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SHARE-North Squared

Parks vs. Parking: Value of Urban Ecosystem Services

Vegetation, Mobility, and the Reallocation of Urban Space in Malmö, Helsingborg and Lund

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Summary sheet

Project Name	SHARE-North Squared
Title of the document	Parks vs Parking: Value of Urban Ecosystem Services. Vegetation, Mobility, and the Reallocation of Urban Space in Malmö, Helsingborg and Lund
Deliverable	/
Work Package	WP3 – Exploration, Monitoring, and Evaluation
Programme	Interreg NSR
Coordinator	Freie Hansestadt Bremen
Website	https://www.interregnorthsea.eu/sn2
Author	Michael Johansson, Lund University
Status	Public
Dissemination level	Open
Reviewed by	/
Starting date	January 2023
Number of months	48

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Summary

Parks or Parking? Rethinking urban space in Southern Sweden

Cities across Europe are facing a fundamental dilemma: how should scarce urban land be used in a time of climate change, densification, and growing demands for public health and social cohesion? For decades, a significant share of urban space has been allocated to the storage of private cars. Streets, courtyards, and large surface lots have been designed around the assumption that car ownership is a normal and necessary condition of urban life. Yet as cities pursue climate neutrality and more liveable environments, this model is increasingly questioned.

This study examines how residents in Malmö, Helsingborg, and Lund perceive the transformation of parking areas into green spaces. Through in-depth interviews with 27 residents and analysis of municipal planning strategies, the research explores whether reducing parking is experienced as a loss of accessibility or as a gain in environmental and social quality.

Across all three cities, green spaces were consistently described as essential elements of everyday life. Residents referred to parks and green courtyards as “breathing spaces” that offer relief from traffic, noise, and dense built environments. They associated vegetation with calmness, mental restoration, and improved well-being. During recent heatwaves, shaded areas and tree-lined streets were experienced as noticeably cooler and more comfortable than asphalt-dominated environments. Parents emphasized the importance of green areas for children’s play and development, while many interviewees described parks as shared meeting places that strengthen neighbourhood identity and social interaction.

In contrast, parking was primarily framed in terms of convenience. For residents who commute by car or live in less centrally located areas, having accessible parking was described as practical and sometimes essential. However, even frequent drivers often acknowledged that parking occupies a large amount of valuable space relative to how little cars are used. While parking benefits were perceived as individual and instrumental, the benefits of green space were seen as collective and multifaceted.

The study also found that parking availability influences mobility behaviour. In areas where parking supply had been reduced and high-quality alternatives such as cycling infrastructure, reliable public transport, and shared mobility services were available, residents often adapted their routines. Some shifted to cycling more frequently, others increased their use of public transport, and a few households reduced the number of cars they owned. Importantly, these adjustments were rarely described as long-term sacrifices. In many cases, residents reported that neighbourhood quality improved after parking areas were converted into green or multifunctional spaces.

Resistance was nevertheless present. Concerns about accessibility, especially among older residents and suburban commuters, were common. Some homeowners expressed fears that reducing parking might affect property values or housing attractiveness. Generational differences were visible, with younger residents generally more open to car-light lifestyles and older residents more attached to established mobility routines. However, acceptance of parking reduction increased significantly when high-quality green spaces visibly replaced former parking lots. When residents could see and experience the benefits, scepticism often softened.

The findings suggest that the debate between parking and parks is not simply about transport logistics. It reflects deeper questions about what cities prioritize and how urban value is defined. Green infrastructure provides multiple benefits simultaneously, including climate regulation, social cohesion, public health, and aesthetic quality. Parking primarily supports private vehicle storage. When land is scarce, this difference becomes crucial.

For cities and regional initiatives such as SHARE-North Squared, the research offers important insights. Parking reform can support sustainable mobility transitions, but only when combined with reliable transport alternatives and inclusive planning processes. Visible improvements in public space are essential for public acceptance. Reallocating space from parking to vegetation is therefore not merely an environmental improvement; it represents a structural shift toward more resilient, inclusive, and climate-responsive urban systems.

Ultimately, the study suggests that the question facing European cities is not how much parking they can maintain, but how urban land can best serve collective well-being in the long term.

Sammanfattning

Parkering eller parker? Om stadens markanvändning i grön omställning

Många europeiska städer står inför en grundläggande fråga: hur ska den begränsade marken i tätorten användas i en tid präglad av klimatförändringar, förtätning och ökade krav på folkhälsa och social hållbarhet? Under decennier har stora ytor i städer reserverats för parkering av privata bilar. Gator, innergårdar och öppna parkeringsytor har utformats utifrån antagandet att bilägande är en självklar del av stadslivet. I takt med att klimatmålen skärps och ambitionerna om mer levande och hållbara städer växer, ifrågasätts denna prioritering.

Denna studie undersöker hur invånare i Malmö, Helsingborg och Lund upplever omvandlingen av parkeringsytor till grönområden. Genom 27 djupintervjuer samt analys av kommunala styrdokument analyseras om minskad parkering upplevs som en försämring av tillgänglighet eller som en förbättring av livsmiljö och stadskvalitet.

I samtliga tre städer beskrev invånarna grönområdena som centrala för vardagslivet. Parker och gröna innergårdar beskrevs som andningsrum som erbjuder paus från trafik, buller och täta stadsmiljöer. Många kopplade grönska till lugn, mental återhämtning och ökat välbefinnande. Under senare års värmeböljor upplevdes skuggade parker och trädkantade gator som märkbart svalare och mer behagliga än asfaltsdominerade ytor. Föräldrar betonade betydelsen av gröna lektyor för barns utveckling, och flera intervjupersoner beskrev parker som gemensamma mötesplatser som stärker grannskapets identitet och sociala sammanhållning.

Parkering beskrevs däremot främst i termer av praktisk bekvämlighet. För pendlare och boende i mer perifera områden uppfattades tillgång till parkering som viktig och ibland nödvändig. Samtidigt noterade även frekventa bilister att parkering tar stora ytor i anspråk i förhållande till hur lite bilen faktiskt används. Medan parkeringsnyttan uppfattades som individuell och funktionell, upplevdes värdet av grönska som kollektivt och mångdimensionellt.

Studien visar också att parkeringsutbud påverkar resvanor. I områden där parkering minskat och där alternativ som cykelinfrastruktur, tillförlitlig kollektivtrafik och delade mobilitetstjänster finns tillgängliga, har många invånare anpassat sina vanor. Vissa har börjat cykla mer, andra använder kollektivtrafik oftare, och några hushåll har minskat antalet bilar. Dessa förändringar upplevdes sällan som långvariga uppostringar. Tvärtom beskrev många att bostadsområdet blivit mer attraktivt när parkeringsytor ersatts med grönska och gemensamma ytor.

Motstånd förekom dock. Särskilt äldre invånare och personer med starkt bilberoende uttryckte oro för försämrade tillgänglighet. Vissa fastighetsägare befarade att minskad parkering skulle påverka bostadens värde. Tydliga generationsskillnader framträdde, där yngre invånare oftare såg bilfria eller bilsnåla livsstilar som naturliga, medan äldre i högre grad var knutna till etablerade bilvanor. Samtidigt ökade acceptansen när högkvalitativa gröna miljöer faktiskt ersatte parkeringsytor. När förbättringarna blev synliga och konkreta minskade skepsisen.

Resultaten visar att diskussionen om parkering och parker inte enbart handlar om transportfrågor. Den rör djupare prioriteringar kring hur stadens mark ska användas och vilka värden som ska dominera. Grön infrastruktur levererar flera nyttor samtidigt, såsom klimatanpassning, social sammanhållning, folkhälsa

och estetiska kvaliteter. Parkering fyller huvudsakligen en funktion: att förvara fordon. I en tät stad blir denna skillnad avgörande.

För kommuner och initiativ som SHARE-North Squared innebär studien viktiga lärdomar. Parkeringsreformer kan stödja omställningen till hållbar mobilitet, men endast om de kombineras med fungerande alternativ och inkluderande planeringsprocesser. Synliga förbättringar i stadsmiljön är avgörande för acceptans. Att omvandla parkeringsytor till grönska är därför inte bara en miljöåtgärd, utan en strukturell omorientering mot mer resiliert, inkluderande och klimatanpassad stadsutveckling.

I slutändan visar studien att frågan inte främst är hur mycket parkering staden behöver, utan hur stadens mark bäst kan bidra till långsiktigt gemensamt välbefinnande.

1. Introduction

1.1. Background

European cities are increasingly confronted with difficult land-use trade-offs in the transition toward climate-neutral and socially sustainable urban development. Urban land is finite yet demands upon it continue to intensify due to population growth, densification strategies, climate adaptation requirements, biodiversity loss, and the need to enhance public health and social cohesion. As municipalities pursue compact-city policies to reduce urban sprawl and transport emissions, the competition for surface space becomes more acute. One of the most pressing spatial conflicts concerns the allocation of land between green infrastructure and parking infrastructure.

This conflict is fundamentally about opportunity costs. Every square meter devoted to car storage is a square meter not available for vegetation, stormwater retention, biodiversity corridors, recreational space, active mobility infrastructure, or social interaction. In dense urban environments, these trade-offs are not marginal but structural. Surface parking and multi-level parking facilities represent a substantial share of developable land, often in locations well suited for ecological or community-oriented functions. From a sustainability perspective, the question is not merely how much parking is needed, but what forms of urban value are displaced by its provision.

Historically, post-war planning paradigms in Europe institutionalized automobile accessibility as a core organizing principle of urban form. Zoning practices, parking minimum requirements, and road expansion policies embedded high levels of parking supply into residential and commercial developments. These regulatory frameworks reinforce car dependency by normalizing automobile ownership as a precondition for urban participation. Parking minimums in particular functioned as spatial subsidies to automobility, shaping built form and land economics for decades.

However, accelerating climate commitments at EU and municipal levels, alongside increasing awareness of environmental degradation and public health impacts, have shifted planning discourse toward sustainable mobility, compact development, and green infrastructure. The European Green Deal, Fit for 55 targets, and urban climate adaptation strategies have strengthened pressure to reduce transport emissions and enhance resilience. Within this evolving context, the theoretical framework of green urbanism has gained prominence, advocating integrated approaches where ecological performance, social well-being, and economic vitality are co-produced through multifunctional land use.

The transition from car-oriented planning toward sustainable mobility is central to this shift. Rather than treating mobility solely as transport efficiency, contemporary approaches emphasize accessibility, proximity, shared mobility systems, and active travel. Reallocating space from parking to green infrastructure can therefore serve dual purposes: reducing structural incentives for car ownership while simultaneously enhancing ecosystem services and urban liveability.

Southern Sweden offers a particularly relevant context for examining this transformation. Malmö, Helsingborg, and Lund are mid-sized cities operating within a high-trust governance system, strong environmental policy culture, and growing climate ambition. All three municipalities have adopted strategies to reduce car dependency and expand sustainable mobility options, including cycling infrastructure, public transport investments, and mobility service integration.

Within the Interreg North Sea Region project SHARE-North Squared (SN2) framework, the reallocation of parking space becomes more than a local planning decision; it becomes a strategic lever for systemic mobility transition. By reducing parking supply and embedding shared mobility services—such as car sharing, bike-sharing, and multimodal hubs, cities can weaken the structural lock-in of private automobility. Simultaneously, liberated land can be repurposed for green infrastructure, enhancing ecosystem services such as heat mitigation, stormwater management, and biodiversity support.

This intersection between shared mobility transition and green urbanism is critical. While SN2 primarily addresses mobility systems, its implications extend directly to spatial planning and land-use governance. The transformation of parking infrastructure into multifunctional green and social spaces represents a tangible manifestation of mobility transition at neighbourhood scale.

In this context, the central question is not simply whether parking can be reduced, but how its reallocation contributes to climate mitigation, climate adaptation, social sustainability, and urban resilience simultaneously. Understanding how residents perceive these transformations is therefore essential. Acceptance of shared mobility and reduced parking is not purely technical, it depends on lived experience, perceived fairness, accessibility, and local identity.

By situating the Malmö, Helsingborg, and Lund cases within the broader objectives of SHARE-North Squared, this study explores how mobility transition and green infrastructure expansion intersect in everyday urban life. It examines whether reallocating space from parking to vegetation is perceived as loss of convenience or as gain in ecological and social value—and whether such spatial reconfigurations can support the broader ambition of the North Sea Region to become climate-neutral, space-efficient, and socially inclusive.

1.2. Reframing the research problem: Urban land as a political-ecological resource

The allocation of urban land between parking infrastructure and green space cannot be understood merely as a technical or managerial planning decision. Rather, it constitutes a fundamentally political-economic question concerning the production, distribution, and valuation of urban space (Lefebvre, 1991; Harvey, 2008; Logan & Molotch, 1987). Urban land is not a neutral substrate but a contested resource embedded within competing regimes of value, shaped by institutional arrangements, property markets, governance logics, and sociocultural norms. Decisions about how land is allocated reveal underlying priorities about mobility, accessibility, environmental resilience, and collective well-being.

In contemporary European cities, this competition increasingly manifests as a tension between entrenched automobility systems and emerging ecological urbanism paradigms. The persistence of parking infrastructure in dense urban environments exemplifies this conflict. Surface parking, underground garages, and parking minimum regulations occupy significant shares of developable land, often in highly accessible and centrally located areas. The spatial dominance of parking is thus not accidental; it is the material expression of a historically consolidated mobility regime.

Automobility, as conceptualized by Urry (2004), is not simply a transport mode but a sociotechnical regime, an interconnected system of infrastructures, economic interests, regulatory frameworks, cultural

imaginaries, and everyday practices. This regime is stabilized through reinforcing feedback loops: road investments encourage car ownership; car ownership generates demand for parking; parking provision reduces the perceived cost of driving; and dispersed land use patterns further entrench automobile reliance (Newman & Kenworthy, 1999; Cervero, 2003). Parking minimum requirements in particular have institutionalized high levels of car storage within urban form, functioning as a spatial and economic subsidy to private vehicle ownership (Shoup, 2005; Manville, Beata & Shoup, 2013).

From a political economy perspective, parking is not only mobility infrastructure but also an instrument of land valorisation. Growth coalitions (Logan & Molotch, 1987) and real estate actors often frame parking provision as necessary for property value retention and market competitiveness. Consequently, parking becomes embedded within urban development models that prioritize accessibility for motorists and commodification of land. This institutionalization generates path dependency (Pierson, 2000), making the reduction of parking politically sensitive and economically contested.

Conversely, green infrastructure embodies an alternative regime grounded in ecological resilience, public health, and social reproduction. Urban vegetation is increasingly recognized not as aesthetic surplus but as critical infrastructure delivering ecosystem services, including heat mitigation, stormwater management, biodiversity support, carbon sequestration, and air purification (MEA, 2005; Gill et al., 2007; Bowler et al., 2010; Gómez-Baggethun & Barton, 2013). Beyond biophysical functions, green spaces contribute to psychological restoration (Kaplan & Kaplan, 1989; Ulrich, 1984), social cohesion (Peters, Elands & Buijs, 2010), and environmental justice (Wolch, Byrne & Newell, 2014).

Within this framing, reallocating space from parking to vegetation is not merely a redistribution of land use categories but a reorientation of urban metabolism and collective value production. It shifts spatial priority from individualized car storage toward multifunctional ecological infrastructure that serves broader publics. In doing so, it challenges the dominance of automobility and opens space for alternative mobility regimes centred on proximity, active travel, and shared mobility systems.

The transition from parking-dominant to vegetation-rich urban space can thus be interpreted through the lens of sustainability transitions theory (Geels, 2011). Using the Multi-Level Perspective (MLP), parking reduction represents a potential destabilization of the automobility regime, triggered by landscape pressures such as climate commitments, EU decarbonization targets, and rising awareness of biodiversity loss. Simultaneously, niche innovations—including shared mobility platforms, mobility hubs, and maximum parking policies offer pathways for regime reconfiguration. The integration of green infrastructure into urban redevelopment further aligns with green urbanism and biophilic city approaches (Beatley, 2011), which advocate systemic ecological integration within dense urban environments.

Importantly, this transformation is not only technical but normative. It involves redefining what constitutes urban value. While parking delivers accessibility convenience and private utility, green infrastructure generates collective benefits and long-term resilience. The core tension, therefore, concerns whether urban land should prioritize individualized mobility rights or shared ecological and social goods.

These reframing positions urban land as a political-ecological resource, a medium through which competing visions of the city are negotiated and materialized. Urban space is not simply allocated according to functional efficiency but according to normative assumptions about urban life, rights, and priorities. Decisions concerning the balance between parking infrastructure and green space therefore

reveal underlying political choices about who the city is designed to serve. When substantial land is reserved for car storage, urban space implicitly privileges those who own and operate private vehicles. Conversely, when land is reallocated to green infrastructure and shared public environments, it signals a prioritization of collective accessibility, ecological resilience, and inclusive urban life.

The allocation of land also reflects broader assumptions about how mobility should be organized. Parking-dominant planning reinforces individualized, car-based mobility regimes structured around ownership and spatial dispersion. In contrast, reducing parking provision and investing in green and public spaces aligns with models of mobility centred on proximity, multimodality, shared systems, and active travel. These choices shape everyday practices and, over time, normalize patterns of movement and accessibility.

Moreover, land-use decisions determine how environmental burdens and benefits are distributed across urban populations. Parking infrastructure contributes to impervious surfaces, urban heat island effects, and spatial fragmentation, while green infrastructure enhances microclimate regulation, stormwater absorption, biodiversity, and opportunities for recreation and social interaction. The redistribution of land from parking to vegetation therefore has implications for environmental justice, influencing which gain access to ecosystem services and which continue to bear environmental externalities.

Finally, the competition between parking and green space forces a reconsideration of what forms of value are prioritized per square meter of urban land. Parking delivers individualized utility tied to convenience and property market considerations, whereas green infrastructure generates multifunctional ecological, social, and health-related benefits that extend beyond direct users. The question is thus not only how much space is allocated to each function, but how urban value itself is defined and measured, whether primarily through short-term economic calculus or through broader metrics of resilience, well-being, and collective sustainability.

In this sense, the allocation of urban land becomes a concrete expression of societal priorities, revealing whether cities continue to reproduce car-centred spatial logics or move toward more ecologically integrated and socially inclusive forms of urban development.

Against this theoretical backdrop, the reallocation of parking space becomes a strategic site of inquiry into urban sustainability transitions. The issue is not simply how much parking should be provided, but how to reduce parking reshapes mobility practices, property relations, and perceptions of urban liveability while potentially enhancing ecosystem service provision and social sustainability. Accordingly, the guiding research problem is not merely spatial but systemic:

How does reallocating space from parking to green infrastructure reshape the socio-technical regime of urban mobility, reconfigure land-based value production, and influence residents' perceptions of ecological and social well-being?

To address this broader problem, the present study articulates the following research aim and questions:

1.3 Research aim and research questions

1.3.1 Research aim

This study therefore aims to examine how residents in Malmö, Helsingborg, and Lund perceive the relative value of green space and parking infrastructure, and how these perceptions relate to urban sustainability transitions, mobility practices, and the political economy of land use.

By empirically investigating lived experiences of spatial reallocation in three Swedish cities, the study seeks to understand whether reducing parking and expanding green infrastructure is perceived as a loss of accessibility or as a gain in ecological and social value.

1.3.2. Research questions (RQ)

- RQ1: How do residents conceptualize and compare the value of green spaces and parking infrastructure in their everyday lives?
- RQ2: How does parking availability influence mobility practices, housing preferences, and perceptions of neighbourhood quality?
- RQ3: What social tensions, generational divides, and spatial inequalities emerge in processes of reallocating land from parking to green infrastructure?

2. Theoretical framework

2.1. Green urbanism and Ecological modernization

Green urbanism (Beatley, 2011) extends beyond greening initiatives toward systemic ecological integration. It aligns with ecological modernization theory (Mol & Spaargaren, 2000), which posits that environmental reform can be embedded within institutional transformation.

However, green urbanism also intersects with political ecology by recognizing that ecological resources are unevenly distributed and contested (Swyngedouw & Heynen, 2003). Access to green space is linked to environmental justice (Wolch, Byrne & Newell, 2014).

Urban vegetation provides regulating, provisioning, cultural and supporting ecosystem services (MEA, 2005; TEEB, 2010). Empirical studies demonstrate that urban trees mitigate heat islands (Bowler et al., 2010), improve air quality (Nowak et al., 2014), and reduce stormwater runoff (Gill et al., 2007).

Beyond ecological performance, green spaces function as therapeutic landscapes (Gesler, 1992) and restorative environments (Kaplan & Kaplan, 1989). Ulrich's stress recovery theory (1984) and attention restoration theory (Kaplan, 1995) provide psychological foundations for understanding green space value. Thus, green infrastructure should be conceptualized as multifunctional capital, ecological, social, and health-related, rather than aesthetic surplus.

2.2. Parking as spatial lock-in and Induced automobility

Automobility theory conceptualizes car-based transport systems as self-reinforcing sociotechnical assemblages that integrate infrastructure, regulatory frameworks, cultural norms, economic incentives, and everyday practices into a relatively stable regime (Urry, 2004). Within this assemblage, parking supply plays a decisive and often underestimated role in sustaining automobile dominance. Abundant parking contributes to induced demand, whereby increased provision of car-related infrastructure stimulates higher levels of car use and ownership (Cervero, 2003). When parking is readily available at destinations, the perceived cost and inconvenience of driving are reduced, reinforcing the attractiveness of private vehicle use relative to alternative modes.

Parking also generates price distortions. In many urban contexts, parking is provided free of direct charge to users, either bundled into housing costs or subsidized through public expenditure. This "free parking" functions as a hidden subsidy, lowering the effective cost of car ownership and masking the true spatial and economic costs associated with automobile dependence (Shoup, 2005). By externalizing these costs, parking provision embeds car use within everyday urban life and normalizes its consumption.

Furthermore, extensive parking infrastructure contributes to spatial lock-in effects. Once land has been allocated to parking facilities whether surface lots or structured garages it becomes physically and institutionally difficult to repurpose (Seto et al., 2016). Built form, zoning regulations, and property expectations adapt around this infrastructure, reinforcing path-dependent development patterns. In this

way, parking not only accommodates existing car use but actively stabilizes and reproduces the broader automobility regime over time.

Shoup (2005) demonstrates that parking minimums inflate housing costs, reduce density, and encourage car ownership. Manville et al. (2013) further show that parking requirements distort urban form and impede transit-oriented development. Parking occupies disproportionate land relative to its temporal use. Studies estimate that cars are parked 96% of the time (Litman, 2014), meaning vast urban surfaces remain underutilized.

From a land-use efficiency perspective, parking is monofunctional and temporally inefficient. In contrast, green infrastructure provides continuous ecosystem service flows.

2.3. Sustainability transitions and Mobility regimes

Using the Multi-Level Perspective (MLP) on sustainability transitions (Geels, 2011), parking reform can be interpreted as a potential process of regime destabilization within the broader automobility system. In the MLP framework, socio-technical change unfolds through interactions between three analytical levels: landscape pressures, regime structures, and niche innovations. At the landscape level, exogenous pressures such as climate change, EU carbon reduction targets, biodiversity loss, and rising energy costs exert increasing strain on carbon-intensive mobility systems. These macro-level dynamics challenge the long-term viability of car-dependent urban development models and create political momentum for structural change.

At the regime level, automobility remains stabilized by deeply embedded institutional arrangements, including parking minimum requirements, car-oriented zoning regulations, road investment priorities, and cultural norms associating car ownership with autonomy and status. These regime structures reinforce high parking provision and spatial patterns that privilege private vehicle use. Because such regulations are codified in planning practice and property development standards, they contribute to path dependency and institutional inertia.

Green infrastructure integration operates at the intersection of these dynamics. It may function as a niche innovation, particularly when green redevelopment replaces parking in pilot districts but it also responds directly to landscape pressures such as climate adaptation and public health imperatives. By reallocating space from parking to multifunctional green infrastructure, cities simultaneously address emission reduction, heat mitigation, stormwater management, and quality-of-life goals. In doing so, green infrastructure can accelerate regime transformation by weakening the spatial foundation of automobility while strengthening alternative urban logics centred on proximity and ecological resilience.

Planning paradigms such as the 15-minute city (Moreno et al., 2021) and Transit-Oriented Development (Calthorpe, 1993) further embed mobility reduction within spatial proximity frameworks. These models prioritize compact, mixed-use where daily needs are accessible by walking, cycling, or public transport. In such contexts, extensive parking provision becomes less necessary and increasingly contradictory to planning objectives. By reorganizing urban space around accessibility rather than vehicle throughput, these approaches align land-use planning, mobility transition, and green infrastructure integration within a coherent sustainability framework.

2.4. Social sustainability and Urban commons

Green space contributes fundamentally to social sustainability, understood as the capacity of urban systems to promote inclusion, well-being, equity, and social cohesion over time (Dempsey et al., 2011). Unlike narrowly defined environmental amenities, parks and vegetated public spaces serve as arenas for everyday interaction, intergenerational contact, and informal social life. They provide low-threshold environments where diverse groups irrespective of age, income, or mobility capacity can share space without the need for consumption. In this sense, green spaces are not only ecological assets but also social infrastructures that support the reproduction of collective urban life.

From an institutional perspective, parks may be conceptualized as forms of urban commons (Ostrom, 1990). Although typically managed by municipalities, they function as shared resources that generate collective benefits rather than individualized returns. Their value is co-produced through public access, social norms, and patterns of everyday use. Unlike privatized amenities, the utility of green spaces does not diminish when shared; rather, it often increases as social presence enhances perceived safety, belonging, and place attachment. This relational dimension of green infrastructure situates it within broader debates about common-pool resource governance and collective goods in urban contexts.

Parking infrastructure, by contrast, is primarily oriented toward private consumption. A parking space serves the needs of a single vehicle owner at a given time and is generally inaccessible to non-drivers. While publicly funded parking may be framed as serving general accessibility, its direct benefits are largely restricted to those with car access. In economic terms, parking approximates a club good or quasi-private good, especially when access is regulated or bundled with property ownership. Its utility is exclusive and individualized, and its spatial footprint limits alternative collective uses.

This contrast aligns with theories of public goods and collective utility. Green infrastructure generates diffuse, non-excludable benefits such as microclimate regulation, improved air quality, biodiversity support, and opportunities for recreation and social interaction. These benefits accrue to a wide spectrum of urban residents, including those without private vehicles. In contrast, parking infrastructure produces highly specific, user-bound benefits tied to car ownership. When assessed through the lens of collective welfare and multifunctionality, vegetation may therefore yield higher collective utility per square meter than monofunctional parking space.

Importantly, this does not imply that parking lacks social value; rather, it highlights how different land uses embody distinct logics of distribution and access. The prioritization of parking over green space reflects a normative preference for individualized mobility and property-based entitlement, whereas the expansion of green infrastructure signals a commitment to shared urban goods. The comparison thus becomes not only technical or environmental but deeply political, raising questions about whose needs and practices are privileged in the spatial organization of the city.

3. Methodology

3.1. Research design

This study employs a qualitative multiple-case study design (Yin, 2014), focusing on the cities of Malmö, Helsingborg, and Lund. The selection of three mid-sized Swedish cities allows for analytical comparison across different urban morphologies, planning traditions, and stages of mobility transition, while maintaining sufficient contextual similarity to enable meaningful cross-case interpretation. The case study approach is particularly appropriate for examining complex, context-dependent phenomena such as land-use reallocation, mobility practices, and perceptions of urban value, where boundaries between social processes and spatial conditions are intertwined.

The research is grounded in interpretivist epistemology, recognizing that perceptions of value, mobility, accessibility, and environmental quality are socially constructed and embedded within everyday experience. From this perspective, urban space is not understood as a fixed physical container but as a socially produced and interpreted environment shaped by norms, practices, and institutional frameworks. Residents' views on parking and green infrastructure are therefore treated not as objective measurements of utility, but as situated interpretations reflecting lived realities, socio-economic position, and local context.

Rather than striving for positivist objectivity, the study adheres to principles of transparency, systematic inquiry, and reflexivity, consistent with Lincoln and Guba's (1985) framework for trustworthiness in qualitative research. The aim is not to eliminate researcher influence, a goal widely critiqued within qualitative traditions but to make interpretive processes visible, traceable, and methodologically coherent. Analytical rigor is ensured through explicit documentation of sampling decisions, interview procedures, coding development, and theoretical integration.

Methodologically, the study combines semi-structured interviews with residents, document analysis of municipal planning materials, and thematic analysis of qualitative data. Semi-structured interviews allow for comparability across participants while providing flexibility to explore individual experiences, values, and tensions in depth. The interviews capture lived experiences of parking availability, mobility practices, neighbourhood change, and perceptions of green space.

Document analysis includes comprehensive plans, parking policies, green infrastructure strategies, and mobility programs from the three municipalities. These documents provide insight into the institutional framing of parking reform and ecological planning, enabling comparison between policy discourse and everyday perceptions. By situating residents' narratives within formal planning frameworks, the study examines how policy intentions are interpreted, contested, or normalized in daily life.

Thematic analysis (Braun & Clarke, 2006) is employed to systematically identify patterns across interviews while remaining attentive to contextual variation and contradiction. Coding was conducted iteratively, moving between inductive identification of emergent themes and deductive engagement with theoretical frameworks such as automobility, ecosystem services, and sustainability transitions.

This triangulated design strengthens analytical depth by integrating experiential and institutional perspectives. It enables examination not only of how parking and green space are governed at policy level,

but also how they are perceived, valued, and negotiated by residents within everyday urban practice. Through this combination, the study captures both the structural and lived dimensions of land-use transformation.

3.2. Sampling strategy

A total of twenty-seven semi-structured interviews were conducted across the three case cities, with nine participants in Malmö, nine in Helsingborg, and nine in Lund. Equal distribution across cases was designed to ensure analytical comparability while allowing for contextual differentiation between the cities' planning approaches, mobility systems, and urban morphologies.

Participants ranged in age from 18 to 57 years, capturing perspectives from young adults, mid-career residents, and individuals approaching retirement. This age span was selected to reflect variation in life stage, housing situation, and mobility dependence, all of which are known to influence attitudes toward parking, car ownership, and green space provision. The sample included fourteen women and thirteen men. Although a perfectly even distribution was not possible due to scheduling constraints, gender representation remained balanced across the dataset.

The composition of the sample was intentionally structured to include residents with diverse mobility practices (car-dependent, multimodal, and car-free), housing tenures (renters and homeowners), and neighbourhood types (dense central districts and more peripheral residential areas). This variation was essential to capture contrasting experiences of parking availability and green space access, and to enable exploration of generational, socio-spatial, and tenure-based differences in perceived urban value.

3.3. Strategic sampling rationale

A strategic (purposive) sampling strategy was applied to capture meaningful variation across key dimensions relevant to the research questions. Rather than aiming for statistical representativeness, the sampling process sought analytical richness and diversity of experience. Participants were therefore selected to ensure variation in age, reflecting different life stages and potential differences in mobility dependence, housing preferences, and attachment to neighbourhood change. Attention was given to including residents with differing mobility practices, including car-dependent individuals, multimodal users combining public transport and cycling, and residents living largely or entirely car-free.

In addition, participants were recruited from undergoing spatial transformation, such as areas where parking provision had recently been reduced, mobility hubs introduced, or green redevelopment projects implemented. This enabled the study to capture firsthand experiences of land-use reallocation and mobility policy change. Individuals with direct experience of parking policy adjustments, altered accessibility conditions, or proximity to new or expanded green infrastructure were prioritized, as these contexts provide especially rich insight into how spatial change is perceived and negotiated in everyday life.

Consistent with qualitative research principles, participants were selected not for demographic proportionality but for their capacity to contribute depth, variation, and relevant experiential knowledge (Patton, 2015). The goal was to assemble an information-rich sample capable of illuminating tensions, contradictions, and differences in how urban land reallocation is understood across social positions and spatial contexts.

3.4. Participant overview

3.4.1 Malmö

Participant M1: Female, 24, university student, renter in a central apartment district. Lives in a small shared flat, does not own a car, relies on cycling and public transport. Has experienced recent courtyard greening replacing surface parking and expresses strong support for reduced parking norms.

Participant M2: Male, 46, employed commuter, homeowner in a redevelopment area. Lives with partner and two children. Owns one car and commutes to work outside the city. Has experienced gradual reduction in nearby parking and expresses ambivalence—acknowledging spatial benefits but concerned about convenience.

Participant M3: Female, 38, parent of two, renter in newly developed housing with reduced parking supply. Household owns one car but increasingly uses bicycle and bus for daily trips. Reflects on adaptation to limited parking and highlights improved courtyard quality.

Participant M4: Male, 29, professional employee, resident in mixed-use central district. Does not own a private car; uses shared mobility services (car-sharing and bike-sharing). Views reduced parking as logical in dense urban environments.

Participant M5: Female, 51, long-term resident in inner Malmö. Previously car-dependent but sold her car after improved cycling infrastructure and reduced parking convenience. Reflects on personal mobility transition over time.

Participant M6: Male, 34, architect, apartment owner in sustainable redevelopment district. Actively supportive of green urbanism principles. Lives car-light lifestyle and views parking reform as necessary structural change.

Participant M7: Female, 19, first-year university student living in student housing. No car ownership; relies on bicycle and public transport. Limited prior attachment to car-based mobility.

Participant M8: Male, 57, private homeowner in a semi-central neighborhood. Owns a car and values parking access for daily errands. Expresses concern about property value implications of parking reduction.

Participant M9: Female, 42, public sector employee, renter in densifying district. Household owns one vehicle but increasingly walks and cycles locally. Observes visible conversion of parking areas into pocket parks.

3.4.2 Helsingborg

Participant H1: Male, 52, suburban homeowner commuting daily by car to a neighbouring municipality. Lives in peripheral residential area with limited public transport. Views parking as essential infrastructure.

Participant H2: Female, 29, renter living near newly implemented mobility hub. Does not own a car; uses shared mobility and bus connections. Reports reduced need for private vehicle ownership. **Participant H3:** Male, 23, service worker renting in central district. Owns an older car but increasingly cycles to work due to parking costs and availability changes.

Participant H4: Female, 45, school teacher living in medium-density housing. Household owns one car. Expresses cautious support for green redevelopment but concerned about school commuting logistics.

Participant H5: Male, 37, entrepreneur, apartment owner near pilot mobility hub. Previously owned two cars; now maintains one vehicle and uses shared mobility occasionally.

Participant H6: Female, 56, retired, long-term resident in central Helsingborg. Does not commute but values occasional car use. Expresses concern about accessibility for elderly residents.

Participant H7: Male, 31, cyclist and renter in compact district. Does not own a car; strong advocate for active mobility. Sees parking reduction as overdue.

Participant H8: Female, 26, apartment renter in redeveloping area. No car ownership. Appreciates improved green spaces replacing parking surfaces.

Participant H9: Male, 48, property owner in mixed-density neighbourhood. Owns one car. Expresses concern about market perception and resale value if parking decreases.

3.4.3 Lund

Participant L1: Male, 21, university student living in student corridor housing. No car ownership; primary mode is cycling. Considers parking reduction consistent with city identity.

Participant L2: Female, 34, university researcher renting centrally. Household owns one car used infrequently. Relies mainly on cycling and train commuting.

Participant L3: Male, 41, parent of two, homeowner in semi-central district. Owns one car but cycles for local trips. Mixed feelings regarding parking reduction.

Participant L4: Female, 57, long-term resident and homeowner. Owns one car; expresses attachment to convenience but acknowledges benefits of increased greenery.

Participant L5: Male, 28, commuter using regional train for work. Does not own a car; occasionally uses car-sharing. Lives in compact neighborhood with limited parking.

Participant L6: Female, 39, municipal employee living in dense district. Car-light household; strong supporter of sustainable planning principles.

Participant L7: Male, 44, private homeowner in slightly peripheral neighborhood. Owns one vehicle and values driveway parking. Expresses skepticism toward reduced parking norms.

Participant L8: Female, 22, student renting in central apartment. No car ownership; relies on bicycle and walking.

Participant L9: Male, 50, self-employed professional living in townhouse. Owns one car; uses it frequently for work-related travel. Reflects on trade-offs between accessibility and green quality.

The sample intentionally captures generational perspectives, household structures, and mobility habits, enabling comparison across socio-spatial contexts.

3.5. Limitations

Several limitations of this study must be acknowledged. First, the sample size of twenty-seven participants, while appropriate for in-depth qualitative inquiry, does not allow for statistical generalization. The findings should therefore be interpreted as analytically rather than statistically generalizable, offering conceptual insights into processes and perceptions rather than representative population trends.

Second, the age range of participants (18–57) excludes older populations, particularly those aged 65 and above. This omission may underrepresent perspectives from groups that are often more car-dependent due to mobility limitations or long-established travel habits. Including older cohorts could potentially have introduced stronger resistance narratives or alternative interpretations of accessibility and spatial change.

Third, the Swedish context presents structural conditions that may limit direct transferability. Sweden is characterized by relatively high institutional trust, a strong cycling culture particularly in cities such as Lund and comparatively well-developed public transport systems. These factors may facilitate acceptance of parking reform and sustainable mobility initiatives in ways that differ from more car-dominant urban contexts. Consequently, findings may not translate directly to regions with weaker public transport provision or stronger automobile dependency.

Fourth, the study may be subject to self-selection bias. Individuals willing to participate in interviews about urban change and sustainability may be more civically engaged or environmentally aware than the broader population. While efforts were made to recruit participants with varied mobility practices and viewpoints, the possibility remains that particularly disengaged or strongly oppositional voices are underrepresented.

Finally, the analysis relies on perceived and experiential assessments of ecosystem service value rather than quantitative or monetized measurements. While this aligns with the interpretivist orientation of the study, it limits the ability to directly compare ecological performance metrics between parking and green infrastructure. The study therefore contributes insight into social valuation rather than biophysical quantification.

Despite these limitations, the findings support analytical generalization to comparable Northern and Western European cities undergoing similar transitions toward sustainable mobility and green infrastructure integration. The study's value lies in its capacity to illuminate mechanisms, tensions, and perception-based dynamics that may inform broader debates on land-use reallocation and urban sustainability transitions.

3.6. Data Collection

3.6.1. *Semi-structured interviews*

The interviews lasted between 45 and 75 minutes and were conducted using a semi-structured interview guide designed to ensure both consistency and flexibility. The guide covered key thematic areas central to the research questions, including participants' perceptions of green spaces in their neighbourhoods, experiences with parking availability and accessibility, everyday mobility routines, perceived neighbourhood changes over time, and attitudes toward parking reduction and green redevelopment initiatives.

The semi-structured format enabled comparability across the three case cities while allowing participants to elaborate on their lived experiences, priorities, and concerns in their own terms. Open-ended questions encouraged reflection on concrete situations such as recent redevelopment projects or changes in parking regulation thereby grounding the discussion in everyday practice rather than abstract opinion. Follow-up prompts were used to explore emerging themes, contradictions, or emotional responses, particularly where participants expressed ambivalence or tension regarding spatial change.

All interviews were audio-recorded with informed consent and subsequently transcribed verbatim to ensure accuracy and preserve nuance in language and expression. The verbatim transcription facilitated detailed thematic analysis and enabled close engagement with participants' phrasing, which was essential for interpreting how concepts such as value, accessibility, fairness, and quality of life were articulated.

3.6.2. *Document study*

In addition to the interviews, municipal planning documents were systematically analysed to contextualize residents' experiences within formal policy frameworks. The document material included comprehensive plans (Översiktsplaner), parking policies and parking norm guidelines, green infrastructure and climate adaptation strategies, as well as mobility and sustainability programs adopted by the three municipalities. These documents represent the institutional articulation of land-use priorities and provide insight into how local authorities frame the relationship between parking provision, sustainable mobility, and green space development.

The document analysis focused on identifying policy narratives, stated objectives, and formal rationales concerning land reallocation and mobility transition. Attention was given to how municipalities justify reductions in parking requirements, promote shared mobility solutions, and integrate green infrastructure into new housing developments. The analysis also examined whether parking reform was framed primarily in terms of climate mitigation, economic efficiency, urban attractiveness, public health, or spatial justice.

By comparing policy discourse with residents' accounts, the study was able to explore alignment or dissonance between institutional intentions and lived experience. The document analysis thus complemented the interview data by revealing how land reallocation is legitimized, contested, or normalized at the policy level, strengthening the triangulated design of the study.

3.7. Analytical strategy

Data was analysed using reflexive thematic analysis as outlined by Braun and Clarke (2006). This approach was chosen because it allows for systematic identification of patterns across qualitative material while remaining sensitive to contextual complexity and the researcher's interpretive role. Reflexive thematic analysis is particularly suited to studies that seek to integrate empirical insights with theoretical frameworks, as it permits both inductive theme development and deductive engagement with existing concepts such as automobility, ecosystem services, and sustainability transitions.

The analytical process unfolded in several iterative stages. First, all transcripts were read repeatedly to ensure thorough familiarization with the material. During this phase, preliminary notes were taken regarding recurring concepts, emotional intensities, contradictions, and city-specific dynamics. Second, initial open coding was conducted across the dataset, identifying segments of text related to perceptions of value, mobility routines, spatial change, and normative judgments about parking and green space. Coding was conducted systematically across all cases to ensure comparability.

Third, candidate themes were developed by grouping related codes into broader interpretive categories. These themes were not treated as static containers but were continuously refined through comparison within and across cases. Fourth, cross-case comparison was conducted to identify similarities and divergences between Malmö, Helsingborg, and Lund, as well as between different demographic and socio-spatial groups. This stage was essential for sharpening analytical contrasts and identifying tensions in the data.

Finally, themes were refined and integrated with the theoretical framework. This stage involved moving between empirical material and conceptual lenses, examining how participants' narratives reflected or challenged theories of automobility, urban commons, social sustainability, and regime transition.

The final thematic structure included patterns such as the multifunctional value attributed to green space, the framing of parking as either entitlement or inconvenience, processes of mobility adaptation following parking reduction, intergenerational differences in attitudes toward car ownership, questions of spatial justice and accessibility, and persistent cultural attachment to automobility.

This approach enabled systematic pattern recognition while preserving sensitivity to contextual nuance, contradiction, and ambivalence. Rather than imposing rigid categories, the analysis sought to illuminate how meanings were negotiated across different social positions and urban settings, thereby strengthening the interpretive depth of the study.

3.8. Ensuring trustworthiness

Rather than relying on conventional notions of validity and reliability derived from positivist research traditions, this study adopts Lincoln and Guba's (1985) framework for assessing qualitative rigor. Their criteria; credibility, transferability, dependability, and confirmability provide a structured approach for ensuring trustworthiness while remaining consistent with an interpretivist epistemology.

Credibility was strengthened through several complementary strategies. First, methodological triangulation was employed by combining interview data with analysis of municipal planning documents, allowing comparison between lived experience and institutional discourse. Second, cross-case comparison across the three cities enabled identification of recurring patterns as well as context-specific differences, enhancing confidence in the robustness of thematic interpretations. Third, elements of member checking were incorporated: selected participants were invited to review brief summaries of preliminary interpretations to assess whether these resonated with their perspectives. Finally, peer debriefing during the analysis phase provided opportunities to critically examine coding decisions and thematic development. Together, these measures increase confidence that the findings reflect participants' perspectives rather than researcher imposition.

Transferability was supported through the provision of rich contextual detail, often referred to as "thick description." The study includes detailed accounts of the planning context, urban morphology, and mobility infrastructures in Malmö, Helsingborg, and Lund, as well as descriptive information about participants' demographic and socio-spatial positions. Rather than claiming statistical generalizability, the aim is to enable analytical generalization by providing sufficient contextual information for readers to assess the applicability of findings to comparable Nordic or European cities undergoing parking reform and green infrastructure integration.

Dependability was addressed through transparent documentation of research procedures. Interview guides were archived, recruitment strategies described, and analytical steps systematically recorded. Coding followed a clearly articulated protocol, and decisions regarding theme refinement were documented throughout the process. An audit trail was maintained, detailing how codes evolved into themes and how theoretical integration was achieved. This procedural transparency allows others to follow the logic of the research process, even if replication in a strict positivist sense is neither intended nor feasible.

Confirmability was ensured by emphasizing traceability of interpretation. Reflexive journaling was used to document the researcher's assumptions, theoretical commitments, and evolving interpretations. Raw data excerpts were retained and linked explicitly to thematic claims, ensuring that analytical conclusions remained grounded in participants' accounts. The objective was not to eliminate researcher perspective, but to make interpretive processes visible and accountable.

3.9. Reflexivity

The researcher acknowledges a normative alignment with principles of sustainable mobility and green urbanism. This positionality may shape interpretive emphasis, particularly in relation to the perceived value of green infrastructure and critiques of automobility. However, reflexive practice, systematic coding, and triangulation were employed to mitigate undue influence and to ensure that divergent or critical perspectives were not marginalized. In this study, transparency replaces claims of neutrality; rigor is achieved through openness about interpretive positioning rather than through assertions of detached objectivity.

3.10. Ethical considerations

All participants provided informed consent prior to participation. Interviews were conducted with assurances of confidentiality, and pseudonyms were used in all transcripts and reporting to protect anonymity. Identifying details were removed or generalized where necessary. Data were stored securely and handled in compliance with the General Data Protection Regulation (GDPR). Ethical considerations were particularly important given the localized nature of neighbourhood transformation processes, where specific comments could potentially be traced back to individuals if not carefully anonymized.

3.11. Methodological contribution

By combining strategic, information-rich sampling with systematic document analysis and clearly articulated trustworthiness criteria, this study offers a methodologically robust qualitative examination of spatial reallocation between parking infrastructure and green space. The triangulated design allows research to move beyond descriptive accounts of urban change and instead situate residents' experiences within broader institutional and policy frameworks. Strategic sampling ensures variation in mobility practices, housing tenure, and neighbourhood context, while document analysis anchors these lived experiences in formal planning rationales and regulatory structures. The explicit application of credibility, transferability, dependability, and confirmability criteria further strengthens the transparency and rigor of the research process.

Importantly, the study does not treat experiential narratives as isolated perceptions but integrates them with socio-technical regime theory and ecosystem service frameworks. This theoretical layering enables analysis of how everyday interpretations of parking and green space intersect with structural mobility systems, land-use governance, and sustainability transitions. By connecting micro-level lived experience with macro-level theoretical constructs, the study enhances analytical depth and contributes to bridging gaps between urban political economy, mobility transition research, and green infrastructure scholarship.

This integrative approach strengthens the study's relevance for both academic audiences and policy-oriented discussions on sustainable urban transformation, enhancing its readiness for publication in peer-reviewed urban and planning journals.

4. Case study context

4.1 Malmö

Malmö represents a post-industrial city that has actively positioned itself at the forefront of sustainable urban transformation. In recent years, the municipality has reduced parking norms in new residential developments, replacing traditional minimum requirements with mobility-oriented measures such as car-sharing integration, enhanced bicycle parking standards, and proximity to public transport. These regulatory adjustments are embedded within broader climate and densification strategies aimed at lowering car dependency while improving urban liveability.

Interviewees in Malmö frequently referred to visible spatial transformations, particularly in redeveloped waterfront and inner-city districts. Former surface parking areas have been converted into semi-public courtyards, pocket parks, and green pedestrian corridors. Residents described these changes as tangible improvements in neighbourhood quality, associating them with increased social interaction and enhanced microclimatic comfort. At the same time, some participants, particularly homeowners and daily commuters expressed concerns about accessibility and perceived inconvenience. Malmö thus illustrates a context in which institutional ambition toward green urbanism is relatively advanced, but where tensions between ecological priorities and automobility norms remain present.

4.2 Helsingborg

Helsingborg represents a transitional case characterized by experimentation with mobility hubs and pilot projects aimed at reducing private car reliance. Rather than focusing solely on parking norm reduction, Helsingborg has emphasized the integration of shared mobility services such as car-sharing vehicles, bike-sharing systems, and multimodal access points into neighbourhood-level infrastructure. These mobility hubs are often coupled with selective conversion of surface parking into multifunctional public spaces, including small parks and social gathering areas.

Residents' perceptions in Helsingborg were more varied and spatially differentiated. Participants living near pilot mobility hubs often viewed these interventions positively, noting increased convenience of shared options and improved public space quality. However, in more peripheral or suburban, scepticism was more pronounced. Some residents questioned whether shared mobility adequately replaces private car ownership, particularly for families or commuters traveling beyond the urban core. Helsingborg thus reflects a city in transition, where innovative mobility solutions coexist with entrenched car dependent patterns.

4.3 Lund

Lund differs from both Malmö and Helsingborg in its long-established cycling culture and compact urban form. As a university city with high student population and strong public transport connectivity, Lund has

historically exhibited lower levels of car dependency relative to comparable cities. Parking reductions in Lund are frequently linked to transit accessibility and cycling infrastructure, reinforcing an urban mobility system already oriented toward active travel.

Interviewees in Lund often framed parking reform as a logical extension of existing mobility norms rather than a radical departure. Car-free or multimodal lifestyles were commonly described as ordinary and unproblematic, particularly among younger residents. Nonetheless, some older participants and homeowners expressed concern regarding flexibility and convenience, indicating that even in cycling-dominant contexts, cultural attachment to automobility persists. Lund therefore illustrates how supportive spatial and cultural conditions can facilitate parking reform, while still revealing generational and tenure-based differences in perception.

Together, the three cases demonstrate varying stages and expressions of parking reform and green infrastructure integration. Malmö highlights ambitious redevelopment within a post-industrial transformation narrative; Helsingborg illustrates incremental experimentation through mobility hubs; and Lund exemplifies how compact urban form and cycling culture can normalize reduced parking provision. These contextual differences provide a comparative foundation for analysing how spatial, institutional, and cultural conditions shape residents' perceptions of land reallocation between parking and green space.

5. Analytical synthesis

5.1. Document Analysis

5.1.1. Malmö (Urban transformation context)

Malmö's planning documents frame parking and green infrastructure as competing land uses within a broader narrative of densification, climate adaptation, and sustainable mobility transition. The municipal "Policy och norm för mobilitet och parkering" explicitly positions parking governance as a steering instrument across planning and building permit processes, as well as in the management of public space (Malmö stad, 2020). Parking is therefore not treated as a purely technical issue but as a structural tool shaping how urban space is used and valued.

A defining characteristic of Malmö's policy framework is the integration of "mobilitetsåtgärder" (mobility measures) as formal mechanisms to reduce car parking demand. The policy defines mobility measures as interventions that provide incentives and opportunities for residents and employees to travel by modes other than private car, explicitly with the purpose of reducing parking demand (Malmö stad, 2020). These include car-sharing services, bicycle pools, public transport incentives, real-time mobility information, delivery lockers, and parking pricing mechanisms.

Importantly, the policy outlines different ambition levels (grundnivå, mellannivå, hög nivå), where higher levels of mobility provision allow for reduced parking requirements. At the most ambitious level, mobility measures are intended to enable residents to maintain everyday accessibility "even without their own car" (Malmö stad, 2020). This reveals a structural transition logic embedded in policy design: parking reduction is conditional upon functional substitution through shared mobility and multimodal systems.

Beyond mobility governance, Malmö's documents strongly institutionalize green infrastructure as ecosystem service infrastructure. The municipality employs the "grönytefaktor" as a planning tool to ensure that ecosystem services are integrated into new development (Malmö stad, 2023a). The tool guides developers in incorporating vegetation to support stormwater management, biodiversity, cooling effects, and recreational quality. Additionally, Malmö's "Grönmodell" evaluates access to recreational green environments and establishes spatial guidelines for proximity to parks and nature (Malmö stad, 2023b).

This policy architecture demonstrates a coordinated strategy: reducing land allocated to car storage while strengthening the ecological and social performance of remaining urban space. Parking reform is therefore embedded within a broader green urbanism agenda, aligning with the empirical findings that former parking areas are increasingly converted into multifunctional courtyards and pocket parks.

From a transition perspective, Malmö's documents illustrate an advanced integration of mobility governance and ecosystem service planning. Parking is explicitly framed as reducible under conditions of mobility substitution, while green infrastructure is framed as productive, climate-adaptive, and socially beneficial (Malmö stad, 2020; Malmö stad, 2023a).

5.1.2. Helsingborg (Mobility Hub and Incentive model)

Helsingborg's "Mobilitetsnorm" replaces the traditional parking norm with a framework explicitly designed to support climate goals and sustainable mobility (Helsingborgs stad, 2022). The document links parking governance directly to the Climate and Energy Plan and the Comprehensive Plan 2021, signalling that parking is treated as a strategic climate instrument rather than a technical minimum standard.

The mobility norm emphasizes increasing the share of trips made by walking, cycling, and public transport while using land more efficiently (Helsingborgs stad, 2022). Parking provision is therefore positioned as a trade-off within limited urban space. A central innovation is the structured mobility package system, which allows developers to receive up to a 15% reduction in required parking if extensive mobility services are implemented.

The most ambitious mobility package includes long-term carpool membership integrated into rent, access to bicycle pools (including cargo bikes and e-bikes), trial public transport cards, travel coaching, and enhanced cycling infrastructure (Helsingborgs stad, 2022). The document also requires five-year follow-up evaluations of car ownership and mobility behaviour, indicating a governance model based on monitoring and adaptive learning.

Parallel to mobility reform, Helsingborg's "Grönstrukturprogram" positions green areas as essential for health, attractiveness, biodiversity, and climate regulation (Helsingborgs stad, 2014). The program frames green infrastructure as delivering ecosystem services including recreation, microclimate regulation, and stormwater management. Green space is therefore institutionalized as a strategic asset rather than residual land use.

Taken together, Helsingborg's documents demonstrate a transitional governance approach: parking reduction is incentivized rather than mandated, shared mobility is institutionalized as substitution, and green infrastructure is framed as multifunctional urban capital (Helsingborgs stad, 2022; Helsingborgs stad, 2014).

5.1.3. Lund (Zoning, Shared mobility, and Climate-adapted densification)

Lund's parking norm explicitly differentiates between geographic zones, linking parking requirements to accessibility conditions and urban density (Lunds kommun, 2024a). Lower parking requirements apply in central areas and along tram corridors, reflecting a transitoriented and proximity-based planning logic.

The policy includes an "åtgärds paket bilpool" (carpool package), allowing up to a 30% reduction in car parking requirements for multi-family housing if developers integrate structured car-sharing systems (Lunds kommun, 2024a). Conditions include guaranteed carpool membership for residents for at least five years and integration of parking purchase in shared facilities to increase space efficiency.

A 2025 addendum revises carpool requirements, replacing fixed ratios with context-sensitive investigations of actual need (Lunds kommun, 2025). This indicates policy learning and adaptation based on implementation experience.

Green infrastructure in Lund is strongly linked to climate adaptation. The municipality's stormwater strategy ("Dagvattenplan") emphasizes developing a robust, climate-adapted system that supports urban

growth while improving quality of life (Lunds kommun, 2018). Vegetation and blue-green solutions are framed as essential for handling extreme rainfall and increasing resilience.

Thus, Lund's documents reveal a densification-oriented strategy where reduced parking supports compact development, shared mobility is incentivized structurally, and green infrastructure is justified as climate-resilient urban infrastructure (Lunds kommun, 2024a; Lunds kommun, 2018).

5.2. Comparative value per square meter

Drawing from ecosystem service valuation literature, green spaces can be understood as forms of natural capital that generate measurable ecological, social, and economic benefits (Costanza et al., 1997; Millennium Ecosystem Assessment [MEA], 2005; TEEB, 2010; Gómez Baggethun & Barton, 2013). Urban vegetation contributes to regulating services such as temperature moderation and mitigation of the urban heat island effect (Bowler et al., 2010), stormwater retention and flood risk reduction (Gill et al., 2007), air quality improvement (Nowak et al., 2014), and carbon sequestration (Escobedo et al., 2011). In addition, green spaces deliver cultural ecosystem services, including recreational opportunities, aesthetic value, place attachment, and psychological restoration (Kaplan & Kaplan, 1989; Ulrich, 1984; Hartig et al., 2014). Emerging public health research further links access to green space with reduced stress, improved mental health outcomes, and increased physical activity (WHO, 2016; Twohig-Bennett & Jones, 2018).

Importantly, these ecosystem services operate simultaneously and continuously. Urban green infrastructure functions as a multifunctional system embedded within the urban fabric, generating cumulative ecological and social returns over time (Ahern, 2011; Hansen & Pauleit, 2014). Unlike single-purpose technical infrastructure, vegetation produces layered benefits that interact across scales—from microclimatic regulation at street level to biodiversity corridors at metropolitan scale (Benedict & McMahon, 2006).

Parking infrastructure, by contrast, primarily delivers convenience by enabling the storage and access of private vehicles. While this function is socially and economically significant within car-oriented systems, it is comparatively narrow in scope and largely individualized in its benefit distribution. Research on parking economics has demonstrated that abundant parking supply reinforces car ownership and use through price distortions and spatial subsidies (Shoup, 2005; Litman, 2014; Manville et al., 2013). The benefits of parking are therefore concentrated among car owners, and its spatial footprint often displaces alternative land uses.

Crucially, mobility convenience is substitutable. Accessibility can be maintained or even enhanced through shared mobility services, high-quality public transport, cycling infrastructure, and walkable urban design (Cervero & Kockelman, 1997; Newman & Kenworthy, 1999; Gehl, 2010). Transit-Oriented Development and proximity-based planning models demonstrate that reduced reliance on private vehicles does not necessarily diminish accessibility outcomes (Calthorpe, 1993; Ewing & Cervero, 2010). As sustainable mobility options expand, the functional necessity of extensive parking provision becomes increasingly contingent rather than structurally inevitable.

Ecosystem services, however, are less readily substitutable. Engineered solutions such as mechanical cooling systems or underground drainage networks may partially replicate specific regulating functions,

but they rarely reproduce the full ecological, social, and aesthetic benefits generated by living green systems (Elmqvist et al., 2015). Green infrastructure provides synergistic and adaptive functions that technical infrastructure alone cannot easily replace, particularly under conditions of climate uncertainty.

From this comparative perspective, green infrastructure demonstrates a higher degree of multifunctionality, delivering ecological regulation, social interaction, aesthetic enhancement, and health benefits within the same spatial footprint (Ahern, 2011). It also exhibits greater temporal efficiency: while parking spaces are intermittently occupied vehicles are parked approximately 95% of the time but individual spaces remain unused for significant portions of the day (Litman, 2014) green spaces generate continuous ecosystem service flows regardless of moment-to-moment user presence. Finally, green infrastructure serves a broader beneficiary base. Its benefits are diffuse, non-excludable, and collectively accessible, extending to residents irrespective of car ownership, age, income, or physical ability (Wolch et al., 2014).

Evaluated through the lens of collective utility and long-term resilience, vegetation may therefore generate a more diversified, inclusive, and adaptive return per square meter of urban land than monofunctional parking infrastructure. This comparison underscores the normative and political dimension of land-use allocation: the choice between parking and green space is not solely about functional efficiency, but about how urban value is defined, distributed, and sustained over time.

5.3. Parking reform as behavioural intervention

The interview findings indicate that parking availability significantly shapes everyday mobility behaviour, lending qualitative support to induced demand theory and broader built environment–travel behaviour research. A substantial body of literature demonstrates that transport infrastructure provision influences travel demand, not merely by accommodating existing patterns but by actively generating new ones (Cervero, 2003; Noland & Lem, 2002). Parking supply has been shown to increase vehicle ownership and trip frequency when abundant and low-cost (Shoup, 2005; Weinberger, 2012; Manville et al., 2013). Conversely, constrained parking availability can reduce car use, particularly when alternative modes are accessible (Marsden, 2006; Guo, 2013).

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Participants living in neighborhoods with reduced parking supply especially in new developments with lowered parking norms frequently described adjustments in daily mobility routines. Where viable alternatives such as high-quality cycling infrastructure, reliable public transport, or shared mobility services were available, residents reported shifting from habitual car use toward multimodal or car-free practices. These findings are consistent with research linking the built environment to travel behavior

(Cervero & Kockelman, 1997; Ewing & Cervero, 2010), which suggests that density, diversity of land use, and design characteristics influence modal choice. Importantly, in the present study, modal shifts were often described as adaptive rather than punitive.

A Malmö resident noted that “once parking became less convenient, I started taking the bike more it was actually easier than I expected,” illustrating how small changes in convenience structures can reshape daily practices. Similarly, in Lund, a participant described selling a second household car after realizing that cycling and rail services adequately met most daily needs. Although some participants initially expressed frustration at reduced parking availability, long-term dissatisfaction was uncommon in contexts where accessibility through alternative modes was perceived as sufficient.

These findings align with theoretical perspectives that conceptualize infrastructure as shaping behavioral “choice architectures.” Thaler and Sunstein’s (2008) notion of “nudging” suggests that subtle alterations to the environment can influence behavior without eliminating freedom of choice. Parking reform can be understood as a structural behavioral nudge: by increasing the relative cost or inconvenience of car storage while simultaneously enhancing alternative modes, it recalibrates default mobility decisions. This interpretation resonates with policy research showing that pricing, availability, and convenience are central determinants of travel mode choice (Litman, 2014; Marsden & Reardon, 2017).

However, the interviews also reveal that such nudges are highly context dependent. In peripheral neighborhoods with limited public transport connectivity or weak shared mobility integration, residents expressed stronger resistance to parking reductions and were less likely to modify car-dependent routines. This supports findings from transport transition literature emphasizing that restrictive measures must be accompanied by enabling infrastructures to achieve sustained behavioral change (Banister, 2008; Geels et al., 2012). Parking reduction alone does not guarantee modal shift; it functions most effectively when embedded within a broader ecosystem of accessibility and proximity planning.

Taken together, the findings reinforce the view that parking policy is not a neutral technical regulation but a structural determinant of mobility behavior. By reshaping spatial incentives and reconfiguring everyday convenience structures, parking reform can contribute to gradual destabilization of the automobility regime—particularly when integrated with shared mobility, transit-oriented development, and proximity-based urban design. In this way, parking policy becomes a critical lever within broader sustainability transitions toward low-carbon, space-efficient urban mobility systems.

5.4. Cultural resistance and Path dependency

Despite the documented ecological, spatial, and public health benefits associated with reallocating parking space to green infrastructure, resistance to parking reform persists across many urban contexts. This resistance is not merely a matter of individual preference but is embedded in deeper cultural, economic, and institutional structures that stabilize automobility as a dominant urban regime.

One key factor is the enduring cultural attachment to automobility. Cars are not only functional mobility devices but also symbols of autonomy, flexibility, and social status (Urry, 2004; Sheller & Urry, 2000). In many societies, car ownership is associated with freedom of movement, temporal control, and household security. These meanings are reinforced through decades of infrastructural investment, advertising, and

everyday practice, creating what has been described as a “system of automobility” that intertwines material infrastructure with identity and lifestyle (Urry, 2004). As a result, reductions in parking availability may be perceived not simply as spatial adjustments but as threats to personal autonomy or established routines. Research in mobility studies has shown that transport habits are deeply routinized and resistant to change, particularly when linked to identity and household organization (Gärling & Axhausen, 2003; Banister, 2008).

A second source of resistance relates to property market expectations and land value logics. Within urban political economy frameworks, land is both a use value and an exchange value (Logan & Molotch, 1987). Parking provision is often embedded in real estate development models as a marker of accessibility and market attractiveness. Developers, homeowners, and financial institutions may perceive parking as a necessary component of property competitiveness, particularly in contexts where car ownership remains widespread.

Empirical studies have shown that parking requirements can influence housing prices and development feasibility calculations (Manville et al., 2013; Gabbe & Pierce, 2017). Consequently, proposals to reduce parking may encounter opposition framed in terms of property value protection, investor confidence, or market demand. In such cases, resistance is less about mobility per se and more about perceived economic risk and asset security.

Institutional inertia further reinforces car-oriented planning patterns. Planning systems, zoning codes, and engineering standards developed during periods of automobile expansion continue to shape contemporary land-use decisions (Shoup, 2005; Marsden & Reardon, 2017). Even when policy rhetoric shifts toward sustainability, regulatory frameworks may lag behind, embedding minimum parking standards, road width requirements, and separation-of-use zoning that structurally favor automobility. Institutional routines, professional norms, and risk-averse governance cultures can slow down reform, particularly where political leaders fear backlash from residents or business interests (Low & Astle, 2009).

Path dependency theory provides a useful lens for understanding this persistence. Pierson (2000) argues that policy trajectories become “locked in” through increasing returns mechanisms, whereby early institutional choices generate self-reinforcing feedback loops. In the context of urban mobility, decades of investment in road infrastructure, dispersed land-use patterns, and parking provision create sunk costs, behavioral routines, and political constituencies that support continuation of the status quo (Seto et al., 2016; Arthur, 1989). Even when alternative mobility systems become technically feasible and environmentally desirable, existing infrastructures and expectations constrain the speed and scope of change.

Moreover, transition studies emphasize that socio-technical regimes are stabilized not only by material infrastructure but also by shared cognitive frames and normative assumptions (Geels, 2011). Car-oriented planning persists partly because it is normalized as common sense. Parking minimums, for example, are often treated as technical necessities rather than political choices. Challenging them requires reframing accessibility, redefining entitlement, and confronting entrenched growth-oriented planning logics.

Taken together, cultural attachment to automobility, property market expectations, and institutional inertia interact to sustain car-oriented planning even when ecological and social alternatives are demonstrably viable. Resistance to parking reform therefore reflects the resilience of a deeply embedded socio-technical regime. Understanding these dynamics is essential for designing transition strategies that

address not only infrastructural change but also economic interests, governance structures, and cultural meanings associated with urban mobility.

5.5. Perceived value of green spaces

Across all three cities, vegetation was consistently associated with a range of ecological, psychological, and social benefits that extended well beyond aesthetic appreciation. Participants frequently linked green spaces to mental restoration and emotional relief, describing parks and tree-lined streets as places where they could “switch off,” “clear their heads,” or temporarily withdraw from urban stress. Several interviewees referred to parks as “breathing spaces,” emphasizing their role in providing respite from traffic, noise, and densely built environments.

These accounts resonate strongly with theories of restorative environments, including Attention Restoration Theory (Kaplan & Kaplan, 1989; Kaplan, 1995) and Stress Recovery Theory (Ulrich, 1984), which demonstrate that exposure to natural settings contributes to stress reduction and cognitive recovery. Empirical reviews further confirm associations between access to green space and improved mental health outcomes (Hartig et al., 2014; Twohig-Bennett & Jones, 2018).

Participants also emphasized the microclimatic benefits of vegetation. Particularly during recent heatwaves, shaded parks and tree-lined streets were described as noticeably cooler and more comfortable than asphalt-dominated areas. Older residents in Malmö and Helsingborg highlighted the importance of shade and air circulation during extreme heat events, while parents stressed the value of vegetated play areas for children’s comfort and safety. These experiential accounts align with urban climate research demonstrating that green infrastructure mitigates urban heat island effects and reduces surface and air temperatures (Bowler et al., 2010; Gill et al., 2007; Norton et al., 2015). Vegetation also contributes to stormwater management and improved air quality, although participants rarely articulated these functions in technical terms (Nowak et al., 2014; MEA, 2005).

Green spaces were further framed as key arenas for social interaction and everyday sociability. Many interviewees described parks as “shared living rooms,” highlighting their role as inclusive meeting spaces that do not require commercial consumption. Parents emphasized children’s opportunities for play and informal interaction, while younger residents noted that small parks and green courtyards facilitated spontaneous encounters with neighbors. These observations support research on public space and social cohesion, which suggests that accessible green environments foster weak social ties, neighborhood trust, and place attachment (Peters, Elands & Buijs, 2010; Dempsey et al., 2011). Conceptually, such spaces can be understood as forms of urban commons (Ostrom, 1990), generating shared social value that transcends individual ownership.

In contrast, parking infrastructure was predominantly framed in individualized and instrumental terms. While several participants acknowledged its practical importance, particularly for commuters, families with children, or residents in peripheral areas, the benefits of parking were described as private and user-specific rather than collectively shared. This distinction reflects broader theoretical arguments that parking functions primarily as a private or club good embedded within the automobility regime (Shoup, 2005; Urry, 2004). Whereas green infrastructure produces non-excludable ecosystem services and

collective amenities (Costanza et al., 1997; Gómez-Baggethun & Barton, 2013), parking utility is largely restricted to vehicle owners and is spatially exclusive.

Overall, participants' narratives revealed a perceived asymmetry in value distribution: green spaces were associated with collective well-being, environmental comfort, and shared social life, while parking was associated with individualized convenience. This experiential distinction aligns with ecosystem service theory, which conceptualizes vegetation as multifunctional infrastructure delivering regulating, cultural, and supporting services (MEA, 2005; TEEB, 2010). The findings therefore suggest that, from a resident perspective, green infrastructure embodies a broader and more inclusive conception of urban value per square meter than monofunctional parking space.

5.6. Perceived necessity of parking

Car-dependent participants frequently emphasized the convenience, flexibility, and perceived security associated with private vehicle access and proximate parking. For several interviewees, particularly those living in peripheral neighborhoods or commuting longer distances having reliable parking near the home was described as essential to managing work schedules, family logistics, and everyday unpredictability. Cars were framed as enabling temporal autonomy and spatial reach, reinforcing findings from automobility research that link vehicle ownership to perceived freedom and control (Urry, 2004; Sheller & Urry, 2000). In addition, some participants associated off-street or nearby parking with personal safety and asset protection, particularly during winter months or late evening travel.

However, even among frequent drivers, there was a recurring acknowledgment that parking occupies disproportionate amounts of valuable urban land. Several participants expressed ambivalence, recognizing that surface parking lots and expansive curbside spaces appeared underutilized relative to their spatial footprint. A Helsingborg commuter remarked that “when you look at it, it’s a lot of space just for storing cars most of the day,” reflecting awareness that vehicles are parked for most of their lifecycle (Litman, 2014). This perception aligns with empirical research demonstrating that cars remain stationary approximately 95% of the time and that parking infrastructure often consumes more urban land than active roadways (Shoup, 2005). Such observations suggest that even car-dependent residents are not unaware of the spatial inefficiency embedded in parking-dominated environments.

In Malmö and Lund, particularly in newly developed districts or areas with reduced parking norms, younger participants reported adapting their mobility habits when parking became less accessible or more costly. Rather than interpreting reduced parking as exclusionary, many described it as an adjustment that prompted reconsideration of everyday routines. Some shifted toward cycling or public transport, while others relied more heavily on shared mobility services. These adaptations were often facilitated by compact urban form and high-quality alternative infrastructure, consistent with research linking built environment characteristics to modal choice (Cervero & Kockelman, 1997; Ewing & Cervero, 2010).

The responses of younger residents also reflect generational differences in car ownership norms documented in European mobility studies, which show declining rates of car ownership among younger cohorts in cities with strong transit and cycling cultures (Kuhnimhof et al., 2012; Newman & Kenworthy, 2015). In Lund in particular, where cycling culture is deeply embedded and transit connectivity is strong, car-free or multimodal lifestyles were frequently described as ordinary rather than exceptional. Reduced

parking availability was therefore interpreted not as a deprivation, but as consistent with prevailing urban mobility norms.

Taken together, these findings reveal a nuanced picture. While car-dependent participants continue to value parking for its convenience and perceived security, there is simultaneous recognition of its spatial cost. Moreover, in supportive urban contexts such as Malmö and Lund, reduced parking provision appears capable of catalyzing mobility adaptation, particularly among younger residents. This suggests that parking reform does not operate uniformly across demographic groups; rather, its effects are mediated by age, life stage, urban form, and the availability of viable mobility alternatives.

5.7. Mobility shifts

Reduced parking supply was frequently associated with shifts in everyday mobility practices. Participants living in neighborhoods where parking availability had been lowered, either through reduced parking norms in new developments or through conversion of surface parking into green or shared spaces described increased reliance on cycling, greater use of public transport, and more frequent walking for short-distance trips. While these accounts do not establish causal relationships in a statistical sense, they align with established findings in transport research indicating that parking availability and pricing significantly influence modal choice (Shoup, 2005; Marsden, 2006; Guo, 2013).

In Malmö and Lund in particular, several participants reported that limited or less convenient parking encouraged them to reconsider habitual car use. A Malmö resident explained that “when parking wasn’t right outside the door anymore, biking just made more sense.” Similarly, in Lund, respondents noted that compact urban form and accessible train connections made car use increasingly unnecessary once parking was less readily available. These narratives are consistent with the broader literature on the built environment and travel behavior, which demonstrates that density, mixed land use, and reduced parking supply are associated with lower car use and increased cycling and transit uptake (Cervero & Kockelman, 1997; Ewing & Cervero, 2010; Newman & Kenworthy, 1999).

Participants living near mobility hubs, particularly in Helsingborg, where shared mobility infrastructure has been piloted reported decreased reliance on private car ownership. Access to shared vehicles, integrated bike parking, and proximity to bus or rail services reduced the perceived necessity of maintaining a privately owned vehicle. Some described transitioning from two-car households to single-car households, while others reported relying on car-sharing for occasional trips. These findings align with emerging research suggesting that shared mobility systems can reduce private car ownership and vehicle kilometers traveled when effectively integrated into urban neighborhoods (Martin & Shaheen, 2011; Firnkorn & Müller, 2012; Shaheen & Cohen, 2013).

The reported increases in cycling and walking also reflect the reinforcing relationship between infrastructure provision and behavior. Active travel becomes more attractive when supported by safe cycling lanes, pedestrian-friendly streets, and compact land use patterns (Gehl, 2010; Banister, 2008). In contexts where reduced parking supply coincided with improvements in cycling infrastructure or public transport accessibility, participants were more likely to describe modal shifts as pragmatic and even beneficial. This suggests that parking reform functions most effectively when embedded within a broader ecosystem of sustainable mobility measures, rather than an isolated restriction.

From a sustainability transitions perspective, these findings illustrate how incremental changes in land-use regulation can contribute to gradual reconfiguration of mobility regimes (Geels, 2011). Reduced parking supply alters the structural conditions of accessibility, recalibrating convenience hierarchies between transport modes. When combined with mobility hubs and shared systems, such changes can weaken the feedback loops that sustain private car dependency.

Overall, the interviews suggest that reduced parking availability, particularly when paired with high-quality alternatives, correlates with increased cycling, greater public transport use, and more walking. While the strength of this correlation varies across socio-spatial contexts, the findings reinforce the view that parking policy is a significant determinant of everyday mobility behavior and a potentially powerful lever in urban sustainability transitions.

5.8. Conflicts and resistance

Conflicts surrounding the reduction of parking provision were evident across the three cities, though their intensity and framing varied by context and social position. A recurring concern related to the perceived loss of accessibility. For several participants, particularly those living in peripheral neighborhoods or commuting longer distance-reduced parking was interpreted as a constraint on mobility flexibility.

Accessibility was framed not only in terms of daily commuting but also in relation to family logistics, caregiving responsibilities, and occasional long-distance travel. These perceptions reflect broader findings in transport research indicating that car-dependent households often equate parking availability with security and reliability (Lucas, 2012; Urry, 2004). In contexts where alternative mobility options were limited or perceived as insufficient, parking reduction was more likely to be framed as exclusionary rather than transformative.

A second source of tension concerned fears of property value decline. Homeowners in particular expressed concern that reduced parking provision could diminish housing attractiveness or resale value. These concerns echo the political economy literature, which highlights how parking is embedded in land valuation practices and development norms (Logan & Molotch, 1987; Manville et al., 2013).

In car-oriented housing markets, proximity to private parking is often perceived as an amenity, and its removal may be interpreted as a loss of competitive advantage. Such anxieties reflect the dual role of urban land as both lived environment and financial asset, where planning reforms intersect with household wealth expectations (Harvey, 2008). Empirical studies have shown that parking requirements can influence housing prices and development feasibility, reinforcing the perception that parking provision is economically protective (Gabbe & Pierce, 2017).

Generational divides also surfaced in the interviews. Younger participants, particularly in Malmö and Lund, were more likely to view reduced parking as compatible with evolving urban lifestyles centered on cycling, shared mobility, and proximity-based living. Older participants, especially those with established car-use routines or suburban residential histories, expressed stronger reservations. These differences align with mobility trend research documenting declining car ownership and usage among younger cohorts in many European cities (Kuhnimhof et al., 2012; Newman & Kenworthy, 2015). Generational

shifts in values related to sustainability, urban living preferences, and digital mobility services may therefore influence attitudes toward parking reform.

Despite these conflicts, acceptance of parking reduction increased significantly when high-quality green spaces visibly replaced parking infrastructure. Participants who initially expressed skepticism often reconsidered their position after experiencing improved public spaces, enhanced greenery, or multifunctional courtyards. In Malmö, for example, residents described former parking areas converted into landscaped courtyards as “worth the trade-off.” This suggests that the perceived legitimacy of parking reform depends partly on the quality and visibility of the alternative land use. Research on urban public space indicates that well-designed green environments can increase neighborhood satisfaction, property attractiveness, and perceived safety (Gehl, 2010; CABE, 2010; Peters et al., 2010).

The findings thus point to a conditional dynamic: resistance to parking reduction is strongest when perceived losses are immediate and alternatives uncertain, but acceptance grows when tangible collective benefits become evident. From a transition perspective, this reflects the importance of demonstrating co-benefits and visibly redistributing value in order to overcome regime resistance (Geels, 2011). High-quality green infrastructure can function not only as ecological enhancement but also as a legitimizing mechanism that mitigates fears of decline and reframes spatial change as collective improvement.

5.9. Theoretical contribution

This study contributes to the literature by integrating four bodies of scholarship that are often treated separately in urban research: urban ecosystem service theory, automobility regime theory, sustainability transition frameworks, and social sustainability and commons theory. By bringing these perspectives into a single analytical framework, the study advances a more systemic understanding of land-use reallocation between parking infrastructure and green space.

First, drawing on urban ecosystem service theory (Costanza et al., 1997; MEA, 2005; Gómez-Baggethun & Barton, 2013), the study conceptualizes green infrastructure not merely as aesthetic enhancement, but as multifunctional ecological capital embedded within the urban fabric. Vegetation is understood as delivering regulating, cultural, and supporting services, contributing to climate adaptation, public health, and biodiversity (Gill et al., 2007; Bowler et al., 2010; Elmqvist et al., 2015). By framing green space as productive infrastructure rather than residual land use, the study situates ecological functions within debates about urban value and land allocation.

Second, the study incorporates automobility regime theory (Urry, 2004; Sheller & Urry, 2000), which conceptualizes car-based transport as a deeply embedded socio-technical system stabilized by infrastructure, regulation, cultural norms, and economic interests. Parking infrastructure is interpreted not as neutral storage space but as a material anchor of the automobility regime, reinforcing car ownership and spatial patterns of dispersal (Shoup, 2005; Newman & Kenworthy, 1999). This perspective enables analysis of parking reduction as an intervention into regime stability rather than as isolated regulatory reform.

Third, sustainability transition frameworks, particularly the Multi-Level Perspective (Geels, 2011) provide a lens for understanding parking reform as part of broader socio-technical transformation processes.

Reduced parking supply, integration of shared mobility systems, and expansion of green infrastructure are conceptualized as niche innovations and regime destabilization mechanisms responding to landscape pressures such as climate commitments and decarbonization targets. By linking neighborhood-scale land-use decisions to systemic transition theory, the study bridges micro-level lived experience with macro-level structural change.

Fourth, the study engages social sustainability and commons theory (Dempsey et al., 2011; Ostrom, 1990; Wolch et al., 2014), conceptualizing green space as a form of urban commons that generates collective value rather than individualized utility. This perspective highlights how reallocating land from parking to parks redistributes benefits across broader segments of the population, potentially enhancing inclusion, social cohesion, and environmental justice. In contrast, parking infrastructure primarily supports individualized consumption tied to car ownership, reinforcing unequal access to urban space.

By integrating these theoretical strands, the study demonstrates that reallocating parking to parks is not simply an act of environmental beautification or incremental greening. Rather, it constitutes a structural intervention into the socio-technical configuration of urban mobility and land-use governance. Reducing parking provision weakens the material foundation of automobility, challenges growth-oriented land valuation logics (Logan & Molotch, 1987), and opens spatial capacity for multifunctional ecological infrastructure.

In this sense, green urbanism (Beatley, 2011) emerges not only as a design philosophy but as a spatial strategy for dismantling automobility lock-in. By reallocating scarce urban land toward shared ecological functions and proximity-based mobility systems, cities can gradually erode the reinforcing feedback loops that sustain car dependency (Seto et al., 2016). Green infrastructure thus operates both as environmental enhancement and as regime reconfiguration, contributing to the broader transformation toward low-carbon, socially inclusive, and space-efficient urban systems.

6. Discussion

The findings of this study lend empirical support to one of green urbanism's central propositions: that multifunctional green infrastructure generates greater long-term and collectively distributed value per square meter than monofunctional parking infrastructure (Beatley, 2011; Ahern, 2011). Participants consistently described green spaces as producing layered ecological, social, and experiential benefits ranging from microclimate regulation and recreational opportunities to stress reduction and neighborhood identity while parking was largely framed in instrumental and individualized terms. This perceived asymmetry reflects the broader ecosystem services literature, which conceptualizes urban vegetation as natural capital delivering regulating, cultural, and supporting services simultaneously (Costanza et al., 1997; MEA, 2005; Gómez-Baggethun & Barton, 2013). In contrast, parking infrastructure typically serves a single dominant function: vehicle storage. When assessed in terms of multifunctionality, temporal continuity of benefits, and breadth of beneficiaries, green infrastructure appears to yield a more diversified and resilient return on scarce urban land (Elmqvist et al., 2015; Hansen & Pauleit, 2014).

Importantly, participants' narratives reveal that this evaluation is not abstract but grounded in lived experience. Green courtyards replacing parking lots were described as "breathing spaces," "shared living

rooms,” and places that improved both environmental comfort and social interaction. Such characterizations resonate with research linking access to urban green space to improved mental health and social cohesion (Hartig et al., 2014; Twohig-Bennett & Jones, 2018; Peters, Elands & Buijs, 2010). The findings thus extend ecosystem service theory by demonstrating how residents internalize and articulate the value of vegetation in everyday terms, reinforcing the argument that green infrastructure is not peripheral amenity but core urban infrastructure.

At the same time, the study confirms that parking policy significantly shapes mobility habits. Consistent with induced demand research (Cervero, 2003; Shoup, 2005), interviewees reported adjusting travel behavior in response to reduced parking availability, particularly in neighborhoods where alternatives such as cycling infrastructure, public transport, or shared mobility were accessible. These shifts align with built environment–travel behavior studies demonstrating that land-use design, density, and parking supply influence modal choice (Cervero & Kockelman, 1997; Ewing & Cervero, 2010). Participants in Malmö and Lund, where compact urban form and strong cycling cultures are established, described reduced parking not as deprivation but as a catalyst for reconsidering habitual car use.

Crucially, reduced parking supply did not, in most cases, diminish perceived quality of life. On the contrary, many participants associated green redevelopment and reduced car presence with enhanced neighborhood attractiveness, improved aesthetics, and quieter streets. These findings echo into research suggesting that reduced car dominance can increase public space quality and social vibrancy (Gehl, 2010; Banister, 2008). By lowering traffic intensity and increasing opportunities for social encounter, green and pedestrian-oriented environments may generate co-benefits that outweigh the inconvenience of less proximate parking.

However, the findings also underscore that such transitions are conditional rather than automatic. Parking reduction alone does not guarantee modal shift or public acceptance. The data indicates that successful reallocation of space requires a supportive ecosystem of reliable public transport, accessible mobility services, and inclusive planning processes. Where public transport was frequent, safe, and well-integrated as in central Malmö and Lund participants were more willing to adapt mobility practices. Where alternatives were perceived as inadequate particularly in peripheral areas of Helsingborg resistance was stronger. These observations align with sustainable mobility scholarship emphasizing that restrictive measures must be paired with enabling infrastructures to achieve durable behavioral change (Banister, 2008; Geels et al., 2012).

Mobility services, including car-sharing and bike-sharing systems integrated into mobility hubs, emerged as important transitional tools. Participants living near such hubs reported decreased reliance on private vehicles, supporting research indicating that shared mobility can reduce vehicle ownership and kilometers traveled when embedded in dense urban contexts (Martin & Shaheen, 2011; Shaheen & Cohen, 2013). In this sense, parking reform operates most effectively when combined with strategic investment in multimodal accessibility, rather than an isolated regulatory intervention.

Inclusive planning processes also proved critical for legitimacy. Where residents felt informed and able to see tangible improvements in public space quality, acceptance increased. Conversely, when parking reduction was perceived as imposed without adequate consultation or without visible compensatory benefits, skepticism intensified. This finding resonates with governance literature highlighting the importance of procedural justice and stakeholder engagement in sustainability transitions (Bulkeley & Newell, 2015; Healey, 2006).

Despite growing acceptance in certain contexts, cultural norms surrounding car ownership remain resilient. Particularly among older participants and suburban residents, the car was framed as a symbol of autonomy and security. These perspectives reflect the deeply embedded nature of the automobility regime, sustained not only by infrastructure but by identity and habit (Urry, 2004; Sheller & Urry, 2000). Path dependency mechanisms (Pierson, 2000; Seto et al., 2016) help explain why car-oriented planning persists even when alternatives are technically feasible and environmentally preferable. Generational differences observed in the interviews suggest, however, that normative shifts may be underway, especially in cities with strong cycling cultures and high-quality public transport.

Perhaps most significantly, the findings suggest that green spaces actively reinforce sustainable mobility rather than merely complement it. Vegetated streets, shaded walkways, and inviting parks make walking and cycling more attractive by improving environmental comfort and perceived safety. Research on walkability and urban design supports this connection, demonstrating that high-quality public spaces encourage active travel and reduce reliance on private vehicles (Gehl, 2010; Ewing & Handy, 2009). In this sense, vegetation is not simply an environmental asset but a mobility enabler. By enhancing the experiential quality of non-motorized travel, green infrastructure strengthens the viability of low-carbon mobility systems.

From a socio-technical perspective, reallocating parking to parks can therefore be interpreted as both ecological enhancement and regime transformation. It weakens the spatial foundation of automobility while simultaneously strengthening alternative mobility configurations centered on proximity, shared systems, and active travel. The transition is not purely environmental but structural: it reshapes incentive systems, redefines urban value, and reorients land-use priorities. Green urbanism, in this light, functions as a spatial strategy for reconfiguring the relationship between mobility, ecology, and social life in the contemporary city.

Taken together, the findings suggest that the debate over parking and green space is not simply about aesthetics or convenience. It concerns how urban land is mobilized to produce collective well-being, environmental resilience, and long-term sustainability. Where supportive infrastructure and inclusive governance are present, reallocating space from parking to vegetation can enhance perceived quality of life while contributing to broader sustainability transitions. However, the persistence of cultural attachment to automobility underscores that such transformations require not only physical redesign but also normative and institutional change.

6.1. Strengthened conclusions

The findings of this study point toward several interrelated conclusions that extend beyond the immediate cases examined:

First, parking supply emerges as a structural determinant of car dependency rather than a neutral response to mobility demand. Consistent with research on induced demand and parking economics (Shoup, 2005; Cervero, 2003; Guo, 2013), the interviews suggest that the availability, convenience, and pricing of parking shape everyday mobility practices and long-term household decisions about vehicle

ownership. Participants living in neighborhoods with abundant and easily accessible parking were more likely to maintain car-dependent routines, while those in areas with reduced parking particularly where alternatives were viable reported gradual shifts toward cycling, public transport, or shared mobility. This reinforces the argument that parking provision does not simply accommodate automobility but actively sustains and normalizes it within the urban fabric (Urry, 2004). From a socio-technical perspective, parking infrastructure constitutes a key stabilizing component of the automobility regime, embedding car use into patterns of land use, housing development, and daily life (Newman & Kenworthy, 1999; Seto et al., 2016).

Second, the findings support the proposition that green infrastructure produces higher multifunctional value per square meter than monofunctional parking infrastructure. Drawing from ecosystem service theory (Costanza et al., 1997; MEA, 2005; Gómez-Baggethun & Barton, 2013), vegetation provides layered ecological, social, and health-related benefits simultaneously. Participants' narratives highlighted microclimate regulation, opportunities for recreation, enhanced aesthetic quality, and strengthened social interaction. These benefits accrue collectively and continuously, extending beyond individual users. In contrast, parking space was typically framed as serving a singular, individualized purpose vehicle storage. When assessed through the lens of multifunctionality, temporal efficiency, and breadth of beneficiaries, green infrastructure demonstrates a more diversified and inclusive return on scarce urban land (Elmqvist et al., 2015; Hansen & Pauleit, 2014). This comparative framing underscores that the debate over parking and parks is fundamentally a debate over competing land-use logics and value systems.

Third, the findings indicate that sustainable urban transition requires coordinated integration of mobility and ecological planning. Parking reduction alone does not automatically yield modal shift or public acceptance. Rather, it must be embedded within a broader ecosystem of reliable public transport, accessible shared mobility services, and high-quality walking and cycling infrastructure (Banister, 2008; Geels, 2011). In contexts where such alternatives were present most notably in central Malmö and Lund participants were more likely to adapt mobility practices without perceiving a decline in quality of life. This aligns with transition theory's emphasis on the interaction between niche innovations, regime structures, and landscape pressures (Geels et al., 2012). Green infrastructure, when combined with sustainable mobility systems, reinforces proximity-based urban living and reduces reliance on private vehicles. The integration of ecological and mobility planning therefore represents not only spatial optimization but systemic transformation.

Fourth, the study highlights that spatial reform must be accompanied by cultural and normative change. Despite recognition of ecological benefits, cultural attachment to automobility remains strong, particularly among older residents and those living in peripheral neighborhoods. Cars continue to symbolize flexibility, independence, and security (Sheller & Urry, 2000). Path dependency mechanisms (Pierson, 2000) and increasing returns effects (Arthur, 1989) help explain the persistence of car-oriented expectations even in cities actively pursuing sustainability goals. Without shifts in social norms, identity, and expectations around mobility, spatial reforms may encounter resistance framed in terms of entitlement or perceived loss. Generational differences observed in the data suggest that normative transitions may be underway, yet such change is uneven and context-dependent.

Taken together, these conclusions imply that the opportunity cost of parking extends beyond ecological considerations. Allocating large areas of urban land to vehicle storage displaces not only potential ecosystem services but also opportunities for social interaction, climate adaptation, and inclusive accessibility. The cost is therefore social and systemic as well as environmentally. It reinforces car-

dependent spatial structures, limits multifunctional land use, and constrains the transformative capacity of cities to respond to climate and sustainability imperatives.

In this sense, parking reform should not be framed narrowly as a technical adjustment in land-use ratios, but as a strategic intervention into the socio-technical configuration of urban systems. Reallocating space from parking to green infrastructure represents a redefinition of urban value shifting from individualized convenience toward collective resilience and well-being. The findings thus underscore that sustainable urban transformation requires integrated policy instruments, infrastructural redesign, and cultural reorientation, working in tandem to reshape the political ecology of urban land.

6.2. Answering the research questions

RQ1: How do residents conceptualize and compare the value of green spaces and parking infrastructure in their everyday lives?

The findings demonstrate a clear asymmetry in how residents conceptualize the value of green spaces and parking infrastructure. Green spaces are consistently described as multifunctional and collectively beneficial, contributing to mental restoration, microclimate regulation, social interaction, and neighborhood identity. Residents frame vegetation as a shared urban asset that enhances quality of life beyond individual use.

Parking, by contrast, is primarily understood in instrumental and individualized terms, valued for convenience, flexibility, and accessibility, particularly among car-dependent households. While acknowledged as practically important, parking is rarely described as generating collective or long-term benefits. In everyday discourse, green infrastructure emerges as socially and ecologically productive space, whereas parking is perceived as necessary but spatially inefficient.

RQ2: How does parking availability influence mobility practices, housing preferences, and perceptions of neighborhood quality?

The study shows that parking availability functions as a structural determinant of mobility behavior. In neighborhoods where parking supply is abundant and easily accessible, car dependency tends to persist. Where parking has been reduced and viable alternatives exist, such as reliable public transport, cycling infrastructure, and shared mobility services, residents report adapting their routines toward more sustainable modes. Importantly, reduced parking did not generally diminish perceived quality of life; in several cases, neighborhood attractiveness increased when parking areas were converted into green or multifunctional spaces.

Concerns about housing value and accessibility were present, particularly among homeowners and older residents, but these concerns often softened when tangible environmental improvements were visible. Parking availability thus shapes both mobility practices and broader perceptions of urban livability.

RQ3: What social tensions, generational divides, and spatial inequalities emerge in processes of reallocating land from parking to green infrastructure?

The reallocation of space from parking to green infrastructure generates identifiable social tensions. Generational divides are evident, with younger residents more inclined toward multimodal or car-light lifestyles, and older residents more attached to established automobility practices. Spatial inequalities also shape perceptions: residents in well-connected, central neighborhoods are more likely to accept parking reductions, while those in peripheral areas with weaker mobility alternatives express stronger resistance.

Additionally, concerns regarding property values and perceived loss of accessibility reflect underlying economic and cultural attachments to car-oriented planning. However, acceptance increases when green redevelopment visibly improves environmental quality and social space. The findings therefore suggest that parking reform is not merely technical but socially negotiated, shaped by life stage, spatial context, and access to alternatives.

6.3. Conclusions

This study indicates that:

- Reduced parking supply functions as an effective structural instrument for decreasing car dependency, particularly when accompanied by viable alternatives such as public transport, cycling infrastructure, and shared mobility services.
- Green spaces generate ecological, social, and public health benefits that exceed the spatial and functional value of monofunctional parking infrastructure, delivering multifunctional ecosystem services and collective well-being per square meter.
- Integrated planning across mobility systems, ecological infrastructure, and social sustainability objectives is essential to ensure that parking reduction contributes to broader urban resilience and accessibility rather than perceived loss.
- Multifunctional land use should replace monofunctional parking infrastructure, prioritizing spaces that simultaneously support climate adaptation, biodiversity, recreation, and active mobility.
- Mobility hubs and shared mobility systems serve as critical transitional mechanisms, enabling reduced reliance on private car ownership while maintaining accessibility and flexibility.
- From a green urbanism perspective, reallocating parking space to vegetation represents not merely environmental enhancement but a structural transformation of urban life, reshaping mobility regimes, redistributing collective value, and redefining how scarce urban land contributes to long-term sustainability.

6.4. Contribution to knowledge

This paper advances the field in four principal ways:

1. It empirically links ecosystem service valuation with parking policy.

While ecosystem services are often assessed quantitatively and parking policy is typically studied within transport economics, few studies connect the two empirically at the neighborhood scale. This paper demonstrates how parking reform can be understood as a mechanism for enhancing ecosystem service provision.

2. It integrates automobility regime theory with green urbanism at the neighborhood scale.

By combining Urry's automobility framework with green urbanism and sustainability transitions theory, the study conceptualizes parking reform as regime destabilization rather than incremental design change.

3. It reframes parking reform as ecosystem service enhancement.

Rather than treating parking reduction as mobility restriction, the study shows how it functions as spatial reallocation toward multifunctional ecological infrastructure.

4. It provides qualitative evidence of perceived “value per square meter.”

The paper contributes a novel analytical lens: comparing monofunctional parking with multifunctional green infrastructure in terms of collective and experiential value.

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The SHARE-North Squared project

SHARE-North Squared (SN²) aims to increase the sustainability, resource and spatial efficiency of real estate developments as well as the affordability of housing by integrating shared mobility as a means of supporting multimodal travel behaviour and for reducing car ownership, car dependency and the demand for parking.

SHARE-North Squared is an Interreg North Sea project co-funded by the European Union. The project was approved in 2022 and runs until 2026. The SN² partners are: City of Bremen (DE), GEWOBA (DE), Mipact (BE), Way To Go (BE), City of Helsingborg (SE), Lund University (SE), City of Aarhus (DK), City of Utrecht (NL), AM Gebiedsontwikkeling (NL), City of Stavanger (NO), Kolumbus (NO), Gustave Eiffel University (FR), City of Mechelen (BE), Woonland (BE), Housing Europe (BE) and Bergen kommune (NO).

Together, we want to reduce car-dependency in real-estate developments by helping local governments and project developers to successfully integrate shared mobility, and to promote its use to end users.

For further information, please visit our website: <https://www.interregnorthsea.eu/sn2>