



MASTER THESIS

MAINSTREAMING CLIMATE ADAPTATION IN PRIVATE URBAN DEVELOPMENT PROJECTS

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Mainstreaming Climate Adaptation in Private Urban Development Projects

An Exploratory Study of Drivers and Policy Instruments for Motivating Climate Adaptation Planning

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Abstract

In order to protect our urban environment against the consequences of climate change, mainstreaming climate adaptation into private urban development projects is crucial. Yet, little research has been done on drivers for mainstreaming climate adaptation by the private sector. Consequently, we know little about what motivates private mainstreaming and what policy measures can be taken to enhance private climate adaptation planning. In this study we aim to explore internal drivers and policy instruments that motivate mainstreaming climate adaptation in private urban development projects. We use in-depth interviews and additional document analysis to examine what motivates private mainstreaming of climate adaptation. This research shows that property drivers, e.g. increased environmental quality, and corporate drivers, e.g. image enhancement, are key motivators for mainstreaming. Furthermore, this study indicates the need and desire for securing climate adaptation planning in law and regulations, enhancing consumer awareness with respect to climate adaptation, and more active participation of the public sector in urban development projects. The findings of this study can be used to inform private parties of the reasons to engage in climate adaptation planning, and to inform and inspire public parties about the use of policy instruments for purposefully enhancing private climate adaptation planning.

Keywords: Climate Adaptation, Drivers, Private Sector, Urban Development, Policy Instruments

1. Introduction

Climate change has become one of the major challenges of our society, seriously affecting daily life and living conditions on earth. Climate change related events such as excessive rainfall, drought and heat stress have the potential to result in societal disruption, property damage and ultimately also loss of lives (Uittenbroek et al., 2014). Urban environments are characterised by high population densities and ongoing urbanisation which is why they are particularly vulnerable to the impacts of climate change (Mees, 2014; Uittenbroek et al., 2014; Wamsler, 2015). Also in The Netherlands, climate change related events are increasingly causing distress (Mees et al., 2018). Climate adaptation (CA), referring to the physical adjustment of the urban system to accommodate current and future impacts of climate change, is crucial for moderating the adverse effects of climate change (IPCC, 2007; Moser & Ekstrom, 2010; Uittenbroek et al., 2013). Considering the local variations of climate change impact, CA is best handled on a local level (Rauken et al., 2015; Uittenbroek et al., 2013). Therefore, CA is best integrated in (local) urban development projects (Wamsler et al., 2014). Rather than initiating dedicated CA projects, CA goals and measures are often integrated into existing policies and projects; a process which is commonly called “mainstreaming” (Uittenbroek et al., 2013). Mainstreaming in our study refers to the process of integrating climate adaptation policies and measures into existing urban development projects, and has

occurred when CA objectives have been integrated in the urban development planning process. Mainstreaming allows for more efficient and effective realisation of CA objectives (Uittenbroek et al., 2013; Wamsler, 2015). Moreover, it removes the necessity for dedicated resources allocation as CA objectives can be integrated in existing (and already funded) projects. Furthermore, in case of mainstreaming, CA can profit from the existing (political) commitment to the domain in which it is integrated (Uittenbroek et al., 2014). While the importance of mainstreaming CA is recognised by many national (Nationale Adaptatie Strategie, 2018) and international organisations (European Commission, 2021; OECD, 2010), the implementation of CA measures in practice has been slow and insufficient (Ekstrom & Moser, 2014; Noble et al., 2014; Runhaar et al., 2012; Uittenbroek et al., 2013). Considering the local character of CA and urban development, municipalities are primarily responsible for ensuring sufficient mainstreaming (Mees et al., 2018; Rauken et al., 2015; Vogel & Henstra, 2015). To do so, municipalities rely heavily on private sector engagement to adequately and effectively integrate CA measures in the built environment (Eckersley et al., 2018; Klein et al., 2017). There are three reasons for this. In the first place because the majority of land in urban areas (50-70%) is generally owned by private parties (Bor & Mesters, 2018; Mees, 2014), implying a great dependence on private cooperation. Secondly, due to budget restrictions, municipalities (increasingly) depend on private co-funding in urban development (Baarveld et al., 2018; Heurkens et al., 2020; Kuitert et al., 2019). Thirdly, private participation can foster innovation and efficiency gains in mainstreaming CA (Mees, 2014). Private sector contributions are therefore crucial for meeting CA goals and therewith ensuring climate resilient and future-proof urban environments (Leemkolk et al., 2020; Mees, 2014; Schneider, 2014).

Previous studies have devoted little attention to mainstreaming CA by the private sector. Therefore, we currently have little knowledge on what motivates the integration of CA in private urban development projects. In fact, a clear action perspective for private mainstreaming appears to be missing (Schneider, 2014). Being predominantly a public good (Mees, 2014), CA measures mostly result in societal benefits rather than delivering profits to the private investor (Tompkins & Eakin, 2012). Benefits of CA often appear intangible and long-term, while its costs are immediate and short-term (Vogel & Henstra, 2015). The absence of a full return on CA investments, let alone any profit potential, mismatches with the profit-oriented business model of private parties. As a result, mainstreaming efforts currently often fall short (Schneider, 2014). Furthermore, considering that CA has only gained more attention recently, scientific research on the topic is still limited (Marchese et al., 2018; Murieta, 2020; Vogel & Henstra, 2015; Zhang & Li, 2018). Previous research has focussed on discussing CA policy integration (Rauken et al., 2015; Runhaar et al., 2018; Uittenbroek et al., 2013) rather than the integration of CA in urban planning. Moreover, it also concentrated on public sector adaptation, leaving private adaptation largely underexposed (Klein et al., 2017; Rauken et al., 2015; Runhaar et al., 2018; Uittenbroek et al., 2013; Wamsler, 2015). Hence, there is a limited understanding of private CA mainstreaming practices, and specifically drivers for CA action (Asplund & Hjerpe, 2020; Eckersley et al., 2018). Exploring such drivers for mainstreaming is important (Klein et al., 2017; Schneider, 2014), as they can provide insights into the rationale for private CA action and possible ways to purposefully stimulate and facilitate private CA initiatives.

This study aims to explore current drivers and future opportunities for enhancing climate adaptation mainstreaming in private urban development projects. In order to do so, it provides answers to the following two questions: What are the existing and potential internal drivers for mainstreaming? How can policy instruments be used to enhance future mainstreaming? This study examines how CA can be achieved within the Dutch context by commercial developers and investors. Moreover, it focusses on the factors influencing the motivation for mainstreaming, rather than the impact of CA measures in practice.

Section 2 discusses the theoretical background and key concepts from literature. Next, section 3 elaborates on the methodology. Section 4 subsequently discusses the results of this study. Section 5

presents a discussion of findings and addresses implications for policy and practice. Lastly, conclusions and recommendations for future research are shown in section 6.

2. Theoretical background

This section presents an overview of the state-of-the-art of current scientific research. First of all, we discuss what drives commercial enterprises in general, i.e. business models and corresponding drivers for action. We subsequently discuss internal drivers for mainstreaming CA, succeeded by an analysis of the application of policy instruments to enhance private mainstreaming of CA in urban development. We conclude this section by summarising the findings in a conceptual framework.

2.1 Understanding business models and drivers for action

We have discussed before the importance of expanding knowledge on private drivers for mainstreaming in order to better understand and stimulate private CA efforts. In order to comprehend what motivates organisational behaviour and actions, one has to understand the core of private firms: their business model. A business model is commonly defined as the rationale of how an organisation creates, delivers and captures value (Osterwalder & Pigneur, 2010). Value refers to the services and products produced by organisations which are perceived worthy by potential beneficiaries (e.g. consumers) (Bos-de Vos et al., 2016). The concept of value lies at the essence of organisations, as they create value in different ways and for different targets, while simultaneously also capturing value themselves (Lepak et al., 2007). Value creation refers to the amount of value being subjectively realised for a targeted user or buyer, who is willing to exchange money for the value they receive (Lepak et al., 2007). Value capture, on the other hand, describes the ability of a firm to earn revenue in different ways, including but not limited to monetary value (Lepak et al., 2007). Value capture lies at the foundation of organisational survival, explaining why value capture is a key concept underlying organisational behaviour and actions (Bos-de Vos et al., 2016).

Urban development projects create value to the user (use value), i.e. the beneficiaries of the new development and its environment, while simultaneously ensuring value capture for the private developer or investor. The perceived value capture provides the rationale for these commercial developers and investors to engage in urban development activities. The business case of commercial developers revolves around developing real estate and selling it after completion, whereas commercial investors acquire real estate (after completion) as an object for long-term investment. Prior research by Bos-de Vos et al. (2016) has identified two ways of private value capture, namely professional value and exchange value. Professional value refers to 'soft', non-monetary value capture, e.g. experience and reputation (Bos-de Vos et al., 2016). Exchange value is the price for which the produced good (in this case a property) is exchanged (Bos-de Vos et al., 2016) and generally covers the main share of organisational motivation in real estate development. The principle of value capture is thus positioned within the core of (private) organisations, explaining their behaviour and actions. The anticipated value capture, referring to the perceived benefits for the organisation, hence acts as a driver for action. The anticipated value capture of integrating CA measures in the urban environment thus provides the justification, i.e. drivers, for mainstreaming.

2.2 Internal drivers for private climate adaptation mainstreaming

Scientific research on drivers for private mainstreaming is scarce. A small body of research has taken a behavioural economics perspective for explaining climate adaptive behaviour (Dang et al., 2012; Grothmann & Patt, 2005; Grothmann & Reusswig, 2006). More specifically, Grothmann & Patt (2005) have explained adaptive behaviour through protection motivation theory. They introduced a conceptualisation of private proactive climate adaptation behaviour which was later expanded by Grothmann & Reusswig (2006) and Dang et al. (2012). However, this psychological perspective focusses

on personal rather than organisational drivers, hence it cannot be used to fully and correctly represent motives for mainstreaming. Because literature has not yet discussed drivers for private mainstreaming of CA in detail, we must look beyond the scope of CA. Literature on urban sustainability planning offers a different perspective on drivers for private action, yet it shows similarities with CA mainstreaming (Floater et al., 2016). Therefore, sustainability science provides a useful context for evaluating cross-disciplinary and complex issues such as CA (Schweikert et al., 2018). Sustainability science shares many similarities with resilience (Marchese et al., 2018), which is again very closely related to CA (European Commission, 2014; IPCC, 2007). For this reason, we turn towards the field of sustainability planning for exploring drivers for the integration of CA objectives and measures in urban development projects.

Falkenbach et al. (2010) have explored sustainable building drivers for real estate investors, introducing a framework of three distinct levels of drivers: property level, corporate level and external level (Falkenbach et al., 2010). They identified a total of 10 drivers divided amongst these levels, considering both monetary and non-monetary benefits. Falkenbach et al. (2010) concluded that external and corporate level drivers are the most prevalent in existing literature, while property level (economic) drivers were found to appear the least in previous studies. Nevertheless, they found the lack of property level drivers to be the most important impediment to the adoption of sustainable building practices (Falkenbach et al., 2010). This underscores the high relevance of additional research into property-specific and economic drivers for CA. Some years later, Darko et al. (2017) expanded the framework of Falkenbach et al. (2010) by considering a wider range of construction stakeholders than solely investors. Darko et al. (2017) defined drivers as the persuasions that encourage the adoption of sustainable building practices, distinguishing internal and external drivers. They added two novel categories of drivers to those introduced by Falkenbach et al. (2010), namely project level and personal level drivers. Divided among these 5 categories, they uncovered a total of 64 individual sustainable building drivers.

When combining the findings of Falkenbach et al. (2010) and Darko et al. (2017), one can distinguish internal drivers and external drivers. Internal drivers refer to unforced and intrinsic motivation for taking action, based on perceived and potential benefits of this action to the actor itself (Darko et al., 2017; Olubunmi et al., 2016). External drivers are discussed in the next section. In terms of internal drivers, one can distinguish corporate, property, project and personal-level drivers (Darko et al., 2017; Falkenbach et al., 2010). Corporate level drivers are based on perceived organisational benefits of CA, exceeding the scope of individual projects (Darko et al., 2017). Property level drivers relate to perceived operational benefits of CA during the exploitation phase of real estate, whereas project level drivers concern the perceived benefits that manifest during the construction phase itself (Darko et al., 2017). Project-level drivers concern a relatively short timeframe (construction phase only) compared to the property level drivers (entire lifetime), which could explain why they had not received much prior attention. Lastly, personal level drivers are those which internally drive people to adopt sustainable construction practices based on personal beliefs and commitment (Darko et al., 2017). Altogether, these four categories of drivers reflect the different motivations for mainstreaming CA in private urban development projects. Table 2.1 summarises the definitions for each of these drivers.

Table 2.1: definitions of categories of internal drivers

Drivers	Definitions	References
Property	Motivation based on operational benefits during the property's life cycle that result from mainstreaming	(Darko et al., 2017; Falkenbach et al., 2010)
Corporate	Motivation based on perceived organisational benefits and professional value capture that result from mainstreaming	(Bos-de Vos et al., 2016; Darko et al., 2017; Falkenbach et al., 2010)
Personal	Motivation based on personal beliefs and commitment to CA.	(Darko et al., 2017)
Project	Motivation based on perceived benefits during the construction phase that result from mainstreaming	(Darko et al., 2017)

2.3 Policy instruments for enhancing private CA mainstreaming

Apart from internal drivers explaining organisational behaviour, external drivers have also been discussed in prior research. External drivers are those originating from external parties, mostly (local) authorities, aiming to influence private mainstreaming (Darko et al., 2017; Olubunmi et al., 2016). Sustainable building literature has identified numerous external drivers, e.g. incentives, regulations, and education efforts by (local) authorities. Additionally, the role of non-government organisations in creating external drivers has also been discussed, e.g. the role of client/consumer demand as a driver for sustainable building (Darko et al., 2017; Falkenbach et al., 2010). Nonetheless, Darko et al. (2017) and Falkenbach et al. (2010) have not further explored external drivers in great detail.

This study focusses specifically on external drivers created by (local) authorities, which can be referred to as policy instruments (Olubunmi et al., 2016). Considering the locality of urban development, these policy instruments are mostly applied by municipalities. External drivers in general have not been thoroughly discussed in CA literature. Nevertheless, the use of policy instruments specifically for promoting CA has in fact been subject of prior research (Henstra, 2016; Mees et al., 2014; Molenveld et al., 2020). Molenveld et al. (2020) in fact plea for a strong(er) role of (local) authorities in using policy instruments to increase private CA mainstreaming.

Prior research has classified policy instruments (for CA) in multiple ways. For example, Mees et al. (2014) have distinguished the following three types of policy instruments: regulations (legal instruments), financial incentives (economic instruments), and information and education efforts (communicative instruments). These instruments are commonly used interchangeably, depending on the type of governance structure (hierarchical, interactive or market governance) (Mees et al., 2013). Another classification by Henstra (2016) uses four categories: nodality (information), authority (enforcement/legal), treasure (financial incentives), and organisation (government demand, e.g. procurement). Combining these categories from literature, we consider the following three categories for policy instruments: communication & cooperation, enforcement, and incentives. These policy tools can be applied (in combination) to stimulate, promote and enforce mainstreaming. Table 2.2 provides definitions for these different types of policy instruments.

Table 2.2: definition of types of policy instrument (external drivers)

Policy Instruments	Definitions	References
Communication & Cooperation	Using education and communication to inform adaptation behaviour and cooperating with private parties to enhance mainstreaming	(Henstra, 2016)
Enforcement	Using power to enforce mainstreaming by means of law and regulations	(Henstra, 2016; Mees et al., 2013)
Incentives	Using financial incentives for creating additional benefits that induce mainstreaming	(Henstra, 2016; Mees et al., 2013)

2.4 Conceptual framework

In the previous sections we discussed internal and external drivers for mainstreaming. Drivers are referred to as the motivators for mainstreaming, inspired by underlying perceived benefits. Drivers concern both the benefits of a certain action as well as the averted costs of inaction. Based on the exploration of prior scientific research, we established a conceptual framework. The conceptual framework shown in Figure 2.1 originated from a synthesis of literature on sustainable building drivers, predominantly considering the studies by Falkenbach et al. (2010) and Darko et al. (2017). This model illustrates the relation between (internal and external) drivers and mainstreaming CA.

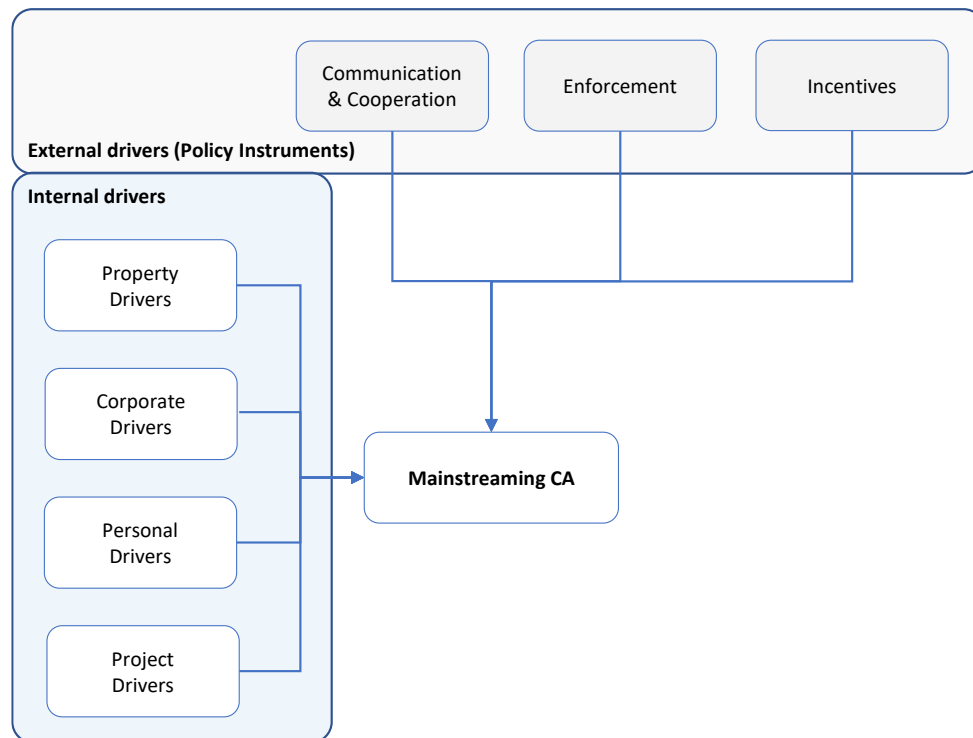


Figure 2.1: conceptual model of drivers for mainstreaming CA in private urban development projects

Mainstreaming CA concerns the integration of CA objectives and measures during the design and planning phase of private urban development projects. The willingness for mainstreaming CA is influenced directly by four internal drivers: property, corporate, personal, and project drivers. Mainstreaming CA is also influenced by the use of (CA) policy Instruments, referring to the external drivers discussed before: communication & cooperation, enforcement, and incentives. This conceptual model allows for systematically analysing and categorising the internal and external drivers influencing mainstreaming.

3. Methodology

The limited theoretical basis for mainstreaming climate adaptation in private urban development projects demands for an empirical and qualitative research approach. This approach fits well with the exploratory character of this research and the deep understanding of drivers that we aim to achieve (Queirós et al., 2017). We selected an interview study as our main research strategy, allowing us to examine mainstreaming in detail from different perspectives and within its natural context (Queirós et al., 2017). In-depth interviews allowed for extracting rich information, validating previous findings, and probing for additional information, while at the same allowing us to identify general patterns that cannot always be observed at a case-level (Queirós et al., 2017). This section discusses our data collection and analysis methods.

3.1 Data collection

Data were collected primarily through interviews and data collection was further supported by document analysis, focussing on policy documents and consultancy reports on CA in urban development. In order to study mainstreaming from different perspectives, we distinguished two types of interviews: project-level interviews and strategic-level interviews. Each type had a different focus and concerned different types of respondents, which is discussed below.

All interviews were held in Dutch and conducted through Microsoft Teams. Interviews were semi-structured, using pre-defined interview scripts while also allowing us to deviate and probe for additional information where deemed necessary. The interviews were recorded, provided orally obtained consent from each of the interviewees. Interview recordings were automatically transcribed using computer software, after which they were manually reviewed. The interview references were anonymised for privacy reasons, implying that findings can only be traced back to interviewees by the researchers. A full overview of interviews is provided in Appendix A, Table A.1.

3.1.1 Project-level interviews

Project-level interviews focussed on existing internal drivers for CA and the use of policy instruments by the public sector for influencing mainstreaming in current practices. Therefore, these interviews featured actors involved in CA projects in practice. Corresponding interview questions are discussed in Appendix B.

On the basis of exploratory interviews with CA experts, an inventory was made of frontrunner projects concerning CA integration in urban development. The scope of project selection involved projects in The Netherlands, initiated by the private sector (urban developers and/or investors), concerning the purposeful mainstreaming of CA, and having completed the (initial) planning phase (thus having reached a decision on mainstreaming). We found four projects matching these criteria, differing in magnitude and context: Merwedekanaalzone Deelgebied 5 (Utrecht), Schalkwijk Midden (Haarlem), ZOHO (Rotterdam), and Schiphol Trade Park (Hoofddorp). The first three cases concern urban transformation projects in high density urban areas, featuring the creation of respectively 6000, 2000 and 500 residential units. Schiphol Trade Park concerns the development of a 306ha new business and logistics park characterised by a high ambition in terms of sustainability and CA. More information on these projects is provided in Appendix C. For each of these cases, we selected at least 1 public (municipality) and 1 private party (commercial developer). A total of 10 project-level interviews were conducted, of which 4 with public and 6 with private parties.

3.1.2 Strategic-level interviews

Strategic-level interviews focussed on potential new internal drivers for CA and the application of policy instruments (external drivers) for enhancing private mainstreaming in the future. Consequently, strategic-level interviews concerned general experts on CA and urban development who were not directly involved in specific projects but were rather involved on a strategic/tactical level. Corresponding interview questions are discussed in Appendix B.

Strategic-level interviewees were selected on the basis of exploratory interviews, stakeholder analysis, and snowball sampling. Exploratory interviews led to the selection of knowledgeable commercial developers and investors, as well as urban development and CA consultants. Using snowball sampling, by means of recommendations from past interviews, additional interviewees were contacted during the data collection phase. Our aim was to conduct at least 1 interview for each type of urban development stakeholders. This resulted in the selection of 1 commercial developer, 1 developing investor, 1 institutional investor, and 4 urban development and CA consultants. Moreover, based on exploratory interviews and a stakeholder analysis, 8 urban development stakeholders were interviewed. The

selection consists of representatives from insurance companies (3), banks (2), a water board (1), and an urban development design agency (1). Additionally, a group interview was part of our series of strategic-level interviews, featuring a total of 8 CA and urban development consultants from the same organisation. The group interview set-up was identical to the other strategic-level interviews, but more dynamic discussion took place considering the number of respondents involved. We conducted a total of 13 strategic-level interviews (primary data), supplemented by 2 additional interviews which were retrieved from internet and magazine articles (secondary data).

3.1.3 Document analysis

Document collection and analysis focussed on policy papers and consultancy reports on CA. Specifically, we focussed on exploring new potential drivers for CA and the existence and effectiveness of CA policy instruments. Considering the locality and context-specificness of CA, document collection confined to those concerning the context of The Netherlands. The majority of collected documents focused on policy instruments for enhancing the integration of CA in private urban development projects. Other documents addressed barriers (and ways to overcome these barriers) to CA planning, and market-induced incentives for CA. Document analysis was used to complement and support our interview study.

3.2 Data analysis and validation

Interview transcripts and documents were uploaded to Atlas.ti software, providing comprehensive tools for analysing qualitative data based on the principle of data-coding. We analysed the data by means of manual coding, assigning labels to specific parts of text containing information on elements of the conceptual framework. For example, sections mentioning 'reputation' or 'image' were coded as corporate driver. We analysed and coded the interview data in two rounds. An initial set of codes was established by means of deduction from academic literature on sustainable building drivers (Darko et al., 2017; Falkenbach et al., 2010). By means of induction, the list of codes was amended and modified based on the insights from the first round of coding. A second round of coding then took place. The final codes, established through deduction and induction, are shown in Appendix D.

Having completed the data coding process, findings were manually analysed and synthesized per code. For example, all pieces of text labelled as corporate driver were extracted from the transcripts. These passages were then examined and the findings in terms of individual drivers were combined where possible (in case of overlap). These internal drivers were subsequently grouped by frequency of occurrence in the database. Considering the explorative character of this study, the frequency of occurrence merely provides an overview of how often certain aspects were mentioned, without giving a full and accurate reflection of their occurrence and importance in practice. Moreover, information about the use of policy instruments (external drivers) and other general findings were extracted and combined. A synthesis of our results provided the basis for formulating policy implications for enhancing mainstreaming in future projects.

To validate the results and implications, we organised a validation focus group. We selected a total of four urban development and CA experts, aiming to involve representatives from different sectors. The selection involved a CA consultant, an urban development consultant, a strategic project manager from a municipality, and a senior project manager from a commercial developer. The latter two had been interviewed before, while the first two had not been closely involved yet. All of them had experience and affinity with CA. An overview of participants is shown in Appendix A, Table A.2. During the focus group, a short recap of the research was provided, followed by a brief presentation of the research results. The general findings and policy implications that resulted from a synthesis of the research results were then presented to the participants by means of bold statements, aiming to initiate group discussion. Overall, the findings and policy implications were well-received and mostly agreed with by

the participants. Only a few additions and refinements were mentioned, which led to minor adjustments to our findings and implications.

4. Results

This section presents our research results. First of all, we discuss the internal factors driving the integration of CA in private urban development projects. Secondly, the role of policy instruments for enhancing mainstreaming is discussed. The results provide insights into what currently drives mainstreaming and what actions can be taken by (local) authorities to stimulate, facilitate or enforce private CA behaviour. References to interviews are made in brackets.

4.1 What drives private CA mainstreaming?

Interviews were analysed in order to investigate what motivates private parties to integrate CA in urban development projects. Commercial developers and investors are pre-eminently driven by (perceived) value capture, also concerning the mainstreaming of CA in urban development projects. For motivating mainstreaming, both exchange value and professional value play a role. Interviews indicate that property and corporate drivers are important motivators for private mainstreaming, whereas personal and project drivers play no influential role. Table 4.1 provides an overview of the drivers for private mainstreaming resulting from interview analysis. Private party references are highlighted in this table, considering that these parties are directly engaged in mainstreaming CA. For that reason, these references were considered more relevant compared to others. The different categories of drivers and their influence on motivating mainstreaming are discussed in this section.

Table 4.1: internal drivers for private CA mainstreaming, sorted by occurrence in interviews with private parties.

Drivers	Category	Interview reference(s)	
		Private parties (%) ¹	Others ²
Corporate image enhancement	Corporate	10,13,15,17,19 (83%)	1,3,5,18,20,22
Achieve high quality living environment	Property	13,15,17 (50%)	5,7,8,18,21
Reduced market throughput time (popularity)	Property	13,15,17 (50%)	18,20,21,24
CA / sustainability certification	Property	13,19 (33%)	18,22
Knowledge development possibilities	Corporate	10,19 (33%)	5
Increased property longevity (robustness)	Property	10 (17%)	7,18,21,23
Operational costs reduction	Property	13 (17%)	18,21,24
Achieve high quality, comfortable property	Property	12 (17%)	5,18
Increased property value	Property	13 (17%)	7,11
Corporate social responsibility	Corporate	12 (17%)	18
Competitive advantage	Corporate	13 (17%)	
Impressing regulators	Corporate	17 (17%)	
Personal commitment	Personal	19 (17%)	14,20
Construction costs savings	Project	Confirm: 13,17 (33%) Deny: 10,15,19 (50%)	

4.1.1 The role of property drivers

The majority of drivers that were raised during interviews are property drivers. According to our respondents, the following 7 property drivers for mainstreaming apply (in order of occurrence): 1) achieving high quality living environment, 2) reduced market throughput time, 3) CA / sustainability certification, 4) increased property longevity, 5) operational costs reduction, 6) achieving high quality property, 7) increased property value (see Table 4.1)

¹ Percentage of respondents from this group indicating the existence of this driver

² Public parties (municipalities) and strategic-level interviews (consultants, experts)

Interestingly, most of these property drivers do not directly reflect monetary value. Property drivers are pre-eminently based on the perceived capture of exchange value, however increased property value was only put forward as a driver by a small portion of the respondents (least occurring driver). This indicates that private parties do not expect significant quantifiable and monetarised benefits resulting from mainstreaming. The other drivers that were mentioned only indirectly represent an increase in exchange value. For example, respondents indicated that achieving a higher quality living environment (because of CA integration) can lead to a higher popularity, therefore a higher demand, and eventually a higher exchange value.

Many of the benefits of CA manifest during the (long) lifetime of real estate, benefiting property users and owners. It appears that commercial developers cannot capture this value directly, possibly because of their short involvement in the urban development chain. The business model of urban developers, which involves selling the property after completion, implies that all value must be captured before the moment of sale, and hence also before the property is being put into use. For this reason, developers highly depend on the value that users and/or owners assign to CA features in urban development projects. This implies that they depend on how users/owners perceive future CA benefits, and how they translate these benefits into exchange value (money) at the moment of sale. Developers can therefore only capture value indirectly, through user and/or owner appraisal. Commercial investors, on the other hand, appear to be able to capture some of the benefits of CA directly. Considering that they remain involved (through ownership) for a longer period of time, they can also benefit from the long-term (operational) merits of CA (e.g. enhanced lifetime) that accrue to them.

Absence of bottom-up demand

The above illustrates that commercial developers, and to a lesser extent investors, heavily rely on the value that users assign to CA. Corresponding with results from document analysis (BPD, 2019), many respondents (experts, developers, municipalities) indicated that they perceive consumers/users to hardly appreciate and understand the merits of CA. In fact, a study on the appraisal of sustainability by consumers shows that they generally do not explicitly and consciously value sustainability in urban development (BPD, 2019). Some respondents indicated that technical specificities of CA measures are rarely of interest to consumers, instead they rather focus on aesthetics. This could well explain the absence of bottom-up demand for CA, illustrating why integrating CA in urban development often fails to result in a (perceived) increase of exchange value (for developers and investors), nor the (perceived) ability to charge rental premiums (for investors). The absence of consumer demand thus hinders mainstreaming, because the consumer does not appear to be willing to pay the bill for CA. Therefore, it will be harder for commercial developers and investors to recoup the costs of CA measures.

Non-financial property drivers prevail

The most prevalent property driver concerns the perception that CA measures contribute to achieving a high(er)-quality living environment, specifically when they involve creating more green space. The vast majority of commercial developers indicated that they do not see CA as a goal but rather as an instrument for creating comfortable, liveable, and high-quality properties and environments. Moreover, many respondents mentioned an expected decrease in market throughput time and increased tenant retention rate, resulting from the perceived distinctiveness and popularity of developments featuring CA. Especially institutional investors mentioned the acquisition of CA certifications as a driver, considering that they often have to achieve certain sustainability goals for their investment portfolio. Increased longevity, reduced operational costs and increased property quality/comfort were also mentioned by several respondents. All of these drivers concern indirect monetary benefits, considering that the translation of these benefits into quantified financial profit is still largely unsubstantiated. These indirect benefits often proceed on yet existing knowledge, for example the (common) understanding that green environments boost property values (Deloitte Real Estate, 2020). Only two respondents from large urban development corporations mentioned a direct increase in property (exchange) value as a

driver for mainstreaming. They said “we don’t do climate adaptive urban development, we do integral urban development, and climate adaptation is part of that” [7,13]. Most commercial investors indicated that they reason from a perspective of investment robustness for motivating mainstreaming, considering that they “are in there for the long run” [3]. The majority of private parties indicated that they still actively try to find a balance between the costs of CA versus its benefits, which currently often seem unquantifiable and unbalanced compared to the costs.

4.1.2 The role of corporate drivers

Corporate drivers were often mentioned during interviews as important motivators for mainstreaming. Respondents mentioned the following 5 corporate drivers: 1) corporate image enhancement, 2) knowledge development, 3) corporate social responsibility, 4) competitive advantage, 5) impressing regulators. These drivers mostly relate to perceived professional value capture. Corporate image enhancement was mentioned as a driver by many commercial developers, investors, and CA experts. In fact, this driver has the highest occurrence of all drivers in our dataset. Most respondents showed awareness of the transition towards increased integration of CA in urban development. Considering this transition, they often indicated they would like to be seen involved in CA for image benefits in order to secure future business opportunities [10]. Moreover, considering the expected CA transition, developing know-how and skills on CA (mainstreaming) was mentioned as an important driver as well, particularly among commercial developers. Other drivers that we uncovered are corporate social responsibility, competitive advantage, and impressing regulators. The latter two are in fact very similar and are related to corporate image enhancement as well. Overall, interviews indicate that developers and investors are generally very aware of the professional value of engaging in CA. Respondents appear to share similar views on the future with respect to the integration of CA in urban development, motivating their mainstreaming intent. It appears that the lacking substantiation of CA benefits during the property lifetime, and the resulting lack of financially substantiated property drivers, shifts attention to corporate drivers as well for motivating mainstreaming. Professional value, such as reputation or skills, seem tangible drivers considering that they do not need to be quantified or monetarised. This could well explain the focus on these (non-monetary) corporate drivers among commercial parties which are pre-eminently money-focused and profit-oriented.

4.1.3 The role of personal and project drivers

Respondents indicated a minimal importance of personal and project drivers for motivating CA integration in urban development. Only one respondent mentioned the presence of personal drivers influencing mainstreaming. A private project manager, also being a bird watcher in his spare time, was found to stress the importance of biodiversity in urban development, hence putting increased focus on green, CA and biodiversity-enhancing measures [20]. Other respondents illustrated that personal commitment could create additional opportunities for increased attention towards CA. Nevertheless, none of the interviews indicate personal drivers having an influential or decisive role in motivating mainstreaming. With respect to project level drivers, two (out of six) developers confirmed possible construction benefits resulting from mainstreaming CA. Nevertheless, none of the respondents confirmed its actual use in practice. The majority of respondents denied or did not mention the existence of project drivers for motivating mainstreaming, some saying that “CA just adds complexity and costs, rather than delivering benefits” [5]. Overall, it seems that project drivers could exist, but our respondents provided no substantiation for the current use of project drivers.

4.1.4 Potential new drivers for motivating future mainstreaming

We investigated potential new drivers in order to uncover opportunities for increasing intrinsic mainstreaming motivation. Our analysis reveals that various urban development stakeholders can stimulate private mainstreaming by providing rewards to users/tenants of properties featuring CA measures. These benefits provide operational savings, which can in turn lead to a higher appraisal

(bottom-up demand) and willingness to pay for CA. In turn, this can make mainstreaming more attractive for commercial developers and investors, while urban development stakeholders also benefit themselves from the merits of increased integration of CA in the urban environment. Interview and document analysis uncovered that the following stakeholders could contribute to stimulating mainstreaming: damage insurance companies, health insurance companies, banks, municipalities, and water boards. Table 4.2 provides an overview of these potential new drivers.

Table 4.2: potential new drivers for mainstreaming, grouped by stakeholder type.

Stakeholders (who?)	How?	Benefits who?	Why?	Applied yet?	[Interview] reference(s)
Damage insurance companies	Discount on premium	Owner/ Tenant	CA measures can reduce leakage and flooding risk, as well as reducing risk of drought damage	Only small-scale application	[1,2,5, 6,8,12, 13,16,21] (Bor et al., 2021)
Health insurance companies	Discount on premium	Tenant	Reduction of heat stress, and greener living environments lead to significant health benefits	No instances found. Sector is likely too distantly connected to urban development	[6]
Banks	Discount on mortgage interest	Owner	Reduction of climate risks increases the robustness and safety (less risk) of mortgage collateral	No instances found, too little data / taxation knowledge about CA benefits.	[1,6,8] (Bor et al., 2021)
Municipalities	Discount on sewage tax	Tenant	In case of disconnecting rainwater drainage: reduced sewerage use	Only small-scale application	[7,13,16] (Bor & Mesters, 2018; Deloitte Real Estate, 2020)
	Discount on real estate tax (OZB)	Owner	Reduced impact on urban facilities such as drainage, heat, etc.	No instances found.	[7] (Bor & Mesters, 2018; Deloitte Real Estate, 2020)
Water boards	Discount on water board tax	Tenant	Reduced use and impact on water system and sewage treatment process	No instances found. Legally not possible (yet).	[8] (Bor & Mesters, 2018; Deloitte Real Estate, 2020)

Several respondents and documents demonstrate that damage insurance companies can provide premium discounts to owners and tenants of properties featuring CA measures. This is based on prior research on financial risks related to climate change, showing that CA measures can reduce risk for leakage, local flooding and drought damage (Bor et al., 2021). Premium discounts benefit commercial investors (owners) and/or tenants of properties directly, which can create additional incentive for mainstreaming. Interestingly, this is already being applied on a small scale in The Netherlands [6]. Similarly, health insurance companies can also provide premium discounts to tenants based on the perceived health benefits of reduced heat stress and/or greener living environments. Healthier living environments result in significant health benefits (Bor & Mesters, 2018), which could be rewarded with a health insurance premium discount. Nonetheless, interviews and documents show no proof for the application of this incentive, possibly because health insurance companies are not commonly involved in urban planning. Moreover, banks can provide mortgage discounts to owners of properties featuring CA measures (Bor et al., 2021). The reduction of climate risks increases the robustness and safety of the mortgage collateral, reducing the overall mortgage risk. Some banks are already experimenting with

'green mortgages', however these are currently only focussing on sustainable energy solutions [1]. Document and interview analysis has not uncovered current initiatives for CA mortgages, possibly because of the absence of detailed taxation knowledge on the benefits of CA. Water boards could provide discount on the annual water tax to compensate tenants of properties featuring CA measures which effectuate a reduced impact on the water system and water treatment facilities [25]. Nonetheless, national law currently does not allow for water tax differentiation (Bor & Mesters, 2018). Lastly, municipalities also play an important role in making private CA mainstreaming more attractive. In line with prior studies, respondents have indicated the possibility for lowering real estate taxes in order to create incentives for property owners to invest in CA measures. This is supported by prior studies on financial incentives for CA planning (Bor & Mesters, 2018; Deloitte Real Estate, 2020). This can be justified based on the principle that CA can alleviate the impact and reliance on urban facilities such as drainage and can reduce heat stress. Moreover, taking measures to reduce sewerage water runoff can be compensated by giving sewerage fee discounts (Bor & Mesters, 2018; Deloitte Real Estate, 2020). Respondents indicated that some municipalities have already been experimenting with sewage tax differentiation, whereas we found no evidence for the application of real estate tax differentiation in practice.

4.2 How can policy instruments be used for enhancing mainstreaming?

We have analysed interviews and documents in order to uncover to what effect policy instruments can be used for motivating mainstreaming. Document and interview analysis indicates the co-existence of different policy instruments affecting mainstreaming in practice: communication & cooperation, enforcement, and incentives. One respondent indicated that "CA is much more a social challenge than a physical one" [16]. This implies that CA is more a challenge in governance rather than technical aspects, which supports the use of policy (governance) instruments for enhancing mainstreaming. Our respondents show a predominant focus on communication & cooperation, specifically concerning intensive cooperation between public and private parties for the integration of CA in urban development practices. In some cases, co-development even takes place, a situation in which the municipality itself engages in urban development as well. It appears that municipalities focus on 'showing how it's done', rather than 'telling what to do'. Respondents indicated that very few legal and regulatory boundaries concerning CA are in place, especially on regional and national level. On a local level, municipalities often take responsibility for installing CA demands and regulations, but respondents indicated that these are rather divergent as they differ for every municipality. Lastly, respondents showed few instances of subsidies or other incentives promoting CA. Developers and investors showed that they mostly disregard the use of incentives, or that they were unaware of their existence. This section presents the status quo for the use of policy instruments to promote mainstreaming, including possible barriers and enablers to the use of specific policy instruments (see Appendix E for more details).

4.2.1 Communication & cooperation: educating and co-developing with the private sector

The use of communication & cooperation efforts as tools for enhancing mainstreaming was well-received by all respondents. The report by Handgraaf & Dekker (2019) also supports that communication and cooperation efforts can be effectively used in practice. Multiple arguments were given in favour of communication & cooperation. As some respondents argued, 'unknown makes unloved' also applies to CA. We have shown before that consumers are generally unaware of CA and that the information demand considering sustainability, and CA specifically, is very high (BPD, 2019). Secondly, respondents indicated that public-private cooperation – based on trust and transparency – is crucial for successfully navigating through mainstreaming processes. Respondents showed that municipalities tend to act as "many-headed monsters" [11,13,17] as they create policy and install demands without properly considering feasibility and effectiveness. For that reason, interviews indicate that instead of talking about the private sector, municipalities should communicate and co-develop with them. This underpins the importance of (intensive) public-private cooperation and co-development to

mainstreaming CA. Moreover, respondents argued that clearly communicated and formulated CA expectations can contribute to enhanced mainstreaming.

Interviews indicate that communication & cooperation activities could be performed in the following ways, targeting both private parties as well as consumers. First of all, it is crucial that both public and private parties are transparent about their objectives and expectations, and engage in co-development. Being transparent and co-decide which objectives to focus on, instead of pushing off public ambitions onto private developers and investors, appears to be key according to many respondents. Moreover, co-developing provides municipalities with increased means to guide mainstreaming from a cooperative perspective rather than as a legislator. Secondly, respondents indicate that informing, educating, and inspiring developers and investors about the necessity and possibilities of CA is essential. Thirdly, in line with findings from document analysis (Pols, 2020), respondents argued that informing and educating consumers/citizens about CA is crucial. This contributes to creating a sense of urgency and appreciation of CA, which can in turn drive bottom-up CA demand. Lastly, some respondents argued that municipalities should participate in land development activities again in order to regain influence on CA integration in urban planning. It appears that before the 2008 financial crisis, municipalities often actively participated in urban development through so-called land development ('grondexploitaties'). Municipalities would collect and buy lands, prepare construction sites, take care of plot-transcending facilities (e.g., infrastructure) and then sell building plots to developers. In these public-private partnerships, municipalities thus developed together with the market. During such conduct, public facilities could be funded through the sale of land, sacrificing part of the public profit for the realisation of public goals (Deloitte Real Estate, 2020). Following the past economic crisis, it appears that municipalities have become hesitant to take on the risk of land development again, leaving this entirely to the private sector. Municipalities in The Netherlands have therefore largely lost their ability to call the tune in urban development.

4.2.2 Enforcement: creating boundaries to guide private CA mainstreaming

CA enforcement was also well-received by public parties, general experts, and commercial developers and investors. Respondents indicated that commercial developers and investors in fact desire more boundaries and regulations in order to guide their CA efforts in urban development, saying: "give us something to work with" [14]. Only one interviewee opposed enforcing of CA, stating that "we already have enough laws and regulations" [15]. Multiple arguments were given in favour of CA enforcement. First of all, the general perception exists that without regulation it will be too easy for most private parties – under time or financial pressure – to 'save' on CA measures. Secondly, respondents (specifically commercial developers) indicated that setting boundaries for CA can guide private parties in taking CA into account already from the early stages of development. Reports on bottlenecks in CA planning also reveal that there is a great need for practical guidelines to guide CA efforts, especially among smaller urban developers who do not have the resources and expertise for guiding CA action themselves (Wal & Kampert, 2020).

Our interviews indicate that enforcement could be applied as follows. First and most importantly, regulations should be created together with the urban development 'market' parties, ensuring mutual understanding and realistic demands. This can prevent over-regulation and competing policy objectives, which were regarded significant barriers to mainstreaming by many respondents. Secondly, only the development process should be safeguarded using regulations (the 'how'), while leaving the exact interpretation (the 'what') to the market to decide upon. Respondents indicated that mainstreaming is a process, not a goal by itself. It should therefore also be secured as a process rather than a fixed result, leaving sufficient design freedom to the private parties. Lastly, developers showed a preference for uniform policy, most preferably on national level, instead of divergent regional regulations. Similar regulations already exist, e.g. the Besluit Ruimtelijke Ordening (BRO) already dictates that one should consider the consequences of urban development on water management in urban planning (Handgraaf

& Dekker, 2019). Especially municipalities already have many possibilities of installing CA demands on a local scale for urban planning, whereas on national level there are fewer possibilities (Handgraaf & Dekker, 2019). Nonetheless, as the report by Handgraaf & Dekker (2019) shows, municipalities appear to use their legal instruments only to a minimum extent. This indicates opportunities for improvement.

4.2.3 Incentives: boosting mainstreaming by alleviating financial burdens

Most private-sector respondents indicated that they regard incentives as a good means to enhance mainstreaming efforts, whereas public parties generally expressed to be less in favour. General experts also supported the use of incentives, albeit under certain conditions. No objections against incentives were voiced, but rather critical notes about the fact that incentives are often unrightfully perceived as the 'holy grail' for stimulating certain action. The temporary character of incentives, e.g., subsidies, implies that it can only be used once and for a specific group. Nonetheless, respondents indicated that incentives can be used to contribute to increasing mainstreaming in the long term.

Interview analysis reveals that CA incentives could be used in the following ways. First of all, to subsidise CA initiatives by consumers/citizens as to increase CA awareness. Moreover, it should be used to take away part of the financial risk of CA in order to overcome risk-averse behaviour and therewith stimulate private parties to get familiar with mainstreaming CA. Incentives were perceived to be more effective for raising awareness among consumers/citizens, rather than offering (relatively small) subsidies to commercial parties. Especially for small subsidies, urban developers argued that the costs of accounting often outweigh the actual benefits [12]. The temporary character of (financial) incentives implies that it is not a long-term solution, but instead should only be used to stimulate mainstreaming to become (more) common practice.

5. Discussion and implications

This article has focussed on internal drivers and the use of policy instruments for motivating the integration of CA objectives and measures in private urban development projects. We have demonstrated that property and corporate drivers are important motivators for commercial developers and investors to integrate CA in their projects. Moreover, this study shows that the use of a combination of policy instruments could well support and enhance private mainstreaming efforts. This section discusses our findings in comparison to literature. Moreover, it presents implications for policy and practice, based on the synthesis of our findings. Lastly, we present a reflection on our research.

5.1 Comparing findings to literature

We found both professional value (reflected by corporate drivers) and exchange value (reflected by property drivers) of great influence to motivating mainstreaming CA. Our finding that corporate and property drivers prevail over personal and project drivers aligns with the research findings from Darko et al. (2017), who also found limited theoretical basis for the existence and importance of personal and project drivers underlying sustainable building planning. Specifically, we found that corporate image enhancement is one of the key internal drivers underlying mainstreaming. Darko et al. (2017) and Falkenbach et al. (2010) also found image enhancement to be a key driver. Moreover, their findings also included corporate social responsibility, impressing regulators and knowledge development as important drivers. With respect to property drivers, Falkenbach et al. (2010) support our analysis that financial property drivers have the potential to be key motivators for mainstreaming, albeit that they currently have a low prevalence. Even more, they have shown that the absence of financial property drivers is the most important impediment to sustainable building practices. This aligns closely to our conclusion that property drivers show to be key motivators for mainstreaming, but that they are often still hard to substantiate. This explains why business cases currently rest more on unquantified property benefits rather than proven financial returns. We have shown before that private firms do not only

pursue commercial but also professional goals (Bos-de Vos et al., 2016). The concept of value capture can therefore explain how the difficulty in substantiating property benefits (exchange value) could be compensated by focussing on corporate drivers (professional value) instead. Lastly, also for sustainable building practices, bottom-up consumer demand appears to be missing (Häkkinen & Belloni, 2011; Tran et al., 2020). This indicates that also for sustainable building practices, demand and willingness of consumers is a crucial moderating factor. The absence of proven financial returns relates to the absence of consumer demand, considering that increased demand could make mainstreaming more financially attractive for commercial parties (Darko et al., 2017).

In line with past research, we have shown that effectively enhancing private mainstreaming of CA demands for a mix of different policy instruments (Mees et al., 2013; Molenveld et al., 2020). In our study, we have distinguished the following types of policy instruments: communication & cooperation, enforcement, and incentives. Molenveld et al. (2020) and Darko et al. (2017) have particularly stressed the importance of law and regulations for enhancing mainstreaming, while also indicating that enforcement measures alone are not sufficient. In fact, joint initiatives and collaboration are becoming increasingly important (Molenveld et al., 2020). Our results also indicate the importance of enforcement, while placing communication and cooperation efforts on the same level of importance. Although incentives can contribute to enhancing mainstreaming CA as well, our results show a lesser importance and prevalence compared to other policy instruments. Our results indicate a predominant focus on 'soft' governance measures: communication and cooperation. According to prior scientific research, communication, education and incentives can well be used to promote knowledge development and raise consumer awareness with respect to CA (Darko et al., 2017; Häkkinen & Belloni, 2011; Tran et al., 2020). Moreover, the importance of intensive cooperation between public and private parties is supported by literature (Molenveld et al., 2020). Secondly, respondents indicated few instances of subsidies or other incentives promoting CA. Developers and investors showed that they mostly disregard the use of incentives, or that they were unaware of their existence. Incentives could be used to promote mainstreaming CA, but we have shown that it is not the holy grail as they can only be used to temporarily boost CA efforts. Lastly, our results indicate that few legal and regulatory boundaries concerning CA appear to be currently in place, especially on regional and national level. On a local level they appear to be rather divergent. Nonetheless, we have found great support for more enforcement measures from all different perspectives (public, private, experts). Literature also supports the use of law and regulations to enhance mainstreaming, as it was found very effective in leading a change in thinking, raising awareness, and guiding parties to act more sustainably (Darko et al., 2017; Falkenbach et al., 2010; Häkkinen & Belloni, 2011). Similarly to our results, literature illustrates that law and regulations are explicitly welcomed by commercial developers and investors: "if you don't legislate people won't start to do it" (Darko et al., 2017, p. 40). Commercial developers and investors in fact desire more boundaries and regulations in order to guide their CA efforts in urban development (Molenveld et al., 2020).

To conclude, although we have not found all of the sustainable building drivers identified by Darko et al. (2017) in our data, we can confirm that our findings in general align well with the findings from prior scientific research on sustainable building. Moreover, in accordance with prior research, we found strong proof for the use of external drivers and the role of the public sector for enhancing private mainstreaming efforts. Our findings illustrate the importance of both internal drivers and policy instruments (external drivers) for motivating private mainstreaming. Prior research on sustainable urban development planning has also underpinned the importance of interplay between internal and external drivers (Darko et al., 2017; Falkenbach et al., 2010; Olubunmi et al., 2016; Tran et al., 2020). Therefore, internal and external drivers go hand in hand, assigning no preference to either one of them (Olubunmi et al., 2016).

5.2 Implications for policy and practice

In order to formulate implications for policy and practice, we have combined our results and insights on internal and external drivers for mainstreaming CA. These implications were subsequently validated during a focus group. Our results show that in order to make our urban environments more climate-resilient in the future, both the public and private sector will have to do their part. Public parties could adopt a more cooperative attitude instead of simply pointing fingers to the private sector. Moreover, public parties can use policy instruments to promote, facilitate and enforce private CA efforts. In order to contribute to making our urban environments more climate resilient, the private sector should also take responsibility instead of considering CA merely as a public matter. First of all, the private sector could embrace the transition towards a new way of construction that includes CA. This involves acknowledging the need for CA, recognising and seizing CA opportunities, and positioning themselves receptive to the use of policy instruments by the public sector. Figure 5.1 visualises our findings and propositions for the use of policy instruments by (local) authorities. We will further discuss the use of policy instruments in this section.

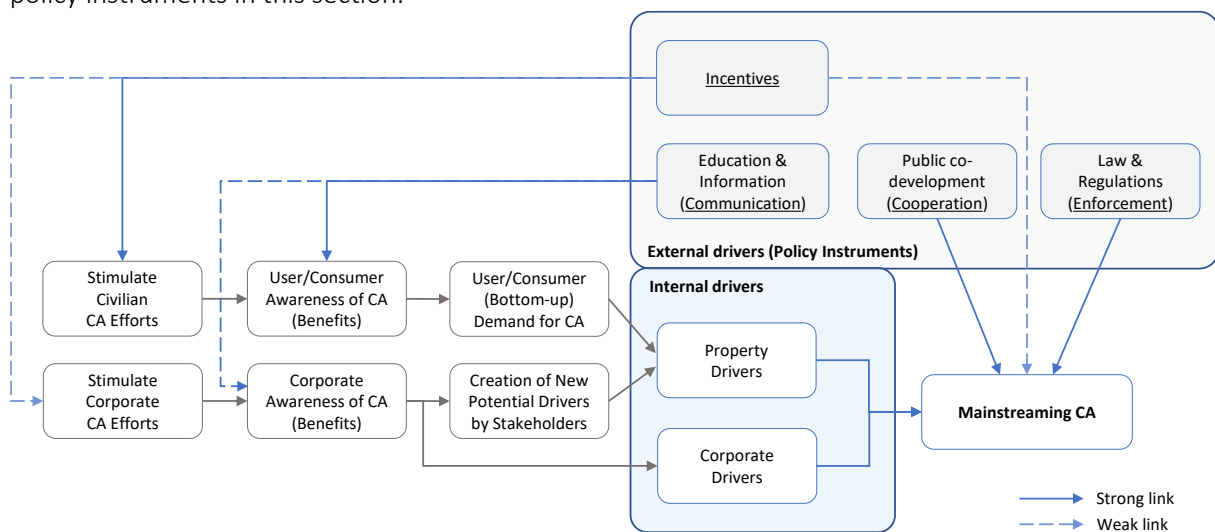


Figure 5.1: implications of internal and external drivers to mainstreaming CA.

5.2.1 Secure mainstreaming in law & regulations

Guiding private CA action and setting minimum standards requires CA to be secured in law and regulations. CA is a means, not a goal by itself. Therefore, law & regulations should secure integral urban development in which CA is carefully considered, without already prescribing specific solutions. The precise implementation of CA (the ‘how’) could best be left to the design freedom of market parties, allowing them to come up with smarter, cheaper and better solutions than authorities could otherwise prescribe (Leemkolk et al., 2020; Wal & Kampert, 2020). On a national level, the Besluit Ruimtelijke Ordening could be supplemented by adding another article, stating for example: “one should consider the consequences of climate change on urban development and appropriate measures should be taken, specifically concerning drought, flooding, and heat stress”. Nonetheless, the locality of CA implies that more specific directions can only be given on a local level by municipalities (e.g., in environmental plans), demanding customisation based on specific environmental characteristics. Municipalities should be cautious of being too prescriptive, and rather embrace the complexity of CA. On the other hand, clear communication of wishes and demands, also relating to CA, is essential. Therefore, (local) authorities should develop law and regulations in close consultation with the private sector, enabling the establishment of realistic, feasible and clear CA requirements. The ‘Omgevingswet’, a new Dutch law which aims to simplify urban planning in the near future (from 2022), offers additional opportunities for municipalities to regulate urban planning pre-eminently on a local scale (Vereniging Nederlandse Gemeenten, n.d.).

5.2.2 Promote CA awareness and understanding through education and incentives

Our study indicates that consumers are generally unaware of (the benefits of) CA, and specifically what actions they can and should take to address climate change. The absence of consumer demand for CA makes it very hard for developers and investors to purposefully invest in CA features, because their clients are essentially not asking nor willing to pay for it. Effort should thus be taken to satisfy the high information demand of consumers. Education efforts can be used to increase awareness and a sense of urgency related to CA amongst consumers. Together, public and private parties could educate, inform and inspire them about the positive effects of sustainability and CA in real estate (BPD, 2019). This can be effectively combined with providing incentives, e.g., subsidies, which create incentives for citizens to get familiarised with CA. Moreover, the private sector can also play a role in marketing CA in their projects, i.e., translating CA into values that matter to the consumers (e.g. aesthetics). Educating and facilitating commercial developers and investors can therefore also enable these parties to better inform consumers about the merits of CA. Even more, spending more time at home during the COVID-19 pandemic has increased and revived the focus and appreciation of citizens for healthy, liveable and comfortable urban environments (Rijksinstituut voor Volksgezondheid en Milieu, 2020). This offers additional opportunities for educating and informing citizens about the role that CA can fulfil in achieving this. Using the current momentum, important steps can be taken to establish an increased long-term focus on CA.

5.2.3 More active participation of the public sector in urban development

In order to increase their influence on mainstreaming CA, local authorities should take a more active role in urban development once again. Our proposition is based on a simple line of reasoning: he who pays the piper calls the tune. As we have shown before, land development activities were mostly halted in the past decade. Specifically for CA, this implies that the municipalities have lost a means to co-develop, in which they took part of the risk but also part of the profit. During such public-private partnerships, municipalities had more means to integrate policy goals in a bottom-up way as they became co-decision maker. Moreover, they could sacrifice part of their profit for investing in societally relevant objectives, such as CA. Taking a more active role in urban development again will create means for municipalities to address CA in a collaborative way, instead of having to enforce CA through law and regulations or rely on the willingness of developers to voluntarily integrate CA. In fact, co-development can contribute to more than CA objectives alone. Increased public participation in urban planning can also provide opportunities for better guiding many of the other challenges that are currently faced in urban planning, e.g. tightness of the housing market in The Netherlands, affordability of houses, circularity, and biodiversity. The current historically low interest rate further facilitates municipalities in attracting relatively cheap capital for returning to the conduct of land development again.

5.3 Reflection and limitations of research

The absence of academic research into private mainstreaming of CA implied a limited scientific basis for guiding this study. At the same time, it indicates the relevance of our research. Sustainable building literature was used in order to substantiate a theoretical background and conceptual model for drivers to private CA mainstreaming. We have demonstrated significant alignment between our results and prior scientific research on sustainable building, indicating that this could be a promising approach for further CA research. We have chosen for an interview study as our main data source, providing us with detailed results considering the specific (local) Dutch context. The interview study has given us great flexibility in the data collection process, allowing us to investigate a wide range of perspectives to get good grip on mainstreaming practices. In order to reduce subjectivity and bias, we have investigated mainstreaming CA from multiple perspectives and sources. A thorough stakeholder analysis has informed our respondent selection, resulting in a wide representation of different types of CA and urban development stakeholders in our collection of interviews. We have tailored our interview approaches to the types of interviews, taking into account the knowledgeability of specific types of actors.

Moreover, we used document analysis to complement our interview findings. Computer software was subsequently used for systematically analysing the collected data. We argue that the careful selection of respondents and triangulation of data (sources) has contributed to the quality of our findings.

Inherent to an interview study is a limited generalizability of results (Queirós et al., 2017). We have organised a focus group in order to discuss and validate our findings with a group of experts. The focus group generally confirmed our findings as only minor adjustments were made afterwards. Nonetheless, our study has focussed on urban development in The Netherlands, specifically concerning projects and respondents from the west of The Netherlands. Our geographical scope was thus limited, indicating that further research is required to assess the applicability of our findings in a different (national) context. The goal of this study was to explore internal drivers and policy instruments for motivating mainstreaming, rather than to uncover the exact details about mainstreaming in practice. The explorative rather than descriptive nature of this study therefore supports a lessened necessity for obtaining highly generalizable results. Instead, our study provides a first step in investigating mainstreaming CA in private urban development projects.

6. Conclusion and recommendations for further research

In this article, we have explored internal drivers and policy instruments for enhancing CA mainstreaming by commercial developers and investors in private urban development projects. We conclude that property and corporate drivers are key motivators for mainstreaming. Particularly property drivers were found of great importance, albeit that the exact benefits of CA, and more specifically its translation into increased property value, was found hard to substantiate. This implies that commercial developers and investors still face difficulties in seeing direct financial benefits resulting from the integration of CA in their urban development projects. Moreover, corporate drivers motivate mainstreaming based on perceived professional value, of which corporate image enhancement was found to be the most important driver. We found little confirmation of project or personal drivers substantially supporting mainstreaming. Our results show that the current use of policy instruments by (local) authorities is in fact a mix between communication and cooperation, enforcement, and incentives. We found that especially communication and cooperation, as well as enforcement efforts, are considered preferential.

Based on our research, we urge that both the public and the private sector take responsibility for integrating CA objectives and measures in the urban environment. Commercial developers and investors have to take responsibility for considering CA in their urban development projects. Likewise, (local) authorities as well have an important responsibility in facilitating and stimulating mainstreaming efforts. In order to enhance private mainstreaming, (local) authorities should actively promote CA awareness and understanding through education and the use of incentives, creating bottom-up demand for CA. Moreover, mainstreaming could be secured by authorities through law and regulations on both a national and local level. Enforcement of CA integration also provides guidance to the private sector for their CA efforts. Lastly, we propose that local authorities take a more active role in urban development by actively co-developing with the private sector, i.e. through land development. Combining intrinsic motivation with policy instruments for promoting private mainstreaming can pave the way for creating more comfortable, resilient, and future-proof urban environments.

This study provides a first exploration of drivers for mainstreaming CA in private urban development projects. Yet, further research is required to expand our knowledge on internal drivers and policy instruments for mainstreaming CA. First of all, in order to enhance (our understanding of) private drivers for CA, future research should focus on quantifying the effects of CA on urban development. Exploring these benefits of CA can significantly contribute to increased motivation and a better business case for private CA efforts. Moreover, this can inspire and create additional opportunities for urban development stakeholders to stimulate private developers and investors to integrate CA in their projects. Secondly, this study has explored the use of different policy instruments in general alongside

three main categories. Before implementing policy measures such as regulations or incentives, additional research is required. Future studies should focus on the precise implementation (process and feasibility) of policy measures and their effectivity in terms of enhancing mainstreaming. Lastly, this study has focussed on CA in The Netherlands. Nonetheless, future studies could investigate drivers for mainstreaming in a different (national) context. To conclude, combining future research with our results can contribute to mainstreaming CA in private urban development projects.

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Appendix A: List of Respondents

Table A.1: List of interview participants

Organisation	Role/position	Source*	Interview type
Janssen de Jong	Project Manager	Primary	Project - Merwedekanaalzone
Municipality of Utrecht	Strategic Project Manager	Primary	Project - Merwedekanaalzone
Synchroon	Project Developer	Primary	Project - Merwedekanaalzone
AM	Senior Project Developer	Primary	Project - Merwedekanaalzone
Municipality of Haarlem	Urban Planner	Primary	Project - Schalkwijk Midden
	Sustainability Manager		
Dura Vermeer Vastgoed	Project Manager	Primary	Project - Schalkwijk Midden
Municipality of Rotterdam	Climate Adaptation Advisor	Primary	Project - ZOHO
Stebru & Leyten	Project Developers	Primary	Project - ZOHO
Schiphol Area Development Company	Coordinator	Primary	Project - Schiphol Trade Park
	Urban Developer		
	Project Manager		
Unibouw	Commercial Advisor	Primary	Project - Schiphol Trade Park
Rabobank	Manager Sustainable Construction	Primary	Strategic
Dutch Association of Insurers	Policy Advisor Climate Change	Primary	Strategic
Bouwinvest	Manager Strategic Partnerships	Primary	Strategic
BNG Bank	Business Development and Sustainability Specialist	Primary	Strategic
Rooftop Revolution	Director	Primary	Strategic
&Flux	Director	Primary	Strategic
BPD	Manager Environment and Environmental Quality	Primary	Strategic
Wonam	Director	Primary	Strategic
Flux Landscape Architecture	Landscape Developer	Primary	Strategic
Waterschap Vechtstromen	Board member	Primary	Strategic
Stadkwadraat	Director	Primary	Strategic
Interpolis	Strategic Business Manager	Primary	Strategic
APPM	Urban development and climate adaptation consultants (group interview: 8 participants)	Primary	Strategic
Dutch Association of Insurers	Senior Policy Advisor Climate Change	Secondary	Strategic
CBRE	Director Sustainability	Secondary	Strategic

*Primary data concerns interviews conducted during this study; secondary data concerns interviews retrieved from other sources

Table A.2: List of validation focus group participants

Organisation	Role/Position
APPM	Climate Adaptation Consultant
Municipality of Utrecht	Strategic Project Manager
AM	Senior Project Developer
APPM	Urban Development Project Manager / Consultant

Appendix B: Interview Questions

Project-level interviews

- Municipalities & commercial developers
 1. What does CA mean for you and your organisation? How are you involved in CA?
 2. To what extent was CA integrated in this project?
 3. Who made the decision to integrate CA? Was this intrinsically motivated, based on a (signed) agreement, or enforced?
 4. Did (local) authorities apply policy instruments to stimulate CA integration? If so, which instruments were used? How did you perceive their effectiveness?
----- **only for commercial developers** -----
 5. Is it important to integrate CA in your urban development project(s)?
 6. How does CA contribute to the (property) value of urban development projects?
 7. Apart from financial benefits, does your company in another way profit from integrating CA?
 8. Does the integration of CA offer any benefits in the construction phase of urban developments?

 9. Did you encounter any bottlenecks in CA planning?
 10. Did you encounter any success factors in CA planning?
 11. What policy measures should (local) authorities take to enhance CA planning in the future?
 12. How do you think CA will influence and affect your organisation in the future?

Strategic-level interviews

- Urban development stakeholders
 1. What does CA mean for you and your organisation? How are you involved in CA?
 2. How are you as a stakeholder involved in private urban development projects?
 3. How are you affected by climate change? How do you benefit from CA?
 4. How can you influence commercial developers and investors to integrate CA in private urban development projects? Is that already being done?
 5. How do you think CA will influence and affect your organisation in the future?
- Commercial developers & investors
 1. What does CA mean for you and your organisation? How are you involved in CA?
 2. How does CA contribute to the (property) value of urban development projects?
 3. Apart from financial benefits, does your company in another way profit from integrating CA?
 4. Does the integration of CA offer any benefits in the construction phase of urban developments?
 5. What policy measures should (local) authorities take to enhance CA planning in the future?
 6. How do you think CA will influence and affect your organisation in the future?
- Urban development experts and consultants
 1. What does CA mean for you and your organisation? How are you involved in CA?
 2. How do you see the current integration of CA in urban development projects? How do you perceive the private sector contribution to CA?
 3. What factors currently impede or promote private CA planning? How can these be resolved?
 4. How does CA contribute to the (property) value of urban development projects?
 5. Apart from financial benefits, do commercial developers and investors in another way profit from integrating CA?
 6. Does the integration of CA offer any benefits in the construction phase of urban developments?
 7. In what way can urban development stakeholders influence CA planning in private urban development projects?
 8. What policy measures should (local) authorities take to enhance CA planning in the future?
 9. How do you think CA will influence and affect your organisation in the future?

* Translated from Dutch

Appendix C: Project Description

Merwedekanaalzone Deelgebied 5, Utrecht

The Merwedekanaalzone is situated in the city of Utrecht, between the A12 highway and Utrecht Centraal train station. The redevelopment of Merwede has been split up in 3 parts: Deelgebied 4, 5 and 6. The Merwedekanaalzone Deelgebied 5 project concerns transforming a former industrial area into a lively, green, and sustainable mixed-use city district. The district is going to feature residences, commercial spaces with a focus on innovative and sustainable businesses, and other recreational facilities. Apart from creating 6000 homes, it should become a home base for creative companies, hospitality, and sports clubs. A total of 6 private owners and the municipality of Utrecht as a 7th landowner together own the area and are actively cooperating in its redevelopment. The municipality and the private developers and investors have together developed the area, entering into an anterior contract as final product of years of intensive collaboration. Taking a holistic view, surpassing individually owned land plots, the 7 owners have created a vision for the best possible area, providing a key role for climate adaptation. Following this vision, land plots have been traded in order to create equal opportunities for each owner. Having recently signed the anterior contract, parties are currently making detailed designs for their plots. The design phase is being overseen by an independent quality team.

Schalkwijk Midden, Haarlem

The project “Schalkwijk Midden” concerns the transformation of a former office area located in the Schalkwijk district in Haarlem. Located in between the Spaarne Gasthuis (hospital) and the Schalkwijk shopping centre, Schalkwijk Midden is to become the ‘city between the trees’ featuring a mixed-use residential area. Three private developers/developing investors are currently active in the area which is going to feature 2000 homes and 1400 job spaces. The private parties have together established the new ‘city between the trees’ identity that Schalkwijk Midden is to become. The private owners and the municipality have together come up with plot rules for the whole area, setting the boundaries for each individual development. The designs from each developer have subsequently been assessed using these plot rules. The municipality of Haarlem has identified CA as a focus point, yet it has not pushed CA in the Schalkwijk Midden development. Focussing mostly on flooding and heat stress, CA was embedded into its new identity in a bottom-up way. Some projects have already been completed, while the majority of the area is still under development.

ZOHO, Rotterdam

ZOHO concerns the transformation of the Zomerhofkwartier in the hearth of Rotterdam, currently housing many creative enterprises. The redevelopment was initiated by housing corporation Havensteder together with the municipality of Rotterdam. Choosing CA as one of the central themes in this redevelopment, the municipality wrote out a tender for transforming ZOHO into a lively and resilient urban area featuring 550 residential units amongst the existing space for creative companies. The tender was awarded to the consortium Leyten / Stebru, who created an ambitious plan for a green, liveable and climate resilient neighbourhood. CA plays a key role in the redevelopment of ZOHO, which is going to feature green landscaping and other CA measures. CA was embedded into a new urban living concept especially targeted towards urban professionals. The high density demands for a very high-quality outdoor environment, in which CA plays an important role. Having been awarded the tender for ZOHO, the developers are currently working out their winning proposal into detailed plans.

Schiphol Trade Park, Hoofddorp

Compared to the previous cases, Schiphol Trade Park (STP) is a rather unique area development. STP is a business park located in Hoofddorp, nearby Schiphol Airport. It features the development of 306ha of logistics, offices, data centres, etc. Schiphol Area Development Company (SADC) is coordinating the establishment of this new business park near Schiphol. SADC is a publicly owned company striving for the highest standards in sustainability. STP is claimed to be the best connected, most innovative, and most sustainable business park of Europe. SADC has extensive ambitions on sustainability, circularity, and climate adaptation. One of its key areas is the Logistics Zone, housing numerous logistics facilities. STP faces the highest land prices in the country, yet it is able to demand extremely high sustainability standards as compared to traditional business parks. Integrating sustainability and climate adaptive measures in developments for an industry focussing so much on efficiency and functionality as logistics, STP can be called truly unique. SADC is well on its way to transform this business park from solely commercial efficiency to a habitable and pleasant working environment. SADC supports and challenges developers to rethink their way of designing and incorporate sustainable features along the way. Currently, the development of its logistics area is well on its way with the first properties already being under construction.

Appendix D. Data Analysis Codes

Table D.1: List of codes for data analysis

Data codes	Keywords (translated from Dutch)
Internal drivers	
Corporate drivers	Image, reputation, knowledge development, skills, experience, competitive advantage, recognition, marketing, impress regulators, corporate social responsibility
Project drivers	Construction costs savings, time savings, risk reduction, improved constructability
Property drivers	Reduced lifecycle costs, increased property value, higher rental return, higher popularity, high quality building, high quality environment, increased longevity, reduced operational costs, ease in rent renewal, ease in resale, lower vacancy rate, certification
Personal drivers	Personal commitment, moral imperative, tradition
Policy Instruments (external drivers)	
Enforcement	Law, regulations, legal, policy
Communication & Cooperation	Education, communication, information, inspiration, cooperation, collaboration, partnership
Incentives	Subsidy, incentive, financial support

Appendix E. Detailed Results

Table E.1: enablers to CA mainstreaming

Enablers	Interview reference(s)
Intensive public-private cooperation	7,10,11,12,13,14,16,17,19,21,23
CA as a means to a high-quality environment, not a goal by itself	7,10,11,13,19
Integral, area-wide development focus	11,13,14,15,21
Long term (business case) perspective	5,7,12,14,16
Clearly stated and formulated CA expectations by municipality	14,16

Table E.2: barriers to CA mainstreaming

Barriers	Interview reference(s)
Stacking of requirements by municipality, lacking sense of feasibility and cost-effectiveness	3,10,12,13,16,17,19,21,23
Competition between CA and other (policy) objectives	6,10,11,12,13,15,21,22
Absence of clear vision within the municipality	3,10,13,15,23
Unrealistically ambitious preliminary design	7,16,20,22
Risk-averse attitude	13,20,23
Too prescriptive, taking away design freedom	7,13