, disconnected renewal, emphasises how the neighbourhood's renewal has been largely disconnected from its community. Despite its strategic location near the city centre and a train station—endowing it with high potential spatial capital—private development projects have mostly benefited, rather than contributing to the community's empowerment or resilience. Furthermore, often, such projects proceeded without meaningful input from existing residents (interview city official team urban renewal, 2024). This disconnected renewal leaves many residents with a sense of unfairness, perceiving that some parts of the neighbourhood are being upgraded, while other areas are left behind in decay. One example is the commercial shopping site Dok Noord, which fails to engage local youth, as these spaces are often paid, of a pre-structured nature, with little alignment to their needs (Schiettecat et al., 2024). Theoretically, this disconnection reflects a broader pattern of uneven development, in which decision-making power concentrates in the hands of wealthy developers and investors. The stigmatised character of underprivileged neighbourhoods often legitimises urban regeneration policies that lead to gentrification and displacement (Kallin & Slater, 2014). Such processes can erode neighbourhood liveability (Schiettecat et al., 2024), reduce access to affordable housing and local amenities, and exacerbate spatial inequalities and energy injustices.

Furthermore, this disconnected approach to urban renewal undermines opportunities for implementing collective energy solutions, which depend on coordination across projects. Instead, it often results in more individual-scale solutions. From a spatial capital perspective, this marker demonstrates how renewal processes that exclude community participation can simultaneously deplete existing spatial capital through displacement while failing to build new collective capacities needed for just and inclusive energy transitions.

“Participation regarding the energy transition is essential in this fragmented urban fabric, because ownership is so fragmented. If you don’t get people on board, you risk the entire process becoming blocked” (interview government official urban renewal, 2025).

Lastly, the absence of a clear heat vision for the neighbourhood—marker 5—has created uncertainty regarding collective energy solutions. While the city is actively exploring alternatives to fossil fuels, it currently promotes individual measures, such as heat pumps, as ‘no-regret’ solutions (interview city official environment and climate, 2024). This approach may accelerate the energy transition, but it also risks financially excluding residents who cannot afford such measures. Moreover, promoting individual solutions can make it harder to engage people later in collective solutions, which may offer greater financial and spatial benefits. This fragmented, individual-focused approach weakens the neighbourhood’s spatial capital by failing to mobilise collective spatial assets and coordinate across buildings or blocks. In neighbourhoods such as Sluizeken-Tolhuis-Ham—with an outdated housing stock, financial vulnerability, or dense urban forms—the viability of individual solutions is constrained by financial aspects and spatial characteristics, such as technical feasibility, building orientation, or regulations. This hinders mobilising collective spatial assets, hampering spatial capital. A government official stated: “I feel like our approach is still too piecemeal at times, especially from a spatial point of view. Sometimes it would make more sense to approach a whole neighbourhood or building block as one unit. Because at the current pace, with the tools we have now, we’re just not going to get there” (interview government official urban renewal, 2025). This marker reveals how policy uncertainty and fragmented governance prevent the strategic mobilisation of spatial resources, hampering residents' capacity to leverage their spatial capital collectively and perpetuating individual-scale solutions that may be financially or spatially unviable for vulnerable populations. This reinforces the

need for area-based strategies that move beyond individual measures to mobilise spatial resources.

Comparative synthesis

A comparison of Watersportbaan and Sluizeken-Tolhuis-Ham reveals how the presence or absence of spatial capital shapes patterns of energy (in)justice. Despite clear differences in housing tenure, ownership, morphology, and transition approaches, both neighbourhoods exhibit recurring limitations in spatial capital that constrain residents' capacity to participate in and benefit from energy transitions.

In both cases, the morphology and built form—whether the compartmentalised and isolated high-rise structures of Watersportbaan or the dense, ageing housing stock and constrained public spaces of Sluizeken-Tolhuis-Ham—shape energy injustices by creating unequal exposure to energy inefficiency and undermining participation in collective energy efforts. These spatialised inequalities are further reinforced by power relations embedded in local governance and policy structures. In Watersportbaan, this is manifested through the concentration of marginalised tenants and temporariness of living conditions, which limits residents' agency and excludes them from decision-making in transition projects. This is exacerbated by a mismatch between local needs and the supra-local agendas of institutional stakeholders leading the energy transition. In Sluizeken-Tolhuis-Ham, spatial inequalities are expressed through a 'renovation divide', where underprivileged residents lack the financial and technical capacity to improve their homes, a condition worsened by regressive subsidy schemes and policies that accelerate gentrification.

Across both contexts, limited spatial capital contributes to energy injustices through the misrecognition of local agency, and unequal distribution of transition burdens. Across both contexts, constrained spatial capital manifests through fragmented planning and disconnected transition agendas, whether in Watersportbaan's uncoordinated projects or Sluizeken-Tolhuis-Ham's disconnected renewal and ambiguous heat visions, leading to energy injustice, as a consequence of a lack of transparency and a misrecognition of local needs.

5. Discussion and conclusions

This paper examines how a spatial capital perspective generates place-specific insights into energy injustices at the neighbourhood level. Using a comparative case study of two Ghent neighbourhoods, we show how distinct spatial markers both reflect and reinforce energy injustices, revealing a bidirectional dynamic: socio-spatial barriers deepen energy vulnerability, while unequal transition processes further erode neighbourhood spatial capital. The study contributes to the literature by demonstrating how spatial, social, and structural factors intersect to shape energy injustices, and by providing a framework for integrating spatial capital into analyses of just energy transitions. By applying a spatial capital lens at the neighbourhood scale, the paper illustrates how social and spatial inequalities intersect and reinforce each other, connecting local experiences to wider structural dynamics. In doing so, we have used existing literature not only to situate our empirical findings within broader debates on energy justice and spatial inequality, but also to frame and interpret the specific neighbourhood dynamics observed in the field.

Spatial capital helps reframe energy injustice beyond individual socio-economics by treating space as an active enabler or barrier to just transitions (Bouzarovski & Simcock, 2017; Gürtler, 2023; Mace, 2017). Applied at the neighbourhood scale, it highlights how vulnerable households often live clustered in specific areas where geographical inequalities are compounded. The case studies show how inequalities can be deeply embedded in energy systems shaped by the material and discursive dimensions of a geographical area (Sayan, 2019): ageing housing stock, and dense or fragmented layouts, can inflate energy costs and constrain affordable upgrades. Beyond analysis, spatial capital offers practical value for policymakers, supporting place-based diagnostics of vulnerability and more context-sensitive interventions. Indeed, recent European policy frameworks, such as PEDs, embrace neighbourhood approaches that are context specific and integrate different transition agendas (Parkhill et al., 2015; Koutra et al., 2023), yet these initiatives are often concentrated in affluent areas (Hearn et al., 2021). Underprivileged neighbourhoods therefore require a justice-oriented understanding of spatialised energy vulnerability to inform area-based policies that truly alleviate energy poverty (Bouzarovski & Simcock, 2017; Sayan, 2019).

Furthermore, spatial capital allows us to critically interrogate how power structures shape space (Mace, 2017) and how this deeply affects energy transitions. We have shown how

ownership structures can sideline (social) renters from renovation decisions, while high urban density fuels competing spatial claims that can limit collective energy solutions. These imbalances reinforce stigmatisation, reducing both the perceived value and policy priority of underprivileged areas (Walker, 2009), and residents' self-perception (McNamara et al., 2013). Spatial capital thus captures not only the physical presence of resources but also the capacity to access, shape, and benefit from them (Lévy, 1994; De Decker & Wyckaert, 2023).

Our findings empirically show how spatial and social realities are deeply intertwined (Mace, 2017). Physical environments—such as isolating tower block layouts or the absence of communal spaces—can weaken social ties, trust, and collective capacity. Similarly, individualised retrofit schemes fragment responsibility and undermine spatially efficient collective approaches. They risk fragmenting collective agency and eroding spatial capital by discouraging collaboration, pooling resources or building trust networks which are crucial for just transitions. Limited spatial capital constrains the development and mobilisation of social capital, which in turn limits participation in energy programmes, uptake of sustainable technologies, and the emergence of grassroots initiatives.

These insights carry key policy implications: technical fixes or isolated infrastructure investments are unlikely to succeed if they are not paired with efforts to strengthen the social fabric and build local ownership (Mace, 2017). Many top-down retrofit strategies assume physical upgrades will automatically generate social benefits. In reality, long-standing exclusion, fragmented community ties, and negative representations create major barriers to participation (Gaupp et al., 2023; Joshi et al., 2022; McNamara et al., 2013). Neighbourhood-scale energy policies must prioritise lived experience and collective agency, embedding social innovation that fosters co-creation and knowledge exchange for a more equitable and sustainable future (Gaupp et al., 2023).

Building on a spatial capital lens, several directions for future research and policy developments emerge. First, research could explore how the urgent need to revitalise underused or poorly maintained public spaces in underprivileged neighbourhoods can become a lever for energy transitions. This could involve co-designing upgrades while exploring innovative ways to integrate renewable energy and sustainable, community-led

maintenance models that enhance public amenities and support collective energy systems. Second, as the analysis demonstrates, social welfare partners, social housing companies or socio-cultural neighbourhood players could play a stronger role as ‘transition frontrunners’, facilitating capacity-building, resident support, and brokerage of neighbourhood collaborations (Rotmans & Loorbach, 2010; Suitner et al., 2023). Third, there is a need for more in-depth studies on how low-threshold energy support programmes, or peer-to-peer energy sharing initiatives can be embedded in residents’ daily routines and existing social gathering points. By situating such efforts within familiar neighbourhood “nodes,” these initiatives can build on existing trust networks to strengthen participation and collective agency in local energy transitions. Fourth, subsidy schemes should be examined to explore how incentives can be allocated at the neighbourhood level, based on area-wide energy poverty metrics, rather than targeting individual homeowners. This could help enable more coordinated and equitable retrofits. Fifth, there is a need to develop spatial policy frameworks that guide renovations by private homeowners in ways that upgrade the housing stock while avoiding resident displacement. Across these directions, living labs and other multi-stakeholder testbeds can illuminate socio-technical pathways, while intermediaries can perform crucial relational work to bridge residents and institutions, ensuring that interventions resonate with local needs and capacities (Campos & Marín-González, 2023; Hargreaves et al., 2013; Von Wirth et al., 2019).

6. Declaration of Competing Interest

The authors report there are no competing interests to declare.

7. Ethical considerations

Research participants have been anonymised, ensuring they remain unidentifiable in the manuscript. Participants in this research have given their informed consent. This study has been ruled as non-interventional by the ethics committee responsible of Ghent University, faculty of architecture and engineering.

8. Acknowledgements

This study is part of the CO2PED project, we thank project colleagues Griet Juwet, Laura Shllaku and Sophie Leroy for their contributions in the fieldwork, and Griet additionally, for the valuable feedback on this paper.

This work was supported by the FWO under Grant S009123N_ERA_NET_SBO as part of the JPI Urban Europe DUT program.

Generative AI tools Claude and ChatGPT were used for idea exploration and language improvement purposes. The authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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