# Unifying different sustainability wishes

## A case study on self-build cohousing initiatives in Amsterdam


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List of abbreviations

| Abbreviation | Meaning |
|---|---|
| CPC | Collective private commissioning |
| CC | Co-commissioning |
| EPC | Energy performance certificate |
| SUD | Sustainable urban development |

# Abstract

A growing number of co-housing projects are being completed in Amsterdam showing an increased public interest in this form of housing. Those projects vary in their main goal, but have a relatively high aspirations concerning sustainability. From the government perspective those projects can aid in achieving their sustainability ambitions giving new meaning to sustainable urban development. As a result, this research aims to find out how the sustainability aspirations are accomplished in various co-housing projects in Amsterdam during the last decade, including the impact spatial policies have on those projects. In this study an embedded case study research has been carried out on four co-housing projects across Amsterdam. Through a mixed method approach consisting of a survey and semi-structured interviews, it was found that all projects were completed using a mostly hands-off strategy by the government. Therefore, showing that self-governance is successful for co-housing. However, unforeseen costs and rules may impact the sustainability wishes of the group. It became clear that environmental sustainably was not the main motivator for co-housing group. Nevertheless, a considerable number of measures from the socio-economic side of sustainability were accomplished. Lastly there is an indication that pro-environmental behavior depends on size and the strength of social networks within a co-housing group.

**Key concepts:** Sustainable urban development, co-housing, collective private commissioning, co-commissioning, self-governance, pro-environmental behavior

# 1. Introduction

On 12 May 2021 the first sustainable housing cooperative started to build in Amsterdam. It was not only the first cooperative in Amsterdam, but also nationwide (de architect, 2021). A group of 50 members from a building community designed and developed their own, entire apartment, with high sustainability ambitions such as using wooden building materials and becoming energy positive (de architect, 2021). The building has multiple social functions such as a common garden and kitchen which are shared amongst its inhabitants. While this cooperative housing project is the first of its kind in Amsterdam, the city has almost a decade of experience with collective self-build practices (Gemeente Amsterdam, 2017). Also, other collective self-build forms such as collective private commissioning and co-commissioning have given individuals the chance to realize their own dwellings. As such it has resulted in projects in which people are more involved with each other, the neighborhood, and the city (dearchitect, 2021). Additionally, the municipality of Amsterdam has noticed that due to the increased number of collective self-build projects, it has surpassed the pioneering phase (Gemeente Amsterdam, 2017). It showed that there is an increased public interest in making their own dwelling and therefore introducing a new stage in collective self-build projects in Amsterdam.

As mentioned above the past decade has resulted in more than 100 different sorts of co-housing projects, in which groups could choose what they find the most important theme for their project. Such themes ranged from sustainability, affordability, architecture, unique building types and togetherness (Gemeente Amsterdam, 2015). However, all projects did have a combination of elements when completed (Gemeente Amsterdam, 2015). Moreover, the (environmental) sustainability theme of projects is safeguarded by the municipality to a certain level through criteria and rules (Gemeente Amsterdam, 2021a). To a lesser extent the social character can be determined by municipality criteria, but not for all projects (Gemeente Amsterdam, 2021a).

Therefore, already from the start co-housing projects have a sustainability base that can be expanded depending on the motivations and wishes of the participants. When starting with a co-housing project participants must balance their individual wishes in the group towards one design (Tummers, 2011). Nevertheless, during the process, a lot can happen that influences the final project result. As a consequence, the group must organize itself through rules and activities to overcome those challenges. Additionally, this asks for a different and a more pro-active role from the participants to shape their future dwelling (Boonstra & Boelens, 2011; Bossuyt, 2021).

On the other hand, the government has instruments to influence the co-housing process and outcomes with mostly rules, (financial) incentives and information (Heffernan, 2021). However how they facilitate such projects can vary a lot, varying from being more actively involved in the co-housing process to less directly involved (Fotel & Hanssen, 2009; Bossuyt, 2021).

On a global scale climate change is progressing and asks for more measures to be taken by the governments around the world. Decarbonization and use of renewable energy are two important measures which must be done across multiple sectors (IPCC, 2021). One of them is the building and construction sector that accounted for 39 % of carbon dioxide emissions in 2018 (IEA, 2019). In addition to this, a national and regional housing crisis is unfolding, resulting in higher housing prices and housing shortage. In 2021 the median price of an owner-occupied home has risen with 16,3 precent compared to previous year (CBS, 2021). Amsterdam is no exception to a growing inaccessible housing market. Those issues ask the Dutch government to act and think creatively in how to increase the housing supply but also in developing sustainable dwellings and neighborhoods. In that way Amsterdam is pioneering in the Netherlands with granting various co-housing forms the permit to build and solve those issues to an extent (Gemeente Amsterdam, 2017).

While co-housing is not a panacea it can contribute positively to a lot of issues present in the housing sector, but also around new citizenship (Tummers, 2015; Scheller and Thörn 2018). Such citizenship is part of the societal trend of decentralization and self-reliability (Tummers, 2015). Challenging the current spatial policies and planning cultures. Similarly, the individual owner-occupied household unit that is rooted in the planning culture and practice is challenged. As a consequence, most legal and financial instruments are made for such household units (Tummers, 2015). While co-housing exists already for some time, it still provides confrontations with the current planning and urban development processes. Those confrontations occur because co-housing

groups are self-governing and unique in their character depending on the location (Boonstra & Boelens, 2011; Tummers, 2011).

In the past decade the study on "alternative" ways of housing provision has risen, one of them is collaborative housing (Tummers, 2011; Tummers, 2015; Czischke, 2017). Such forms consist of a broad array of initiatives ranging from collective self-organized housing to co-housing and co-operative housing. Regardless of the relatively small amount of co-housing compared to regular housing, it is seen as a way of housing provision with various benefits (Tummers, 2015a; van den Berg et al., 2021; Wang & Hadjri, 2018). Studies have shown that such housing is more sustainable, increases well-being, encourages pro-environmental behavior and is social inclusive (Williams, 2005; Tummers, 2015a; van den Berg et al., 2021; Wang & Hadjri, 2018). Some authors even say that collective housing has a wider service to society (Parasote, 2011 in Tummers, 2015). Nevertheless, such claims need more empirical evidence with case studies.

Furthermore, there has not been done much research yet on how SUD is put into practice in combination with co-housing. Past research is mostly based on policy analysis or is theoretically driven (Seyfang & Smith, 2007; Scheller and Thörn 2018). It was shown that in policy documents contradictions and tensions may occur between the three pillars (environmental, economic, and social) of sustainability (Seo, 2016; Scheller and Thörn 2018; Morris et al., 2020). Therefore, this research is intended to contribute to an emerging body of in-depth case studies on how SUD is applied in combination with co-housing (McCollum, 2018; Scheller and Thörn 2018). Additionally, little research has been conducted on the motivations to participate in co-housing projects as well (Tummers, 2016).

Thus, based on the above-mentioned reasons and issues the completed co-housing projects in Amsterdam will be evaluated on their achieved sustainability. In particular, this study is aimed to find out in what way the sustainability aspirations are accomplished in various co-housing projects from the past 10 years, including the impact spatial policies make on those projects in Amsterdam. To be able to study this complex social phenomenon a single embedded case study approach has been used (Yin, 2003). The case study subunits are chosen in form of co-housing projects varying primarily in type, size, and year of completion. Looking at those cases, more insight is obtained on the way co-housing projects deal with internal and external challenges working towards the same goal, that is accomplishing their project and sustainability goals.

Therefore, based on the research aim the main research question is the following:
***How do self-build co-housing initiatives accomplish their sustainability aspirations in Amsterdam over the last ten years and in what ways has this been influenced by spatial policies?***

To support the main question, the following sub-question are developed:

1. Which forms of co-housing initiatives can be distinguished?
2. What are the potential contributions of cohousing to sustainable urban development?
3. Which strategies and policies do the national and regional government, and especially the municipality of Amsterdam, use to facilitate sustainability in self-build co-housing initiatives?
4. What are the motivations of individuals to participate in self-build co-housing initiatives?
5. Which internal and external challenges do co-housing initiatives encounter in the city of Amsterdam?
6. How are the sustainability outcomes perceived by the (selected) co-housing initiatives?

The subsequent chapter discusses the various forms co-housing and its relation to SUD. It also looks at government strategies and instruments to steer co-housing development. Moreover, the motivations and group dynamics are examined. All this comes together in a conceptual model. Chapter 3 introduces the research methodology whereby a mixed method is adopted for a case study. In addition to the methodology, the method of data collection and analysis is also dealt with in this chapter. It also includes the necessary ethical and philosophical considerations. Chapter 4 first introduces the cases, then the government strategies that have been identified will be presented. Furthermore, the found motives, challenged, and perceived sustainability of the residents are discussed. Chapter 5 brings the results together and compares them with previous research. From this, 5 takeaways can formulate. Finally, in chapter 6 a conclusion will be made and a reflection on the research will be given.

# 2. Literature review and theoretical framework

## 2.1 The various forms of Co-housing for sustainable urban development in spatial planning

The co-housing term is used as a concept that covers housing practices that have advantages in collaboration, collectiveness, and shared facilities. Collaboration happens between the inhabitants during the design or the development of the project between future residents and other parties such as architects and the municipality. As shown in Tummers (2016) housing practices can be very different from monasteries to student dorms and in German Baugruppen. Collective private commissioning and co-commissioning and housing cooperatives can be also placed on those axes varying in participation and collectiveness. The last form should not be confused by social housing that is funded by the state. These forms exist without much city government interference and have a composition of residents that have the same norms and values of the housing cooperative (Barenstein et al., 2021). For this research it is important to understand the various definitions to understand the current co-housing field to avoid confusion.

### Definition and elements of cohousing

Both terms co-housing and cohousing can be identified as being part of a wider "Collaborative Housing" concept. It must be noted that both terms are mostly used in English-speaking countries. However most classical co-housing terms are inspired from Danish bofællesskab (Lang, Carrious & Czischke, 2018). This type of housing emphasizes the active participation in the design and management of residents in their neighborhoods or appartements. Vestrbo (2010) adds that co-housing brings together autonomous private dwellings and makes sharing recourses and community living possible. It is unclear for what the "co" in co-housing stands for. This adjective can mean communal, collective, cooperative, or collaborative depending on the context (Vestbro, 2010). However, in this research mostly the collaborative and collective aspects will be investigated. Furthermore, for the purpose of this research four elements are used that contain the co-housing concept, namely the initiator, influence during the building phase, design, and use (Vestbro, 2010; Tummers, 2016; Groeneveld, 2018).

#### *Initiator*

Present day co-housing is mostly resident led, while other parties can initiate such projects as well. The initiators are often highly motivated and committed citizens with various motivations to realize a co-housing project (Tummers, 2016). Other initiating parties can be architects that have the function of designer and process manager. They often already have initial designs and/or a plot of land (Groeneveld, 2018). Lastly there are developers who want to try out working more closely with the end users. This party often already has acquired land and is open is new building concepts (Groeneveld, 2018).

#### *Influence during the building phase*

The degree of influence by the end users during the building phase can vary from project to project and co-housing type. Depending on who initiates the project the future residents are most involved during the design process (Williams, 2005). There is a difference however if all residents decide on the design or just a core group. Furthermore, in both models the citizens do use the help of professionals (Williams, 2005) In other forms where the developers or architects take the lead, citizens have less influence, but can give their input.

#### *Design and sharing facilities*

The emphasis on quality design in a co-housing project is another characteristic feature. Over the years co-housing started off as practical enterprise to provide support for working families (Williams, 2005). After that it became more focused on the social part of community building. This focus can often be found back in the site plan and building design (Tummers, 2016). Moreover, in Fromm (1990) especially the "intermediate spaces" are considered crucial in making communities function. Such intermediate spaces can be hallways or staircases where residents can meet each other regularly. But also, common facilities can be seen as an important design element for co-housing. Those facilities tend to vary on the size of the building as multi-story buildings can fit more shared facilities than smaller buildings (Vestbro, 2010). Example of such facilities are laundromats or

kitchens. Furthermore, nowadays the design focus tends to be more holistic trying to incorporate environmental, social, and economic dimensions. Moreover, environmental designs use the newest technologies to reduce the impact made by the residents on the environment. While social inclusivity and affordability also play an important part nowadays (Williams, 2005).

### *Use: individual or collective*

In the use of the building, inhabitants need to make a tradeoff between personal autonomy and collectiveness within the co-housing community. Nevertheless, co-housing does combine private dwellings with the benefits of community living (Williams, 2005). There is a duality between autonomy and collectiveness within co-housing (Lang, Carrious & Czischke, 2018). While individuals may lose some autonomy authors also found that participating in the building of the co-housing complex may be an expression of one's own personal autonomy (Van der Klundert, 2016; Douglas and Reynolds, 2015 in Lang, Carrious & Czischke, 2018). This expression is achieved because the individuals have more control over their own (future) living environment. Sharing and solidarity are two concepts that are part of collectiveness in a co-housing community. Sharing is done in multiple forms such as spaces, values, facilities and many more (Williams, 2005). Solidarity is formed both in terms of norms but also mutual help (Lang, Carrious & Czischke, 2018). Lastly collectiveness also creates a sense of community through the feeling of belonging together in the co-housing groups and the accumulation of social capital (Ruiu, 2014).

## Cohousing initiative types

Motivation to participate in the cohousing groups are diverse and will be discussed later in this chapter. Yet a main distinction can be made in residents who build together and live together. Moreover, sometimes both elements can also be combined (Vestbro, 2010; Groeneveld, 2018). The first motivation is about combining qualities and assets to achieve practical and economic benefits for a project. The second motivation, besides developing the building together, sharing everyday activities. Lastly there are groups which are built around a common ideal or lifestyle, such as sustainable living (Krokfors, 2012).

### *Collective private commissioning*

In Collective private commissioning (CPC) the future residents are the ones who initiate the project by forming a resident group. They also have the most say in the design and building process, while they do employ professionals such as architects and project managers (Van der Klundert, 2016). In CPC projects the focus is on designing and building these apartments together, but also to create shared spaces for the community. In Parvin et al. (2011) the author suggests that the whole CPC process and result can be seen as "value architecture", meaning that due to the role of the future resident as self-builders more vital decisions are made during the building process. It adds to higher value in terms of use, feeling of belonging and social status (Parvin et al, 2011). Moreover, with this co-housing type the residents own their own apartments and share facilities and spaces. However, there are signs that CPC has its drawbacks as well. For instance, a remark is made on the slower speed of the development due to the group forming process and other forms of decision making (Boelens & Visser, 2011).

Nevertheless, CPC projects do tend to be more energy efficient, use quality materials and look at social aspects in the building. It results in the building to maintain a higher value over time for its residents and overall quality (Boelens & Visser, 2011). Lastly the residents are highly satisfied with their homes in CPC projects and also of their projects in relation to their surrounding area (Boelens & Visser, 2011). However, the affordability is put in question compared to houses developed by established parties (Boelens & Visser, 2011)

### *Baugruppen as a German form of CPC*

In a European context the German Baugruppen (and German speaking countries) practices are closely related to Dutch CPC projects. Concerning the four elements described above they are even identical to CPC projects. With more than 500 projects across Germany, Austria, and Switzerland those countries can be considered advanced in co-housing projects (Ache & Fedrowitz, 2012). An important aspect in those projects is the public control of land, giving the municipalities control on the land prices. Practices do vary on the way the

municipalities give out land. Nevertheless, as a result, no speculative land market exists leaving more room for design and more elaborate elements in sustainability (Hamiduddin & Gallent, 2016).

### *Centraal wonen*

Just like with the CPC, in Centraal Wonen the future resident initiates the project with their own formed group. What is notable is that those groups are formed based on people sharing the same values, beliefs, and ideologies and less on practical reasons (Jonckheere & Maes, 2013). Moreover, in Centraal Wonen the future resident is actively involved in the design and building of the project (Ache & Fedrowitz, 2012). In the design of the building complex the groups also aim at creating a community through shared spaces and facilities (Butot, 2017). Moreover, with Centraal Wonen people live in autonomous dwellings and share facilities and spaces. On the amount and extent of sharing, authors do not have a final say. One notes that with Centraal Wonen less facilities and spaces are shared compared to CPC (Jonckheere & Maes, 2013). While others claim that Centraal Wonen is characterized with extensive common facilities such as gardens, kitchens, and workshops (Vestbro, 2010; Resink, 2021). They do agree however that the original projects from the 70's and 80's were only focused on community, whereas nowadays the projects have become more individualistic (Resink, 2021).

There has not been much research on Centraal Wonen and their sustainability aspects. However, based on the development of many Centraal Wonen concepts it can be concluded that social aspects are considered important (Vestbro, 2010; Jonckheere & Maes, 2013; Resink, 2021). Such social aspects are a need for the community by sharing amenties and participating in group activities (Williams, 2005; Jonckheere & Maes, 2013). Nevertheless, nowadays Centraal Wonen projects are also busy with making their housing stock more sustainable, by retrofitting their materials and using energy renewable sources (Jonckheere & Maes, 2013)

### *Co-commissioning*

With co-commissioning the developer or architect initiates the project and design, while the residents do give an input. In general, the developer makes the most design decisions while considering the residents wishes (Williams, 2005). Another sub-form of co-commissioning is when the architect is the developer. In this form architects recruit future residents based on central ideas proposed by the architects. The future residents have most to say about the design of their own appartements (Van der Klundert, 2016). However communal spaces are co-designed together with the architect (Van der Klundert, 2016; Groeneveld, 2018). Additionally, the number of shared facilities is lower than compared with CPC projects. The main raison is because people participating in co-commissioning place usually less importance in sharing spaces (Williams, 2015; Vestbro, 2010).

Building together is still an element in this type of co-housing yet the focus for the residents is more on capacity building and visioning (Williams, 2005). Sharing resources, amenities, and spaces such as courtyards are also considered important but to a lesser degree. Furthermore, mostly only during the building stage the co-housing group works together with the developer while afterwards the residents have the power to lead their own community (Groeneveld, 2018).

There is not much written information on co-commissioning and the presumed sustainability outcomes. What is known in the literature is that in co-commissioning the developer mostly focusses on the environmental aspects of the design in the building (Williams, 2005). Those environmental aspects are mostly technical such as solar panels, better insolation, and non-gas dwellings. Such environmental aspects are also to a large extent imposed by national or regional rules (Heffernan et al., 2021). Furthermore, there is not yet much written compared to CPC on solidarity and community building in the co-commissioning projects (Lang et al., 2018).

### *Housing cooperatives*

Just like CPC the housing cooperatives initiate the projects, while the final ownership is different. Housing cooperatives are membership-based associations in which people do not own their dwellings, but rent it out from the cooperation (de Warren, 2021; Zande, 2021). Yet just like with CPC the future resident come up with design criteria and have an active influence during the building process (Balmer & Gerber, 2017). These communities share facilities, while the amount of shared facilities tends to vary between co-house groups. Furthermore, just like in the original Centraal Wonen the new self-build housing cooperatives put an emphasis on living together (de Warren, 2021).

Moreover, this housing form is based on solidarity and seeks not to make profit from its members. Therefore, the money being earned is only being spend on managing & maintaining the building and other costs of living. Such cooperatives can be a place of social innovation in providing affordable housing (Cabre &

Andres, 2017). This was the case in La Borda, Barcelona where a group of citizens organized itself to provide for unmet social needs by private and public actors. In the Netherlands housings cooperatives never gained ground due to a sufficient supply of social housing (Zonneveld, 2020). While there are some examples this is changing in big unaffordable cities such as Amsterdam (de nieuwe Meent, 2020; de Warren, 2021).

Above the types of co-housing are discussed and described. After pre-liminary research no completed housing cooperatives are found in Amsterdam. Also, there are no new Centraal Wonen apartments build during the past decade. Therefore, the following co-housing types will be most relevant for this research:

**Table 1:** Cohousing types

| Type | Collective private commisioning | Co-commisioning |
|---|---|---|
| Initiator | Future residents | Architect/developer and future residents |
| Influence during building process | Full resident influnece | Part influenced by residents |
| Design focus | Common spaces | Intermediate spaces? |
| Use | - Balance of collectiveness and personal autonomy<br>- High Sharing<br>- High Solidarity | - More focused on personal autonomy<br>- Low/medium sharing<br>- Low/medium solidarity |
| Sustainabilty focus | Environmental & Social | Environmental |

## 2.2 Co-housing for sustainable urban development

SUD finds its origins in the concept of the sustainable development. This concept was first coined by the Brundtland Commission saying that: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (p.43, WCED, 1987). That description encompasses economic, social and environmental aspects for conservation and change (Seo, 2016; Scheller & Thorn, 2018). More specifically, the concept advocates for intergenerational equity and closer communities. Moreover, there is a commitment to maintain the supportive capacity of the Earths ecosystems, giving the chance for a better life for all flora and fauna (Seo, 2016).

As a result, the current generation must ensure that future generations will be able to survive. This asks for a fair distribution of welfare and production capacity also in the housing sector. Urban development is an area of conflict between certain groups, because what can be a profit for one can be at the expense of someone else. Moreover, due to the openness of the SUD concept diverse and even contradictory strategies can be applied simultaneously (Laclau, 2005 in Scheller & Thorn, 2018). It shows that the SUD term and the meanings attributed to it is value-based, making it inherently political and easy to be interpreted in various ways (Cooper, 2017). Nevertheless, housing is widely considered a basic need in SUD (Seo, 2016; Scheller & Thorn, 2018). Thus, if housing is not met for the present generation, it is difficult to attain it for the future ones (Seo, 2016). Moreover, some SUD constraints or policies can negatively affect the lower-income citizens more than the higher-income citizens (Seo, 2016; Næss et al., 2020). Likewise, current city leaders may even adopt environmental measures in development, yet still hurt future generations, because economic efficiency is still at the heart of their policies (Marchuse, 1998; Seo, 2016; Scheller & Thorn, 2018).

Besides social equity, the biggest tensions arise between environmental sustainably and economic growth. Such a tensions exist because people in power mostly focus on smarter building designs and a growing building stock. Efforts to achieve more environmental and humane cities should not be only focused on growth according to Næss et al. (2020). Such a shift in thinking or decoupling is important because otherwise the overall environmental sustainability will not be achieved. Those ambitions can only be achieved through social intuitions and policies aiming at the reverse of growth and quality of life for its citizens (Næss et al., 2020)

Nevertheless, besides the critiques on SUD and urban planning there are also positive perceptions. Those are for instance that it can improve the quality of life in the city, by solving issues holistically, including technical and social aspects (Teriman & Yigitcanlar, 2015; Medina & Garcia, 2020). Moreover, in the SUD planning paradigm participation of existing and new partners in the planning process is considered important (Media & Garcia, 2020). Such participation is usually in forms of collaboration by local planners with the involved stakeholders by listening and acting upon their wishes (Kasioumi, 2011; Media & Garcia, 2020). It results in more favorable outcomes for all involved parties, but most importantly for the future residents (Kasioumi, 2011). Usually, a proactive role and a strong vision for the future of a place is taken by local planners to ensure the environmental, social, and economic aspects of SUD (Kasioumi, 2011; Teriman & Yigitcanlar, 2015; Medina & Garcia, 2020). An example: some best practices include neighborhoods in Stockholm and Freiburg in which the principles of sustainable urbanism have become normal practice (Kasioumi, 2011; Scheller & Thorn, 2018). However, this cannot be done without first mapping the various elements, dimensions, and challenges of SUD.

There have been made various frameworks have been made to standardize SUD and give a conceptual and empirical overview of this field. Such efforts are useful since they map the relevant aspects of the field and give guidance in practice (Joss et al., 2015; Cooper, 2017). A notable framework has been developed to structure the information on SUD. This framework is called the building environmental quality evaluation for sustainability (BEQUEST). It integrates subjects ranging from socio-economic ones to technical, planning, design, and property dimensions (Cooper, 2017). Whilst the BEQUEST framework is very extensive, for this research important elements will be selected and will form the further basis of this chapter.

Lastly multiple authors have identified challenges for SUD in policy making and implementation. Those challenges can be summarized into 4 points namely:

- Positive development: Is a new paradigm in the built environment that seeks the aim to provide greater quality of life through more amenities and safety, but also ensuring the health of the inhabitants. It does not sacrifice nor waist money (Josss et al., 2015).
- Regenerative design: Is an approach that encourages the co-evolution of human and natural systems. With this approach the building can act as a driver of positive change in the place where it is located (Cole, 2012). It focusses on renewing or revitalizing their own sources of materials and combining the needs of society without negatively impacting the integrity of ecological systems (Cole, 2012; Joss et al., 2015).
- Resilience: For this context resilient buildings are most applicable. Buildings are resilient if they can counter stresses or shocks that impact their durability, robustness, safeness, and disaster resistance (Basyouni, 2017; Stagrum et al., 2020). Therefore, new mitigation and adaptation methods are needed to be used, but also new standards for new innovations to make buildings future proof (Cole, 2012). Particularly retrofitting existing buildings if done cost-optimal can offer more resilience to the existing buildings (Stragrum et al., 2020).
- Climate change: is probably the biggest challenge that will affect the urban environment. This relationship must be understood and includes areas such as sustainable buildings, renewable energy, use of plants and urban climate (Cole, 2012; Stagrum et al., 2020).

## Environmental sustainability outcomes for co-housing

### *Low impact materials and reuse*

When co-housing projects are built usually high emphasis is put into using natural materials. That is achieved through design choices that aim at minimizing the usage of ecologically unsustainable natural materials (Hodson & Marvin, 2010; Cabre & Andres, 2017; McCollum, 2018). Furthermore, during and after the building process the concept of "reducing, reusing and recycling" is adopted for materials (McCollum, 2018). Especially retrofitted cohousing is a good alternative to bring building materials back into the material cycle (McCollum, 2018). Additionally, there have been made various technological advances in the building process that reduce construction waste and make components lighter. Therefore, creating more benefits for the environment (McCollum, 2018). What also has additional benefits is sourcing the materials locally. Especially modular timber constructions have gained popularity in construction, therefore using less energy and Co2 compared to

traditional methods (Khouli, John & Zeumer, 2015 in McCollum, 2018). Since most cohousing is modular the use of timber is rather environmentally sustainable (McCollum, 2018).

### *Water conservation and energy reuse*

Another important element in co-housing is the application of renewable water and energy systems and their self-management. To let this, happen a clustered design has to be made by the residents and be optimized (Meltzer, 2000; Jarvis, 2015; Tummers, 2017). Therefore, this design has multiple benefits. First, the cluster can absorb peaks in supply such as sunny days and interruptions. That is especially handy since co-housing projects tend to have shared facilities such as cars and laundries (Tummers, 2017). Second, the organization and decisions made by the community can have more impact by producing energy for the common good. Additionally, renewable energy and water conservation technology also play an important role in self-management. Those technologies are for instance solar panels, heat pumps, shower regulators and water flow management systems. Nevertheless, high-tech solutions such as state of the art heat pumps are more vulnerable to disruptions. However lower tech solutions such as older heat pumps are prone to faster decay (Tummer, 2017)

### *Space saving*

In previous studies researchers have found that co-housing projects improve land use efficiency compared to regular condominiums. Such an efficiency is created due to the clustering of various social, vocational, and recreational activities for its residents (Meltzer, 2000; Williams, 2005). Furthermore, co-housing also brings space savings due to the density of the buildings (Williams, 2005). Besides effective and efficient use of land the residents tend to also be more responsible for their surroundings (Williams, 2005; Kosk, 2017). The increased density also can bring negative consequences such as stress and conflicts (Kosk, 2017). Additionally, the perceived density created by the social and physical features of the area plays an important role as well (Kosk, 2017).

## Economic sustainability outcomes for co-housing

### *Tailor made housing*

Co-housing encourages smaller and tailor-made housing production compared to the dominating mass produced housing. Especially in the last century residential developers mostly aimed at maximizing profit therefore not considering the social needs of the future inhabitants or even the community (Boyer & Leland, 2018). As an effect the mass produced housing has led to a multitude of social and environmental problems (Putnam, 2000; Ewing, Bartholomew, Winkelman, Walters, & Chen, 2007 in Boyer & Leland, 2017). Furthermore, in co-housing group size may differ, but the scale is still small compared to regular housing production (Ledent, 2021). In the co-housing context co-production means that the residents determine their living environment and design this to their own needs. Furthermore, while the small-scale co-housing developments might not enjoy economies of scale, they do tend to provide more lasting upkeep benefits for its residents (Garciano, 2011; Ledent, 2021). Additionally, there is a difference that co-commissioned projects tend to be bigger than collective private commissioned ones due to costs in production and the parties that are involved (Groeneveld, 2018).

### *Retrofitting buildings*

In retrofitted cohousing the future residents redesign and add elements to an existing building. Those elements can be spaces for common activities and technical things such as better isolation. While individual homeowners also could retrofit buildings, doing it together as a cohousing group is more equitable (Seo, 2016). Additionally, such retrofit projects have multiple benefits of which neighborhood regeneration, material reuse and economic opportunity are the most important (Strobel, 2006; McCollum, 2018). Especially the socio-economic opportunities created by reusing a building helps low and middle-incomes access certain parts of the city. Or the retrofitted building can even become an incubator for enterprise (Jacobs, 1961; Stobel, 2006). Retrofit co-housing projects also have the potential to revitalize areas and, in some situations, promote economic self-sufficiency (Strobel, 2006). Lastly retrofitting, existing building has shown to provide more affordable and environmentally sustainable housing (Williams, 2005).

### *Sharing practices*

Co-housing groups engage in shared practices that include facilities, utilities and services that range from small things such as sharing DIY tools to utilities such as electricity. Most importantly sharing amenities results in savings on space, electricity, and goods (Williams, 2005; Vestbro, 2010). In co-housing it is also common to pool large domestic appliances such as laundromats (Vestbro, 2010). Outside the building co-housing groups tend to share their gardens by removing fences and use them for common activities (Pinderhughes, 2003 in Strobel, 2006; Jarvis, 2011). Additionally, residents use practices to circulate books and exchange other kinds of goods or information. They also sometimes provide services such as childcare (Williams, 2005; Strobel, 2006). Furthermore, usually the development and maintenance costs are equally divided between the residents. Nevertheless, co-housing groups do experience gains through reduced living costs and expanded social possibilities through sharing (Chatterton, 2013). Those reduced living costs can be found in savings in energy use but also high-value-low-use resources (Williams, 2005; Chatterton, 2013).

## Social sustainability outcomes for co-housing

### *Pro-environmental behavior*

There are indications that residents in co-housing communities exhibit pro-environmental behavior in their choices and desires. Such behavior is expressed due to high levels of social capital and the pooling of resources within the communities (Stobel, 2006; Szaraz, 2015). These social relationships facilitate the transaction of pro-environmental ideas and resources in a co-housing community (Pretty and Ward, 2001). Additionally pro-environmental norms seem to reinforce the individual commitment towards sustainable practices (Marckmann et al., 2012). It empowers the communities to tackle environmental problems step by step (Williams, 2005). The sharing of resources has also shown to increase the residents' awareness for the environment (Szaraz, 2015). In most cases that leads to reduced consumption in goods and resources or even a shift in consumption (Meltzer, 2000; Williams, 2005; Vestbro, 2012). Such consumption accompanied with (strong) social networks within the co-housing group encourages pro-environmental behavior (Melzter, 2000). As an example, common activities withing co-housing groups are recycling, re-using and collective consumption (Vestbro, 2012; Szaraz, 2015).

### *Sense of Community*

Another characteristic in co-housing is that the residents place high value on building togetherness or a sense of community. Resulting in a mutually supportive community and creating social cohesion (Williams, 2005; Szaraz, 2015). Additionally, the residents tend to be diverse in household types, ages, interests, and religion. Nevertheless, they can still be a homogeneous social group based on race, education, and class (Williams, 2005). Therefore, such homogeneity within the group reinforces social interactions (Gehl, 1987). Furthermore, the sense of community can only arise due to strong social networks which are already developed from the start of the project through activities (Williams, 2005; Boelens & Visser, 2011; Tummers, 2016).

Studies have shown that formal and informal activities conducted by co-housing residents result in strong social networks and cohesive communities. Those actives are in the development, but also management of the communities (Putnam, 2000; Williams, 2005). Therefore, co-housing groups tend to have strong social cohesion while there are remarks that they might be less inclusive (Williams, 2005; Boelens & Visser, 2011). Additionally, it takes time for the residents to form social bonds, but can be beneficial for vulnerable groups such as elderly people (Gusmano & Okma, 2018; Lubik & Kosatsky, 2019).

Summary of the sustainability aspects for co-housing with the most important elements (figure 1).

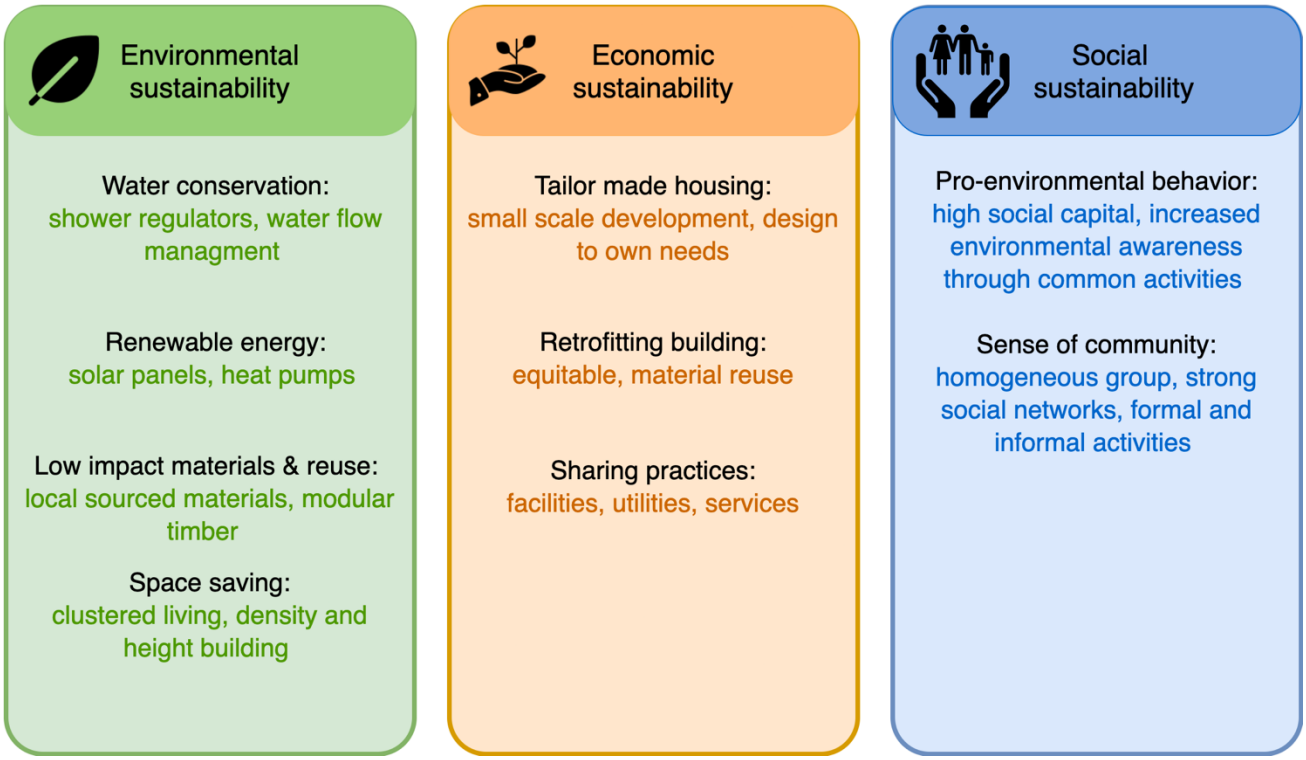


**Figure 1:** Summary of the sustainability aspects found in the literature review.

## 2.3 Cohousing as self-governance in a wider governance landscape

For this study local sustainable co-housing initiatives are seen as a form of self-governance. This chapter elaborates why this is the case. In the following sections the theoretical concepts will be discussed of self-governance in local community initiatives, meta-governance and the instruments used by (local) government in terms of carrots, sticks, and cusps.

So first, what does self-governance entail? Self-governance can be seen as a governance type in which non-governmental actors have the most freedom in governing their own matters (Arnouts et al., 2012; Rauws, 2016). Such actors and citizens also take the lead in this governance type. They also have more freedom to choose with whom they collaborate and their budget (Arnouts et al., 2012). This does not mean the government is not involved at all, but it does keep a certain distance and sets certain conditions (Kooiman, 2003 in Arnouts et al., 2012).

In the context of co-housing and (sustainable) urban development, self-governance can be specified even further. An important characteristic for self-governance is the collective intent towards a common goal, such as the completion or management of the co-housing initiative (Rauws, 2016). In Boonstra & Boelens (2011) a remark is made that the community acts out of self-interest since they are usually also the end users. However, there are various factors that make such initiatives succeed or fail such as the strength of the organization, loyalty to the common goal and external disturbances (Rauws, 2016; Fu & Ma, 2020). Furthermore, there are multiple examples of self-governance for sustainable development in community gardens, street refurbishments and other public services (Miazzo & Kee, 2014 in Rauws, 2016; Fu & Ma, 2020)

In the new mode of governance, the power and rules are differently distributed compared to the old governance type. Since the non-governmental actors such as co-housing initiatives can decide on their own matters, they have more power compared to older situations. As a result, this gives the actors more autonomy (Arnouts et al., 2012). However, this autonomy does happen still in an institutional framework set out by the national government. Therefore, the government still can interfere, but only when certain boundaries are violated (Arnouts et al., 2012; Rauws, 2016).

Moreover, governance differs considerably from meta-governance and its various types. Meta-governance is mostly concerned about the practices and procedures governments use to influence, control and command inside governance regimes (Whitehead, 2003). Additionally meta-governance does not replace governance but is merely another lens and extent to look at governance regimes (Whitehead, 2003). Therefore, this concept explores new ways in how state power is projected and conveyed in and through governance

structures (Whitehead, 2003). Additionally in a literature review by Gjaltema, Biesbroek & Termeer (2019) four different types of meta-governance are identified. For this study based on the research aim multi-level governance seems to be most relevant. In this governance arrangement various meta-governors steer a specific network on multiple levels (Gjaltema, Biesbroek & Termeer, 2019). Such meta-governors are public actors such as local municipalities.

Nevertheless, in multilevel governance the multiplicity of meta-governors may create role and coordination problems. While governments usually do have coordinating mechanisms intact on various spatial scales it is not enough. Over time especially in western countries meta-governance gets rescaled, which creates potential for lock ins by actors (Allmendinger Haughton, 2009). Or the actors and more specifically meta-governors have a possibility on not working towards the same goals (Gjaltema, Biesbroek & Termeer, 2019). In Allmendinger and Haughton (2009) the authors stress that it is even rare for all government layers to work unified and coherent towards a project. There is always a negotiation and a struggle between the meta-governors.

While it is still not widely applied worldwide, governments use meta-governance to steer self-regulation or in this case self-governance. This can take two approaches, the first one is "hands-off" as in network framing through rules and network design (Whitehead, 2003; Fotel & Hanssen, 2009). The second form is "hands-on" in which civil servants manage the process and bring organizational knowledge and are thus more involved directly (Whitehead, 2003; Sorensen, 2006 in Fotel & Hanssen, 2009). Both approaches do share one thing that they are less forceful form of control and use of power compared to top-down steering by the government (Boulding, 1990; Nederhand, Bekkers & Voorberg, 2016; Katre & Tozzi, 2019; Aboltins et al., 2020; Heffernan et al., 2021). Furthermore, both strategies and instruments occur at mostly the municipal government level in the Netherlands (Marvelde, 2017). Based on the work of Boulding (1990) and Heffernan et al. (2021) three main instruments can be distinguished that are used by the government to steer the development of initiatives:

### 1. *Carrots*

The first instrument is to reward actors and compensate them for a desired action. In terms of policies examples are tax incentives, grants and subsidies (Katre & Tozzi, 2019; Aboltins et al., 2020; Heffernan et al., 2021). As an example, in Hamburg new co-housing projects can get subsidies if they meet the requirements on generating green energy and having family friendly concepts (Scheller & Thorn, 2018). Another example is from Leeds where Lilac, the first ecological and affordable co-housing won a national government grant (Chatterton, 2013). However, such grants are not given to every project making them hard to replicate (Chatterton, 2013).

### 2. *Sticks*

The second instrument is used to enforce action by threat or coercion. Those are policies that legislate towards the goal through mostly as minimum standards in forms of targets or possible penalties (Katre & Tozzi, 2019; Aboltins et al., 2020; Heffernan et al., 2021).
An illustrative example is from the project Vauban in the city of Freiburg. Here the city officials set up social and ecological goals such as low energy standard for the new building, rain infiltration on the own territory and a social mixed inhabitant structure (Coates, 2013). Consequently, if those goals are not reached the permits cannot be granted by the local authority (Coates, 2013). Those sticks do not need to be specific for co-housing but can also be for the whole building sector. In the UK for instance buildings needed to have a mandatory disclosure of energy performance what later changed to a nationwide minimum energy standard (Heffernan et al., 2021).

### 3. *Cusp*

The third instrument are cusp policies between both carrot and stick policies that have elements of both. Those can be loans and other arrangements (Heffernan et al., 2021). An example is given in Droste (2015) where the local provincial authorities give Baugruppen loans if certain conditions are met. Such conditions include setting a percentage for social housing or an obligation to use methods generate renewable energy.

For especially the carrot and stick instruments the government shows it does have power by using certain resources. Those resources can be knowledge, information, and money, but mostly still power from authority (Scharpf, 1994; Whitehead, 2003). Such authority is to approve and disapprove proposals of multiple actors including that of the co-housing groups (Scharpf, 1994). Linked to this authority is the fear actors may

experience which makes them behave in the by the government desired direction (Nederhand et al., 2016). Another name for this effect is "the shadow of hierarchy" by the government which exists in networked governance (Scharpf, 1994). This shadow also has the possibility to influence the content and outcomes of self-governance, but also the cooperation between actors (Nederhand et al., 2016).

Research has shown that self-governance takes place in the shadow of governance: either based on fear or benevolence by the government. The fear type is created by the government to scare the involved actors in behaving a certain direction (Nederhand et al., 2016). In this type usually the local governments set out guidelines and requirements for the other actors. Usually distrust from the parties involved towards the government is present in this type. However, initiatives do get the room to produce their services yet within a framework set out by the government (Nederhand et al., 2016). The benevolent type can be seen as a more positive that uses supportive actions. Such actions are supportive by providing resources and granting the citizens a more privileged position (Nederhand et al., 2016). This type is also based on trust between the government and the involved parties.

Lastly co-housing initiatives in the Netherlands do still face difficulties due to strongly institutionalized housing practices. Yet to boost self-build co-housing the role of the citizens in commissioning projects must be strengthened. For this political commitment is needed from the public authorities on all levels, but a social claim is needed as well for the public to partake in self-building (Lang & Stoeger, 2017; Bossuyt et al., 2018). Furthermore, on the political side social use values in housing have to be reconsidered on a national level. Combating the individualization in housing (Bossuyt et al., 2018). Examples in Europe can be taken from Austria in which cohousing is more institutionalized (Lang & Stoeger, 2017). In Austria mainly there is a political consensus that housing should not be left to the free market, but is a responsibility of the public authorities. Therefore, one of the main instruments are subsidies that are given for cohousing, as a consequence it may press public budgets (Lang & Stoeger, 2017). However back to the Dutch context a different housing provision regime can be identified. Where housing is provided through a coalition of state, housing association and large private developers (Bossuyt et al., 2018). This still puts residents into a structurally weakened and disadvantaged position to produce their own living (sustainable) environment.

To sum up co-housing initiatives are a form of self-governance with a collective intent towards a common goal. Moreover, the participants act out of self-interest because they are also the end users. However, there are multiple factors that can let the initiative succeed or fail. Another important actor is the government that influences, controls, and commands what is called meta-governance. Since the government consists of multiple meta governors from local municipality to the national government role and coordination problems may arise. Such problems are that the different layers do not work unified and coherent towards one a project. Nevertheless, broadly speaking the government uses hands-off and hands-on strategies to steer self-regulation such as co-housing initiatives. Additionally, two different and one hybrid instrument is used to steer development. The first are carrots that aim to reward actors for a desired action. Second are sticks that enforce action through threat or coercion. The second instrument can be a combination of those two. Furthermore, the relation between the government and self-governance initiatives can be based on fear or benevolence. Lastly further institutionalization and the role of the citizens must be strengthened compared to other housing providers for cohousing. This asks for proper political valuation of alternative forms of housing from the national level.

## 2.4 Participants motivations and group challenges

While most citizens participate voluntarily in self-build groups there are still various motivations to participate in such risky projects. One of them is the search for alternative lifestyles and create living arrangements that are not provided by regular housing market (Tummers, 2015; Lang et al, 2018). Another advantage is that participating brings an opportunity to obtain homeownership (Bossuyt, 2021). A more social motivation is to be part of a community and know your neighbors better, alongside combating loneliness under de elderly (Tummers, 2015; Hacke et al., 2019; Beck, 2020).

Moreover, environmental awareness can be explicitly seen as part of a lifestyle and reason to participate. Such awareness may lead to new social behaviors in some cases (Seyfang & Smith, 2007; Daly, 2017). This environmental approach is not limited to energy consumption but also tries to tackle complex challenges (Lang et al., 2018). Adopting a low carbon lifestyle is an example of tackling such complex challenges (Lang et al., 2018). Lastly what can be seen as a barrier for co-housing is that its unconventional and doesn't even come to mind as an option for many potential participants (Hacke et al., 2019).

Nevertheless, participants will be motivated if they view that participating will help in achieving their goals. Such goals can be more pragmatic or ideological (Williams, 2005). The ideological projects may have the intention to challenge the prevailing political and economic order (Sager, 2017; Lang et al., 2018; Horlings et al., 2021). For self-build groups this means that the state does give the groups a lot of freedom to develop their own apartment and leaves room for experimentation (Sager, 2017). This gives a counter voice to the "shadow of the state" or the "rent seeking housing providers" (Brown, 2002 in Ansell & Gash, 2008; Sager, 2017). Moreover, the practical projects put more phasis on building an affordable home (Williams, 2005). In Huygen et al. (2012) the authors emphasize that an intrinsic drive is important for the participants of citizen collectives such as co-housing projects. Lastly co-housing collectives may emerge by not only accomplishing their own goals, but also the society at large and bring sustainable innovations (Seyfang & Smith, 2007; Huygen et al. 2012).

There are various factors and characteristics that influence the workings of co-housing communities A main characteristic is that the communities from the start are independent form the government. Such community initiatives arise from the civil society and are an autonomous network of citizens (Boonstra & Boelens, 2011, in Wijk, 2019). It usually starts with an initiating small group that attracts more people through social-media, advertisements, or word of mouth (Jarvis, 2011; Beck, 2020). Furthermore, the group must organize itself and self-govern the group by coming up with rules and practices (Huygen et al., 2012; Balmer & Bernet, 2015). Such an organization also influences on how the community will be informally and formally managed (Beck, 2020). Three main themes can be identified that are important in the working of co-housing groups, namely achieving community and internal and external conflicts.

### *Achieving community*

The co-housing group is consolidated by formal and informal collaboration and activities resulting in the feeling of belonging, togetherness, and trust. Such collaborations take place between the inhabitants when working in groups, cooking, and dining together (Beck, 2018). Yet collaboration and relations do not solely occur through formal organized activities. However, practices in dining together one or multiple days a week is often used to achieve a community (Christian, 2014; Hamiduddin & Gallent, 2016; Beck, 2018). Enjoyable shared activities can be seen as a form of "community glue" which creates stronger bonds and keeps the group together (Christian, 2014). Lastly some research even highlights that when trust and good will is created through shared activity, conflicts can be resolved more easily and effectively (Christian, 2014).

### *Internal/external conflicts*

Power imbalances between stakeholder and participants can arise in self-build projects. Those power imbalances can have an impact on the realization of the housing projects and can form an outside challenge for the group and their dynamics (Tummers, 2011). When certain stakeholders and participants lack the resources, capacity, status, or organization they are easy affected by stronger actors (Ansell & Gash, 2008). Thus, after the initiative has been set up it is not guaranteed that the project will survive. Therefore, more people with different skills are needed to make the project more resilient for the future (Seyfang & Smith, 2007). Moreover, another external conflict can arise when government funding programmes have too many constraining targets for the projects (Seyfang & Smith, 2007). Failing to meet those targets could lead in the long rung to weak commitment of the members of the co-housing initiative (Warner, 2006 in Ansell & Gash, 2008).

Internal conflicts may become more present if the organizational infrastructure and capacity is lacking or important experts are missing. Those experts are needed to solve the lack of skill and expertise to engage with technical or organizational problems (Answell & Gash, 2008). Especially underrepresented or smaller groups benefits the most of such expertise. However, for co-housing projects in particular professional partners are often found by chance, due to the few professionals working in that area (Hacke et al., 2019). Yet it depends on locality to locality if consulting infrastructure exists that sometimes is financed partly by public money (Hacke et al., 2019).

## 2.5 Conceptual model

The treated concepts in the subchapters of this chapter can be summarized into the conceptual model presented here below (figure 2). First are the motivations to participate that form an important part in the formation of the cohousing initiatives. Of those motivations the environment or more broadly sustainability can be one of them, but not exclusively. Second are the instruments and strategies by the various levels of government that facilitate or shape the cohousing initiative. Moreover, both participant attributes and

government rules and instruments can create internal or external conflicts. However, the type of cohousing initiatives, in this case CPC or CC can have an influence on the conflicts and the way community is achieved. Lastly all the above-mentioned elements and concepts lead to certain sustainability outcomes divided into the environmental, economic, and social aspects.

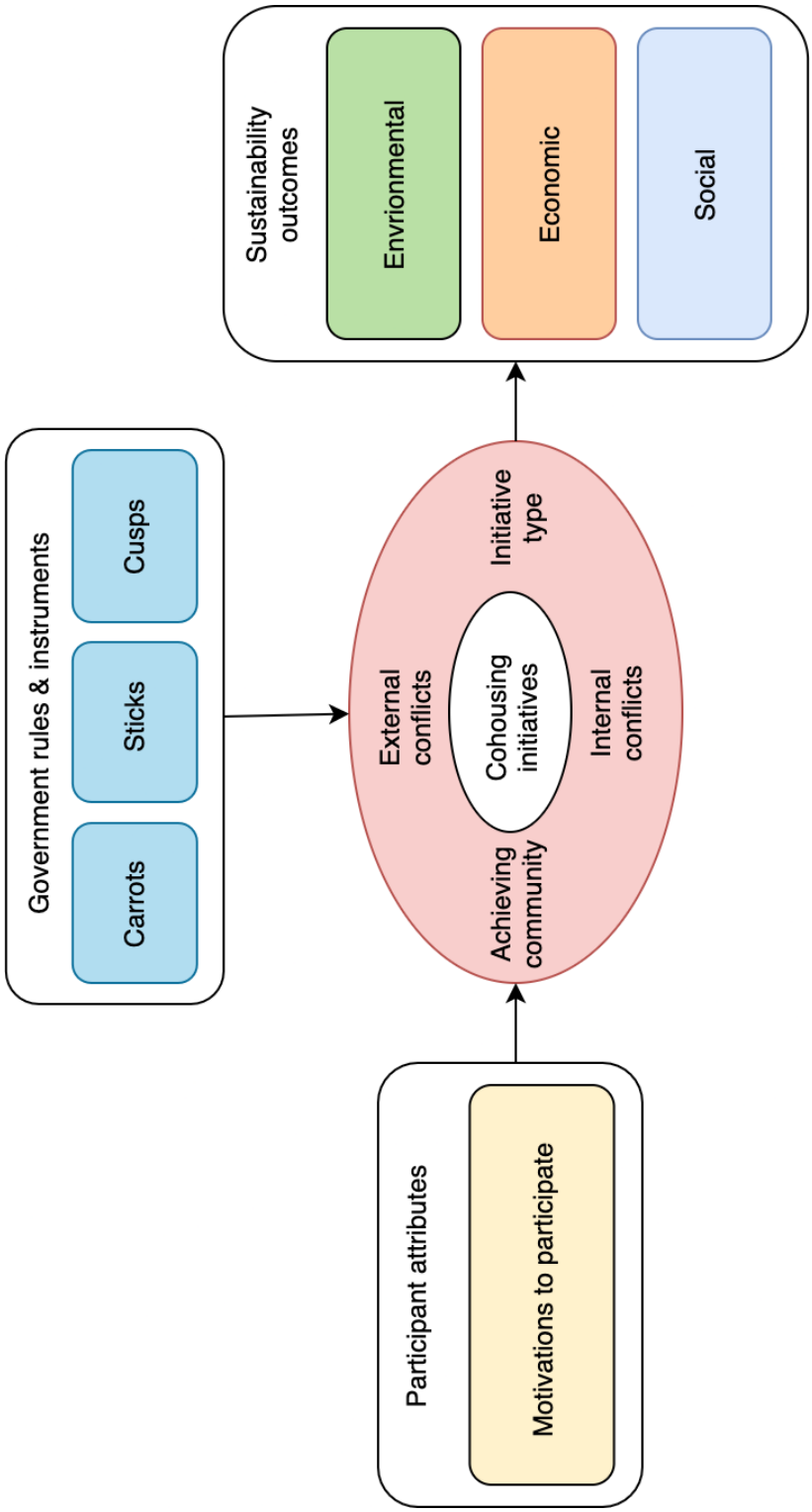


**Figure 2:** Conceptual model

# H3 Methodology

In this chapter the philosophical considerations, research set up, methodological approach, used methods of data collection, methods of analysis and lastly the ethical considerations will be discussed and described.

## 3.1 Philosophical considerations

To begin there are many ontological positions within research, but they do tend to fall in the dichotomy between realism and relativism. For the realism ontology researchers believe that there is one single reality that can be understood (Moon & Blackman, 2014). The relativist ontology sees reality as a construct of the human mind, resulting in not a single reality. The latter position sees reality as relative for each person basing it on experience at a certain place and time. However, this study departs from a critical realist ontology. Since such an ontology is useful to explain outcomes in natural settings and how certain phenomena or events occur (Sturgiss & Clark, 2020).

In urban planning and spatial research critical realism is a less established concept compared to other social sciences. According to Naess (2015) critical realism may be well suited for research into social city phenomena. Additionally critical realism has the main objective to explain observable phenomena by uncovering underlying mechanisms divided into 3 domains. For this research this is done by gaining in-depth knowledge on co-housing initiatives and their sustainability aspirations in Amsterdam. Focusing on the empirical domain through interviews and surveys. Moreover, the cohousing initiatives are observed through the actual domain (Naess, 2015). Consequently, both the empirical and actual domain are influenced by the real domain consisting of structures and mechanisms that create those cohousing initiatives. For the last domain the spatial policies play a crucial part in shaping those co-housing projects over the past ten years.

Moreover, in critical realism both a mix of qualitative and quantitative methods are used. However, from positivist viewpoint causal relationships are not preferred to be explained by statistical correlations alone (Naess, 2015). Therefore, critical realism views qualitative empirical methods with theoretical reasoning more suited in revealing causal relationships (Naess, 2004, in Naess, 2015). However, an appropriate epistemology is also needed to determine how knowledge can be produced, which has consequences for the validity and methods used in this research.

Therefore, this study rejects a complete objective truth and accepts that meaning is created through the process of social interaction (Moon & Blackman, 2014). However, in this research it is acknowledged that the creation of knowledge through social interaction does have its limits. Avoiding a relativist view of knowledge or even denying an objective material world (Jacobs, 2004). The use of this epistemology is more interpreted to seek a greater understanding of the problems and outcomes through multiple approaches (Fopp, 2008 in Taylor, 2021). Such a greater understanding is found through exploring the causes behind the outcomes and the experiences of the people.

## 3.2 Research design

Considering the research questions and objectives a mixed methods approach is adopted for this research. Using qualitative methods, it is a great way to get in-depth understating of co-housing initiatives embedded in the social system within Amsterdam (Gagnon, 2010 in Sommer, 2020). To reach this understanding qualitative methods such as (semi) structured interviews help collect insights on actions, attitudes, and thoughts of the participants. While the quantitative method used in this research can provide more description on the characteristics of all the co-housing initiatives chosen for this research (Brown & Harris, 2010).

A mixed method approach is chosen to provide contextualization of the co-housing phenomena and to provide more detailed and meaningful conclusions on self-build cohousing initiatives and their accomplished sustainability aspirations (George, 2021). Additionally, this mixed approach enables to better explain observable (social) phenomena by uncovering underlying (causal) mechanisms such as the government instruments and strategies, but also participant motivations (Naess, 2015). Furthermore, since the focus of this research is to gain more in-depth knowledge on the topic the data collection and analysis will follow an embedded design. It means that the quantitative side will be embedded into the qualitative side of this research (George, 2021). Another added benefit to choose such a design is that it will make the study more adaptable during the research period (Brown & Harris, 2010). Lastly in the figure 3 the five phases of this research combined with the methods are presented.

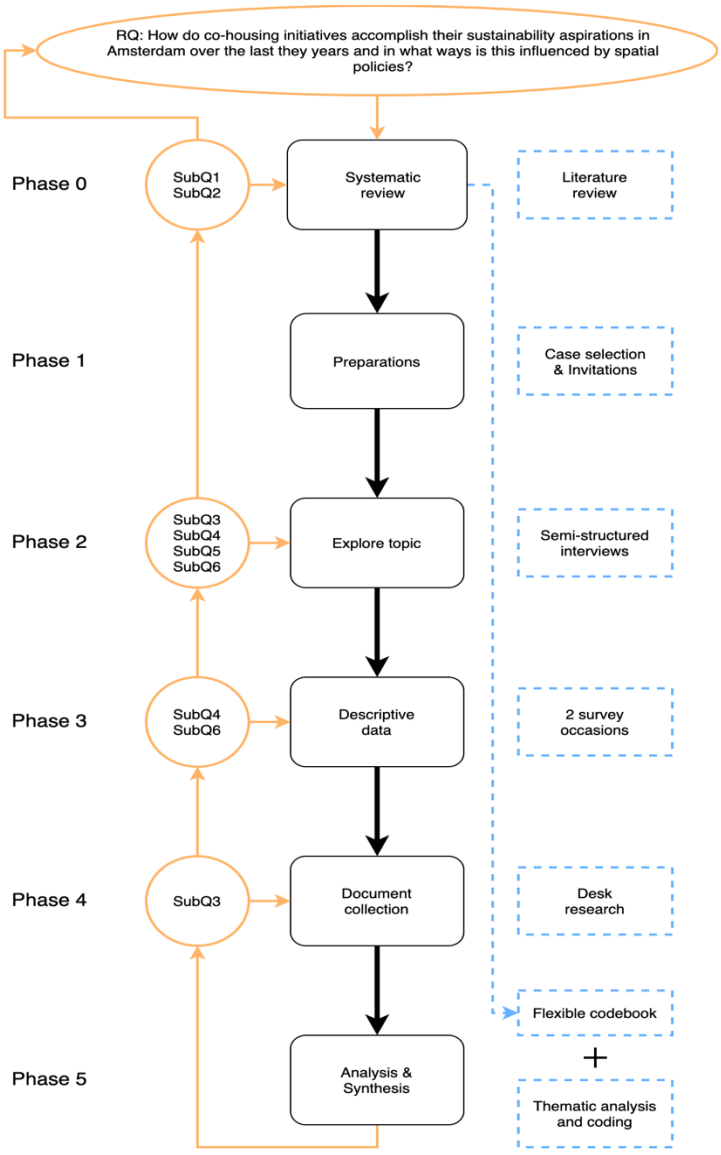


**Figure 3:** The research set up visualized in five phases.

## 3.3 Methodological approach: Case study

A single-case embedded design is used in this research. Consequently, choosing a single case with embedded subunits as cases is useful to study the cases individually but also to analyze the data between and across cases (Yin, 2003). Like this can be said about examined phenomena throughout Amsterdam. Furthermore, this approach assists in studying the phenomena more systematically and in more detail (Yin, 2003). Another benefit is that the subunits can easily include the various types or "clusters" in cohousing initiatives (McClintock, 1985). A major pitfall can be that the researcher only focuses on the subunit level, which in this case is each individual co-housing initiative. Another consequence is missing the larger unit of analysis, in this case co-housing in Amsterdam (Yin, 2003). Therefore, it is important to look more holistically and try to try to contribute to a wider debate of sustainable dwellings and communities influenced by spatial policy.

A case study needs to have clear outlined boundaries which indicate its scope, geographical and temporal borders. This process is called binding the case which forms a fundamental step in showing what will and will not be studied (Crowe et al., 2011). Therefore, the case is geographically bounded by the municipal boundaries

of Amsterdam in the Netherlands. The time frame of the data collection is November until March 2022. The unit of analysis will be explained in the next section.

In terms of case selection, a cluster technique is used. Those clusters are identified through theoretical elements and definitions found in the literature review (McClintock, 1985; Yin, 2003). In this study choices are also made in what to include based on several criteria as seen in table 2 (McClintock, 1985; Yin, 2003; Gerring, 2007). That resulted in the following cases. They fit in all the criteria and are seen as an exemplary and unique co-housing projects according to multiple authorities and organizations (Gerring, 2007). As one of the selection criteria a size of four or more households for in a co-housing group was chosen. Furthermore, two forms in co-housing types were selected. A reason for this was that the properties will be individually owned for both CPC and CC after completion by the participants compared to other co-housing forms. Other criteria were that the projects needed to be completed and have extensive sustainability ambitions. Lastly out of sustainability considerations there has been selected an equal amount of existing and new buildings for the cases.

**Table 2:** choice of cases

| Name project | Amundsenhofje | Broekmanhuis | En Bloc | Roze Hallen |
|---|---|---|---|---|
| Neighborhood | De Kolenkit | Osdorp-Oost | Houthavens | Da Costabuurt |
| Co-housing type[1] | CPC | CPC | CC | CPC |
| Starting year | 2012 | 2017 | 2016 | 2014 |
| Completion year | 2015 | 2019 | 2020 | 2018 |
| Number of inhabitants [2] | 24 | 48 | 120 | 28 |
| New or existing building | Existing | Exiting | New | New |
| Sustainability ambitions | -Retrofitting<br>-Heat/cold storage<br>-Heat pump<br>-Solar Panels<br>-Isolation<br>-Common garden | -Retrofitting<br>-Common garden<br>-Common room<br>-Neighborhood inclusion<br>-No gas | -EPC 0,15<br>-District heating<br>-Isolation<br>-Common room | -EPC 0,15<br>-Solar panels<br>-Common room<br>-Community |

1: CC = Co-commissioning with Developer
2: Estimates based on realized dwellings (dwelling x2 persons)

## 3.4 Data collection

There are multiple ways to reach saturation in qualitative research based on the choices that are made by the researcher. In Saunders et al. (2017) four models of saturation are identified. Of which a priori thematic saturation is the most relevant for this research. This model is based on pre-determined theoretical categories that are usually collected in a code book (see appendix D). Therefore, it relies on theoretical sampling after which such a method looks at the degree of the discovered codes that can be found back in the data. Nevertheless, studies show that researchers do not have a univocal answer to the required amount needed to reach saturation (Hennink et al., 2017; Saunders et al., 2017; Guest et al., 2020).

Nonetheless choices are made in this research that influence saturation and sample size. First parameter is the study purpose, that is mainly descriptive. A second parameter is about the relatively homogeneous population, because all participate in cohousing (Hennink et al., 2017). Therefore, a smaller sampling strategy is needed in this case iterative sampling. All aiming at developing thick data that provides rich insights into the

cohousing phenomena that is researched. Additionally, from the literature review and conceptual model certain elements and concepts will become core codes and are leading in reaching saturation (Hennink et al., 2017). Consequently, those codes will be the focus of this research, but leaving the possibility open for emerging codes. Additionally, almost all core codes have to be present in the subcases to reach saturation. Additionally, a low participation is expected in the interviews. All in all, those parameters choices lead in a need for a relatively small sample size for the interviews. The size will be a range between 4-9 in depth-interviews for this study based on previous research (Hennink et al., 2017; Saunders et al., 2017; Guest et al, 2020)

Six in depth semi-structured interviews will be conducted with three types of relevant stakeholder groups (see appendix C). Most interviews will be conducted with members and residents of completed self-building groups in Amsterdam. An interview with the self-build department of the municipality will be undertaken and for some cases stakeholders such as architects and self-build advisors. A reason for the distribution of interviewees is that civil servants at the municipality collaborate and share their work. So, it would be enough to only speak to one representative of the municipality. In contrast self-building groups are all different in their accomplishments, obstacles, and experiences they face.

Besides the semi-structured interviews, both physical and online surveys are conducted for every self-building group. In this research a descriptive survey design is chosen because of the homogenous target population and research aim. The main aims are getting a better an understanding of the demographics of the population and examining the opinions of the participants on co-housing in Amsterdam. Next to this, quota sampling is used which is a form of non-probability sampling (Ishak & Bakar, 2014). Considering the research questions this method is sufficient. As such for this research a quota of 20% respondents from each project is set. Therefore, adjusting for the unequal sizes of the co-housing projects.

### Data analysis

For both the policy documents, websites, interviews, and parts of the survey thematic analysis will be used. Thematic analysis is a method to identify, analyze and report themes (patterns) within data (Budds et al., 2013). For this research an open deductive approach will be used for the thematic analysis (Caufield, 2021). Considering the document analysis that will create an organized way of looking at the data. Similarly for the interviews the themes related to the workings of the co-housing group, government involvement and sustainability outcomes will be predetermined. Those themes will be found in the code book (see appendix D). However, there will be room to expand the code book with extra codes and themes found inductively during the document and interview analysis (Braun & Clarke, 2006; Nowell et al., 2017). Furthermore, the open-ended questions from the surveys will be thematically analyzed as well. As of the other questions in the survey frequencies, patterns and opinions will be analyzed. All those elements will be related to the participants profiles, motivations, and perceptions on sustainability in their projects.

## 3.5 Ethical considerations

Lastly before the interview begins or people start their surveys the respondents will be informed about several considerations. That is the aim and the purpose of the research, the audio recording and processing, anonymity, and confidentiality. All will be stated during the introduction after which the participants have the right to withdraw before and during the interview/survey. For the survey anonymity is ensured by not asking aspects that can trace someone's identity (Allen, 2017). Only personal information will be about what cohousing project the person participated in. However no other aspects/questions will be used to derive a specific participant. For the interview confidentiality is important. Therefore, it is chosen to not use any real names or pseudonyms. Additionally, if there is still information that can connect the data to a participant it will be masked. Only disclosing information from the interviews that support the research (Allen, 2017). Lastly after online publication of the research all the audio recordings will be deleted to ensure confidentiality.

# 4. The report of cohousing projects in their contribution to a sustainable Amsterdam

This chapter first contains the co-housing case information, followed with government strategies on SUD and facilitating cohousing. The first part is mostly derived from the policy analysis. The last part will contain motives, challenges, and sustainability outcomes of the four cohousing projects. Derived from interviews and a survey.

## 4.1 Introducing four cohousing projects and their sustainability ambitions

**Amundshofje**

| | |
|---|---|
| Neighborhood | De Kolenkit |
| Co-housing type | CPO |
| Start & completion year | 2012-2015 |
| Number of dwellings | 12 |
| Sustainability ambitions | • Retrofitting<br>• Heat/cold storage<br>• Heat pump<br>• Solar Panels<br>• Isolation<br>• Common garden |

**Figure 4:** Front site of several apartments of the Amunshofje behind there is a courtyard (Nul20, 2022)

The first case is Amundsenhofje located in the neighborhood de Kolenkit in the Western city district of Amsterdam (figure 4). Before it got retrofitted it was a kindergarten (Nul20, 2022). Therefore, when the municipality requested the kindergarten to be improved into housing the self-build group Amundsenhofje was formed (Amundsenhofje, 2012). From the beginning sustainability and sustainable building was considered important. After the proposal had won 12 apartments were realized varying in shape and sizes. The project started from 2012 till 2015 and was designed by Hulshof Architecten (Wikiwaza, 2022). The main sustainability ambitions were retrofitting the existing building and adding a newly build part. Also, the heat pump and warm/cold storage was seemed important. Considering energy production, the building had solar panels. Lastly the project has private gardens that are connected to a common courtyard garden. Giving the participants place to meet.

**Broekmanhuis**

| | |
|---|---|
| Neighbourhood | Osdorp |
| Co-housing type | CPO |
| Start & completion year | 2017-2019 |
| Number of dwellings | 24 |
| Sustainability ambitions | • Retrofitting<br>• Common garden<br>• Common room<br>• Neighborhood inclusion<br>• No gas |

**Figure 5**: Front of the Broekmanhuis apartments (Winter, 2019)

The second case is Broekmanhuis located in the neighborhood Osdorp-Oost (figure 5). The building had many functions from being a nursing home to a primary school. The surrounding has few new buildings and is considered to be a problem area (Winter, 2019). That led also for the building to be empty for some time in which illicit activities took place. Therefore, the municipality and the owner wanted to redevelop the building. To avoid the group to be only focused inwards the municipality wanted the building to have a social function (Winter, 2019). The Broekmanhuis CPO had the best idea and collaborated with the architect Ponec de Winter (Winter, 2019). Resulting in the realization of 24 unique apartments. The building started from 2017 and ended in 2019. The main sustainability ambition was retrofitting the building. But also connecting it to the district heating network. Furthermore, there is a common room which has a social function for the neighborhood. Lastly there is a big common garden at the back of the building.

**En Bloc**

| | |
|---|---|
| Neighbourhood | Houthavens |
| Co-housing type | CC |
| Start & completion year | 2016-2020 |
| Number of dwellings | 67 |
| Sustainability ambitions | • EPC 0,15<br>• District heating<br>• Isolation<br>• Common room |

**Figure 6:** Front of the En Bloc apartment complex in yellow and brown brick (BPD, 2022)

The third case is En Bloc located in the neighborhood Houthavens (figure 6). This is a new development located in an area that is surrounded with other new developments. For the municipality it was the first CC project in which the future resident are co-developers. Thus, the future residents organized themselves as a co-commissioning group with the developers BPD and ERA Contour (Marc Koehler Architects, 2022). Eventually that resulted in the realization of 67 unique apartments (Marc Koehler Architects, 2022). The building started in 2016 and ended 4 years later. As their main sustainability ambition, they wanted to say under the 0,15 EPC norm by multiple measures. Such measures include solar panels, isolation, and district heating. Lastly this project also has a common room which has not been used often yet.

**Roze Hallen**

| | |
|---|---|
| Neighbourhood | Da Costabuurt |
| Co-housing type | CPO |
| Start & completion year | 2014-2018 |
| Number of dwellings | 14 |
| Sustainability ambitions | • EPC 0,15<br>• Solar panels<br>• Common room<br>• Community |

**Figure 7:** Front of the Roze Hallen with green bricks in front of a canal (Mooyman, 2008)

The fourth case is Roze Hallen project located in the neighborhood Da Costabuurt on a canal (figure 7). It is a newly build apartment complex surrounded by other newly build or retrofitted houses. Together with OutForever future residents were recruited from the LHBTI community (Roze Hallen, 2020). After that the CPO was formed and the self-build building lot was won after a competition between other CPOs in 2015. This resulted in 14 unique apartments in different layout and sizes each (Mooyman, 2008). The building started 2015 and ended in 2018. Their main sustainability ambitions were to stay below the 0,15 EPC, in which they succeeded by different measures. Such measures included solar panels, isolation, and district heating. Furthermore, they have a common room in which the group eats regularly or has meetings. Lastly the group puts priority of being a community for elderly LHBTI people.

## 4.2 Government ambitions and strategies for SUD and co-housing

In this section the sustainability and cohousing ambitions will be discussed on a national, regional and local level. Also, the strategies to achieves those ambitions will be briefly presented. Afterwards the more concrete measures in terms of carrot, sticks and cusps will be linked with the selected cases.

### Government ambitions for sustainability and cohousing

The national government acknowledges that sustainability is a broad definition, therefore on multiple issues there are various ambitions. Even though the national government does not have a specific ambition on cohousing (RAP, 2016). According to the government sustainability consists of topics related to conserving, reusing, and generating clean energy and materials. Most notable it the National Energy agreement that aims at saving and reducing energy consumption for buildings (RAP, 2016). However, also socio-economic wishes such as accessibility and quality of life are part of those national aims (RAP, 2016). On cohousing the government mostly is concerned about sharing expertise and information towards lower layers of government.

The regional government and specifically the province of North Holland aims mostly at the renewable energy side of sustainability. On cohousing the regional government wanted to assist at least 15 villages and towns in 2013 (Provincie Noord Holland, 2022). Especially subsidies are used to assist those projects. However, anno 2022 those subsidies stopped. Furthermore in 2016 the province decided to accelerate the energy transition in buildings (RAP, 2016). They did this by supporting their own sustainable energy agency that provides information to interested parties, local initiatives and renovating monumental heritage. Thereby the province aims to have a sustainable housing stock with enough living comfort to lower the housing costs.

Also, the municipality of Amsterdam wants to transition towards a cleaner future within the build environment, mobility, industry, and energy. In the sustainability agenda of the municipally of Amsterdam those topics are divided into 4 transition paths (Gemeente Amsterdam, 2015). Especially the topics about the build environment,

mobility and energy are relevant for self-build co-housing groups. For the build environment those measures are to increase energy efficiency through isolation, connection to district heating, heat/cold storage and solar power (Gemeente Amsterdam, 2015). Other measures are building climate neutral and encouraging environmental awareness and behavioral change. Both the province of Holland and municipality of Amsterdam agree that investments must be made in those transitions for the build environment (RAP, 2016).
They try to achieve this by investing into energy efficiency. Especially lower income but also middle incomes can benefit from such sustainability measures. All those investments have spatial consequences which the self-build projects may encounter.

## Strategies and measures for sustainability and cohousing

Intensification of the existing land and small-scale development is a strategy used by the regional and local government to promote sustainable urbanism. Yet also from the national government priority is given to build in the inner-city areas (RAP, 2016). Additionally, intensification is associated with the mixture and clustering of functions within an area. As a consequence, this makes the lives of certain groups such as elderly in the neighborhood and the people living in the buildings easier (Gemeente Amsterdam, 2011). Moreover, the clustering of functions and intensification of land ask for more flexibility in the planning of social services. They go hand in hand with phased small-scale development (Gemeente Amsterdam, 2011; Gemeente Amsterdam, 2021c ). Especially for the Roze Hallen and En Bloc projects the groups knew they had to develop mid-rise buildings based on the plans and location of the areas. This also meant an intensification of functions in a small area. Such intensification of functions may also lead to more flexible buildings that can adapt to the wishes of society. These flexible functions can be seen in Broekmanhuis where the common house serves multiple social functions for the group but also for the neighborhood.

The municipality of Amsterdam has put effort in connecting new projects with district heating. Therefore, during the study, the most mentioned renewable energy and heating type was district heating. Also, before the projects were completed the use of no gas with help of district heating was considered an important element of sustainability. Afterwards besides other factors a majority expressed district heating to be a valuable realized sustainable aspect. Only during one interview the respondent did not like that the municipality only gave him the option to participate in district heating. He pointed out that during a transition period not only residual heat is used for district heating which makes the measure unsustainable.

The clean energy policy from the municipality of Amsterdam is mostly aimed at housing cooperatives in terms of subsidies. Such policies consist largely of isolation and the installment of solar panels (Gemeente Amsterdam, 2015). Nevertheless, all projects had or indented to install solar panels individually or collectively. From all the projects only the Amundshofje did use a loan to install solar panels. At the Broekmanhuis the residents considered a loan from the municipality after completion of the project. Moreover, the Roze Hallen there is even a surplus in energy. This surplus can only be used for other parties if modifications are made on the electricity network. The municipality acknowledges that in their policy and so it plans to make smart grids (Gemeente Amsterdam, 2015).

Every new construction in the municipality of Amsterdam must adhere to the building decree with specific sustainability targets. In this decree an emphasis has been put on climate neutral building, which has been set to an energy performance certificate (EPC) of 0,15. Building climate neutral is seen to put less pressure on the environment. It consists of using materials more efficient using less CO2 during in the process and building climate proof. The importance is stressed even more in multiple policy documents (Gemeente Amsterdam, 2015; Gemeente Amsterdam, 2020) due to making energy neutral building the norm from 2020 onwards. As of the selected cases both Roze Hallen and En Bloc have an EPC of 0,15 (or lower) what is seen as an achievement by its residents according to the survey. This shows that setting strict building standards drives the development of more sustainable buildings.

Before the realization of the projects multiple proposals for one lot have to compete to get a tender from the municipality. One important selection criterion of the tender is about sustainably which amounts to 30% when selecting a developer (Gemeente Amsterdam, 2020). An entry that scores better than the competition

have a better chance of being selected. So, this strategy ensures relatively sustainable projects to be developed at the selected places. This sustainability was not only limited to EPC norms, but it also shaped other aspects of the projects. Especially at the Broekmanhuis a connection with the neighborhood was demanded and realized (Gemeente Amsterdam, 2021b). Furthermore, in the interview with someone from the Roze Hallen it was shown that groups have sometimes to participate in multiple tenders to finally get a plot of land. Lastly compared to the older Amundshofje project the sustainability criteria for En Bloc have become stricter and more extensive. Another reason for this change is that En Bloc is built in the Houthavens, a neighborhood that has been selected as an excellent area by the municipality and government (Gemeente Amsterdam, 2021d). Such an excellent area is considered to be a good place to build energy neutral and have shaped the En Bloc project.

## The carrots, sticks and cusps instruments

### *Carrots*

Carrots are types of policies that reward actors and compensate them for a desired action. Initially the province of North-Holland had subsidies to cover the costs for the initiation and development of collective self-build projects. These subsidies lasted from 2015 till the end of 2018 (Provincie Noord-Holland, 2022b). Based on the interview only the Roze Hallen and Amundshofje got such subsidies. Although no subsidies are given to CC projects, it is remarkable that the Broekmanhuis project did not receive any funding from the province. So only two out of four got financial assistance at the beginning of the project. On the municipal level no direct subsidies exist for cohousing. However, there are subsidies related to renewable energy and greening the environment given to the projects. Lastly on the national level no fund or subsidy structure is available to aid (starting) co-housing projects.

### *Sticks*

Sticks are a policy type that impose threat or coercion towards a desired action. As for the sticks the national and local government have measures to ensure sustainability for co-housing. On the national level the VET (Acceleration Energy Transition) passed law is intact since 2018 (Overheid.nl, 2020). It demands that all new build houses to be free from the use of natural gas. As for the local government building energy neutral and having energy efficient housing is the most important (Gemeente Amsterdam, 2015). These rules provided a foundation for the groups to work by. Because in all projects the sustainability ambitions were the same or higher those rules did not hinder the projects. Only in two cases at En Bloc and Broekmanhuis the respondents of the interview had some remarks. At En Bloc as mentioned earlier for the district heating the resident wanted more participation and a choice to decline the measure. Such a distance from the local government was also noticeable at the Broekmanhuis according to the respondent. He expected more regular checkups from public officials if the projects met the set demands. Yet compared to the policy in Amsterdam, such check-ups are only done on a random basis (Gemeente Amsterdam, 2016).

### *Cusps*

Cups are a combination of the above-mentioned policy types, so they have elements of coercion and reward. Of the cusps policies none are directly aimed at cohousing projects. Yet at the Broekmanhuis an energy loan for solar panels will be used after the completion of the project. A motive to only use the loan after the completion is because only owners' associations can apply for such a loan. Another scheme was used by the residents of En Bloc. They could get a discount on their ground lease because of their low EPC score. Yet this scheme had to be sorted out by the residents themselves. Of all the other projects the same scheme can also apply for the Amundshofje yet the discount was not mentioned there. A reason is that the project had been completed before the scheme but still can be requested. Showing that there are schemes in aiding the projects financially but not every group is aware of them.

## 4.3 Motives, challenges, and other emerged themes from the four cohousing projects

In this section the data from the interviews and surveys is presented in a thematic way. Beginning from the various motivations to participate in such projects. After which the organization and challenges of the co-housing projects will be discussed.

The main characteristics of the respondents were that they are between the age of 30-40 and 50-60. Additionally, while some joined recently, most were already part for 4 years or longer in the project. In total 35 participated in the survey. As for the interviewees three out of four were involved from the start of the project. While all interviewees can be considered active participants of the co-housing process. Lastly, all the participants were overall very satisfied with the projects at the end.

### Motivations to participate

The answers of the respondents show that the reasons and motivations to participate are numerous. Yet the motivations can be grouped into having a chance to get a home, affordability, the social character of the project and the freedom of choice in design. The first reason can be considered practical one illustrated in one of the responses:

***"a chance for a unique dwelling, lots of influence, creativity, and togetherness. But also, a chance to stay in Amsterdam"***

For this research a chance to get a home in Amsterdam was often mentioned in the survey. In 11 out of 35 cases this was their primary reason to participate in self build projects (see figure 8). Nevertheless, as the quote shows the residents that the cohousing concepts also appeals to them.

Cohousing was considered to be more affordable compared to regular housing and formed another reason to participate. Participants saw the added benefit of being able to design their own apartment and to have more control on their finances. One respondent form the Broekmanhuis articulated this benefit as follows:

***"It's a nice way to design and arrange your house in a relativity cheap way. Additionally, because of the length of the project you also familiarize yourself with your neighbors"***

Other respondents saw it as their own way of participating in the housing market without outbidding or paying unaffordable prices. Moreover 10 out of 35 respondents put affordability as their primary reason to participate. This shows that the initial price of a house and expected costs are important for people to participate.

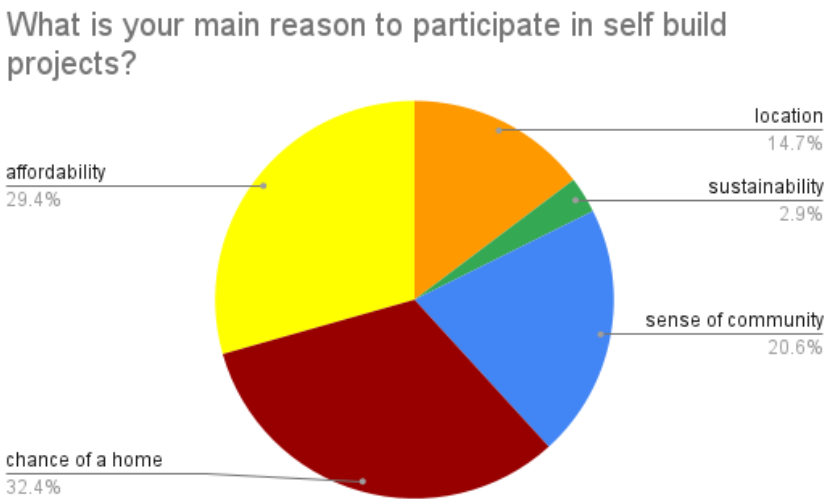


**Figure 8:** The main reasons to participate in self-build projects from survey.

The next main reason to participate was the social character of the self-build projects which varied between cohousing type. As the CPO projects placed more importance in the social character of the self build-projects. Compared to the CC project that considered this less important. There was a commonality at all groups that the projects gave an opportunity to know your neighbors better. A respondent showcased that in the following sentence:

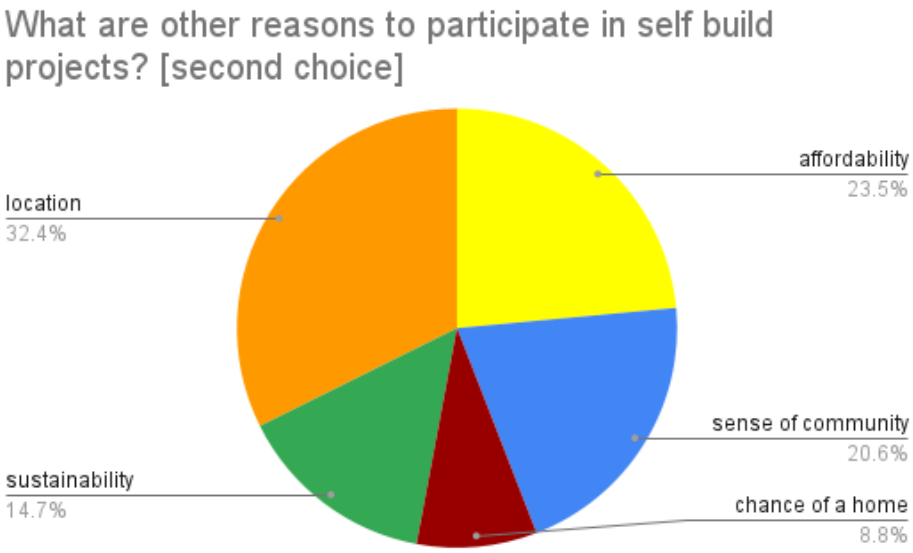


**Figure 9:** The second reasons to participate in self-build projects from survey.

***"I really liked that as a group from the start you can build your own appartement, this way you get to know your neighbors well"***

As already described at the beginning of the chapter the Roze hallen had an extra social component to it. The participants noted that they appreciated to build their apartment with older like-minded people from the LHBTI community. To combat loneliness and social isolation that is common among the elderly. Other social elements consisted of family members such as sisters and grandmothers that were part of the same self-build project. That occurred in the Broekmanhuis and En Bloc.

Additionally, based on the survey results seven people found sense of community the most important aspect to participate in the project. However, sense of community was not unimportant because at the second-choice people still found it important (figure 9).

Freedom of choice and design were another reason to participate for the majority of the future residents. At the CC project this freedom was mentioned, but also because of a dissatisfaction in newly constructed houses without that freedom. A respondent from En Bloc said the following about it:

***"My personal motivation is because I just cannot become happy with newly build houses. If I ever would get a newly build house from a commercial party, I would need to have a lot of control. Control in how I can design and furniture the house"***

However not every participant got in the project at the same time. Usually, the people who joined later on placed less importance in the building together aspect of the project. Although not everyone, one resident of En Bloc, for example still felt it was important to be able to make decisions about his dwelling:

***"We got in later in this project when a lot had been decided already. We especially thought along about the common rooms. Furthermore we also still could tweak some things about our apartment"***

People also considered the location an important reason to participate. For instance, 20 respondents identified location as one of their reasons for participating in the projects (see figure 8 and 9). Especially respondents of En Bloc and Roze Hallen who live in or around central Amsterdam. That is not surprising as it is hard to get a new house in this area.

Furthermore, sustainability was not seen as an important reason for joining the projects, but still was considered relevant. A respondent from the Broekmanhuis project described it as follows:

***"Yes, sustainability in the sense of green living has been a part of the motivation, but affordability was also important. So, it did influence our motivation, but it was not our main one"***

This answer gives a glimpse in how sustainability gets interpreted by the respondents. It can be taken from this that in particular environmental sustainably is meant by the respondent. Moreover, the survey shows that 22

persons in total find sustainability somewhat important when participating in those projects. With an assumption that they were referring to environmental sustainably.

Another aspect of sustainability was measured based on their lifestyle. The results were that 85% believed they had a sustainable lifestyle (see figure 10). This shows that people are conscious about their choices towards the environment. A quote from a resident of En Bloc shows this awareness towards the environment:

***"Something that played a role for me to participate in this self build project was the wish to live smaller. Because I felt I lived too big"***

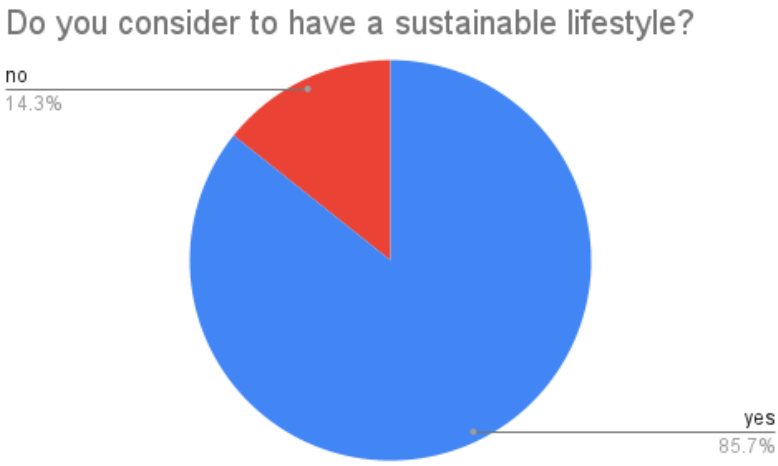


**Figure 10:** Answers if the participants have a sustainable lifestyle.

Lastly, three sustainability measures were the most important in the projects. Those measures include off the gas, good isolation and renewable ways of generating energy. Especially the first measure was seen for some participants a motivation to participate. It is noteworthy to mention that the off the gas measure was most facilitated by the municipality.

All in all the above results show that sustainability is not a main motive to participate in cohousing projects. However, residents do share a sustainable lifestyle with each other. Such lifestyles are a part of environmental awareness. This is one of the motivations found in the literature review done by Lang et al. (2018). Other motivations such as affordability and the social character are not seen as motivation in Lang et al. (2018). Yet the results show that people do see it as motivators. About the other motives it can be said that they are not directly related to the cohousing concept. It shows that there is a lack of knowledge or interest in cohousing. This can lead to barriers in the future development of the projects (Hacke et al., 2019).

## Internal & outside challenges for co-housing

The group composition changed during and after the completion of the project due to various reasons. As such people left the project early or joined after the start. These changes were caused due to a mismatch in expectations, lack of participation or lack of funds. A respondent from Amundshofje said the following about it:

***"Well, a certain natural selection happened, people left the project and people joined. There was someone for instance who didn't contribute as much and did not feel the connection with the group. He eventually left the group. This shows that if you want to participate in such a project you need to be wanting to collaborate. But also put time in it and learn to compromise."***

Being able to compromise was important in cohousing projects. At the Broekmanhuis project a whole board left the project because of a disagreement on the budget and hiring external advisors.
Furthermore, it can be noticed that in all projects there is an almost unchanged core group that was there from the beginning. However, the long duration of the projects showed to be a factor for some participants to leave the project early. Other reasons to leave the projects were due to life events such as family expansion or a breakup between people. But also, financial reasons for selling the apartment at a profit. Lastly compared to the other projects En Bloc had the most changes in group composition during and after the self-build process.

Unforeseen costs had more of an impact in some projects than others, resulting in different decisions in terms of sustainability measures. As an example, at the Amundshofje more cheaper options were favored versus the more expensive higher quality ones. This happened after they went over their budget. Although it solved issues in the short term it could lead to problems in the future according to a respondent. In other projects they found a solution for this. At the Roze Hallen they put a lot of importance and effort to get calculated and fitting budget. This had the benefits of averting discussions and being able to choose the sustainably measures they wanted. One board member had the following to say about it:

*"Because everything has a relation with money. And if you talk about money during a discussion, you always get big differences. As a board we did avert a lot of discussions because our finances were in order."*

The right timing to bring up certain sustainability measures was considered another challenge for some groups. Good timing also goes hand in hand with support from the cohousing group.
Especially many technical interventions during construction require good timing according to a respondent form the Roze Hallen:

*"The thing is the project can be seen as a riding train and you must continue. You must be very resolute as a client to stick to your idea. And you need group support for it as well."*

Moreover, what was noticed that investment in sustainable measures such as solar panels during the project is easier compared to after the completion of the project. A respondent gave the explanation that if the collective money is gone people must pay individually which creates an extra barrier.

The greatest external difficulties were created by market prices and inflexible regulations by the local government. First the rising housing market prices in Amsterdam lead to higher costs from the contractors. This raised disagreements over the budget in projects to keep the project affordable for every member.
Second is the reaction of the municipality due to a change in construction plans. At the En Bloc project a change in the design layout resulted in a higher ground lease for all the participants. Therefore, for many people in the En Bloc project it became unaffordable. Therefore, a lot of left the project because of the increased ground lease.

## 4.4 Perceived sustainability

In this section the perception of environmental, economic, and social sustainability by the participants will be explained.

### Perceived environmental sustainability

This section discusses the environmentally sustainable outcomes of the projects as perceived by the respondents. By far the most respondents perceived that they shared solar panels with their cohousing group (see figure 11). However, from an answer of a resident of Amundshofje it is shown that panels are also used solely individually:

*"Yes we do have solar panel on the roof those are mostly individual. But we also have collective solar PVT solar panels. They are used to warm our water system"*

At a project such as the Broekmanhuis they did not have solar panels, but the whishes were high to still install them. However, a major barrier were the costs to get the solar panels. While in other projects, respondents noticed savings in energy costs due to solar panels.

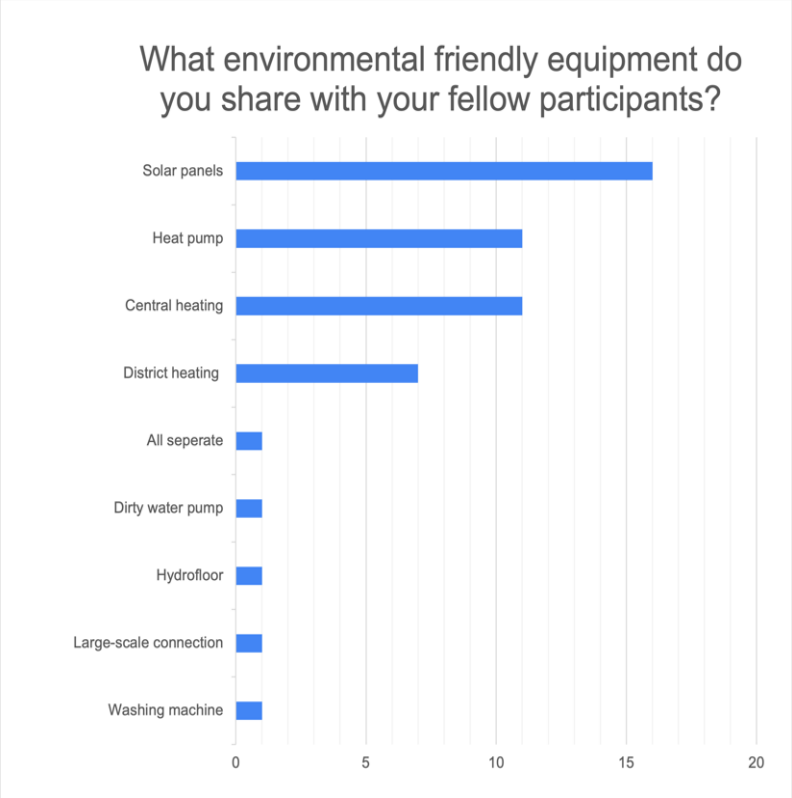


**Figure 11:** Frequency of shared equipment amongst neighbors of the projects.

Another reoccurring equipment was heating, which came in various types. In all cases the residents shared their heat installation. The only big difference was between district heating from the

municipality and their own heating installations. Generally, all residents noticed savings in their heating bill since they did not use gas anymore. But only at the Amundshofje the high-tech heat pump installation did cause trouble in maintenance.

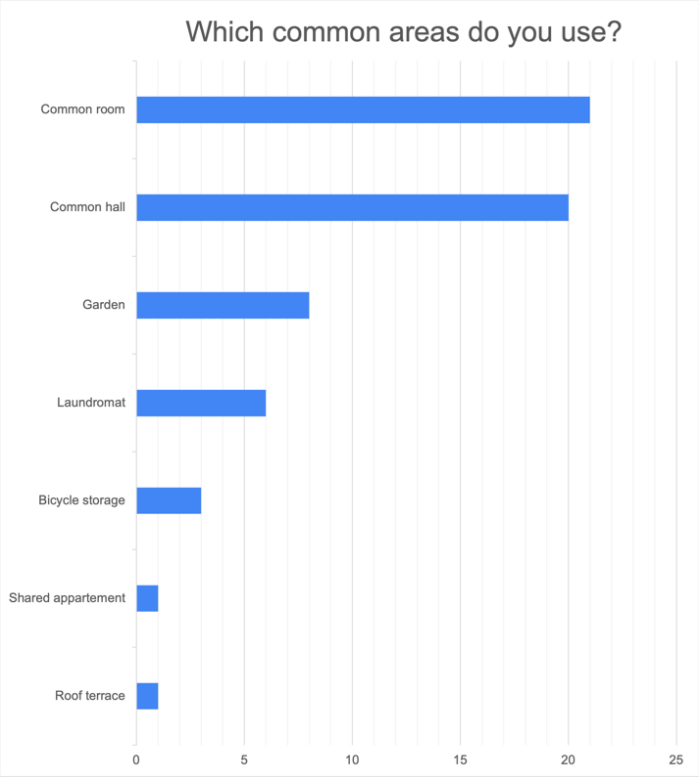


**Figure 12:** Frequency of used common areas.

The results from the survey show that common rooms and gardens are the most used among residents (see figure 12). These results confirm a main characteristic of communal spaces in cohousing found in other literature (Williams, 2005; Lang et al., 2018). At the En Bloc project an issue on multifunctionality did arise of the common space. As shown in the quote below:

***"So eventually the common room is called the multifunctional room. It has a kitchen, chairs, tables, and a beamer. But it is almost never used. It did cost us 250.000 euro together to buy it. It has already been a year after the project has finished. It's well furnished but not much happens there"***

Many factors can play a role why nothing happens there yet. The respondent from En Bloc gave to possible explanations for this. The first explanation was that due to the size of the group, it was difficult to choose what the exact functions would be. The second statement built on the first that because of the group size, no final decisions were made about the space either.
In other smaller projects, the multifunctional rooms have been more successful. A respondent form the Roze Hallen had the following to say about it:

***"It is multi-functional our room. It is a place to eat together and to meet each other of course. But also, for people to stay over and it is also a place where we have our common dryer and laundromat"***

Of the other environmental measures, water conservation was important at two projects.
At one project water saving taps and douches were installed. In another project, ways of collecting rainwater were discussed but not applied. At the Roze Hallen there was little interest in water-saving measures.

The results show that in terms of energy and heat residents share their appliances, but they are also willing to share spaces. The issue at Amundshofje shows that problems can arise in maintenance if the systems are too difficult to maintain. Confirming the findings in Tummers (2016) that self-maintaining high tech systems can cause more disruptions compared to district heating. Furthermore, the clustering of activities was successful at most projects (Meltzer, 2000; Williams, 2005). However, at En Bloc the density and group size showed conflicts and disagreements on functionality of the common area (Kosk, 2017). Leading to underused common space in the building.

## Perceived economic sustainability

In all projects people shared material, facilities, or services what people exactly shared varied.
DIY materials such as screwdrivers and drills were most shared (figure 13). Other less frequent mentioned things were shared laundromats, dryers, and cars. The respondent at the Broekmanhuis had the following to say about the sharing practices:

*"It's the little things such as DIY materials that you can ask at your neighbor who is handy. If you want something, you just have to ask him, and he probably will have it and lend it out."*

This shows a sharing custom that existed in most of the projects. Less sharing practices occurred at the En Bloc compared to the other 3 projects. Although at En Bloc residents did put importance in bicycle storage. This multi floor parking space can be seen as a less direct yet practical sharing practice.

Another theme that emerged was the reuse of materials and buildings. Especially at the projects that retrofitted the buildings this was an important theme. In these projects most materials were reused. At the Amundshofje project they had even made a system for all participants to reuse materials from the building itself. However, respondents also encountered draw backs of retrofitting existing buildings due to the difficulties in proper isolation. The fact that one of the buildings was a monument increased the restrictions in terms of sustainable measures even more.

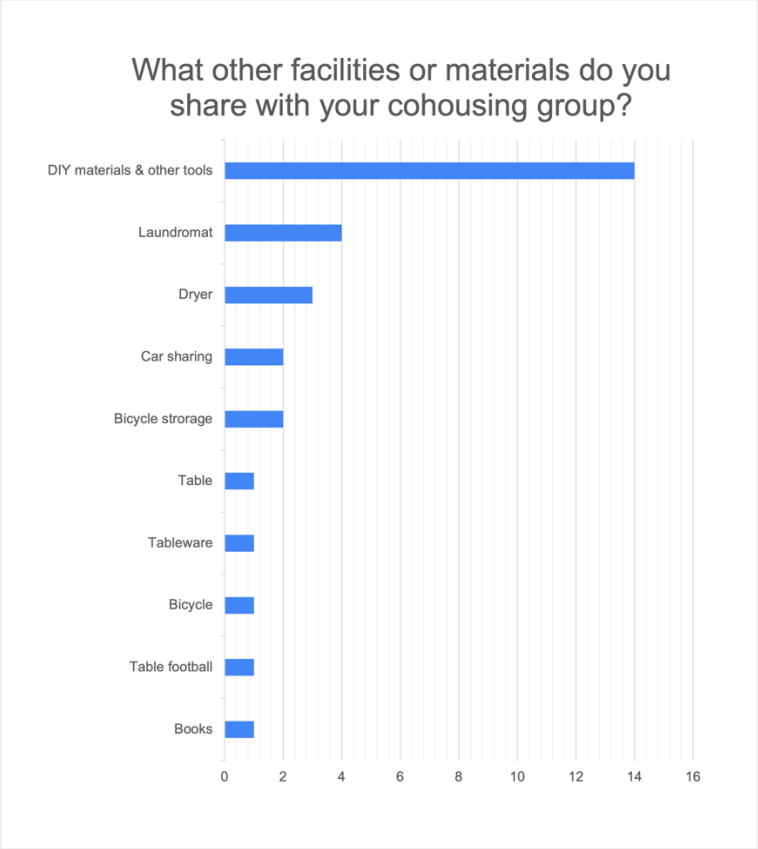


**Figure 13:** Frequency of other shared facilities or materials within the group.

Lastly only at one project residents shared services with each other. This was at Broekmanhuis were they organized services such as petting pets and children day care. Whilst petting pets happened less frequently, children daycare occurred almost daily:

*"We [in our group] also look after our kids from ranging from 1,5 years to the eldest of 8 years. We have made a babysitting schedule with each other. So, we made a schedule in which every day one of the parents looks after the children. We appreciate that a lot because the children will grow up together and they love it as well. They often play in the garden when it is nice weather and go to school together. So, it is in a way free daycare"*

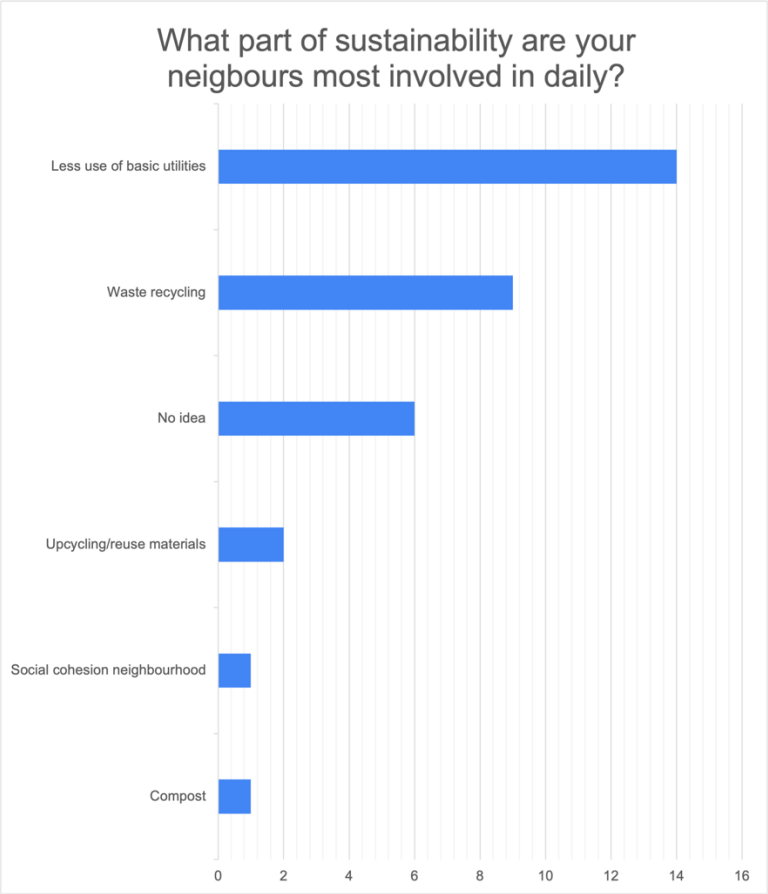


**Figure 14:** Frequency what pro-environmental behavior neighbors expressed.

So, the last quote shows with cohousing people can save time and money by organizing services. Overall residents shared materials, facilities, but those were mostly limited to small things. No widespread sharing of kitchens or laundromats/dryers happened as suggested in Williams (2005). At the Broekmanhuis project people also shared services that can indicate that they have strong social networks withing the cohousing community (Williams, 2005). Furthermore, the results confirm partly the benefits of retrofit projects of which material reuse is most prominent (Strobel, 2006; McCollum, 2018). Yet other limiting findings such as the age and protected status of the buildings is not discussed in literature (Strobel, 2006; McCollum, 2018)

## Perceived (social) sustainability

Pro-environmental behavior was measured through questions about their own and expected behavior of their neighbors. The results showed that cutting down on basic utilities such as gas, water, electricity was most expected among residents in the projects (see figure 14). Some also saw waste recycling as a preferred behavior. There was also a group that had no idea on what kind of behavior their neighbors had or what behavior was expected. This occurred mostly at En Bloc. During an interview a respondent did remark that only sustainable measures were not enough, but behavior was as important. So, when asked what utility people checked daily to reduce in consumption it was electricity.

Another topic was the extent people felt connected with each other, this was dependent on the number of shared activities. But in general, all groups felt connected, which created a sense of community. Most people only participated in such activities once or several times a year. The most attended activities were the maintenance of the building or garden (figure 15). Eating together was also a common shared activity. At the Roze Hallen during such dinner's topics could arise about the environment or sustainable lifestyles:

***"Our food is always vegetarian. But we have a lot of talks about the environment and sustainable lifestyle. And how to fix it. For instance, we talk about flying and what other ways of travel there are"***

So, this shows that the residents at the Roze Hallen not only bond through dinner but also by talking. Other activities such as small parties or watching film together also occurred across most groups. There was a difference in with whom the activities where shared. At En Bloc people did more things with their close neighbors. Only at the owner's association meeting most residents came together. This created a feeling of togetherness according to a respondent:

***"We as a group do have a feeling of togetherness, because we want to make the best out of our project. This developed during the whole building process. But nowadays for instance our owners association administrator is surprised that 50% of the people are present during an owners association meeting. Usually it's just around 30% "***

The COVID pandemic formed a substantial limiting factor for all the projects in terms of organizing activities (figure 16). However, every project also an online community in form of WhatsApp groups where they shared information and experiences.

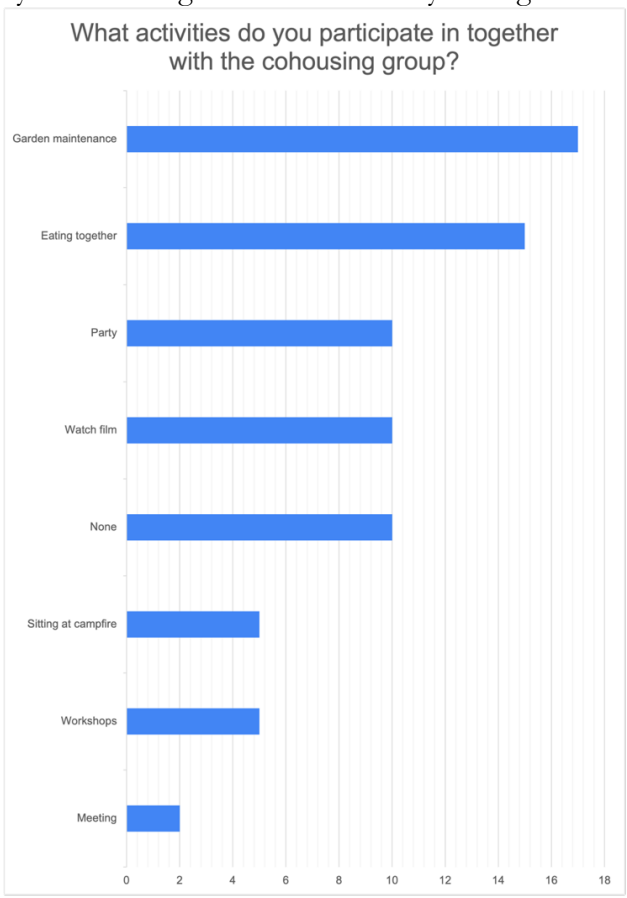


**Figure 15:** Most attended activities expressed.

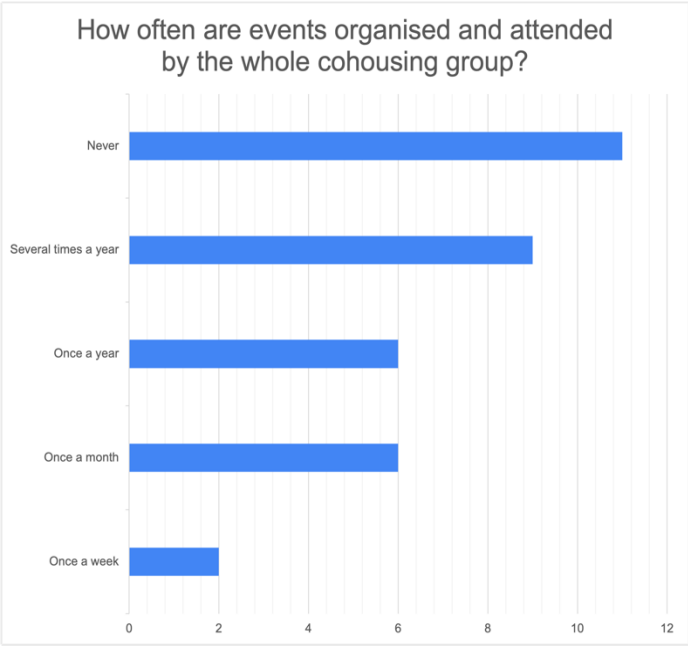


**Figure 16:** Frequency of attended of the last years.

Some projects managed to create a social function in the neighborhood by offering certain services. At the Broekmanhuis the common room was multifunctional such as providing homework support for the children in the area. This function was partly enabled by project demands from the municipality in which the development needed to have an active role in the neighborhood. Causing improvements in social facilities in the already deprived area.
Furthermore, at the Roze Hallen their social function was mostly aimed at the LHBTI community. Other plans were made to offer localized care. This would be in form of care practitioners staying in the common room for a designated time.

To sum up in all projects people engaged in pro-environmental behavior. The results also show that there is a link between pro-environmental behavior and the high level of social capital withing the members of the cohousing groups (Stobel, 2006; Szaraz, 2015). Such high social capital and a sense of community is created by shared activities. This is illustrated by the quote from Roze Hallen during dinner in which also the transactions of pro-environmental ideas can happen (Pretty and Ward, 2001). Moreover, the results show that even with relatively few events such as those at En Bloc people can have a feeling of togetherness. This is also reinforced by an online community which is not much discussed in other literature. Lastly at two projects social services are provided outside the cohousing community. In Williams (2008) the potential has already been recognized, yet the results show that the applicability of local services may vary due to the national government priorities. Since in the Netherlands healthcare is differently organized compared to the USA.

# 5. Discussion

Five major takeaways can be provided based on the research question and sub questions, which will be described in this section.

1. All projects were completed using a hands-off strategy, while a more active role from the government was expected from the participants

A more active role from especially the local government was expected from the participants in the facilitation of their projects. Nevertheless, all the projects were completed, even with the challenges they faced. The projects also showed that more active and involved citizens aim at creating a better dwelling for themselves and the environment (Boonstra & Boelens, 2011). Such an involvement is organized in a form of self-governance, because the group works towards a common goal (Rauws, 2016). The group succeeded eventually with minimal interference of government actors. During the process group compositions may change, due to personal and external circumstances. In all co-housing projects and also to an extent in the En Bloc project social networks developed between the participants. This was not only limited to the projects, but also in the wider neighborhood due to creating social functions confirming the claims made in Williams (2008). Consequently, such new social networks within a neighborhood are a product of conditions set by the local government (Kooiman, 2003 in Arnouts et al., 2012).

Those conditions fit in the overall "hands-off" strategy that was encountered at all levels of government (Fotel & Hanssen, 2009). Thus, only providing (environmental) rules that the co-housing groups have to abide by. That was not always the case, based on the policy analysis there is a shift noticeable from the regional and local government from hand-on to hands-off strategy towards co-housing. Such a shift could explain the expectations of the participants towards the government, because they were used to a more active role. "Carrots" in the form of subsidies have shown to stimulate sustainably even more in the contexts of Hamburg and Leeds (Chatterton, 2013; Scheller & Thorn, 2018). It shows that it is a matter of political will to be more active in facilitating co-housing projects.

Lastly the results show that on the regional and national levels of the government co-housing is less institutionalized and seen as an alternative to mainstream housing (Bossuyt et al., 2018). More institutionalization and providing better incentives in terms of subsidies on all levels of government could make CPO and CC cohousing more mainstream. This may also solve the inflexible regulations of the local government towards cohousing projects. Such institutionalization may also make the projects more affordable for future participants.

Other co-housing forms such as co-operatives are a viable alternative for people with a tighter budget (Boonstra & Boelens, 2011).

2. Affordability, freedom in design, and the social character are the biggest motivations to participate in co-housing projects

The participants gave various motivations why they joined the co-housing project. The biggest motivations to participate were, affordability, freedom in design and the social character. It supports the small, but growing literature that participants do not prioritize use values such as the freedom of design over exchange values (Bossuyt, 2021). It shows that self-build co-housing is not only related to self-expression, but also an opportunity to acquire a homeownership in Amsterdam at reduced costs. This breaks with the common perception that self-builders build foremost for personal use values (Bossuyt, 2021). Furthermore, the location and a chance to get a home were considered important as well. An explanation for some projects could be the continued change in group composition. This allows new people to have less of a connection with the cohousing concept.

Yet in general residents scored high on environmental awareness which could lead to new social behaviors such as new sharing practices and more activities (Seyfang & Smith, 2007). The results show that those behaviors can also take place on platforms such as WhatsApp, which has not been studied extensively yet.

The social side was another big motivator to participate therefore getting to know your neighbors and becoming a part of a community. The participatory design process formed a crucial basis for new relationships

and interactions (Beck, 2020). Here again there was a difference between CPO and CC projects which shows that puts more importance on personal autonomy (Vestbro, 2010). However, this did not mean that at En Bloc they shared less activities, they did only with their closest neighbors.
Looking at the results, sustainability was not considered a major motivation for the largest part of the participants. However, looking at the overall results many people use the narrow definition of sustainability, therefore only looking at environmental sustainability (Scheller & Thorn, 2018). So, if a more broader interpretation of sustainability is taken, including the social side, more participants see it as an important motivator.

3. Unforeseen costs and rules may impact the sustainability wishes of the group

There are multiple internal and external challenges impacting the affordability of co-housing projects in Amsterdam. Internally those are unforeseen costs that impact the budget negatively and the sustainability wishes of the group. Externally those are rules or changes in the housing market that make the project more expensive. Such unforeseen costs led to some choices by the group that could lead to problems or higher costs in the future. As a consequence, such costs have impact on the freedom and pooled resources of the co-housing groups (Seyfan & Smith, 2007), which led to the use of lower quality technologies for the projects. Not every group has kept a solid budget as an element of organization (Ansell & Gash, 2008). However, to fill in the gap all groups used local consultants or experts to give advice to the group about the building processes. A big difference compared to Hacke et al. (2019) is that those advisors are not publicly funded.
Co-housing projects challenge, to a certain extent, current institutional planning and rules by their unique designs (Tummers, 2011). That was the case at the En Bloc project were the land lease was increased by the municipality due to a change in the building design. That might show a lack of facilitation and inflexibility of the land lease towards the project by the local government. Unfortunately, that resulted in a group of participants leaving the project, because of an increase in land lease costs.

4. Some participants appreciate to not only share facilities and materials, but also services with each other

Another outcome of the cohousing projects was that the residents participated in sharing practices. Those ranged from sharing facilities and materials such as laundromats and DIY materials. Also, services traditionally reserved for individual household such as childcare were shared in certain projects. Consequently, this eases individual burdens and possibly empowers disadvantaged citizens and is essentially practical (Williams, 2005). It showed that while cohousing might have become more evolved it still has elements from its previous waves (Williams, 2005). Another result was that children also enjoyed very localized childcare, which has not yet been remarked in other cohousing literature. Additionally, it also saves costs for households that live at the well-organized childcare at the Broekmanhuis project.

The interviews and policy documents indicate that the municipality of Amsterdam recognizes the environmental and social benefits of cohousing shown by the environmental and social demands it asks at the start of the projects. Yet based on the selected projects the municipality not always demands the cohousing projects to include the neighborhood in their plans. Nevertheless, the Broekmanhuis project shows that cohousing has the potential to deliver local services, which in this case was collaborating with the local high school giving support to the whole neighborhood (Williams, 2005). At the Roze Hallen project it was revealed that care could be localized potentially as well through designating a common room for a temporary health practitioner. From the literature it appears that no research has been done yet on combining elderly co-housing with localized care for the neighborhood (Pedersen, 2015). Furthermore, the results show that in some cases family members of different generations choose to live and take care of each other. While this study did not focus on multi-generational co-housing, other studies such as that from Kehl & Then (2013) have seen various benefits for the residents. Such benefits range from better access to support, better health conditions and reduced demand for professional care. Consequently, the sharing of services, and to an extent also materials and, facilities may aid to sustainable community development (Kehl & Then, 2013).

The results showed that just as in previous studies residents share goods and pool large domestic appliances (Williams, 2005; Vestbro, 2010). DIY and gardening tools were mostly shared while less people than expected shared a laundromat. Furthermore, the participants showed to share their cars less with each other if they had one, which contradicted the result found in (Meltzer, 2000 in Williams, 2005).

5. Residents perceive pro-environmental behavior better in smaller group sizes

From the results it seems that pro-environmental behavior is perceived better by the residents in smaller group sizes. An explanation was given by Pretty and Ward (2001, in Williams, 2005) that strong social networks encourage the exchange of pro-environmental ideas and resources. The result of the study confirms this by showing that in groups more activities and resources are exchanged and residents are more aware about their own and neighbors' behavior (Williams, 2005). Also, the type of co-housing seems to matter whereas in the CC project most people had difficulty in estimating their neighbor's pro-environmental behavior. Nevertheless, in future studies smaller CC projects must be included to see if this assumption is true for all CC group sizes. However, it might be too early to conclude that big CC projects show less pro-environmental behavior. The covid epidemic from 2020-2022 and the relative newness of the project En Bloc may have impacted the development of the social networks. So, an argument can be made that it takes time and a higher frequency in activities to form social bonds and therefore to develop pro-environmental behavior (Lubik & Kosatsky, 2019). Moreover 85 % of the respondents does consider having a sustainable lifestyle, which shows that a majority intends to live more sustainable.
Additionally, Marckmann et al. (2012) argue that compared to non-co-housing formats residents follow their pro-environmental ideals better in practice. Because co-housing encourages resource sharing from its design (Williams, 2005). Such resources sharing design element in most projects is encouraged through central district heating by the municipality, which found back in most projects for this study. Showing an important role, the local movement can play in enabling pro-environmental behavior through physical measures.

Lastly what has not been studied extensively in this report is the sense of community and the homogeneity of the group. Because previous studies have shown that homogeneity reinforces social interactions (Gehl, 1987; Williams, 2005). However, based on the characteristics of Roze Hallen it can be expected, that they have a lot of social interaction and pro-environmental behavior. In the results that is also confirmed because of the activities and things they share letting them have a strong pro-environmental culture (Pretty and Ward, 2001 in Williams, 2005).

# 6. Conclusion

The study aimed to find out how the sustainability aspirations are accomplished in various co-housing projects in Amsterdam from the past 10 years, this includes the impact spatial policies make on those projects. The main research question for this study was: ***"How do co-housing initiatives accomplish their sustainability aspirations in Amsterdam over the last ten years and in what ways has this been influenced by spatial policies?"***

The case study looked at four co-housing projects in Amsterdam which had completed their projects with the necessary challenges they faced. The participants have shown that active citizens can create tailor made dwellings for themselves with taking the environment in consideration. Such projects accomplish bigger social coherence compared to regular housing, empowering minorities, and creating social functions for themselves and surrounding neighborhood. Moreover, self-governance has shown to be successful even when group composition may change due to personal or external circumstance. An important external circumstance is that the regional and local government have shifted from a hands-on to a hands-off strategy in facilitating co-housing. This goes accompanied with less "Carrots" policies while the "Sticks" policies and rules stay the same.

Furthermore, the co-housing groups seem to be motivated and working together towards the same goal. Environmental sustainability was not the main goal. The big motivators were affordability, freedom in design and the social character of the project. During the self-build process internally, unforeseen costs have impacted projects negatively in terms of their sustainability wishes. But also externally unexpected rules and changes in the housing market made the projects more expensive. It resulted in some people to leave the project early. Once the building started, all co-housing projects were ambitious in their sustainability wishes. Those whishes were mostly about environmental sustainably such as solar panels and material reuse. However, the socio-economic side of sustainability was also accomplished in terms of sharing facilities, goods, services, and common rooms. In terms of services groups organized day-care and possibility for elderly care. Beside sharing, also activities were undertaken together such as dining and meeting, developing the pro-environmental behavior of the group. It teems to matter that group size and strong social networks are needed for this behavior to develop. All and all the results show that cohousing has the potential to not only develop their own communities, but also the wider neighborhood.

The results have shown that co-housing is not only citizens collaborating with each other, but also cooperating with the government. Such a development is part of a more active civic involvement in spatial planning through co-operative methods (Boonstra & Boelens, 2011). While civic participation has produced disappointing results in the past, this research shows that civic involvement into spatial planning can be successful. A major reason is that citizens are motivated to contribute to urban development out of self-motivation (Boonstra & Boelens, 2011). Those motivations are presented and examined in this research showing that affordability, freedom of design and the social character are important. In almost all cases freedom of design is achieved due to the high participatory organization of co-housing groups. Affordability within a project was in some cases harder to obtain. It confirms partly the critique of Boelens & Visser (2011) on the affordability of co-housing projects. Such an affordability has multiple causes as seen in this research. However, two causes could be contributed to government strategies. The first cause is the standard, uniform policy, especially related to land lease on which every actor and citizens have to abide by (Boonstra & Boelens, 2011). Such preconditions tend to impact co-housing projects negatively with the current hands-off strategies of governments (Whitehead, 2003; Fotel & Hanssen, 2009). The second cause is that the government lacks "Carrots" or rewarding instruments such as tax intensives, grants, and subsidies (Katre & Tozzi, 2019; Aboltins et al., 2020; Heffernan et al., 2021). While the second cause is more for national or regional politics, the first cause can be potentially resolved by a change in strategy. Planners could therefore in the future employ a more hands-on approach and become an integrated actor in the co-housing process, not standing above or outside the co-housing process space (Boelens & Visser, 2011). Such a hands-on approach means setting specific (sustainability) criteria for co-housing projects and checking in regularly if those are accomplished in a managerial way (Fotel & Hanssen, 2009). Lastly concerning affordability there are multiple self-build housing cooperative projects that will be completed in Amsterdam in the future (e.g. de Warren and Nieuwe Meent). One of their aims is making affordable (social) housing. Future research could focus on those completed projects and see how affordable and in other way sustainable they are compared to other types of co-housing.

The studied co-housing projects are part of the wider sustainable urbanism movement within planning. Such projects contribute to a greater quality of life, regenerative design, resilient buildings, and combat climate change, although that was not the residents' main motive (Cole, 2012; Joss et al., 2015; Stagrum et al., 2020). Such principles of sustainable urbanism do provide a guide, but not how to achieve them (Kasioumi, 2011). For this to happen values and priorities have to be made making planning inherently political (Owens, 1994, in Kasioumi, 2011).

Additionally, all the projects met the environmental criteria and standards. Yet looking at the results there is an opportunity for planners to focus their time on the socio-economic elements of co-housing. Such elements are services or facilities that can enrich the co-housing community and neighborhood (Williams, 2005). Likewise, such practices are already encouraged by the planners, but could become mandatory also for CC projects. Especially localized elderly care for the co-housing community and its surroundings has not yet been developed to its full potential and is understudied by academia. Lastly the results show that there could be a maximum size to co-housing projects for a sense of community and certain behaviors to develop. Future studies could therefore study the interrelationship between co-housing group size and pro-environmental behavior.

## Reflection and limitations

Looking back at the research process many things went well. Yet also some weaknesses and limitations can be identified. Firstly, there is the focus on Amsterdam. This city has many cohousing projects, but is not the only city in the Netherlands which has them. Therefore, future studies could choose multiple cities to make a comparison. Secondly, there is the completeness of the conceptual model. During the research it appeared that possibly other personal characteristics are also important. Those personal characteristics are the socio-economic position of the participants and their personal values regarding sustainability. Thirdly, as of the selected cases. Non-completed CC and CPO co-housing projects could have given valuable information in how sustainability is achieved.

Next almost all the participants were very cooperative and felt free to talk about their projects during the interviews. The same applied to the people who filled in the survey. Not many participants refused to be involved in the research when asked directly.

Nevertheless, when looking at the quantitative part, the data collection process has had two weaknesses. Firstly, the response rate was relatively low for some of the projects. For advanced analysis more respondents would have been needed to make stronger conclusions. Secondly, because of the relatively big difference of the projects, some questions in the survey did not fully apply. In the survey the possible answers could have been more tailored to this. Especially at questions where only one answers was possible the box "does not apply" should have been added. Additionally, the data collection process can be done defiantly next time. Not relying on online questionnaires, but going door to door. While this may be labor intensive it is does generate more responses than online questionnaires.

Next, when looking back at the qualitative part during the data collection process less people participated than anticipated. The intention was to interview around 8 respondents ranging from co-housing residents to developers, advisors, architects, and government officials. However, it showed to be difficult to get to all the whished participants. Eventually only 6 people were interviewed. It can be argued that this is not enough to reach saturation. However, based on literature it was sufficient.

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# Appendix A: Documents used in Analysis

Documents used in the policy analysis:

| **Layer government** | **Document reference** |
|---|---|
| Municipality of Amsterdam | Gemeente Amsterdam (2011). *Structuurvisie Amsterdam*. Retrieved from https://131f4363709c46b89a6ba5bc764b38b9.objectstore.eu/hior/Documenten/Structuurvisie%20Amsterdam%202040%20(2011).pdf<br><br>Gemeente Amsterdam (2015). *Agenda duurzaamheid*. Retrieved from https://www.tweedestem.nl/wp-content/uploads/2019/10/agenda_duurzaamheid1.pdf<br><br>Gemeente Amsterdam (2016). *Koers 2025 Ruimte voor de stad*. Retrieved from https://issuu.com/gemeenteamsterdam/docs/koers_2025_januari_2016<br><br>Gemeente Amsterdam (2020). *Rapportage stands van zaken Woningbouwplan 2018-2025*. Retrieved from https://openresearch.amsterdam/image/2021/3/22/rapportage_woningbouwplan_2018_2025.pdf |
| Province of North Holland | Stadsregio Amsterdam (2016). *Regionaal Actieprogramma Wonen Stadsregio 2016 t/m 2020*. Retrieved from https://openresearch.amsterdam/image/2020/1/27/rap_regionaal_actie_programma_wonen_stadsregio_2016_2020.pdf |
| National Government | Stadsregio Amsterdam (2016). *Regionaal Actieprogramma Wonen Stadsregio 2016 t/m 2020*. Retrieved from https://openresearch.amsterdam/image/2020/1/27/rap_regionaal_actie_programma_wonen_stadsregio_2016_2020.pdf |

# Appendix B: Questionnaire

Questions asked during the physical and online survey:

Inleiding
Om te beginnen bedankt dat u wilt meedoen aan mijn onderzoek! Voor mijn masterscriptie sociale planologie richt ik mij op verschillende zelfbouw initiatieven in Amsterdam. Hierbij ben ik in het bijzonder benieuwd naar hoe duurzaamheid opgevat wordt. Maar ook wat de ambities zijn met betrekking tot het uitvoeren van duurzaamheid bij zulke initiatieven. Zo kunt u bij duurzaamheid denken aan de meer gebruikelijke ingrepen zoals zonnepanelen en materiaal hergebruik, maar ook het delen van faciliteiten en het ondernemen van gezamenlijke activiteiten.

Om hierachter te komen zal ik eerst enkele persoonlijke vragen stellen. Ik stel ook vragen hebben over hoe zelfbouw groepen zijn georganiseerd en omgegaan wordt met tegenslagen. Vervolgens stel ik vragen over hoe de lokale overheid zelfbouw en duurzaamheid faciliteert of juist niet. Tenslotte zijn er nog wat vragen over in welke mate en op welke manier duurzaamheid wordt bereikt in het gehele gebouw. Deze vragenlijst heeft in totaal 30 vragen, en duurt ongeveer 5-10 minuten.

Vrijwillige deelname
Uw deelname is vrijwillig. Tijdens het invullen van deze vragenlijst kun u op elk moment stoppen en de enquête afsluiten. U hoeft hiervoor geen reden te geven.

Privacy
Het invullen van de enquête is anoniem. Uw gegevens worden niet opgeslagen. De gegevens zullen worden geanalyseerd door de onderzoekers die betrokken zijn bij dit project.

Wat zit er voor jou in?
Als u wilt, delen wij nadien onze inzichten over uw zelfbouw initiatief en andere deelnemende initiatieven. Het kan voor u wellicht interessant zijn om in te zien hoe uw buren of andere zelfbouw initiatieven over duurzaamheid denken. U kunt aan het einde van de vragenlijst daarvoor uw e-mailadres achterlaten.

Hierbij blijft u anoniem. En zal uw e-mailadres los van de onderzoeksgegevens worden opgeslagen.

**Deel 1: Persoonlijke kenmerken**
De volgende vragen gaan over uw persoonlijke kernmerken en ideeën over duurzaamheid:

1. Wat is uw leeftijd? *
   - Jonger dan 20
   - Tussen de 20-30
   - Tussen de 30-40
   - Tussen de 40-50
   - Tussen de 50-60
   - Tussen de 60-70
   - Ouder dan 70

2. Bij welk zelfbouw project hoort u? *

   - Amundshofje

- Broekmanhuis
- En Bloc
- Roze Hallen

3. Hoe lang bent u betrokken bij dit project (in jaren en/of maanden)? *

_____

4. Op wat voor manier heeft u bijgedragen aan het zelfbouw project? (meerdere antwoorden mogelijk) *

- Bruikbare kennis over zelfbouw
- Bruikbare ervaring over zelfbouw
- Waardevolle contacten
- Extra financiële middelen om experts in te huren
- Anders:_____

5. Wat is uw motivatie om mee te doen aan dit (collectief) zelfbouw project? *

_____
_____
_____
_____

6. Hoe belangrijk zijn de volgende redenen om mee te doen aan dit zelfbouw project? (kruis een top 3 aan, maar een keuze per rij mogelijk) *

| | duurzaamheid | betaalbaarheid | gemeenschapszin | locatie | kans op een woning |
|---|---|---|---|---|---|
| Belangrijkste reden | | | | | |
| Tweede reden | | | | | |
| Derde reden | | | | | |

7. Bent u van mening dat u een duurzame levensstijl heeft door bijvoorbeeld bepaalde producten te kopen of bewust om te gaan met het milieu? *

- Ja
- Nee

8. Wat vindt u het belangrijkste onderdeel van duurzaamheid al het gaat om uw woning? *

**Deel 2: Kenmerken zelfbouw groepen**
Iedere zelfbouwgoep is anders en vindt andere dingen belangrijk. Daarover gaan de volgende vragen:

9. Hoeveel voorstellen met betrekking tot duurzaamheid zijn aangenomen door de groep? *

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Geen | O | O | O | O | O | Allemaal |

10. Op wat voor manier bereiken jullie overeenstemming als er tegenstrijdige voorstellen worden gedaan? *

_____

_____

_____

_____

11. Wat voor activiteiten ondernemen jullie gezamenlijk met de gehele (zelfbouw) groep? (meerdere opties mogelijk) *

- Samen eten
- Workshops
- Feesten
- Film kijken
- (tuin)onderhoud
- Anders:_____

12. Hoe vaak ondernemen jullie activiteiten met de gehele (zelfbouw) groep? *

- 1 keer per jaar
- 1 keer per maand
- 1 keer per week
- Anders:_____

13. Hoeveel steun bieden jullie elkaar als het gaat om persoonlijke situaties (bijvoorbeeld geboorte en overlijden) ? *

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Geen steun | O | O | O | O | O | Veel steun |

14. Hoe goed kennen de leden elkaar binnen de zelfbouw groep? *

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Helemaal niet | O | O | O | O | O | Heel goed |

**Deel 3: Overheidsbeleid met betrekking tot zelfbouw en duurzaamheid**
De overheid en met name de gemeente Amsterdam heeft een belangrijke rol in het tot stand komen van de zelfbouw initiatieven. Daarover gaan de volgende vragen:

15. De gemeente Amsterdam doet voldoende om zelfbouw initiatieven te promoten op bijvoorbeeld hun website of social media *

- Eens
- Oneens

16. De gemeente Amsterdam doet voldoende om zelfbouw initiatieven te faciliteren door de juiste informatie te geven of hun expertise te delen *

- Eens
- Oneens

17. De gemeente Amsterdam biedt genoeg financiering om de zelfbouw projecten te laten slagen *

- Eens
- Oneens

18. Van welke soorten financiering heeft u en het zelfbouw project gebruik gemaakt via de gemeente Amsterdam? *

- Belastingvoordeel
- Schenking bedrag
- Subsidie
- Lening
- Anders: _____

19. De gemeente Amsterdam doet voldoende om duurzaamheid te bevorderen bij (collectieve) zelfbouw projecten. *

- Eens
- Oneens

20. De gemeente Amsterdam heeft te strenge eisen als het gaat om duurzaamheid bij (collectieve) zelfbouw projecten *

- Eens
- Oneens

21. Wat kan de gemeente Amsterdam nog meer doen om duurzaamheid te bevorderen bij (collectieve) zelfbouw projecten? *

_____
_____
_____
_____

22. Welke rol zou de provincie volgens u moeten hebben bij zelfbouw initiatieven ? *

_____
_____
_____
_____

**Deel 4: Toepassingen duurzaamheid bij zelfbouw**
Tenslotte gaan de laatste vragen over hoe duurzaamheid wordt uitgevoerd in de gerealiseerde projecten. Onderwerpen zijn het verbruik van grondstoffen, delen van faciliteiten en spullen.

23. Waar let u dagelijks het meest op als u wilt besparen op basisvoorzieningen zoals water, gas en elektriciteit? *

| | gas | water | elektriciteit |
|---|---|---|---|
| Meest | | | |
| Minder | | | |
| Minst | | | |

24. Welke apparatuur voor de basisvoorzieningen zoals bijvoorbeeld zonnepanelen of centrale verwarming deelt u met de medebewoners van dit gebouw? (meerdere keuzes mogelijk) *

- Zonnepanelen
- Centrale verwarming
- Warmte pomp
- Anders:_____

25. Van welke gedeelde ruimtes maakt u gebruik? (meerdere keuzes mogelijk) *

- Tuin
- Gezamenlijke kamer
- Gezamenlijke gang
- Dak(terras)
- Wasserette
- Anders:_____

26. Van welke gedeelde faciliteiten en materialen maakt u gebruik in het gebouw? (meerdere keuzes mogelijk) *

- Klus materialen
- Auto
- Fiets
- Kleren
- Wasmachine
- Droger
- Anders:_____

27. Met welke onderdelen van duurzaamheid, zijn volgens, u de bewoners dagelijks het meeste bezig? *
*Mark only one oval.*

- Recyclen van afval
- (Upcyclen) hergebruik producten
- Vermindering van gebruik grondstoffen (water, gas, stroom)
- Anders:_____

28. Wat vindt u het belangrijkste onderdeel van duurzaamheid dat is gerealiseerd als het gaat om het gehele project? *

_____

_____

_____

_____

29. Hoe tevreden bent u over het geheel als bewonder van het zelfbouw project ? (geef een cijfer tussen de 1 en 10) *

_____

**Afsluiting**

30. Hartelijk dank voor uw deelname aan dit onderzoek! Mocht u nog iets willen toevoegen, dan kan dat hieronder.

_____
_____
_____
_____

31.
Bent u geïnteresseerd in de uitkomsten van het onderzoek? Zo ja, dan kunt u hieronder uw e-mail adres achterlaten.

_____

**Einde**
Hartelijk voor uw deelname aan dit onderzoek!

# Appendix C: Interview guide + list interviewees

Questions asked during the semi structured interview

**Intro tekst**

Het doel van deze interview is te achterhalen hoe verschillende collectieve zelfbouw projecten op hun eigen manier duurzaamheid in hun ontwerp en realisatie opnemen. Hierbij vraag ik eerst naar verschillende eigenschappen van de deelnemers die meedoen aan zulke projecten. Daarna heb ik vragen over hoe overheidsbeleid zelfbouw faciliteert en verschillende aspecten van duurzaamheid aanspoort. Ik kijk ook naar hoe zelfbouw groepen georganiseerd zijn en omgaan met tegenslagen. Als laatste achterhaal ik hoe in projecten duurzaamheid aspecten worden toegepast.

Dit gesprek wordt opgenomen en daarna thematisch geanalyseerd en gedocumenteerd voor mijn onderzoek. De data van dit gesprek blijft versleuteld opgeslagen op mijn telefoon en laptop. Op verzoek van de geïnterviewde kan de data gewist worden na afloop. Tenslotte heeft de geïnterviewde de keuze zijn/haar eigen naam of pseudoniem te gebruiken voor dit onderzoek.

**Participant attributes (SQ2)**

1. (Wat is uw rol bij (dit) collectieve zelfbouw project(en)? Vanaf wanneer er bij ? )
2. Wat is uw rol gebruikelijk bij collectieve zelfbouw projecten?

3. Wat is uw motivatie om mee te doen aan een collectief zelfbouw project? //Hoe belangrijk vond u duurzaamheid in uw afweging om mee te doen? // Wat verstaat u onder duurzaamheid? // mo en woningbouwcooperatie

4. Over wat voor kennis beschikte u m.b.t. zelfbouw voordat u begon aan een collectief zelfbouw project? // Hoe bruikbaar was die voor het voltooien van het zelfbouw project // kennis duurzaam bouwen//waar lag focus op?

5. Over wat voor middelen beschikt u die bruikbaar zijn in het voltooien van het zelfbouw project? //denk aan waardevolle contacten & groot netwerk// toegang tot financieren of zelf genoeg geld hebben // opgebouwde status zodat je serieus word genomen

**Government strategies and policies to facilitate self-build cohousing groups (SQ1)**

6. Wat is de rol in het algemeen van de gemeente bij collectieve zelfbouw projecten?

7. Hoe maakt de gemeente duidelijk aan een breder publiek dat mensen zelfbouw projecten kunnen ondernemen?

8. Hoe belangrijk vindt de gemeente zelfbouw initiatieven als een alternatief op de huidige woningaanbod in de stad? 40-40-20

9. Wat doet de gemeente eraan om zelfbouw initiatieven te faciliteren? // Waarom dat beleid? // wat voor "beloningen" zoals subsidies// bijv platforms of bijeenkomsten// willen jullie meer doen (genoeg gedaan?)

10. Hoe wordt duurzaamheid bevorderd door de gemeente bij collectieve zelfbouw projecten? // welke aspecten duurzaamheid// waarom deze aspecten

11. Wat doen jullie als projecten zich niet houden aan hun duurzaamheid beloftes? // standaarden en boetes

12. Hoe actief is de gemeente betrokken bij zelfbouw projecten ? // Verschilt dat per stadium? // Per type project?

13. Krijgt iedere zelfbouw groep even veel kansen om hun ideeën te realiseren? Hoe gaat dat in zijn werking?

14. Hoe ervaart u het vertrouwen tussen de burger en de overheid als het gaat over zulke zelfbouw initiatieven?

15. Doet de gemeente genoeg om zelfbouw in Amsterdam te stimuleren en duurzamere woningen te realiseren?

16. Hoe draagt de provincie bij aan collectieve zelfbouw projecten? //hoe wordt er gelet op duurzaamheid // en de nationale overheid?

**Co-house initiative organization and internal & external group dynamics (SQ3)**

17. Hoe is het zelfbouw initiatief georganiseerd? // hebben jullie subgroepen per vakgebied //wat doen jullie als jullie niet over bepaalde kennis beschikken // hoe groot? Varieeerde het mbt duurzaamheid

18. Hoe worden er kleine en grote keuzes gemaakt in het zelfbouw collectief? //verschil tussen kleine en grote keuzes // consensus model, op basis van toestemming of iets anders // als geen kennis // hoe kwamen duurzame voorstellen erdoor?

19. Wat wordt er gedaan als er tegenstrijdige of onverenigbare voorstellen zijn binnen een groep? // Opgelost met consensus// Wat als er maar een iemand tegen is en voorstellen blokkeert

20. Wat voor activiteiten ondernemen jullie gezamenlijk met de zelfbouw groep? // eten & koken jullie geregeld samen // is er meer vertrouwen onderling

**Perceived sustainability outcomes (SQ4)**

21. Hoe wordt er in het uiteindelijke ontwerp rekening gehouden met het milieu en toekomst bestendigheid van het project? //water behoud & hergebruik // duurzame energie // duurzame materialen zoals hout //optie warmte net

22. Hoe wordt er in het collectieve zelfbouw initiatief rekening gehouden met de betaalbaarheid en winstgevendheid van het project? // Waarom deze woon constructie// Vermindering consumptie energie of water// Welke gedeelde faciliteiten// car sharing // uitlenen gereedschappen// algemene ruimte

23. In wat voor opzichte is er bij de uitvoering van jullie project gelet op verschillende leeftijdsgroepen zoals kinderen en ouderen? // Wat voor gedeelde ruimtes en hoe groot// hoe inclusief x

24. Hoe is er sprake van een gemeenschap (na voltooiing) in het zelfbouw collectief? // mensen kennen elkaar goed & vrienden x // lift

25. Waaraan kan je dagelijks merken dat de bewoners bezig zijn met het milieu en klimaat? Afval scheiding

26. Hoe wordt het uiteindelijke project gemonitord aan de duurzaamheid eisen die zijn opgesteld vooraf bij het ontwerp? Zo ja welke aspecten wordt het meest op gelet?

27. Hoe dragen collectieve zelfbouw projecten toe tot duurzame stadsontwikkeling?

28. Zijn er nog ander relevante dingen die je kwijt wilt m.b.t. dit interview?

Bedankt voor je tijd en het meedoen aan mijn interview! Zijn er nog andere mensen die ik kan spreken?

+kan ik een survey uitsturen later deze maand?

Einde interview ☺

| **Cohousing type or Name organization** | **Function** |
|---|---|
| CPC Amundshofje | Resident |
| CPC Roze Hallen | Resident |
| CPC Broekmanhuis | Architect |
| CPC Broekmanhuis | Resident |
| CC En Bloc | Resident |
| Municipality of Amsterdam | Civil servant |

# Appendix D: Codebook

| Code group | code | subcode | code description |
|---|---|---|---|
| Government rules and instruments to influence co-housing & sustainability | Carrots | | The first instrument is to reward actors and compensate them for a desired action. In terms of policies examples are tax incentives, grants and subsidies. |
| | Sticks | | The second instrument is used to enforce action by threat or coercion. Those are policies that legislate towards the goal through mostly as minimum standards in forms of targets or possible penalties. |
| | Cusps | | The third instrument are cusp policies between both carrot and stick policies that have elements of both. Those can be loans and other arrangements. |
| | Land Policy | Ground lease, Lot policy | A lease for projects that build on municipal ground. Who gets what lot. |
| | Negative effect municipality | Inflexible rules, no ground | Rules by the government that are not adjusted to the situation. Not having ground to build on. |
| | Environmental rules and standards | EPC, flexible rules, selection target | All the rules and standard conserving the environment that have impact on the cohousing project |
| Participants & other involved parties in projects and their attributes | Motivation to participate | | The various reasons why people participate in self-build projects |
| | Participant attributes | | Age, sex, lifestyle, knowledge about self-build projects |
| | External advisors and agents | CPO-companion, estate agent, installation advisor, owner association companion, process supervisor | All persons or parties that assist the cohousing group during and after the process |
| Co-housing group | Group composition | Change ingroup composition, types of participants, man/female division | Composition of the group. Changes in the group due to circumstances. Active or less active participants. Man & female division of the group |

| | | | |
|---|---|---|---|
| | Group organization | Board, general members assembly, working groups, owners' association, homeowners' association | All the internal organizations the cohousing groups exist of |
| | Internal group issues | Building costs, early withdrawal, internal conflict resolution, unresolved challenges | Internal issues that arise during and after the completion of the project. Some issues can be resolved right away but some stay within the group such as uneven participation. |
| | Outside challenges group | Challenges with municipality, corona, rising costs, joint risk | Challenges the cohousing group faces from the outside events or parties. Most notably the municipality and developers. But also changing market and corona pandemic. |
| | Models of internal decision making | Consensus, simple majority vote, two votes per appartement | Ways the cohousing group reaches a decision. |
| Perceived Environmental sustainability | (sharing) Natural resources | Collective heating installation, district heating | Sharing energy, heat or water |
| | Material (reuse) | | Materials that are reused or applied in the building |
| | Renewable energy | Solar panels, wind energy | Use of solar, wind or thermal energy |
| | Water conservation | Green roof, water conservation, water systems | Technical ways of water conservation |
| | Clustering of activities (aka saving space) | Common garden, common room, guest room, land use efficiency, multifunctional room, space gain | Clustering of various activities in a building or in the open leads to needing less space and causing less environmental impact |
| | Climate control | Blinds, double glass, floor cooling, heat pump, hot/cold storage isolation, sun-resistant glass | All measures to control the climate in the appartement. |
| Economic sustainability | Small scale development | | Tailor-made housing for the consumer so smaller development |
| | Retrofitting buildings | | Usage of existing buildings for new developments |

| | | | |
|---|---|---|---|
| | Sharing practices | Car sharing, common bike parking, common closet, sharing facilities and supplies, sharing knowledge on product and services | All sharing practices within the co-housing community |
| | Unpaid small tasks | Childcare, pet sitting | Tasks residents undertake for each other without payment. |
| | Affordability | | The price of something, mostly focused on it being inexpensive. |
| Social sustainability | Pro-environmental behavior? | Social inclusive community, sustainable lifestyle | Showing behavior that is not profit driven and aims at less consumption and re use. Furthermore, a bigger focus on the community and the world as a whole. Done by sharing resources |
| | Sense of Community intern | Online community | Strong social networks created through social interaction. Such interactions take place during formal and informal activities |
| | Sense of community neighborhood | Neighborhood inclusion, social infrastructure | Measures taken by the group to include the neighborhood through facilities or activities. |
| | Design for social sustainably | Façade plinth, future proof, inclusive housing design, meeting place, shared places for interaction | Design elements that encourage social interaction. |