

Article

Housing Design and Mobility Convenience—The Case of Sweden

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Abstract: A parking space is the beginning and the end of every car journey. Policies aimed at parking spaces are, thus, an effective way of affecting car travel. Policies regarding parking typically mean setting minimum parking requirements to meet the peak demand for parking. However, in several Swedish cities, as well as around Europe, attempts are made to lower the number of parking places. One way is to build homes without parking places for cars and pilot projects with zero-parking have started to materialize. This paper looks into the academic literature in the field of design and architecture to see how parking issues are dealt with. It also looks into ongoing practice by studying three pilot projects in Sweden that challenge the dominant parking norm by planning and building for a new normal—mobility convenience and zero parking. Both the literature and the cases point to little knowledge in the field. However, high demands on “creative mobility solutions” are placed on housing projects without parking places for cars. Even if the effects of sustainability are still unknown, zero parking pilot projects can narrate the possibility of another future—a future with mobility convenience instead of parking convenience.

Keywords: parking; mobility; housing; planning; sustainable development



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1. Introduction

A parking space is the beginning and the end of every car journey, thus, parking policies are effective for affecting car travel [1,2]. On average, cars are parked 95% of the time and only driven 5% [3]. This means that cities require enormous amounts of land for parking, land that can be used differently [4,5].

Policies regarding parking typically mean setting minimum parking requirements to meet the peak demand for parking without considering, either the price car users pay for parking, nor the cost associated with providing the required parking spaces [6]. Also, parking is often included in housing prices, meaning that parking becomes a part of housing consumption, rather than travel behavior which seems to increase vehicle ownership and use [7]. Weinberger [8] pinpoints that there is a clear relationship between guaranteed parking at home and the car use for journey to work even if origin and destinations are reasonably well, or very well, served by transit. Even though policies like these can lead to the oversupply of parking, planning education and urban planning textbooks typically do not elaborate on how to set parking requirements [6].

“Planners have diagnosed the parking problem in a way that makes it expensive to solve. Understanding the problem as too few parking spaces, planners require developers to provide more parking. But if the problem is too many cars rather than too few parking spaces, minimum parking requirements make the original problem even worse.” [6] (pp. 3–4)

However, in several Swedish cities, as well as around Europe, attempts are made to lower the number of parking places [9]. This is often combined with measures promoting accessibility with other means and by decreasing needs for travel, which can spur sustainable development since the negative environmental consequences of auto dependency are high.

The car-subsidizing parking paradigm described by, e.g., Shoup [3], Manville [7] and Weinberger [8], can be challenged by planning and building homes without parking places for cars and pilot projects with zero-parking have started to materialize.

Even though the home is intimately linked to our travel habits, little attention has been given to how parking links to architecture and design of homes. Guo [10] writes that a large proportion of parking studies focus on travel outcomes like trip generation and vehicle miles traveled, overall car usage, parking location and trip destination, while few studies focus on residential parking, even though it makes up a large proportion of the parking stock. Similarly, Manville [7] and Weinberger [8] pinpoint that there are few studies on travel and the built environment linked to residential parking as well as parking in general. *Parking convenience* affect household's car usage—when parking is guaranteed at home, households are more likely to drive cars [8,10]. If a parking place is easy to maneuver in and out, households drive their car even more [10]. In this paper *mobility convenience*—here defined as having access to mobility in other ways than by a private car and/or a decreased need of mobility because the home is designed in a way, which facilitates staying rather than moving—is assumed to also affect household's car usage. This paper looks into the academic literature in the field of design and architecture to understand how parking issues are dealt with. The literature review thus aims to include papers merging research on architecture/design and parking policy. This is important since design can be used as norm breaker, and thereby, can pilot new ways of planning for decreased car use without removing all off-street parking requirements and charging the right price for on-street parking which is more difficult. In order to learn from literature, but also from ongoing practice that is starting to materialize, this paper looks into three pilot projects in Sweden that challenge the dominant parking norm by planning and building for a new normal—mobility convenience and zero parking. The cases should be understood in the context of Swedish transport planning and policy which includes national targets of decreasing domestic climate emissions from the transport sector (excluding air traffic) by at least 70 percent by 2030, compared with 2010, and reaching zero net emissions by 2045 [11]. However, Swedish national transport planning maintains a practice where transport infrastructure investments are understood as insignificant to climate mitigation [12]. On a local level, policy and planning practices that do not place all hope in vehicle technology and utilization of electrification and biofuels can be found, especially in metropolitan densely built regions, such as those where the pilot cases are found where restrictions on car use are commonplace and, e.g., public transport is well-developed.

Overall, this paper aims to shed light on the challenges and opportunities with zero-parking projects as a way for planning and architecture/design to strive for sustainable development. Analytically, this study resonates with research advocating a shift in parking policy and links that to architecture practice. Empirically, in-depth interviews with actors working with zero-parking pilot projects allowed for a discussion also on upcoming practice.

2. Materials and Methods

The study was made as a systematic literature review on academic literature on parking and mobility linked to architecture, design, urban planning, habits or practices. Together with interviews with officials and practitioners in relation to three recent/ongoing projects, with parking norm zero in Sweden, authorities have started to acknowledge that access to parking places is a factor with great influence on how we choose mode of transport and how our travel patterns look [13].

In order to select papers to be included in the literature review, a search was made in Web of Science (on 19 February 2020) for papers covering the topic parking and mobility and also either architecture, design, urban planning, habit or practices (The search string used: TS = ((parking AND mobility) AND (architecture OR design OR urban planning OR habit OR practices)) AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article). Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI. In

this search string TS equal topic, which means that the search string was search for within the title, abstract, author keywords and keywords plus (which includes, except for the author keywords, also additional relevant but overlooked keywords that were not listed by the author or publisher added by Web of Science)).

The indexes search within were:

- Science Citation Index Expanded (SCI-Expanded)—1900-present
- Social Sciences Citation Index (SSCI)—1900-present
- Arts & Humanities Citation Index (A&HCI)—1975-present
- Emerging Sources Citation Index (ESCI)—2015-present
- Conference Proceedings Citation Index-Science (CPCI-S)—1990-present
- Conference Proceedings Citation Index-Social Sciences & Humanities (CPCI-SSH)—1990-present

The first four citation indexes contain over 12,000 highly acclaimed impact journal worldwide [14]. The two Conference Proceedings citation indexes instead “include the published literature of the most significant conferences, symposia, seminars, colloquia, workshops, and conventions in a wide range of disciplines. They cover over 148,000 journal and book-based proceedings in science, social sciences, and humanities across 256 disciplines” [14]. The conference proceedings typically covers not only established research fields, but also emerging ideas and new research. The indexes not included are two book citation indexes and two chemical indexes (Book Citation Index– Science (BKCI-S)—2005-present; Book Citation Index–Social Sciences and Humanities (BKCI-SSH)—2005-present; Current Chemical Reactions (CCR-Expanded)—1985-present and Index Chemicus (IC)—1993-present).

The abstracts of the papers identified in the citation indexes searches were screened using the following inclusion and exclusion criteria:

- Papers focusing on parking and mobility linked to architecture, design, urban planning, habits and practices were included.
- Papers that turned up in the search but did not have parking and mobility linked to architecture, design, urban planning, habits or practices as a focus were excluded.

In order to compare and contrast the academic literature to ongoing practice, interviews were made with officials and practitioners in Sweden with relation to three recent or ongoing projects with parking norm zero. This means no parking places for cars are being planned or built, except for the ones demanded for visitors and disabled people. Since the cases include no parking places, they can be said to represent so called deviant cases [15]. Thus, the cases are not selected to be representative for parking policy, instead they are surprising anomalies and these deviant cases are good for exploratory analysis [15] and a way to obtain information from cases that can be especially problematic or especially good [16]. Thus, they are information-oriented cases as compared to selecting cases randomly [16].

3. Results

3.1. Results from the Literature Review

A total of 273 papers were identified in the initial search in citation indexes. The abstracts of those papers were screened which resulted in the removal of 259 papers. For the remaining 14 papers, the full texts were read. Three of those were removed because they were not relevant. This resulted in 11 papers included in the literature review (see Appendix A Table A1). Four themes of relevance for this paper were identified in the articles: (1) Parking as a land use issue; (2) Social impacts of parking policies; and (3) Architecture/design. The results from the literature review will therefore be presented under these three headings.

3.1.1. Parking as a Land Use Issue

Cars stand still for most of their lifetime and occupy streetscapes and urban spaces that could have been utilized in other ways [17]. While this is now starting to be recognised,

in the 20th century, Europe uses parking policies to encourage the construction of additional off-street parking [18]. In the last 10 years, policies have changed and parking policies are used to achieve reduction in congestion and air pollution and to shift to walking, cycling and public transport [9,18,19].

Klementschtz et al. [20] give an overview of examples of good practice regarding parking policy: (1) Limiting the total number of private off-street parking spaces; (2) obligatory parking pricing for private off-street car parks; and (3) defining and negotiating trip contingents based on a mobility plan. The experience of all three measures are generally positive, but the trip contingents seem to be the most effective measure as there is a direct link to the number of acceptable trips (in terms of, i.e., capacity or ecological aspects) that can be allocated within a district. Examples mentioned in the paper are parking pricing and subsidizing transit tickets for employees, rebates for visitors arriving by transit (ticket refunded).

It is also noted by the literature that parking is part of the wider field of sustainable mobility which depends on at least four dimensions: (1) pricing policies, (2) land-use planning to produce urban forms that promote walking and cycling, (3) highway space that reflects the priority given to walking, cycling and public transport and where quality, safety and security for vulnerable road users are reflected, and (4) policies that focus on emissions, air quality and health [18]. Nieuwenhuijse [21] concludes more generally that in cities, work is often done in silos but multi-sectorial approaches are needed to tackle the environmental problems.

3.1.2. Social Impacts of Parking Policies

Merriman [22] claims that little research has focused political, social, cultural and geographical significance of parking practices, spaces and policies—practices that involve embodied performances of moving and stilling. In line with this, Antonson et al. [9] state that we do not know enough about how individuals respond to parking policy interventions or how these responses interact with local circumstances, availability of alternative transport modes or alternative destinations. Because of this lack, Antonson et al. [9] study a newly built area in applying lower parking requirement. They found that residents walk and use public transport more often than they did in their previous residence, while car driving and car ownership decreased. However, the changes were small: Car ownership declined for 19% of households and 25% drive less frequently (They sent a questionnaire to everyone living there—782 residents in 471 households (everyone living there 18 years and over registered as residents in Sweden)—and the individual response rate was 39% and household response 45.7%). One reason might be that local parking supply and the availability of shared parking and spill over parking was not dealt with.

Johansson et al. [19] investigated two homeowner associations built with a restricted number of parking places for cars but access to other mobility services, such as car and bike sharing, rental cars and free monthly passes on public transport. The study argues that mobility services can decrease the need for parking places. However, learnings about and spread of still marginal practices are slow why a hypotheses is that the conditions (technologies, ways to pay etc.) need to be stable for new practices to become more spread.

3.1.3. Architecture/Design

In terms of architecture and design, which is the focus of this paper, not much literature could be found that is in line with Grundström's [23] statement that housing is almost completely overlooked in mobility studies. Hermida et al. [24] point to the academic literature on the influence of the built environment on travel behaviour being broad and somewhat unorganized. They investigate the relationships between variables related to an urban environment and pedestrian flow. Among the most used variables to assess the built environment in relation to travel behaviour are "D-variables": Density, diversity, design, destination and distance. However, they state that a recent meta-study found

inconsistencies within the D-variables and concluded that their effect on travel behaviour might be small. Therefore, what makes us move (or stay) in a sustainable way is still unclear.

Grundström [23] explores how one form of mobility, daily movement, has been made meaningful in housing and how that may influence current residential segregation trends. She studies two Swedish cases: The *Markeliushus*—a collective housing complex designed in 1935—and *Victoria Park*—an exclusive life-style housing inaugurated in 2010. Both housing complexes were each the first examples of new forms of housing that represented, when they were built, the most modern way of living and moving in everyday life. These two examples clarified that the meaning of housing and how we live, where we remain in place and where we move is undergoing change. Larsen [17] points out that this can be understood by viewing mobility as being staged from above as well as from below. From above, engineers, planners and politicians make some mobility possible, designed artefacts like bikes and cars are also part of this as is infrastructure and laws, norms and political controversies. From below, mobility is acted out and lived in social interactions by e.g., a cyclist choosing a specific bike, locking it in a specific way etc. Therefore, design and artefacts are affecting our mobility and Hermida et al. [24] present data on potential influence of urban environment on pedestrian flow in Cuenca, Ecuador. Sidewalk width and number of doors were associated with higher number of pedestrians. Front setback and presence of parking spaces had negative impacts on the number of pedestrians. Commerce and service have narrow setbacks, large houses or villas wide setbacks. Cheng et al. [25] identify factors in Nanjing in China, which significantly affect the elderly's decision for active travel: Land use mixture had more profound impacts than population density. Spurling [26], among others, pinpoint that futures of sustainable travel and transportation have focused on vehicles in use, but attention is needed also to them when stationary which is also a design issue.

3.2. Learnings from New Normal Projects

In order to learn from the literature, as well as from new architecture practices that are beginning to materialize, this paper looks into three cases situated in densely built metropolitan regions with good accessibility to public transport, services, parks etc:

- Ohboy, a multifamily house with 55 apartments and a hotel with 31 rooms was built in 2016/2017 in Malmö, Sweden's third biggest city [27]. It was the first house in Sweden to be built with parking norm zero [28].
- Parfymfabriken (from now on the Perfume Factory), an old factory in Sundbyberg—a municipality within the Stockholm region—that will be transformed to rental apartments while also being complemented by a new 16-storey tower [29]. Building will probably start in 2021 [30]. The house will consist of 87 rental apartments with 1–4 rooms and will be the first building in Sundbyberg with parking norm zero [29].
- Nouvelle, a house that was first developed within MoBo, an innovation project aiming for developing and testing how innovative architecture, related services, business models and underlying policy can support sustainable mobility [31]. The house was first planned for condominiums, but was transformed to around 70 rental apartments [32]. The house will be ready in 2020 in the municipality Upplands Väsby situated in the Stockholm region.

3.2.1. Parking Policies

In Sweden, authorities have started to acknowledge that access to parking places is a factor with great influence on how we choose mode of transport and how our travel patterns look [13]. Accordingly, dialogues should be held with builders, property owners and developers about parking needs [13]. To create predictability, municipalities often use parking requirements that can be maximum, minimum or flexible. Flexible parking numbers mean that builders are encouraged to reduce the residents' needs for their own car by offering other mobility solutions. According to the Swedish Planning and Building Act, a lot must be constructed so that "adequate and suitable space is available, on the site

or nearby it, for parking, loading and un-loading of vehicles” [33] (Chapter 8, Section 9). The three cases in this study are situated in three different Swedish municipalities; Malmö, Sundbyberg and Upplands Väsby that regulates parking requirements differently.

The City of Malmö normally demands parking numbers between 0.7–1.0 for apartments in multi-family houses (excluding parking for visitors), but if the homes are connected to car pools or if “extraordinarily good conditions exist or are created”, this can be lowered to 0.5 parking places for cars per apartment [34] (p. 18).

The parking norm in Sundbyberg is flexible with respect to apartment buildings. This means that the number of parking is dependent on the mobility measures implemented. If no mobility measures are taken, the parking norm (excluding parking places for visitors) for small apartments ($\leq 45 \text{ m}^2$) is 0.4, for medium apartments ($45\text{--}70 \text{ m}^2$) 0.55 and for large apartments ($\geq 70 \text{ m}^2$) 0.7 [35]. If basic mobility measures (There is a list of 8 measures concerning bikes, e.g., that the bicycle parking should enable frame locking; 2 measures regarding charging of electric vehicles—at least 30% of the parking places for cars should be equipped with charging pole and another 30% prepared for this; mobility should be ensured by developers and a monitoring report should be sent to the municipality each year) are taken, these figures change to 0.3; 0.45, and 0.6 respectively [35]. If households are also given access to a carpool in at least 10 years from moving in together with information campaigns, figures decrease further. If residents are also given access to an annual pass on public transport for one year (for one adult per apartment), together with access to a bike pool in at least 10 years from moving in together with information campaigns figures decrease further. Suggesting further mobility measures together with information campaigns can decrease the figures even more. The developer should then present several well-thought-out and innovative proposals. Additionally, you need 0.05 parking places per apartment (no matter of size) for visitors [35].

The parking norm in Upplands Väsby should be seen as a guide while the precise number could be adjusted to contextual conditions in specific cases [36]. Deviations should be clearly justified in each particular case. Examples of such conditions are housing with good access to a car pool, student housing, elderly housing and housing aimed at persons with higher or lower car ownership than the average. The prescribed parking number varies between 0.5 and 1.4 places per apartment (plus 0.07–0.1 place per apartment for visitors) [36].

Additionally, all municipalities have to obey Swedish regulations about car parking for disabled people that should be arranged within 25 m of the easily accessible entrance [37].

3.2.2. Why Building a House with Parking Norm Zero?

Ohboy was the first house in Sweden to be built with parking norm zero and it is situated in area with vicinity to workplaces, university, shops, service, carpools, buses and trains [28]. The initiators of Ohboy—the architectural firm and the developer Hauschild+Siegel—were devoted to build a house without parking places for cars and their main argument was that you do not need a car in the area where the house is now built [28]. Another reason was to decrease living costs:

“We find it difficult to change the rent level, but we can offer more service and things that can make people save money. For example, by not having a car, we can indirectly affect the cost of living.” [28]

In a leaflet, Hauschild+Siegel architecture [27] pinpoints that “building codes are still stuck in car-centered ideology”, while they wanted to “focus on creating possibilities for a sustainable lifestyle—in mobility as well as consumption”. For the City of Malmö, the house was a way to try out new ways of changing mobility patterns: a traffic planner at the City of Malmö explains that the city has a pronounced openness to new solutions [38].

The example of the Perfume Factory is different. In this example, there are no ideological driving forces in having a parking norm of zero cars the architect tells [39]. The property

developer at Förvaltaren, a publically owned landlord, tells that it would be difficult and expensive to create parking places and/or a garage for the Perfume Factory and that the municipality's rather new mobility program encourage mobility services, such as free passes on public transport and bike shares [30]. A project leader for sustainable travel at the City of Sundbyberg clarifies that it is not possible to build an underground garage, but she also likes the idea of showcasing that private cars should not be taken for granted [40]. Also, when building rental apartments it becomes expensive for the owner to build garages since you are not allowed to put all the cost on the tenants [30]. The architect explains that the initial idea was to make parking places in nearby parking garages available for the tenants, but it turned out impossible [39].

“So it wasn't really meant to be zero parking, then we looked at it and it is very expensive to make parking on the site.” [39]

Additionally, Förvaltaren is a politically steered organisation that should work with long term and sustainable solutions [30]. Taken together, this meant that Förvaltaren saw the idea of working with parking norm zero as an interesting and challenging project, where you can bring in not only environmental issues but also social through creating a feeling of commonality [30]. A press release articulates that the project is a pilot project where they want to try out whether parking norm zero works or not [29].

The third case, Nouvelle, is different in another way. It was driven by several actors dedicated to reduce car driving, strive for sustainable development and also create a social context. The developer and architects together with planners at the municipality wanted to try out the possibility of a detailed plan with parking number zero to win legal force. Nouvelle was linked to MoBo, an innovation project (Financed by Viable Cities—a strategic innovation program focusing smart and sustainable cities—that is financed by Vinnova—Sweden's innovation agency, the Swedish Energy Agency and Formas—a Swedish government research council for sustainable development) aimed at developing and testing how innovative architecture, related services, business models and underlying policy can support sustainable mobility [31]. When asked why they wanted to build a house with no parking places for cars, the municipal planner answered “why not?” [41]. He explained that it is not unusual that developers want to build less parking places to make projects cheaper, but here the developer wanted to try out something new, which made him interested and pep. The municipality decided to make Nouvelle a pilot project where they can learn what works and not [41]. Except for sustainability arguments, the people behind Nouvelle found it unfair that everyone, also the ones not using them, have to pay for parking places for cars [31].

3.2.3. What Made It Possible to Deviate from the Municipality's Parking Norm?

The initiator of Ohboy started discussing the possibility of challenging the current parking norm early in the construction phase [28,34]. They created and presented a complete solution for how a multi-family housing could look like if tenants should not need any private car [28]. The developers/architects started out from the City's investigation of people's travel habits where travels to works/studies, to buy something, pleasure trips (meeting friends and relatives, going somewhere to exercise or meetings in voluntary organizations and also to leave/pick up children) accounted for a large proportion [42]. Therefore, they tried to find other solutions than using a car for these kind of travels. The City of Malmö found this to be a good idea in line with their parking policy, and thus, decided to make a pilot project called “P-norm 0” and grant the project building permit [28,38]. The reason was that the City wanted to encourage new solutions in order to promote sustainable travel patterns [43]. Since the architects who hatched the idea were also the developers, they had a good overview of costs [28]. This meant that they had “the freedom to experiment with new ideas and solutions along the way” [27].

The City is not sure that the project will be successful, and thus, the project should be evaluated after two, five and ten years [43]. The evaluations should be initiated and paid for by the property owner and carried out in collaboration with Malmö University.

The aim is to find out how well the concept works and what effect the different mobility measures have had on the residents' travel choices. After these evaluations, the City of Malmö will decide whether "P-norm 0" can be implemented on a wider front in other parts of the city [43]. Similarly, in Sundbyberg, the municipality officials and the politicians are positive to the Perfume Factory, the developer explains [30]. However, this does not mean that it is easy:

"[...] since this is the first house in Sundbyberg that will be built [with zero parking places] it will become an examples of how to do it, so they are very careful that we really do our utmost with different measures." [30]

The project leader for sustainable travel at the City of Sundbyberg pinpoints that it is important that you have the right steering documents, in order to build houses without parking places for cars [40]. The architect explains that the City put a lot of requirements on the developers and the architects [39]. The property developer, therefore used mobility consultants that proposed a lot of solutions [39].

"Then, if you want to be a little more ... uh, a little more moody, it was really about a lot of bicycle parking ... [...] From our side as architects, bikes are better than nothing ... but we also try to get through 2.70 as ceiling height so that the place can be used as a premises for business in the future. Moreover, we try to get acceptance for many windows, window sections towards the street, preparing to use the bicycle parking space as premises. However, you put bikes there for a while." [39]

The architect also compares the Perfume Factory with other projects and says, that there are sometimes much more ideological projects devoted to biking [39]. He is critical to the high number of parking places demanded for bikes, but he is positive to few/zero parking places for cars. However, he believes we must make it more difficult to drive cars in general and instead make it easy to go by public transport. When it comes to Nouvelle, both the municipality planner and the developer underlines the transparent and genuine process where the developer, the architects and the municipality wanted to understand and learn from each other [41,44].

"Me and Mats talked very much on the phone. We had a very good and open dialogue. We called each other when things became difficult to straighten out what it was really about. A very open dialogue. No hidden agendas. That's what made it work—that the municipality and we were open." [44]

When the project was first presented, the municipality liked the ideas but found it unclear how the mobility solutions would be implemented, thus, the developer was given "homework" [41]. The developer, together with the architect, reviewed the project and developed it together with the municipality [41]. Both the developer and the municipal planner enthusiastically describe this process that lead to the pilot project. All politicians were not that keen on the idea but dared to try, since it was a pilot project (not a new standard), because of the good cooperation between officials and politicians at that time and also because the scale—even if some of the tenants turn out to have a car it will not mean plenty of extra cars parked on the street [41]. Also, there is a safety net meaning that some parking places for cars can be created on the yard [41].

"We chose to do this as a pilot project so that we can learn what works and what does not work. We do not know enough about this." [41]

3.2.4. Designing for Less Parking

Ohboy has several features that are meant to facilitate life without a car. The initiator talks passionately about good parking places for bicycles, possibilities to bring the bikes—even cargo bikes—into the apartments (big enough elevators, wide enough doors), but also the interactive information board that informs about bus and train departures [28]. There are big delivery boxes where you can receive (and send) goods and a community

room that can be used for parties, yoga etc. in order to minimize the need for travel [28]. However, the delivery boxes do not yet work as intended—the technology is there but not many service providers [45]. There are balconies with automatic watering so that you can grow plants/vegetables in your vicinity, which might facilitate staycations [28]. There are also service stations where you can keep your bike clean and pump the tires, a bicycle share with specially built cargo bikes so that you can transport goods and friends, gift card for public transport and membership in a car share [27].

Initially, the idea was that the property owner would set aside funds and if it later on would turn out that parking places were needed, the funds should finance the buying of those in a nearby parking garage [43]. However, it was not legally possible to make this kind of claim on the developer. Instead, the City of Malmö and the developer agreed that all costs that were saved by not building parking places for cars should be invested in mobility measures, marketing car-free housing and monitoring the project. Also, the developer must provide parking places for visitors.

The traffic planner at the City states that the house was unique when it was built, with features like a cycle room in the ground floor, delivery boxes, the possibility to bring your bike in the elevator even though now many more houses including these types of mobility services have been built [38]. He underlines that these aspects visualised that other transportation alternatives than the private car are possible.

Bicycles also dominate in the Perfume Factory:

“It should be visible that there are a lot of bikes from the outside. It’s a political idea.” [39]

The architect is skeptical about the amount of space dedicated to parking places for bicycles and considers it important to make this space flexible, so that it can be used for something else in the future [39]. He compares with projects designed to have bike rooms that are also common rooms—meeting places—but sees this very much as a way to conciliate a jury [39]. According to him, developers use those gimmicks to charm decision makers. He adds that a more serious way is to focus on the fact that “it is instead of car parking, it is no more exciting than that” [39]. The developer mentions that, not only bikes, but also delivery boxes for receiving packages and a digital signboard showing trams, buses and subway departures [30]. Last, but not least, she proudly describes a bike workshop where e.g., newly arrived immigrants can receive bikes since Förvaltaren continuously find abandoned bikes in their different properties that could be fixed. All in all, this means that there are more subface than normal, so efficiency figures are not as good as they normally are for housing [30].

The architects that first designed Nouvelle, highlights the need to start out from the idea of sharing services and things which means that you can share spaces [31]. They discuss a “sharing architecture” that can facilitate for a smother everyday life. The solutions offered in Nouvelle should be so attractive that they change people’s behaviours and lifestyles [31]. Therefore, Nouvelle was not only about decreasing parking places for cars. It was about exploring how new rooms can be formed, and to support increased social, economic and ecological sustainability [31].

Three spatial solutions were highlighted from the beginning in Nouvelle [31] “The lobby” should be a welcoming entrance room, which connects the homes and the common rooms with the street. The idea was to fill it with shared functions like a refrigerated storage where home-ordered groceries can be stored until the residents pick them up and mailboxes and large service boxes for deliveries of e-traded goods. There should also be a digital information board with upcoming public transport departures and some few parking places for (shared) electrical vehicles. (2) “The hall” was meant to be a large common hall, a multifunctional space for storage, mobility hub and common activities. There should be a kitchenette to enable social activities, but the everyday use would be parking place for the house’s common and private vehicles. In the hall there should be several bicycle-promoting measures such as bicycle pool, a place for mending and washing your bike, and easily accessible individual storage. (3) “The yard” should be lush and contain gathering places.

Since no widespread outdoor parking is required nor a garage under the yard, the greenery can be of high quality with opportunities for large trees, cultivation and permeable areas that delay, cleanse and locally infiltrate stormwater.

However, this was never fully realised. Since the market for condominiums fell, the developer had problems selling apartments [44]. Therefore, they decided to transform the condominiums to rental apartments [44]. This is when Rikshem—one of Sweden’s largest private property companies—acquired the project [44]. They were interested in the project both because of the parking norm zero, but also because they want their manage office in the building [44]. Transforming the condominiums to rental apartments also meant that costs needed to decrease [44]. A building construction operation was commissioned by the developer to build the house for Rikshem and their suggestion was to ask another architect for a second opinion to facilitate for “killing your darlings” [44]. The developer liked the original architects, but noticed they had problems with rethinking the project together with being expensive [44]. Therefore, new architects were brought in. The hall (in the basement) was transformed to an office for Rikshem, parking spaces for bikes were moved to exterior corridors and also a large bicycle storage in the ground floor [44]. The developer believes the mobility solutions were sharpened [44]. Previously, bikes were parked in the basement among other uses, now parking spaces for bikes are easily accessible and closer to your apartment. There is also a bicycle storage room where you can e.g., wash your bike. The car pool is larger since Rikshem will have their office there and make their cars accessible for the tenants at evenings and weekends [44]. The building will still “offer refrigeration space for food deliveries, extra-large mailboxes for home delivery of packages, and solutions for more sustainable means of transport. A common bike pool with different types of bicycles and a pool of bookable cars will also be made available for tenants. Bicycle storage and parking will be well-planned and easily accessible. There will also be spaces for bulky waste, recycling and reuse.” [46] Another thing that had to change was the facade material.

“The new political steering is much more traditional. The chairman of the local council contacted me via the new municipal director, outside working hours, and said that the house was ugly. They saw the facade material as ugly; they wanted a classic design. We thus turned into bricks. And then we got building permits in November 2019. [. . .] After the elections, there is another political steering, they do not like parking number zero.” [44]

3.2.5. What Could Make It Easier to Build Houses without Parking Places for Cars?

The architect behind Ohboy mentions two different aspects that could facilitate for building more houses without parking places for cars [28]:

- Politician could show that this is something they want.
- More pilot projects should be allowed since it takes a long time to develop projects and we cannot keep waiting for all regulations to change.

The transport planner in Malmö [38] where Ohboy is situated pinpoints that it would be easier to allow more similar projects if it actually worked in terms of people not needing cars. However, he adds that it could be better to not aim for zero, but instead just decrease the amount of parking places:

“The question is: is it zero that we should aim for? Yes, maybe in the long-term, but maybe it is more realistic to aim for a number that is lower than our normal properties have.” [38]

The architect behind the Perfume Factory has a clear message; he wants to simplify the process for building without parking spaces for cars. This means reducing the requirements for compensation measures [39]. Today, according to him, too many gimmicks are used in order to get a building permit and he mentions a client that wanted to have a “bike day” every year, and asks “how would you follow up on that”? Should the city assess if the bike day was good enough, he asks [39]. He also underlines that the demand on parking places for bikes should be reduced and that the demand for parking places for cars in a car pool

that often comes when you build with parking norm zero need to be reconsidered [39]. Often clients want car pools to be visible, but this means that you place them on an open space that could have been used for other things.

“I believe in simplifying everything. The desire to avoid parking places already exists, from the market. Then it is easiest to just ... crap parking.” [39]

The developer, on the other hand, pinpoints that other behaviours must be facilitated:

“It’s a bit like garbage sorting—if you make it easy, it works, but as long as it is hard and more complicated, then it is not interesting.” [30]

Nouvelle was developed within the innovation and research project MoBo. In a report from the project [31], it is stated that municipalities need to initiate/allow test beds/pilot projects that break current norms and also evaluate these projects so that new knowledge is received. In an interview, the developer explained that municipalities can be more kindly set [44]. Even though the planner at Upplands Väsby was helpful, this is not always the case. She also underlines that research is needed—we do not know what kind of architecture and mobility services that works and not. The planner at Upplands Väsby underlines that no changes of the law is needed—instead you can seek support in the law and “politically you have to dare!” [41]. However, the municipality needs to have an internal organization that knows how to handle the issue:

“What is zero-parking, how many car pool cars does it mean, etc. There was a lot of administration for us in this project. For example, how to decide what is a good mobility measure? We called it a pilot project, so that politicians would be assured that not everyone can mimic. It will not result in a lot of similar projects, but hopefully nudge the development in the right direction so that parking standards become more flexible.” [41]

3.2.6. What Is Successful/Less Successful with the Project?

Only one of the cases in this paper is finalized—Ohboy. Evaluations (The evaluation was sent by the developers to 1 person per household in the Ohboy house, in total 59 persons. The respondent rate was 56%) show that 55% of the tenants bike more since they moved in to the house than before [45]. The reasons mentioned are that the location (close to jobs, city centre and the sea), but also the easy accessible pool of different kinds of bikes, that it is easy to park and also mend with your bike and that you are influenced by the idea of bicycling. 25% of the households have access to a car now, while 42% used to have it before moving to Ohboy [45]. The reason for people moving to a house without parking places for cars and a strong focus on bicycling, but still wanting to own a car, might be explained by the fact that some tenants moved to the house because it was the only available housing they could find [47]. An experience rate of 42% that they drive less cars now than before they moved to Ohboy, 30% experience no change, 24% never drive a car and 3% experience that they drive more [45]. Except for biking more, the tenants also use public transport more and walk more than they used to do before moving to Ohboy [45]. The developer expresses it as that they have become diversity users of transport solutions [28]. When asked about what mobility services they found important for an everyday life without owning a car, tenants found it most important to be able to park your bicycle just outside your door (see Table 1).

The initiator of Ohboy is satisfied with the possibility to bring your bike into the apartment, but also that the house encourages pride in cycling [28]. The greenery is also brought up as a successful measure and the fact that a lot of pedestrians and cyclists means that the streetscape has changed [28].

When it comes to the downside, the developer mentions the outdoor bicycle workshop as not being used much, maybe because you do not feel comfortable to mend with your bike in semipublic places [28]. There has been problems with bicycle thefts which made the developers increase security with better lock systems. Also, few suppliers deliver to the delivery boxes [28].

Table 1. Answers from tenants on what mobility services they found important for an everyday life without owning a car (private communication, Jonsson, 2020).

Bicycle parking outside the apartment door	79%
Public transport travel card	76%
Ability to bring (even bigger) bicycles in the elevator	73%
Bike share	67%
The workshop in the basement, with tool cabinets, compressor etc.	67%
Information board in the entrance with public transport departures	58%
Outdoor bicycle workshop, with pump and tools	55%
Car share	55%
Orangery at the top floor	46%
Bicycle service once a year (in the fall)	42%
Half the price of membership in Bike & Ride (bicycle parking)	18%
None of the above	3%

The transport planner from the City would like better evaluations, right now they don't now, for example, where people that live in the house and owns a car park it. Overall, the City says that the evaluations so far are thin, not stringent and they wish for more [38]. He also underlines that the most important learning from the project is that it is difficult to reach zero car ownership. At the City, they are also discussing the strong adaptation of the house to the target group—maybe it just means that people biking are placed in one place [38]?

4. Discussion

This study looked into the scientific literature in the field of design and architecture to see how parking issues are dealt with and also into three cases where ongoing practice on zero-parking is starting to materialize. Both the literature review and the cases point to little knowledge in the field. Even though many cities are shifting mobility solutions from focusing the private car to more sustainable alternatives, little has been written on what this mean for the design of housing and parking on the more detailed level. Similarly, the cases point toward trial and error, since there is little knowledge on what will work and not. In spite of the little knowledge, officials and politicians place high demands on projects; if no parking places are to be built, other creative mobility solutions must be offered instead. In order to make informed decisions about such creative solutions, more knowledge about their effect is needed. Therefore, prior to standardising certain creative mobility and design solutions, we need more knowledge on their social and environmental effects. However, according to the literature, it is clear that we need to limit the amount of parking places if we are to reach sustainable mobility. This can be done by pricing policies, but also by other means.

4.1. Economical Injustices

The literature points to the fact that cars stand still for most of the time they are in use [17]. Therefore, cities require enormous amounts of space for parking that could have been utilized in other ways. Also, the price car users pay for parking does not reflect the market cost [3]. The cases presented in this paper pinpoints that it is expensive to build parking places in multifamily houses and that it is unfair that this cost should be shared by all residents, not only the ones with cars. Therefore, zero-parking can be seen as a way of enabling lower living costs for people without cars. This is what the architects behind Ohboy—one of the cases presented in this paper—explicitly argued [28]. Similarly, the property developer behind Perfume Factory [30] and the team behind Nouvelle mentioned that building parking places is expensive [31]. Thus, the cases together with the literature clearly points toward injustices in today's auto-centric architectural and planning practice that creates economic, as well as urban quality injustices. Economic injustices understood as costly parking places paid also by non-car-owners and urban quality injustices in terms of much space being used for parking places that could have been used for social-ecological

purposes. Breaking loose from the narrative of *parking convenience* and instead planning and building for *mobility convenience* could, thus, affect not only the likelihood of households owning a car, but also economic injustices so that car-owning neighbours are not subsidised by their non-car-owning neighbours.

4.2. Mobility Services

The literature, e.g., [19], but even more the cases, bring up mobility services, such as car and bike sharing, rental cars and free monthly passes on public transport as means to achieve mobility convenience without the need to own a private vehicle. In a way, this is nothing new; car pools have been around for a long time. However, what is newer is the linkage to information and communication technologies that facilitate the sharing of services and the possibility to offer door-to-door transport without owning a vehicle [48]. Some solutions, such as the sharing of cars, have become easier when facilitated by ICT while other still suffer from childhood diseases. To mention an example, the delivery boxes in the Ohboy case has technology that works, but there are not many service providers. Different solutions have been implemented in different places, but “the information available of such initiatives is shallow, unstructured, and not properly maintained” [49]. Thus, what we see is ad-hoc solutions that may, or may not, contribute to mobility convenience and sustainable development. This was highlighted in the Nouvelle case where both the planner and the developer pinpointed that it is unknown what kind of architecture and mobility services that works or not when it comes to curbing car dependency.

4.3. Parking Policy as a Way to Increase Ecological Sustainability

The literature review was clear on that we are in a transition where parking policies are shifting from facilitating for parking cars to parking policies also being used to achieve reduction in congestion and air pollution and to shift from car driving to walking, cycling and public transport. This means, e.g., that many European cities are reducing the parking allocation in residential areas by lowering the parking requirements. The Ohboy case shows that car ownership went down when people moved to the house and so did the car driving [45]. Antonson et al. [9] showed that in the low-parking-development they studied residents walk and use public transport more often than they did in their previous residence, while car driving and car ownership decreased. However, the changes were small and the reason might be that local parking supply and the availability of shared parking and spill over parking was not dealt with. This points to the importance of multi-sectorial approaches as Nieuwenhuijse [21] writes about. Parking cannot be looked into as a single problem but must be linked to e.g., urban planning, mobility and transport, parks and green space etc. For example, Antonson et al. [9] write that lower parking requirements for one residential area must be accompanied by a well-coordinated battery of measures such as good access to public transport, higher parking charges, a decrease in public parking spaces etc. The question of the effect of these projects in terms of how much car driving is reduced remains, but the projects seem to be a way to paint the idea that other choices than the private car are possible. It is difficult to know whether access to car parking leads to “changes in housing consumption, changes in vehicle ownership preferences, or both” [7]. This is called the residential self-selection problem. As highlighted by the transport planner in Malmö, maybe the Ohboy case just means that people biking are clustered. Housing without bundled parking might simply be more attractive to people who don’t want their own car [7]. However, empirical results are inconsistent in direction of self-selection bias [50]. Therefore, the issue whether zero parking is a way of redistributing vehicle-free people, or a way of decreasing car use needs to be further researched. We need to know more about why people choose the housing they do (if they have a choice). According to Manville, “travel and parking preferences are generally absent” from these responses to why people chose their neighbourhood and home. However, he also states that financial and design reasons are important, and the cases in this paper have shown

that designing zero-parking homes can be a way of cutting rents while also offering other mobility services and design features such as shared spaces.

In particular, the Nouvelle case in this paper shows that if you do not have to build a garage—which is often the solution to fulfil parking requirements—there is an opportunity for increased greenery and lush yards. You can plant trees, which need deeper soil than an underground garage allows for, that connect the city's green environment and contribute to cleaner air and the possibility of natural infiltration of rainwater. Vegetation reduces air pollution and the filtering capacity increases with more leaf area and therefore trees are good [51]. Trees also reduce noise levels and vegetated areas let water evaporate or infiltrate the ground.

The Nouvelle case's planned lush yard is not only an example of a way to promote functioning ecosystem services, but it is also an example of how design and architecture could change on the local level. It narrates a story about a green meeting place for the residents, an area with high ecological and aesthetic values. Here you can put a hammock between trees or maybe have a cup of coffee under an apple tree. It is a yard that is different from many other newly built yards where under-ground garages make it impossible for larger trees. Not seeing the underground as detached from the ground, but instead shedding light on the fact that choosing to build an underground garage means that we will also say no large trees, is an important part of this project. It also makes evident that parking convenience affects more than we might first think of and that mobility convenience might put forward a different urban development with increased urban qualities.

However, it could also be argued that the zero parking cases in this paper are just a way of strengthening the narrative about the sustainable, dense city. For example, Hagbert and Bradley [52] (p. 241) write about eco-profiled urban districts in Scandinavia “merging urban attractiveness and technological innovation to make it easier to “live sustainably” as part of a “green” urban lifestyle””. This kind of narrative has been criticized for not contributing enough when it comes to transitioning towards a future where important sustainability targets are reached (see e.g., [52]). There is a fear that these kind of projects normalize that no greater behavioural and social changes are needed, in order to reach sustainable development (see e.g., [53]). However, the cases in this paper do challenge the car dominant lifestyle and also the institutionalised practice of planning and building homes with parking places for cars. Therefore, in spite of also promoting a green urban lifestyle, these cases are contributing to questioning the well-established narrative where the car and the home are intimately connected.

4.4. Architecture/Design

The cases show that when trying to break with the car-parking paradigm, the houses planned and built are not only houses without parking places for cars, they also contain other solutions like easily accessible parking places for bicycles, bike and car pools and also the sharing of indoor space.

Francart et al. [54] write that shared indoor space can include, e.g., co-housing; student housing with small rooms and shared facilities such as laundry rooms and a kitchen; coworking and flexible office spaces and also premises shared between several organisations. In the cases, we saw, e.g., shared bicycle workshops, shared spaces for receiving shopping deliveries and also shared flexible spaces. We can assume that Francart et al.'s [54] description of advantages and drawbacks are still valid. The advantages can “include access to affordable high-quality premises, reduced isolation and strong social networks” while drawbacks can “include overcrowding, stress and psychological distress” [54] (p. 71). Therefore, space sharing has its pros and cons and rules for social interaction need to be handled in some way. Francart et al. [54] bring up, e.g., internal communication among users/tenants, cohesion and deliberative processes to define common values. In the Ohboy house, the only house that has actually been built among the cases in this paper, there is an active Facebook group for tenants where they, e.g., share experiences, borrow things, invite each other for events or ask for help, but the latest evaluation shows some dissatisfaction

with noise levels and the lack of tidiness in the common orangery [45]. However, they are also satisfied with the same orangery, so it shows the ups and downs with sharing spaces and the needs of sharing standards/rules. Therefore, sharing spaces is exciting and can have both positive and negative aspects and is something you need to think through carefully, not throw in as a misbegotten solution to reduce the number of parking spaces!

The absence of underground garages allowing for green courtyards with large trees and the possibility to infiltrate storm water naturally have already been discussed, but is also an important design aspect that brings urban qualities and the possibility of ecosystem services.

Even if one critical voice was raised among the cases, saying that building with zero-parking should just mean removing parking places and nothing else, the cases and the literature shows that when building houses (with or without parking places) you have the opportunity to discuss and challenge the current norm on how we want to live, where we remain in place and where we move. However, challenging norms is demanding. The cases presented in this paper shows that breaking with dominant mobility imaginaries is difficult and people (planners, architects and developers) who dare to be uncomfortable are required. Even though there are often governing documents that states sustainability frameworks and targets that reduced car dependency can help achieve, it is difficult to do different than what is normally done. As the literature review showed, mobility is shaped from above and from below, so even if habitual changes is one part, designers and architects can also drive change by scripting and designing places that facilitate for mobility convenience. This became clear in the Ohboy case where tenants find bicycle parking just outside their apartment door important in facilitating for an everyday life without a car. Therefore, even though some creative mobility solutions might be gimmicks to win building permits, others seem to be successful.

5. Conclusions

This paper has presented a literature review of the intersection of design, architecture and parking, as well as three cases where ongoing practice on zero-parking is starting to materialize. Both the literature review and the cases point to the little knowledge available in the field. In spite of little knowledge, municipalities place high demands on “creative mobility solutions” without parking places for cars on housing projects. These solutions are sometimes well functioning and sometimes more like gimmicks.

Zero-parking can be seen as a way of enabling lower living costs for people without cars, since the cost of parking is detached from housing costs. Previous research has found that financial and design reasons are important when people chose their neighbourhood and home, and the cases in this paper has shown that designing zero-parking homes can be a way of cutting rents, while also offering other mobility services and design features such as shared spaces.

This paper has shown that if you do not have to build a garage—which is often the solution to fulfil parking requirements—there is an opportunity for increased greenery and lush yards. This can contribute to cleaner air and the possibility of natural infiltration of rainwater.

Taken together, the cases and the literature shows that when building houses you have the opportunity to discuss and challenge the current norm on how we want to live, where we remain in place and where we move. The literature review shows that we are in a transition where parking policies are shifting from facilitating for parking cars to parking policies also being used to achieve sustainability benefits. It seems like low-parking developments can facilitate decreased car driving, but it is also clear that a more holistic and multi-sectorial approach is needed. Parking needs to be linked to, e.g., urban planning, mobility and transport, parks and green space etc. However, zero-parking pilot projects can narrate the possibility of other futures with mobility convenience instead of parking convenience.

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Institutional Review Board Statement: This study followed ethical requirements and practice for research in Sweden as stipulated by the Act concerning the Ethical review of research involving humans (2003:460). Since the study did not collect sensitive data, it did not need a formal approval from the Central Ethical Review Authority in Sweden. However, the interviewees were informed about the purpose of the study, how the collected data would be used and they also got the opportunity to read the text where they were quoted so that the interviewer had not misunderstood them.

Informed Consent Statement: Not applicable.

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Appendix A

Table A1. Papers included in the literature review.

Author and Aim	Findings
Antonson et al., 2017: Analyse two interlinked problem areas: consequences of lowering the parking requirements for residents and also parking policy and planning.	Case study shows that it is important to adopt an overarching approach in parking policy and planning.
Cheng et al., 2019: Identify factors significantly affecting elderly’s decision for active travel.	Case study shows that land use mixture is more important than population density for enhancing active travel.
Grundström, 2018: Explore how one form of mobility, daily movement, has been made meaningful in housing and how that may influence current residential segregation trends.	The meaning of housing, how we live, where we remain in place and where we move is undergoing change.
Hermida et al., 2019: Investigate the relationships between variables related to an urban environment and pedestrian flow.	Case study shows that sidewalk width and number of doors were associated with higher number of pedestrians.
Johansson et al., 2019: Study progressive mobility plans implemented by two housing companies, supported by two municipalities, in Sweden.	Case study shows that mobility services might decrease the need for parking places, but learning about and spread of still marginal practices are slow.
Klementsitz et al. 2007: Give an overview of examples of good practice measures regarding parking policy.	Three measures have been put into practice in about 30 European conurbations (in 13 countries): (1) limiting the total number of private off-street parking spaces, (2) obligatory parking pricing for private off-street car parks and (3) defining and negotiating trip contingents based on a mobility plan. All measures are generally positive, but the trip contingents seem to be the most effective measure.
Larsen 2017: Ethnographic study of design moorings and practices associated with parking and locking bikes.	Case study explores how bicycle moorings are physically scripted and designed by engineers and urban designers/planners ‘from above’ and appropriated by everyday users ‘from below’.
Merriman, 2019: Examine how parking enforcement techniques have been framed as central to the affective reconfiguration of habits, tracing the tactics and technologies used by traffic wardens when governing parked vehicles and attempting to monitor the practices of motorists.	Reconfiguring parking habits includes reconfiguring collective habits and expectations.

Table A1. Cont.

Author and Aim	Findings
Nash and Whitelegg, 2016: Review the state of research on urban transport pricing and regulation and to assess the most important research needs in this area.	Sustainable mobility depends on at least four dimensions: (1) pricing policies that reflect the internalization of external costs and the polluter-pays principle, (2) land-use planning to produce urban forms that promote walking and cycling, (3) highway space that reflects the priority given to walking, cycling and public transport and where quality, safety and security for vulnerable road users are reflected and (4) policies that focus on emissions, air quality and health. Research point to the need to adopt market-based pricing for parking places.
Nieuwenhuijse, 2016: Provide a narrative towards new insights and possible solutions for the current environmental and health challenges in cities, focusing on the links between built environment, environmental exposure and health and identifying new concepts, methods and tools to inform science and policies.	Concludes that work in cities is often done in silos and that these do not work together well enough; multi-sectorial approaches are needed to tackle the environmental problems.
Spurling, 2020: Explore the future of parking and its implications for land use, space and place.	Coins the concept “dormant vehicles” meaning vehicles that are stationary while waiting to be used. Discusses that future forms of dormancy include e.g., shared electric vehicles, autonomous vehicles, delivery services, bikes and dock-less bikes.

References

- Ison, S.; Mulley, C. Chapter 1, Introduction. In *Parking: Issues and Policies*, 1st ed.; Ison, S., Mulley, C., Eds.; Emerald: Bingley, UK, 2014.
- McCahill, C.T.; Garrick, N.W. Influence of Parking Policy on Built Environment and Travel Behavior in Two New England Cities, 1960 to 2007. *Transp. Res. Rec.* **2010**, *2187*, 123–130. [\[CrossRef\]](#)
- Shoup, D. *Parking and the City*; Routledge: New York, NY, USA, 2018; p. 514.
- Marsden, G. Parking Policy. In *Parking Issues and Policies*; Ison, S., Mulley, C., Eds.; Emerald Group Publishing Limited: Bingley, UK, 2014; Volume 5, pp. 11–32.
- Manville, M. Travel and the Built Environment: Time for Change. *J. Am. Plan. Assoc.* **2017**, *83*, 29–32. [\[CrossRef\]](#)
- Shoup, D.C. The high cost of free parking. *J. Plan. Educ. Res.* **1997**, *17*, 3–20. [\[CrossRef\]](#)
- Manville, M. Bundled parking and vehicle ownership evidence from the American Housing Survey. *J. Transp. Land Use* **2017**, *10*, 27–55. [\[CrossRef\]](#)
- Weinberger, R. Death by a thousand curb-cuts: Evidence on the effect of minimum parking requirements on the choice to drive. *Transp. Policy* **2012**, *20*, 93–102. [\[CrossRef\]](#)
- Antonson, H.; Hrelja, R.; Henriksson, P. People and parking requirements: Residential attitudes and day-to-day consequences of a land use policy shift towards sustainable mobility. *Land Use Policy* **2017**, *62*, 213–222. [\[CrossRef\]](#)
- Guo, Z. Home parking convenience, household car usage, and implications to residential parking policies. *Transp. Policy* **2013**, *29*, 97–106. [\[CrossRef\]](#)
- Sweidsh Ministry of the Environment The Climate Policy Framework. Available online: <https://www.government.se/articles/2017/06/the-climate-policy-framework/> (accessed on 22 December 2020).
- Witzell, J. Assessment tensions: How climate mitigation futures are marginalized in long-term transport planning. *Transp. Res. Part D Transp. Environ.* **2020**, *87*, 102503. [\[CrossRef\]](#)
- Swedish National Board of Housing, Building and Planning, Parkering som Styrmedel [Parking as a Policy Instrument]. Available online: <https://www.boverket.se/sv/PBL-kunskapsbanken/planering/oversiktsplan/allmanna-intressen/klimatpaverkan-och-oversiktsplanering/minska-transportsystemets-klimatpaverkan/parkering-som-styrmedel/> (accessed on 24 November 2020).
- Web of Science, Web of Science Core Collection Help. Available online: http://images.webofknowledge.com/WOKRS533JR18/help/WOS/hp_database.html (accessed on 20 March 2020).
- Seawright, J.; Gerring, J. Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options. *Polit. Res. Q.* **2008**, *61*, 294–308. [\[CrossRef\]](#)
- Flyvbjerg, B. Five misunderstandings about case-study research. *Qual. Inq.* **2006**, *12*, 219–245. [\[CrossRef\]](#)
- Larsen, J. Bicycle Parking and Locking: Ethnography of Designs and Practices. *Mobilities* **2017**, *12*, 53–75. [\[CrossRef\]](#)
- Nash, C.; Whitelegg, J. Key research themes on regulation, pricing, and sustainable urban mobility. *Int. J. Sustain. Transp.* **2016**, *10*, 33–39. [\[CrossRef\]](#)
- Johansson, F.; Henriksson, G.; Envall, P. Moving to Private-Car-Restricted and Mobility-Served Neighborhoods: The Unspectacular Workings of a Progressive Mobility Plan. *Sustainability* **2019**, *11*, 6208. [\[CrossRef\]](#)

20. Klementsitz, R.; Stark, J.; Sammer, G. Integrating Mobility Management in Land Development Planning with Off-Street Parking Regulations. *J. Urban Plan. Dev.* **2007**, *133*, 107–113. [\[CrossRef\]](#)
21. Nieuwenhuijsen, M.J. Urban and transport planning, environmental exposures and health—new concepts, methods and tools to improve health in cities. *Environ. Health* **2016**, *15* (Suppl. 1), 38. [\[CrossRef\]](#)
22. Merriman, P. Relational governance, distributed agency and the unfolding of movements, habits and environments: Parking practices and regulations in England. *Environ. Plan C Polit* **2019**, *37*, 1400–1417. [\[CrossRef\]](#)
23. Grundström, K. Mobility as a stratifying factor in housing: Dwelling-in-place contra dwelling-on-the-move in Sweden. *Mobilities* **2018**, *13*, 96–110. [\[CrossRef\]](#)
24. Hermida, C.; Cordero, M.; Orellana, D. Analysis of the influence of urban built environment on pedestrian flow in an intermediate-sized city in the Andes of Ecuador. *Int. J. Sustain. Transp.* **2019**, *13*, 777–787. [\[CrossRef\]](#)
25. Cheng, L.; Chen, X.; Yang, S.; Cao, Z.; De Vos, J.; Witlox, F. Active travel for active ageing in China: The role of built environment. *J. Transp. Geogr.* **2019**, *76*, 142–152. [\[CrossRef\]](#)
26. Spurling, N. Parking futures: The relationship between parking space, everyday life and travel demand in the UK. *Land Use Policy* **2020**, *91*, 103872. [\[CrossRef\]](#)
27. Houschild + Siegel Architecture, OHBOY the Bicycle House. 2017. Available online: <https://www.hauschild-siegel.com/app/download/14733266022/Ohboy%20-%20about.pdf?t=1516181962> (accessed on 2 December 2019).
28. Siegel, C. Interview with Architect Cord Siegel, Hauschild+Siegel. 26 November 2019.
29. Förvaltaren, Grönt ljus för Parfymfabriken [Green Light for the Perfume Factory], Press Release 12 June 2018. Available online: <https://www.forvaltaren.se/CM/Templates/Article/general.aspx?cmguid=64d39e43-f5fd-4c15-8d4e-e0a0ab8dceff> (accessed on 23 September 2020).
30. Lundborg, T. Interview with Property Developer Therese Lundborg, Förvaltaren. 8 December 2019.
31. Theory Into Practice. *Mo-Bo: Mobilitetstjänster Banar väg för Nyttänkande Arkitektur* [Mo-Bo: Mobility Services Pave the Way for Innovative Architecture]; Viable Cities: Stockholm, Sweden, 2019.
32. Rikshem, Rikshem Förvärvar Innovativ Projektfastighet i Upplands Väsby [Rikshem Acquires Innovative Project Property in Upplands Väsby]. 2019. Available online: <https://www.rikshem.se/media/2782/wkr0006.pdf> (accessed on 23 September 2020).
33. Planning and Building Act (2010:900). Available online: <https://www.boverket.se/globalassets/publikationer/dokument/2018/legislation-edition-3.pdf> (accessed on 15 April 2020).
34. Malmö Stad. *Parkeringspolicy och Parkeringsnorm för Bil, mc och Cykel i Malmö. Antagen September 2010* [Parking Policy and Parking Norm for Car, Motorcycle and Bicycle in Malmö. Adopted September 2010]; Pr 3087; Malmö Stadsbyggnadskontor: Malmö, Sweden, 2010.
35. Sundbybergs Stad. *Mobilitetsnorm för Sundbybergs stad: Parkeringstal för Cykel Och Bil* [Mobility Norm for the City of Sundbyberg: Parking Numbers for Bicycles and Cars]; Stadsmiljö- och tekniska nämnden: Sundbyberg, Sweden, 2018.
36. Upplands Väsby kommun. *Trafikplan Upplands Väsby Kommun* [Traffic Plan Upplands Väsby Municipality]; Upplands Väsby kommun: Upplands Väsby, Sweden, 2013.
37. Swedish National Board of Housing. *Building and Planning, Boverkets Byggregler (2011:6)—Föreskrifter Och Allmänna råd, BBR. BFS 2011:6 med Ändringar Till och med BFS 2020:4. BFS 2011:6*; Swedish National Board of Housing: Karlskrona, Sweden, 2011.
38. Standar, J. Interview with Traffic Planner Jonas Standar, the City of Malmö. 6 December 2019.
39. Milton, K. Interview with Architect Konrad Milton, Jägnefalt Milton. 11 December 2019.
40. Elmgren, J. Interview with Project Leader for Sustainable Travel, Jessica Elmgren, City of Sundbyberg. 12 December 2019.
41. Åberg, M. Interview with Municipal Planner Mats Åberg, Upplands Väsby. 16 April 2020.
42. Houschild + Siegel Architecture, Maximal Mobilitet. Minimal Miljöbelastning. Ett Hus Fritt från Parkering. [Maximum Mobility. Minimal Environmental Impact. A House Free from Parking]. 2015. Available online: https://www.lansstyrelsen.se/download/18.26f506e0167c605d5691adce/1548849210073/Cord%20Siegel.%20b_HS%20Klippers.pdf (accessed on 2 December 2019).
43. Malmö Stad. Pilotprojekt p-Norm 0 [Pilot Project p-Norm 0]. Available online: <https://malmo.se/Sa-arbetar-vi-med.../Stad-och-trafik/Parkeringspolicy-och-parkeringsnorm/Pilotprojekt-p-norm-0.html> (accessed on 2 December 2019).
44. Lundvall, E. Interview with Project Leader Erika Lundvall, LaTERRE. 20 April 2020.
45. Jonsson, A.; (Houschild + Siegel Architecture, Malmö, Sweden). Personal communication, 2020.
46. Veidekke ASA. Veidekke ASA: To Build Car-Free Tenancy-Right Apartments for Rikshem in Upplands Väsby, Press Release 14 03 2019. Available online: <http://veidekke.com/en/company-disclosures/article30250.ece> (accessed on 23 April 2020).
47. Arnehed, F. Bilfritt boende—Vägen Framåt för en Hållbar Mobilitet? En Fallstudie av Cykelhuset Ohboy [Car Free Housing—A Way towards Sustainable Mobility? A Case Study of Cykelhuset Ohboy]. Master's Thesis, Swedish University of Agricultural Sciences, Uppsala, Sweden, 2019.
48. Kamargianni, M.; Li, W.; Matyas, M.; Schäfer, A. A Critical Review of New Mobility Services for Urban Transport. *Transp. Res. Procedia* **2016**, *14*, 3294–3303. [\[CrossRef\]](#)
49. Cledou, G.; Estevez, E.; Soares Barbosa, L. A taxonomy for planning and designing smart mobility services. *Gov. Inf. Q.* **2018**, *35*, 61–76. [\[CrossRef\]](#)
50. Guan, X.; Wang, D.; Jason Cao, X. The role of residential self-selection in land use-travel research: A review of recent findings. *Transp. Rev.* **2020**, *40*, 267–287. [\[CrossRef\]](#)
51. Bolund, P.; Hunhammar, S. Ecosystem services in urban areas. *Ecol. Econ.* **1999**, *29*, 293–301. [\[CrossRef\]](#)

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52. Hagbert, P.; Bradley, K. Transitions on the home front: A story of sustainable living beyond eco-efficiency. *Energy Res. Soc. Sci.* **2017**, *31*, 240–248. [[CrossRef](#)]
 53. Cherry, C.; Hopfe, C.; MacGillivray, B.; Pidgeon, N. Media discourses of low carbon housing: The marginalisation of social and behavioural dimensions within the British broadsheet press. *Public Underst. Sci.* **2015**, *24*, 302–310. [[CrossRef](#)]
 54. Francart, N.; Höjer, M.; Mjörnell, K.; Orahim, A.S.; von Platten, J.; Malmqvist, T. Sharing indoor space: Stakeholders' perspectives and energy metrics. *Build. Cities* **2020**, *1*, 70–85. [[CrossRef](#)]