Delft University of Technology

Protecting Tenants in Social Housing against Heat

Transition Imaging and Pathway Making for Heat Adaptation in Dutch Housing Associations

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Abstract: Climate change poses a significant challenge to humanity , nature and the environment. Next to climate mitigation, climate adaptation becomes increasingly important to ensure liveable surroundings. Rising temperatures are causing more intense and more frequent heat waves, impacting housing conditions. Housing associations have the duty to provide safe and healthy dwellings for their tenants, which is why it is important to also focus on heat. This research focuses on composing a transition image and transition paths for housing associations in the Netherlands. A literature review, content analysis, and interviews with various stakeholders were conducted to assess the current state, the urgency to act, and the ambition level. 70% of the housing associations are aware of the rising problem and have any form of adaptation. The amount of adaptation is not sufficient to meet the requirement of providing safe and healthy dwellings. To accelerate the process, housing associations must continue refining their policies, stakeholders should collaborate to share knowledge, the frontrunners of housing associations should share their strategies, and differing opinions among stakeholders should be openly discussed. Additionally, housing associations should set up a proper complaints procedure and should implement solutions such as providing cool spaces, appointing tenant complex managers and utilizing the skills and knowledge of tenants with different cultural backgrounds, when technical adaptation is not possible in the short term.

Preface

In front of you lies the master thesis ‘’Protecting Tenants in Social Housing against Heat: Transition Imaging and Pathway Making for Heat Adaptation in Dutch‘’ as part of the master's programme of Architecture Management in the Built Environment at Delft University of Technology. I dedicated my time to researching and writing this thesis from September 2023 to June 2024.

During this research, I learned about transitioning towards becoming heat-resilient, focussing on social housing. I gained knowledge about the interaction between different stakeholders and how important it is to include and make use of the added value of every stakeholder. I studied the policies of housing associations and how they and the overarching organizations deal with a new transition challenge. Additionally, I learned practical skills such as interviewing people, reviewing literature and setting up a reliable master thesis report.

I would like to thank my mentors, Dr. Ir. Ad Straub and Dr. Zac Taylor. Ad Straub’s expertise is asset management, and different actors and has a lot of experience working with housing associations. Zac Taylor's expertise is climate transitions and real estate development. I chose them as my mentors, as their knowledge combined fits the topic of heat transition in social housing perfectly. My mentors both challenged me and helped me during the process which, in my opinion, resulted in this thesis of which I am proud to present it to you.

Finally, I want to thank my friends and family who supported me during the process.

I hope you find this thesis both informative and enjoyable to read.

Lianna van Gils
Delft, June 2024

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1. Introduction

The introduction chapter describes the contextual setting of heat adaptation in Dutch social housing, eventually leading to the research gap that forms the base of this research. First, information on the current state of the climate is given and it is explained why climate adaptation in social housing is crucial. The second part explains the health consequences that heat has on tenants. After that, technical aspects such as characteristics of vulnerable surroundings, characteristics of vulnerable dwellings and most effective measures are discussed. Next, an overview of the different stakeholders that potentially influence overheating in Dutch social housing is provided and an overview of the literature on heat policies in Dutch social housing is given. Lastly, a summary and a description of the scope are presented before moving on to the research questions.

1.1 Deteriorating Climate

In this thesis, the words overheating and heat stress will be frequently used. Overheating happens when something or someone becomes hotter than necessary or desirable ("OVERHEAT Definition and Meaning | Collins English Dictionary," 2023). Heat stress is described by Di Napoli et al. (2019) as a heat load, generated by environmental conditions that can undermine the human body's ability to maintain its core temperature within the range of optimal physiological performance (McGregor and Vanos, 2018). It therefore applies more specifically to the human condition. Both terms will be used in this paper as the concept of someone or something getting hotter than desired with ensuing consequences for humans and their surroundings.

The climate is changing as a result of human and natural factors, which has major consequences for people, nature and the environment (Ministerie van Infrastructuur en Waterstaat, 2023). The Earth's average temperature has risen by one degree over the past 130 years. To prevent the environment from deteriorating any further, in 2015, 194 countries agreed on a legally binding international treaty on climate change to maintain the average global temperature below 2 degrees Celsius warmer compared to the average global temperature in 1990 (Global Climate Action, n.d.) (United Nations, n.d.). This goal is aimed to be achieved by limiting greenhouse gasses. This can be done by reducing energy demand, using energy more efficiently and changing to energy sources which emit fewer or even no greenhouse gasses.

Next, to prevent the climate from deteriorating further, we also have to protect ourselves against the consequences of the worsening climate. Climate change leads to more extreme weather (Colbert, n.d.) and thus, among other things, to higher temperatures (Figure 1) and more heat waves (TNO, n.d.). Extreme heat is therefore becoming a bigger problem in different sectors, including the housing sector.

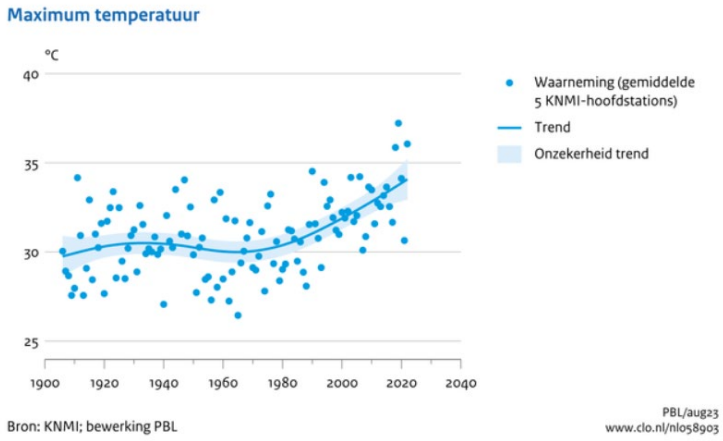

Figure 1: Maximum annual temperature in the Netherlands (mean of five main weather stations) (Source: Temperatuurextremen in Nederland, 1906-2022 | Compendium Voor De Leefomgeving, n.d.)

1.2 Tenant Risk

Research shows mortality rate goes up when temperature rises, even in temperate climates (Armstrong et al., 2010). Temperate climates are characterised by temperature zones that have a coldest month with an average temperature between 0 and 8 °C and at least one month with an average temperature above 10 °C (*Climate Zones*, 2022). The rising temperatures have an even bigger impact on urban areas, where the Urban Heat Island Effect can impact tenants living in social housing. The Urban Heat Island Effect can cause a rise in temperature of up to two degrees. This is caused by the uneven distribution of heat-absorbing buildings and paved areas, compared to the amount of greenery and water (Figure 2) (*Learn About Heat Islands | US EPA*, 2022c). As a high percentage of the housing stock in urban areas are rental dwellings, (Centraal Bureau voor de Statistiek, 2008), overheating is a big threat to the tenants living in rental housing.

Around 30% of the rental housing stock is social housing (*Dashboard*, n.d.). Social rented dwellings are available for single-person households with a maximum income of €47.699,- and multiple-person households with a maximum income of €52.671,- (*Huurbeleid in 2024*, n.d.). Because of this relatively lower income, the tenants have few options to take action by purchasing climate adaptive measures such as air conditioners or moving to a different dwelling, which makes them more vulnerable as opposed to other target groups. Next to the financial situation, age also plays a role in vulnerability. Elderly people have a higher risk of getting diseases caused by heat. As 35% of the tenants of social rent are 65 plus and the ageing of the population in the Netherlands keeps increasing, the elderly form an important aspect of the vulnerability of social renters (*Aedes Datacentrum*, n.d.-b). Lastly, social housing also offers housing for families with a migration background (*Aedes Datacentrum*, n.d.-b). Language barriers could make it difficult for this group to communicate complaints or read instructions or notifications about the topic.

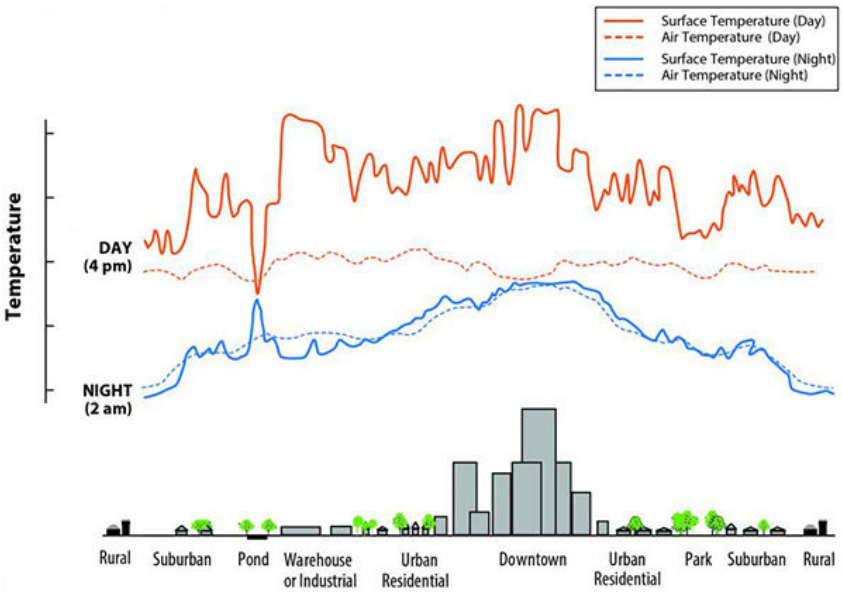

Figure 2: Heat Island Effect (source: Learn About Heat Islands | US EPA, 2022c)

High temperatures can greatly impact humans and their health (Rahif et al. 2021). TNO (2010) researched the correlation between heat waves in the Netherlands, death and disease. They found out that on average the mortality rates go up by 12,1% during heat waves. Minor symptoms and more severe diseases occur as a consequence of the rising temperatures. Heat can also have indirect consequences. For example, thermal discomfort is one of the primary causes of sleep disturbance. Sleep deprivation enhances the chance of heart disease and strokes and decreases concentration (Lan et al., 2017). The elderly are even more vulnerable to the consequences of heat. Until the age of

65, this is not caused by heat itself, but by the fact that the elderly are less fit than younger people. Above the age of 75, a significant rise in diseases caused by heat and dehydration occurs (TNO, 2010). Preventing heat stress is very important to maintain the health of the tenants. The question arises of who is responsible for the tenant's well-being and who has an influence on the process of improving this situation.

1.3 Technical aspects

To get a better grip on overheating within social housing, a look into some technical aspects of overheating in temperate climates is needed. The middle and northern part of Europe has a temperate climate. The following paragraphs expound on the systematic literature search that is done to find technical information on the characteristics of dwellings, the characteristics of the surroundings that make the dwelling vulnerable to heat stress and measures that could prevent dwellings from overheating. This information will be used, together with other sources, to form the context of the thesis and the research problem.

1.3.1 Characteristics of Dwellings

Both Morey et al. (2020) and Hamdy & Hensen (2015a) explore the vulnerability of dwellings to overheating in temperate climates, employing different methodologies. Morey et al. (2020) conducted a large-scale monitoring study on social housing in England, analyzing the indoor temperatures of 122 dwellings in 2015. They found that while overheating does occur, it does not happen frequently. Next to that, they found bedrooms are particularly susceptible due to lower temperature benchmarks set for comfort during sleep. Additionally, newer buildings tend to be more sensitive to overheating due to climate mitigation measures such as insulation. In contrast, Hamdy & Hensen (2015a) modelled Dutch housing types in computer programs, considering climate change scenarios. They identified variations in sensitivity to overheating among different dwelling types, with those with high solar-heat gains and low heat transmissions being more vulnerable. While Morey et al. (2020) rely on monitoring studies to directly measure overheating in dwellings, Hamdy & Hensen (2015a) utilize computer modelling to assess the impact of climate change scenarios on the vulnerability of different housing types. Notably, both studies highlight insulation as a climate change mitigation measure that can exacerbate overheating issues in dwellings.

1.3.2 Characteristics of Surroundings

Next to the characteristics of the building, the characteristics of the surroundings play a significant role in the overheating of dwellings (*Framework Climate Adaptive Buildings - Dutch Green Building Council*, n.d.-b). Especially the characteristics of dense urban areas make the cities vulnerable to heat stress, also known as the Urban Heat Island Effect (*Learn About Heat Islands | US EPA*, 2022c). Deilami et al. (2018) did a systematic review of different factors that affect the Urban Heat-Island Effect on 75 eligible studies on the topic. These factors also include factors that cannot be influenced by the housing associations or the municipality, which will be focused on this research (Table 1). This concerns factors such as seasonal variation or city size that will not be relevant for this study, as well as factors that can be easily adjusted by housing associations or municipalities. The relevant characteristics are highlighted. Note that some of the characteristics have an overlapping/similar meaning.

Variables	**Proportion in the reviewed literature**
Percentage of vegetation	44%
Seasonal variation	33%
City size	28%
Day/Night variation	25%
Population	15%

Percentage of water body	12%
Percentage of pavement	8%
Biophysical indices	8%
Impervious surface	8%
Ground service emissivity	7%

Table 1: Factors affecting Urban Heat-Island Effect (source: Deilami et al., 2018)

1.3.3 Solutions

A second and follow-up research by Hamdy & Hensen (2017a) brings us to possible solutions. This paper adds to research on the potential of ventilative cooling to mitigate the overheating in the dwellings. The results of the research show that a significant amount of Dutch dwelling types are resilient to the ongoing effects of global warming. However, if dwellings are poorly ventilated, they are significantly more sensitive to overheating. Baba et al. (2022) researched the correlation between mitigation measures in high-efficiency buildings and overheating, resulting in more promising findings. They come to the same conclusion as Hamdy & Hensen (2017a). The results show that high energy-efficiency buildings can be more resilient to overheating than non-high energy-efficient buildings, but only if proper ventilation is provided. The paper adds value by recognizing that climate mitigation and climate adaptation can go hand in hand. As the articles of Morey et al. (2020) and Hamdy & Hensen (2015a) point out insulation, which is used to make high-energy efficiency buildings, is a characteristic that makes buildings vulnerable to overheating, Baba et al. (2022) show insulation acts as a stabilizer of the inside temperature. This means that cold can also be kept inside. Furthermore, the article proves that natural ventilation is enough in current temperate climate circumstances, but will not be sufficient if the temperature rises. This stresses the need for climate change adaptation.

In the research of Hooff et al. (2015), the effectiveness of passive climate change adaptation measures is assessed: increased thermal resistance changed thermal capacity, increased short-wave reflectivity, a vegetated roof, solar shading and natural ventilation. As Baba et al. (2015) already spoke about the suppressing effect of natural ventilation, Hooff et al. (2015) also concluded that natural ventilation is an effective measure. Next to that, exterior solar shading is also very effective.

1.4 Stakeholders

In this section, an overview is given of the interacting stakeholders within the different levels of society (Figure 3) that influence heat adaptation in social housing. It is important to understand that transitions are a wide range of interconnected innovations that happen between those different levels within a society (Rotmans, 2005). Loorbach (2007) describes the multilevel model (Rip and Kemp 1998; Geels and Kemp 2000; Geels 2002) which is used to describe these three levels (Figure 3): the macro-, the meso- and the micro-level. The meso-level, called the regime, refers to the dominant structures in a society such as regulations, roads and power relationships. The lower level, the micro-level, is about small-scale innovations or ‘niches’ being created. Think of new laws, technologies and new concepts or ideas and in the case of this thesis, the concept of heat adaptation to protect tenants. The top level, the macro-level or ‘landscape’, refers to the societal setting and consists of social values, political cultures, the built environment and economic development and trends. For this thesis, it is relevant to know the different levels interacting (Loorbach, 2007) and to define what layers influence the transition of housing associations towards heat-resilient dwellings. For example, the current political structures at the macro-level or landscape influence the regulations which are part of the meso-level. The regulations, in turn, can affect the micro-level, for example, the transitions. It is more common for the higher levels to have influence on the levels below than the other way around.

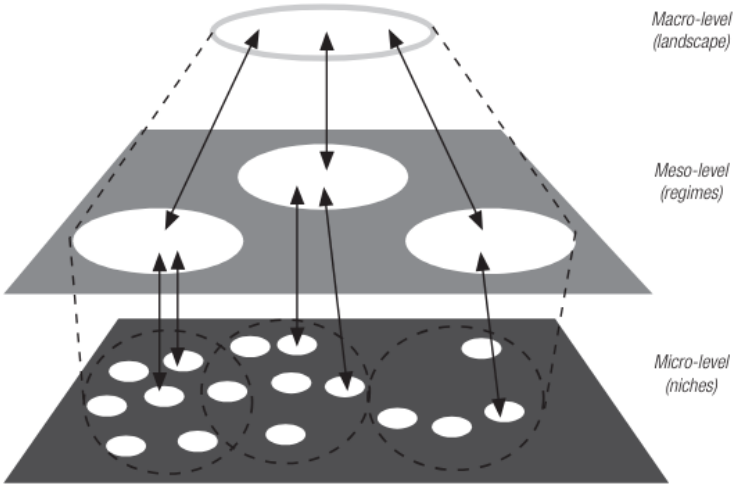

Figure 3: Interaction between different scale levels (Geels and Kemp, 2000)

With the help of Mendelow's power-interest matrix (1991) on the topic of heat stress, the different stakeholders are sorted (Figure 4) and described on their power and interest within the existing conditions. This means that regulating institutions might score relatively low on power because they could potentially have a lot of power but they do not have regulations on the topic. This lowers their power because they can currently not impact the situation by implementing these regulations. All stakeholders that potentially impact or are potentially impacted by the heat transition are included. The more obvious ones are the tenant of the dwellings and the housing associations, but institutions such as the government, the European Union, the municipality and insurance companies, on the higher societal levels, might also have a big influence on the progression of heat adaptation because of their law and rule-making. With the help of Mendelow's power-interest matrix (1991) on the topic of heat stress, the different stakeholders are sorted (Figure 4) and described on their power and interest within the existing conditions. Additionally, a description of every stakeholder's connection to overheating and heat adaptation will be given.

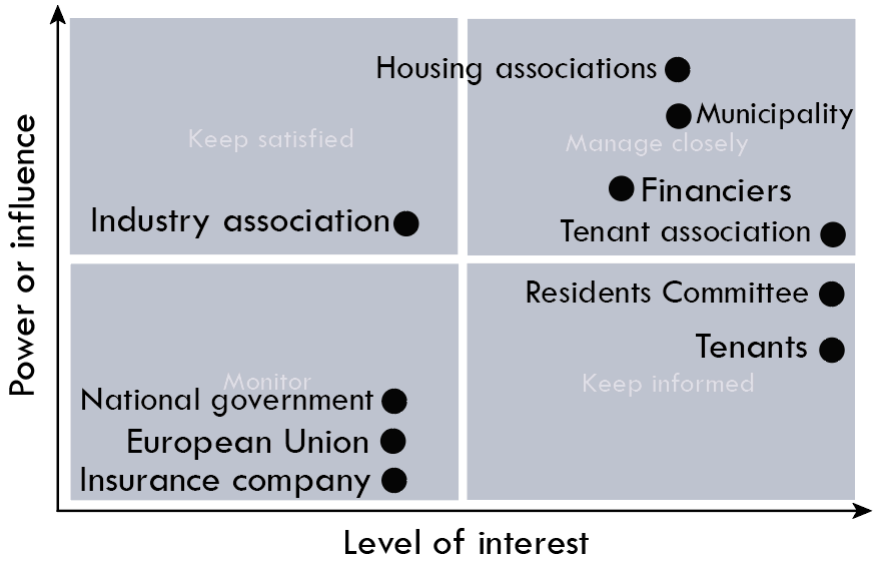

Figure 4: Power-interest matrix stakeholders overheating in social housing (own illustration)

1.4.1 Tenants

The tenants are the ones with the highest interest since the overheating has a direct effect on their health and comfort. They are therefore placed on the far-right side of the figure. As mentioned above, no laws or guidelines are given by the government, besides the Performance Agreements

which differ per municipality. Tenants of social housing often do not have a lot of financial resources to buy their measures themselves so one of the few options for a tenant to act when overheating of the dwelling occurs is to declare the landlord in default. This can result in a rent decrease if the indoor temperature is more than 26,5 degrees for 300 hours per year. If the landlord does not take action, the rent can be decreased by a maximum of 80% (*Te Hoge Binnentemperatuur – Hittewoning | !WOON*, n.d.-b). In practice, this is a difficult concept, since it is the responsibility of the tenant to prove the default and it is not a standard practice to keep track of indoor temperature. For this reason, the power of the tenant is very low.

1.4.2 Residents Committee

A residents committee is an established group of residents from a complex, led by residents which meets regularly to address resident concerns to support the overall operations of the complex (*Resident Committee Definition | Law Insider*, n.d.). The functions and responsibilities of a residents committee can vary widely but are distinctive because they represent the complex specific needs towards the housing associations. The resident committee has a bit more power compared to the individual tenants because they represent a whole block. For this reason, housing associations are more likely to act if problems come forward.

1.4.3 Tenant Association

The tenant association is a group that represents the common interests of renters which can exist on different scales (Rafii, 2024). As different housing associations in the Netherlands have their own tenant association, Woonbond represents the renters on a national scale (Woonbond, 2024). They are in contact with other stakeholders. As the tenant associations represent not one, but a lot of tenants, their position is stronger than the position of the resident committee and the tenant because of the large scale. Next to that, the tenant association is in direct contact with housing associations and industry associations such as Aedes. This is why contacting tenant associations is one of the few things that the tenants can undertake to instigate action from higher levels.

1.4.4 Housing Associations

Housing associations in the Netherlands are obligated to provide a healthy and safe living space (*Aedes-CorporatIEDAG 2024 | Aedes*, n.d.-b), secure the quality of the dwellings and be aware of the changes that may affect the living quality of their tenants (Roders et al., 2012). Next to this, it is important for the associations to keep their assets at a high market value for the future to ensure financial stability and future investment potential (Roders et al., 2012). Housing associations have the final decision power and do also have quite a high interest because they have the responsibility for healthy and safe dwellings. They do have a lot of other responsibilities which seem to have more priority at this moment, so the interest is not at the maximum.

The rising risk of heat stress that comes along with the deteriorating environment makes protection from heat crucial for housing associations to maintain tenant's living quality and the market value of the assets. As surveys from Samen Klimaat Bestendig (September 2023) show an increase in awareness for heat among housing associations, only 19% indicate having any form of policy for heat, which can vary from informing tenants about coping with heat to physical heat adaptations like installing awnings or cooling systems. Heat stress and the awareness and policy of Dutch housing associations are of great importance for their tenants. Renovation cycles are 30-40 years (Van Hal & Femenías, 2009). This means that if heating is a problem that will only be resolved when the consequences have a big influence on the liveability of the housing, there will be tenants who have to still live with heat stress until the next big renovation.

1.4.5 Municipality

In addition to implementing many national laws, the municipality is also responsible for implementing all the tasks that are of direct importance to the inhabitants of the city (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2023). The municipality is responsible for a healthy

environment for all its residents. Just like housing associations, they have multiple other priorities, so the interest is not at the maximum. Their power is a bit below the housing associations since they do not have the final say. To take care of the tenants of housing associations, most municipalities consult the so-called "Performance Agreements" or ‘’Prestatie Afspraken’’ in Dutch with the housing associations operating within the municipality (Personal conversation with two experts in the field, November 2023). These Performance Agreements are set up to work together to create better and more appealing dwellings and neighbourhoods (*Prestatieafspraken Woningcorporaties*, n.d.). The Performance Agreements are agreements that are made on a voluntary but binding basis between the municipality, the tenant association and the housing association for the coming years (*Nieuwe Handreiking Prestatieafspraken*, n.d.). These agreements provide guidance for the municipality and housing associations to work together towards certain goals with each having their own responsibilities. So, in the case of heat, it could be that housing associations agree to work on the technical condition of the houses and the municipality to adjust the outdoor spaces. There are Performance Agreements at the municipal level and Performance Agreements at the national level. In the case of Rotterdam, the municipality created ‘’Rotterdams Weerwoord’’ with other Rotterdam organizations. They focus on preparing Rotterdam for a more extreme climate, focussing on water nuisance, heat stress and groundwater level.

1.4.6 Industry Association

Aedes is the largest industry association of housing associations in the Netherlands. Through substantive programs and projects, Aedes ensures that the housing association sector develops continuously, accelerates where necessary, exchanges knowledge and that housing associations learns from each other. Aedes provides a platform where members meet, exchange ideas and develop visions and products (Aedes et al., 2022). Aedes is one of the parties that set up the national Performance Agreements that focus on moist, mould, led pipes, asbestos and fire safety (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2024). It stands out that overheating is not yet one of the main topics. At this moment, they are working together with organizations who would like to raise the issue. For this reason, they do not have a lot of power at this moment, but this might change in the future. Their interest is also average since there are a lot of other priorities.

1.4.7 National Government

From 2018 the TO-Juli rule is introduced in the Dutch Building Decree. The Dutch Building Decree is the national regulations that you need to comply with when planning on building, rebuilding or renovating something (*Building Regulations*, n.d.). The TO-Juli is a governmental guideline within the Dutch Building Decree. It considers various weather conditions to calculate the risk of overheating within buildings during hot weather periods. A building permit for newly built is since 2021 only given when the TO-Juli is lower than 1.20, with a maximum average temperature exceedance of 450 hours (E-Difference, 2023b). Since the simulations are done in the simulation program BSIM and the principles do not take into account the potential behaviour of the tenants to counter the heat, a revision was done and a benchmark for a maximum amount of 1,000 average temperature exceeding hours was set (*Inhoud Besluit Bouwwerken Leefomgeving*, n.d.). The calculation of TO-Juli takes into account several meteorological factors that influence indoor temperatures. The temperature used for the calculations is based on reference years described in the NEN 5060:2018 and a 5% exceedance probability.

As mentioned before, these rules are for new building permissions. As it would be beneficial for the tenants of dwellings to ensure these benchmarks also in existing dwellings, there are no compulsory rules for existing buildings and renovation projects. That is why the government does not have a lot of power and interest at this moment.

1.4.8 European Union

No specific rules are coming from the European Union that affect heat adaptation in dwellings, but there are new rules that are set up for investors which will have an indirect effect on housing associations: the EU taxonomy. The EU taxonomy is a classification system set up by the European Union to define economic activities that contribute to environmental sustainability (EU Taxonomy for Sustainable Activities, n.d.-b). It aims to provide a standardised framework for assessing and labelling the environmental performance of different economic sectors so that investors and companies can make informed decisions about sustainable investments, with the ultimate goal of supporting a greener economy and contributing to the EU's broader climate and sustainability goals. Housing associations do not fall within the category of companies that have to change to the European Union using this scheme, but their investors do. As a result, investors might increasingly want to invest in housing associations that do score well within the classification system, and it is important for housing associations to also meet the requirements of the classification system (Kadijk, personal conversation, January 2024). This is currently not the case yet, which is why the European Union scores relatively low on both power and interest.

1.4.9 Insurance companies

Insurance companies are not current stakeholders on the topic of heat. However, the Dutch Union of Insurers advocate for a climate label for dwellings (Roders and an expert in the field, 2023). In the climate label, flood probability, foundation damage, heat stress and climate adaptive measures would be included. This gives home buyers, providers and insurance companies the same picture of climate-related risks of homes (Bruins, 2023). The Dutch homeowner's association does not like the climate label. They do think that symmetrical information is of importance, but it is not feasible and fair for the providers of the dwellings, because the label would be based on the potential risk in the area rather than on specific characteristics of one dwelling (*Vereniging Eigen Huis Tegen Verplicht Klimaatlabel*, 2023). The insurance companies as well, do not have high power or interest at this moment.

1.4.10 Conclusion

This section tried to structure different stakeholders that could possibly impact or are possibly impacted by the heat transition. It stands out that, in general, the closer the connection to the tenant is, the higher the interest of the stakeholder is. The tenants, resident committee and tenant associations have the highest interest, followed by the housing associations and the municipality.

Looking at the power of stakeholders, it is remarkable that a lot of stakeholders at the highest societal level, the macro-level, involved in legislation, do not have regulations yet. The European Union, the Government as well as Aedes do not have regulations on heat yet. This does bring a lot of opportunities for the future, especially considering that the higher societal levels affect the lower levels (Loorbach, 2007).

1.5 Policies

As the problem of heat in social housing is defined, the technical aspects and the stakeholders that potentially have an impact or are potentially impacted by heat in social housing are discussed, the next step would be to search for policies or other ways on how heat in social housing in temperate climates is handled. Even though there is a lot of knowledge about the technical aspects and climate adaptation policies, there is not a lot of literature on heat adaptation policies in Dutch social housing. There are two articles that try to measure if heat penetrated the Dutch housing association's policy documents and if they have adapted. These articles will be discussed and an explorative conversation with three experts in the field to provide a starting point for this thesis.

1.5.1 Literature on awareness and adaptation

Both Roders et al. (2012) and Boezeman and de Vries (2019) tried to reveal how far the housing associations are on the topic of climate adaptation by measuring awareness and adaptation of overheating among housing associations in the Netherlands. This is done by conducting a content analysis of the policy documents of different housing associations in the Netherlands. The research of Boezeman and de Vries was done on the year 2017 and is meant as a follow-up research as the study of Roders et al. in 2012.

The content analyses of Roders et al. (2012) suggested that the state of awareness of climate change adaptation is ''unaware'', which is derived from the fact that there are no mentions of heat adaptation in the policy plans of the housing associations. Next to that, 15 out of 25 associations had measures concerning climate change adaptation, which marks these 15 housing associations as ''adapted''. The results of the content analysis of Boezeman and de Vries (2019) also conclude that the housing association's awareness is limited, because of the few mentions in the policy papers. The article did not specify the results further. They conclude that the adaptation that we see is therefore often not deliberate and measures can be seen more as coping strategies than actual adaptation for future scenarios.

Next to the content analysis, Boezeman and de Vries (2019) conducted in-depth interviews with housing associations and other experts in the fields on barriers to implementing climate change adaptative measures. The findings indicate that there is a lack of legal and financial incentives for the mainstreaming of adaptation. The interviews contribute to the understanding of the current status of awareness and adaptation to heat stress among housing associations and are therefore an important addition to the research.

1.5.2 Knowledge in the field

As the previous section adds, the research on the topic of preventing heat stress in housing with a strategic perspective is limited. Therefore some explorative conversations were done with two experts in the field. Martin Roders is the writer of ''Awareness of Climate Change Adaptations among Dutch Housing association's' (Roders et al., 2012), and a heat adaptation policymaker at a large housing association. The conversation revealed that we are currently at a tipping point from knowledge to action taking. There is currently no national policy on combating heat stress because, as with previous relevant topics, it is often the housing associations themselves who take the initiative to research what needs to change before the government makes national rules and laws for it. It differs per housing association if resources can be spent on the topic. A bigger housing association potentially has, in opposition to smaller housing associations, more funding available to assign a person to focus on the topic. The funding and the manpower also play a big role in the prioritization of the problem. At this moment, priority goes out to the demanded energy requirements for the renovation of buildings (Personal conversation with experts in the field, November 2023).

A conversation with Jan Kadijk (January 2024), manager of knowledge and innovation at the Dutch Green Building Council, contained both similar and different insights on the topic. He also states that we are at a tipping point of action and with the Dutch Green Building Council he made a framework which consists of three steps. The three steps form a standard approach which reveals climate risks on the scale of a building and a guide to counter the risks (*Nieuwe Standaardaanpak Klimaatrisico's Zorgt Voor Eerlijke Vastgoedprijzen*, n.d.). In his opinion, the housing associations will ultimately be forced to work on their adaptivity because of the EU taxonomy (*EU Taxonomy for Sustainable Activities*, n.d.-b). The EU Taxonomy is explained in Chapter 1.4.8. in The EU taxonomy will urge investors to make sustainable investments, which also include climate adaptivity modified to the risks that appear in the corresponding country.

1.6 Summary and Conclusion

The climate is changing due to human and natural factors, leading to significant impacts on people, nature, and the environment. Measures are needed to protect against the effects of climate change, such as extreme weather and increased heatwaves, which notably affect the housing sector. Rising temperatures are linked to increased mortality rates, especially in urban areas where the Urban Heat Island Effect exacerbates heat issues for tenants in social housing. Social housing tenants, who often have lower incomes, limited options for climate adaptation measures, and include vulnerable populations such as the elderly and families with language barriers, face greater risks from overheating. High temperatures can cause both direct and indirect health problems, making it crucial to address heat stress and determine responsibility for tenant well-being and health.

Systematic literature research on vulnerable dwellings, surroundings and measures in temperate climates revealed dwellings with high solar gains and low emission values vulnerable to heat. It stands out that climate change mitigation measures such as insulation make dwellings vulnerable to overheating.

The systematic review of Deilami et al. (2018) showed characteristics of surroundings that have a big impact on the overheating of dwellings. Examples of these factors are the percentage of vegetation, waterbody, pavement, impervious surface and ground emissivity.

The literature shows ventilation being an important factor of being able to mitigate the overheating in dwellings. As high insulation was mentioned as a characteristic that makes buildings vulnerable to heat, because insulation traps heat inside, the use of ventilation makes insulation a characteristic that has the potential to keep the cool inside. The researchers show that passive measures should be sufficient in the current temperate climates, with ventilation and exterior sun shades as the most effective measures.

Examining the various stakeholders, it becomes clear that the closer the connection to the tenant, the higher the stakeholder's interest. Tenants, resident committees, and tenant associations have the greatest interest, followed by housing associations and the municipality. Looking at the power of stakeholders, it is notable that many stakeholders at the highest societal level, the macro-level, involved in legislation, lack regulations on heat. The European Union, the Government, and Aedes have yet to establish such regulations. This presents significant opportunities for the future, especially since higher societal levels influence the lower levels (Loorbach, 2007)

This chapter discussed research on the factors that make dwellings vulnerable to overheating and why this issue is expected to worsen in the future. Evaluating literature provided insights into the problem of overheating, its consequences, potential solutions, and the stakeholders involved. Despite this information, there is not a lot of literature and thus knowledge of effective management of the transition available, hindering housing associations from progressing. This study aims to address and resolve this issue.

2. Research Questions and Research Design

This chapter aims to outline the research questions that guide this study and to describe the research design and methodologies used to answer these research questions. This includes a description of the main- and sub-research questions and a detailed explanation of the type of methods, the data collection methods and the data processing methods. First, the research questions are discussed. The questions are developed based on the research gaps identified in the previous chapter. The research questions are designed to manage this heat transition and enable Dutch housing associations to continue the heat transition. After that, the research design is explained. The research is a mixed-method study combining a quantitative content analysis with qualitative in-depth interviews. The results of the content analysis, the interviews and information from the literature will be used to compose a transition image and transition path, following the concept of Loorbach (2007) on how to manage transitions, explained later in this chapter. Lastly, a presentation of the findings from this thesis will be described and the audience, which consists of stakeholders from the heat transition, will be asked for feedback to strengthen the credibility of the thesis.

2.1 Research questions

Chapter 1 provided information on research on the characteristics of what makes a dwelling sensitive to overheating and why overheating will be an even bigger problem in the future. Different measures, static and adaptive (Rahif et al., 2021), have been assessed. So we have knowledge of the problem of overheating, the consequences, the possible solutions, and the stakeholders involved. With all this information present, the problem seems to be a lack of management of the transition that prevents the housing associations from transitioning forward. The housing associations are now at a tipping point of taking action and the goal of this research is to push the housing associations over the edge and enable them to adapt so they are able to continue the transition. This is so they can fulfil their goal of providing safe and healthy dwellings for their tenants.

To be able to reach this goal of managing the heat transition and enable Dutch housing associations to continue the heat transition, a main research question and four sub-research questions are composed. The main research question can be formulated as: *How can Dutch housing associations be instigated to improve policies and strategies on heat adaptation?* To answer the main research question, four sub-questions are formulated.

It is important to first shed light on the current state of awareness and adaptation to heat in Dutch housing associations to be able to provide information on what a good transition should look like. As Roders et al. (2012) researched the status of awareness and adaptation of Dutch housing associations in 2010 and Boezeman and de Vries (2019) conducted similar research in 2017, we lack information on the current state of awareness and adaptation of Dutch housing associations to heat. The first sub-research question therefore is: *What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?*

Next, it is necessary to find out why the Dutch housing associations are in this stage of adaptation. With the available knowledge of what makes a surrounding, dwelling and tenant vulnerable to heat and effective measures to counter the heat, it appears to be the case that enough information is present to fulfil the transition. If the research on the current stage of awareness and adaptation in Dutch social housing results in not all housing associations being fully adapted, this indicates that there are barriers present that prevent the housing associations from adapting. The goal is to find the barriers and opportunities that occur in the different layers of society, therefore the second sub-research question is: *What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?*

After this, Loorbach's approach (2007) to managing transitions on the meso-level, the housing associations level, will be used in this research to reach the goal of enabling the Dutch housing associations to continue the heat transition. The two tools that he uses to manage transitions described in Chapter 2.2.3 are the transition image and transition pathways. The transition image reflects the end goal of the transition and the transition paths describe the route to the transition image. The transition image is crucial to making decisions on the transition path. The two tools are needed to manage the transition and therefore the third and fourth research questions are: *What should a transition image for the transition to heat-adapted dwellings look like?* and *How can transition pathways be composed of housing associations becoming heat-adapted?* An overview of the research questions is shown in Figure 5. The next sections of this chapter explain how the research questions will be answered.

MRQ: How can Dutch housing associations be instigated to improve policies and strategies on heat adaptation?

SQ1: What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?
SQ2: What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?
SQ3: What should a transition image for the transition to heat-adapted dwellings look like?
SQ4: How can transition pathways be composed of housing associations becoming heat adapted?

Figure 5: Overview of research questions (Own figure)

2.2 Research design

Different studies will be done to be able to reach the goal of the thesis. An overview of the studies and how they interact is given in Figure 6. First, quantitative research in the form of a content analysis will be executed to measure the current state among Dutch housing associations on heat adaptation. Secondly, qualitative research in the form of in-depth interviews will be conducted with different stakeholders to gain more detailed knowledge of the current state of the housing associations and the various barriers, opportunities and conflicting statements will be revealed. The results of the content analysis and the interviews will be discussed before moving on to the following part of the research because the outcomes are necessary to perform the next research step. This discussion will contain a review of the results and connecting them to the literature. The limitations and the recommendations for follow-up research will be described in Chapter 6, the discussions, advice on follow-up research and limitations of the full thesis.

The results of the content analysis, the interview and information from the literature will be used to compose a transition image and transition path following the concept of Loorbach (2007) who provided tools to manage transitions. This is done by synthesising the results from the literature, the content analysis and the interviews with the tools of Loorbach (2007). The transition image consists of three elements: a description of the current state, the sense of urgency to act and the ambition level. The available information from the content analysis, the interviews and the literature are used to compose the transition image. The goal of this part of the research is to see if a full transition image can be composed, which is needed to continue and be able to finish the transition. The next part of the synthesis consists of setting up a transition path. The transition path describes routes to get to the transition image. Since there are multiple paths to reach the goal of providing heat-adapted dwellings, this part of the thesis should be seen as advice based on the outcomes of the studies done in this thesis and the literature.

Finally, the last part consists of setting up an extra feedback loop to confirm the findings of the thesis. The findings will be presented at a ''heat session'' that is organized by Groene Huisvesters. Groene Huisvester is, as self-described, an open platform of intrinsically driven housing association administrators committed to accelerating the transition to a sustainable social housing sector (*Groene Huisvesters – Groene Huisvesters*, n.d.). After the presentation, the attending

participants will be asked to give feedback on the findings. This feedback will be used to enhance the transition image and transition path, forming the end results of this thesis.

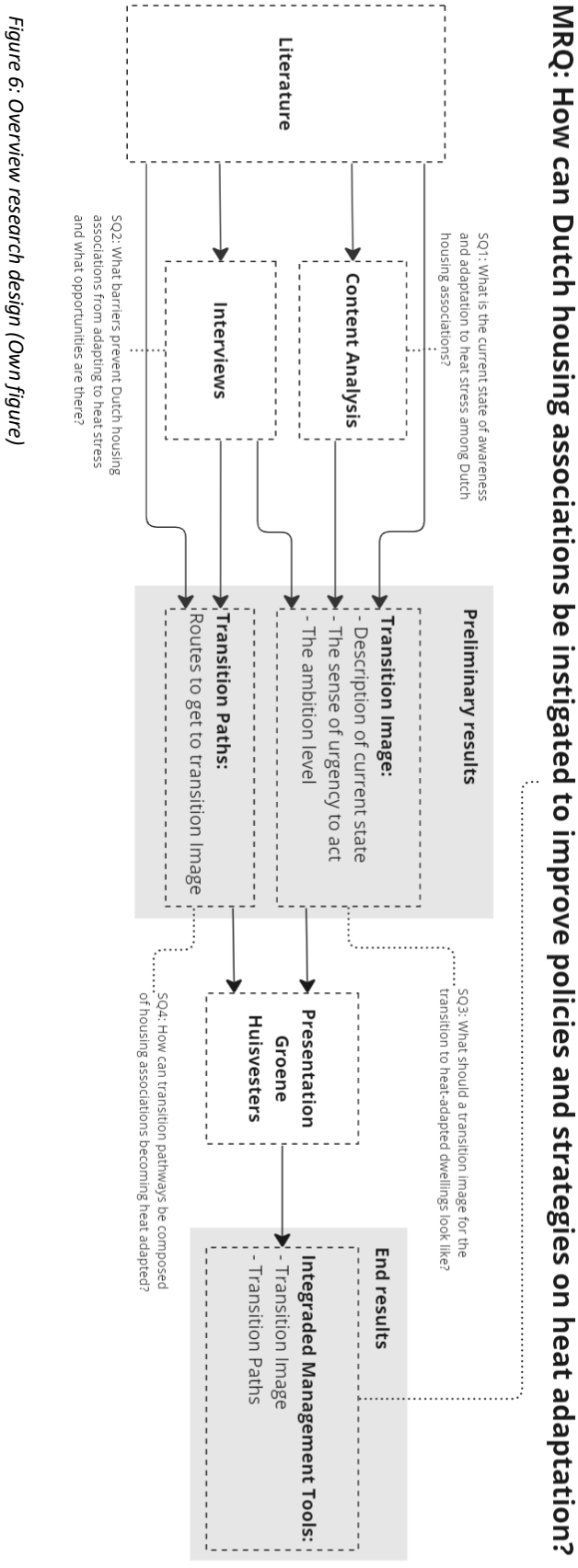

Figure 6: Overview research design (Own figure)

2.2.1 Content Analysis

The first sub-question: *What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?* will be answered by doing a content analysis (Bryman, 2008). This content analysis is done to ascertain whether awareness and heat adaptation have penetrated the strategical and operational levels of policy-making among Dutch housing associations. The content analysis will be executed similarly to the research of Roders et al. (2012) and Boezeman and de Vries (2019) where policy documents of housing associations are searched for keywords that refer to climate adaptation to reveal their awareness and adaptation. The awareness and adaptation is used to describe the current state of Dutch housing associations.

Awareness and adaptation are both terms that leave room for interpretation. Is a housing association aware if they know of the existence of overheating in housing, if they know why overheating takes place or only if they write about it in their policy documents? To be able to research awareness, awareness should be made measurable. To measure awareness on a larger scale by doing a content analysis, awareness can only be measured by finding it in policy documents. For the content analysis, this means that housing associations are deemed aware if they consciously reflect knowledge of the problem of overheating in their policy documents. Later in the research, during the interviews, awareness will be measured differently, with more depth. This is done to overcome the limitation of the content analysis being very black-and-white in measuring awareness, while awareness is a very relative topic.

The definition of adaptation that is used is 'The process of changing to suit different conditions' (Cambridge English Dictionary: Meanings & Definitions, 2024) where the 'different conditions', in this research, would be the overheating of dwellings. The question of how much adaptation is needed for housing associations to be deemed ''adapted to heat'' is again a difficult one to answer. It can be argued that any form of adaptation means ''adapted'', but also ''adapted'' means that the full portfolio is adapted to heat. In this case, overheating is not a problem anymore and the transformation is completed. For the content analysis, we will search for any form of adaptation shown in the policy documents. Assuming that íf it is important enough to be described in the policy documents, a substantial amount of adapting is done. For the content analysis, which is a research with a big sample size, this will be sufficient to get a general vision of adaptation among housing associations. As the research progresses to the interview stage later in this thesis, the focus narrows down to 3 housing associations on a more detailed scale. The focus will be more on assessing how well the housing associations have adapted and if this is sufficient.

The following sections explain the type of documents that will be used, the sample size, what keywords will be used, how the data will be processed and how the research connects to the literature. The content analysis provides a starting point for the rest of the research. The results of the content analysis and the interviews, described in Chapter 2.2.2, will be used in Chapter 5 to provide tools that can manage the transition towards heat-resilient dwellings. Chapter 2.2.3 describes how this will be done.

Approach

Roders et al. (2012) and Boezeman and de Vries (2019) selected two types of policy documents: the annual reports and the policy plans. The annual reports describe the housing association's projects and activities in the previous year and the policy plans describe their plans and strategies for the coming 3-5 years. Next to the annual reports and the policy plans that were searched in the research of Roders et al. (2012) and Boezeman and de Vries (2017), the Performance Agreements will be added to this content analysis. The Performance Agreements are agreements that are made on a voluntary but binding basis between the municipality, the tenant association and the housing association for the coming 2 years (*Nieuwe Handreiking Prestatieafspraken*, n.d.) and can therefore be seen as a type of policy plans. The year 2023 will be used as the reference year for the policy plans and 2022 will be the reference year for the annual reports when studying the current status. Next to that, the available annual reports from the previous years will also be searched to search for

progression throughout the years. The available policy documents of the coming years will be searched to describe what the future might look like.

The content analysis focuses on Rotterdam and includes all 11 housing associations in the city. Rotterdam is a prime example of the Urban Heat Island Effect because there is a lot of pavement, not much greenery, and buildings are close together, all of which contribute to the absorption and retention of heat. Besides that, the city has a large amount of social housing, 53.5% in 2022 (*DPG Media Privacy Gate*, n.d.). This makes Rotterdam an interesting sample to study if housing associations are already making policies and adapting to counter increasing heat. In Table 2, an overview is given of the housing associations that have assets in Rotterdam and their asset quantity.

Housing association	Asset quantity (approx.)
Woonstad Rotterdam	51,280
Havensteder	31,520
Hef Wonen	24,530
Woonbron	20,290
SOR	4,420
Ressort Wonen	2,270
WVH	1,920
MaasWonen	1,710
Habion	1,670
SSH	1,420
Wooncompas	670

Table 2: Housing associations in Rotterdam and their property amount in 2023 (Document RotterdamRaad - [23bb008561] Collegebrief over Prestatieafspraken 2024-2025 - iBabs RIS, n.d.).

As Roders et al. and Boezeman and de Vries (2012) tried to find awareness and adaptation to climate adaptation in general, this content analysis will only be focussing on heat adaptation. This is done by using keywords specifically referring to heat adaptation. The documents are Dutch, therefore the content analysis will be done using Dutch keywords. The keywords consist of words that refer to heat adaptation or the causes or consequences of the topic such as ''heat'', ''overheating'' or ''Urban Heat Island Effect''. The more general terms such as ''climate adaptation'' are also used in the search, but are excluded from the results if they do not refer to heat. Also, terms that indicate measures to prevent overheating are added to the list. Examples are ''trees'' and ''paving'' as more greenery, such as trees, and less pavement will contribute to lower temperatures (Deilami et al., 2018). The keywords are derived from Multiple Dutch sources and literature discussed in Chapter 1.3.3 that wrote about measures that prevent overheating in housing, focusing on surrounding and building ((Nationaal Kennis en Innovatieprogramma Water en Klimaat et al., 2023) (*Maatregelen Voor Woningen*, n.d.) (*Framework Climate Adaptive Buildings - Dutch Green Building Council*, n.d.-b) ((Hamdy & Hensen, 2017a) (Hooff et al., 2015)).

For this thesis, in Table 3, an attempt has been made to connect the keywords mentioned above with the literature from Chapters 1.3,1 and 1.3.2 describing the characteristics of buildings and surroundings that make the dwelling vulnerable to heat stress ((Morey et al., 2020) (Hamdy & Hensen 2015a) (Deilami et al. 2018)). This is to ensure all affecting factors are included in the content analysis. Next, the keywords referring to climate adaptation, heat adaptation and climate risks in general (Roders et al., 2012) are also added to the table to complete the list. Appendix 1 contains a list of the Dutch keywords that are used in the program ATLAS.ti's word cruncher to search the documents.

Affecting factors	**Source**	**Keywords (Measures and general terms)**	**Sources**
Percentage of vegetation	*(Deilami et al., 2018)*	Trees, plants	(Roders et al., 2012)
		Greenery, vegetation	(Roders et al., 2012)
Percentage of pavement	*(Deilami et al., 2018)*	Pavement	
Solar gains	(Hamdy & Hensen, 2015a)	Shadow	(Hooff et al. (2015), (Roders et al., 2012)
		Panes, blinds, shutters, curtains	(Roders et al., 2012)
		Shades, Sun protection film	(Hooff et al. (2015), (Roders et al., 2012)
Heat dissipation	(Morey et al. 2020), (Hamdy & Hensen, 2015a)	Cooling, ventilation, night cooling, natural ventilation	(Hamdy & Hensen 2017a), (Baba et al. 2022), (Hooff et al. (2015)
		Air-conditioning	(Hamdy & Hensen 2017a), (Baba et al. 2022), (Hooff et al. (2015)
		Insulation	(Morey et al. 2020), (Hamdy & Hensen, 2015a)
General		Climate adaptation, heat adaptation, climate risks, heat	(Roders et al., 2012)

Table 3: Composition of keywords that will be used in content analysis linked with factors that affect (Own table).

Data processing

After inserting the documents and the list with keywords, ATLAS.ti provides a list of findings of the keywords which will be called notions from now on. The notions are shown with the context around them, which makes them easier to interpret. Two types of notions can be distinguished: direct notions and indirect notions. Direct notions actually refer consciously to heat adaptation for example: *''For Havensteder, it means, among other things, that our homes and buildings must be able to withstand both low and high water levels and higher temperatures. With this in mind, we follow the Covenant on Climate Adaptive Construction.''* (Stichting Havensteder - Jaarstukken, 2022). Indirect notions are notions that do not consciously refer to heat adaptation but do have an effect on heat for example *''With clear routes connecting the main nodes, plenty of benches, shade and greenery that is nice to look at but also encourages exercise and gardening, for example, and facilitates contact and familiarity.''* (Sociaal Jaarverslag SOR, 2021). In this case, shade and greenery are measures that counter overheating, but the measures were not done with the goal of preventing overheating. Indirect notions, therefore, do not reflect awareness, as shown in Figure 7.

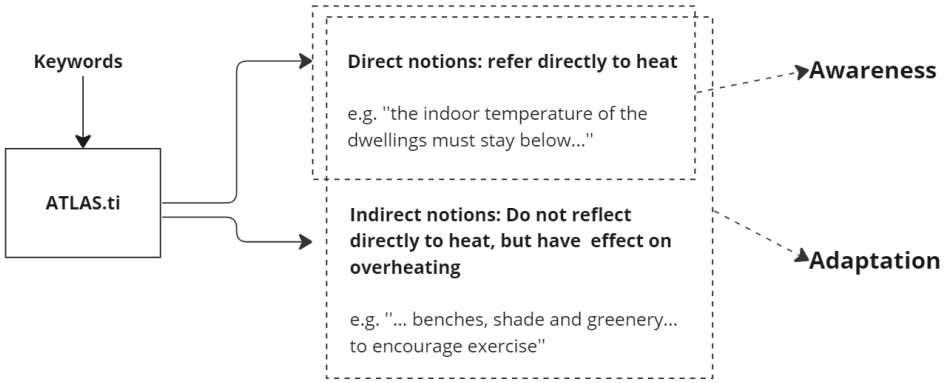

Figure 7: Direct and indirect notions (Own illustration)

The presence of notions referring to heat adaptation in the annual reports of the housing associations will determine if a housing association is adapted or unadapted because the annual reports describe the housing association's activities in the previous year. The presence of notions referring to heat adaptation in both the policy plans and the Performance Agreements will determine if the housing associations are aware or unaware because both documents describe plans for the coming years. The fact that the housing associations plan on taking action or making policies around a topic means that they are aware of the topic being a problem.

Because the annual reports will be searched for keywords to measure adaptation, both direct and indirect notions will be included in the results (Figure 6). The policy plans and the Performance Agreements will be used to measure awareness and will therefore only include the direct notions (Figure 6). Next to that, double notions (notions that are counted multiple times because there are multiple keywords in one sentence) and false notions (e.g. ''green'' referring to ''green energy'' and not physical green) are excluded from the results.

2.2.2 Interviews

The second research question is: *What barriers prevent housing associations from adapting to overheating of dwellings and what opportunities are there?* The goal is to dive deeper into the current state of the housing associations and why this is their state, and to find the barriers that occur during the heat transformation in the regime, as described in Chapter 1.4 (Loorbach, 2007). This will be done by conducting in-depth interviews with housing associations and other stakeholders that influence policymaking or are directly affected by the consequences of overheating of dwellings. The interviews are also done to get a better view of the different interactions among the stakeholders that act at the different levels of society. The method of in-depth interviews is chosen with the aim of instigating the participants to bring up the topics that they find most important but the interviews will still be steered to a conversation about the current status, barriers and opportunities. The following sections explain the stakeholders that will be interviewed and how they are reached out to, the steering interview questions, how the data will be gathered and processed and the connection to the literature. As shown in Figure 5, the barriers, trends and developments found in the interviews will be used in Chapter 5 for the transition management tools which will be explained in Chapter 2.2.3.

Approach

The main focus of this interview is on the housing associations as stakeholders and the stakeholders that connect directly to the housing associations. This is because the aim is to dive deeper into the current state of the housing associations and what the barriers and opportunities are that prevent or could instigate housing associations from continuing or accelerating the transition to a heat-adapted portfolio. Participants were recruited using the 'snowball sampling' method, which effectively addresses the challenge of reaching individuals who are difficult to contact. This method does come

with the limitation that participants may be like-minded, as they are drawn from the same social circles.

The stakeholders that are possible candidates for the interviews are gathered in Chapter 1.4 where the different stakeholders and their interactions are discussed. To start with the housing associations, all 11 housing associations in Rotterdam will be approached for the interviews. Next to the housing association's policymakers, the following stakeholders were approached for an interview: tenant relations officers within housing associations, tenant associations, the municipality of Rotterdam and financing banks. Table 4 provides an overview of these different stakeholders. Given the time constraints of this thesis, the decision has been made to interview the tenant association as a representation of all residents and resident committees. This is because it would take a long time to interview a large enough group of residents to be representative of the average resident living in social housing. This brings the constraint of missing out on specific tenant groups that are not likely to take their complaints to the tenant association. Stakeholders from the European Union and insurers were not interviewed because they currently have no active role in the heat transition. As discussed in Chapters 1.4.7 and 1.4.8, these stakeholders may potentially influence the heat transition in the future, but they do not have an impact at present.

Housing Association Policy Maker
Housing Association Tenant Relations
Municipality of Rotterdam
Tenant Association
Public Financier

Table 4: Interview participants (Own table)

The interviews will be semi-structured, as there will be pre-determined questions to steer the interviews to the topic of barriers and opportunities and why they are occurring, but it leaves room for the interviewee to explore particular parts of the interview deeper. The following questions will be used during the interviews to structure the interviews. The questions to all stakeholders:

- Do you have the impression that heat is becoming a bigger problem in social housing? Why?
- What kind of policies does your housing association have to prevent heat stress in their portfolio?
- What other activities/measures does your housing association do to prevent heat stress in their portfolio?
- Are the Performance Agreements a helpful incentive to instigate action?
- Do you think there is enough action taken to prevent heat stress?
- What is the cause of not enough action being taken?
- Who do you think should the incentive come from to overcome these barriers?

Questions to the housing associations:

- How does your department/organization contribute to addressing heat stress or similar sustainability challenges?
- How can we make social housing more resilient to heat stress?
- What is your organization's potential role in this?

Data Processing

The interview is set up in a way to ensure both protection of the privacy of the participants and maintain credibility. The interviews will be held online and offline and will take approximately 30-45 minutes. In both scenarios, the interview will be recorded, and transcribed and the names of the interviewees and associations will be replaced with anonymous references such as ''Participant 1'' or

''Housing Association 1''. The recordings of the interviews will be discarded after the interviews have been transcribed. After all the interviews are conducted, recorded and transcribed, an attempt is made to organize the results in themes. The themes are made based on the importance of the statements that fall in these themes and the reoccurrence of certain topics. Examples of these themes are ''knowledge'' or ''finance''.

To build on the results of the content analysis that indicates the current status of housing associations, a model of Loorbach (2007) is used to be able to specify this state in a more detailed manner. Loorbach (2007) describes the different stages of a transition in the meso-level, the societal level of the housing associations, shown in Figure 8. He states that historical analysis of transition suggests that transformation consists of four different stages. A transition is fulfilled when all these stages have happened which means full adaptation and institutional changes such as policies. These stages (Rotman et al., 2000) are shown in the figure:

- Predevelopment phase: almost no societal change is visible, and a lot of experimenting is happening.
- Take-off phase: the process of change initiates and the state of the system starts to shift.
- Acceleration phase: Structural changes are starting to take place and are visible through an accumulation of socio-cultural, economic, ecological and institutional changes that react to each other. A collective learning process is happening and the breakthrough point is passed.
- Stabilization phase: The speed of change decreases and stabilization takes place.

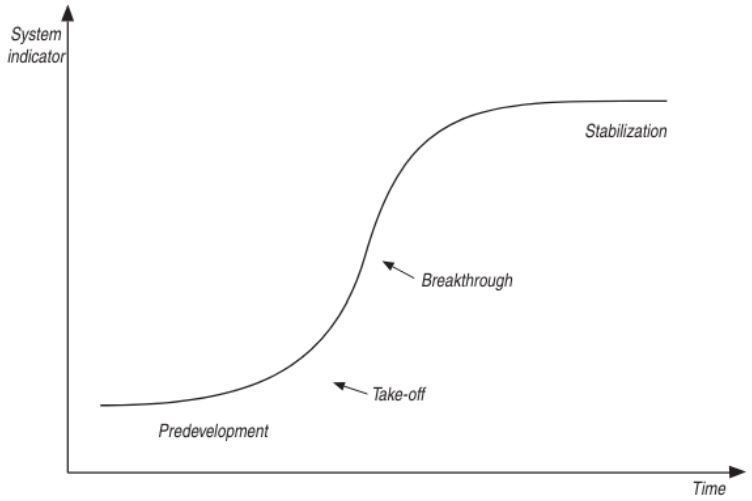

Figure 8 : The four stages of transition (Loorbach, 2007)

2.2.3 Transition Management Tools

As described in Chapter 1, guidance is needed in the transition towards heat-adapted dwellings. This can be done using Loorbach's (2007) tools that are used to manage the transition in the meso-level of society, the regime. The two tools that he describes are the transition image and transition paths, which brings us to the third and fourth research question: *What should a transition image for the transition to heat-adapted dwellings look like?* and *How can transition pathways be composed of housing associations becoming heat-adapted?* The transition image reflects the end goal of the transition as shown in Figure 9. In the case of housing associations transitioning to heat-adaptive dwellings, the transition image reflects this goal. Transition images are translated into transition paths that describe routes to get to the transition image in which strategies and scenarios are combined to achieve goals (Loorbach, 2007). These tools will be used to structure the outcomes of the thesis. The information from the content analysis, the interviews and the literature will be synthesised in Chapter 5 to construct the transition image and transition paths. The final step of the thesis will be a presentation at the Groene Huisvesters where different stakeholders come together to learn about the problem of overheating in social housing. In the presentation, the results of the

synthesis, the transition image and the transition paths, will be presented and after the presentation, the participants get the opportunity to react to the results. This feedback will be used to enhance the results. By integrating findings from content analysis, interviews, and literature, the management tools provide an approach to managing heat in social housing that inclusively engages all relevant stakeholders in the process. The following paragraphs will explain what a transition image and transition path consist of, what information is used to do the synthesis and how the information will be used.

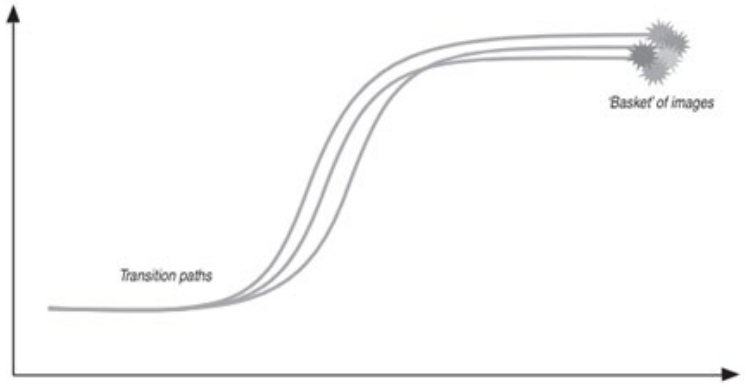

Figure 9: Transition image and transition paths (Loorbach, 2007)

Transition Image

To answer the third sub-question: *What should a transition image for the transition to heat-adapted dwellings look like?*, a transition image for heat adaptation in social housing will be composed. A transition image is the goal of the transition (Loorbach, 2007). The components that are needed to compile a transition image are a description of the current state, the sense of urgency to act and the ambition level. As shown in Figure 5, this will be done with the results from the content analysis, the in-depth interviews and the help of supporting literature.

The current state can be described with the results from the content analysis and a part of the results from the interviews. The content analysis provides answers to whether housing associations are aware and adapted or not. The interviews are used to dive deeper into how aware and adapted the housing associations are to get a more detailed view of the current state of the housing associations in the heat transition.

Loorbach (2007) describes the second element of the transition image as the sense of urgency to act, as the barriers, trends and developments within the society around the topic. The interviews will be used to find those barriers, trends and developments. They can shed light on where those barriers trends and developments occur and if all stakeholders agree on the findings.

The last element of the transition image is the ambition level. The interviews will be used to gain information on whether there is an ambition level set, who took the incentive and why this ambition level was chosen. If there is no ambition level set, the interviews, together with the literature, will be used to provide information on what the ambition level should look like and who should be held responsible for providing an ambition level.

Transition Paths

The next step is answering the fourth sub-question: *How can transition pathways be composed of housing associations becoming heat-adapted?*. A transition path describes the route to the transition image (Loorbach, 2007), so it is about the changes that need to happen to reach the transition image, when the changes should take place, how and with whom these changes should take place and what the short- and mid-term goals should be. This part of the thesis will be set up as advice.

The interviews together with the literature will be used to set up the transition paths. The themes that are used to structure the results of the interviews will be used to organize the transition paths similarly. Per topic, the barriers and the conflicting statements are highlighted. These barriers and conflicting statements can be seen as the obstacles which keep the heat transition from moving forward. Findings in the literature and opportunities from the interviews will be used to set up a plan to overcome those barriers and conflicting statements. The advice will include short- and mid-term goals to differentiate the urgency of overcoming the barriers and conflicting statements.

Presentation Groene Huisvesters

The final step of the research is the presentation at the Groene Huisvesters. This step does not involve adding more information to the study but is meant to verify the results of the thesis for the purpose of the reliability of the study. The findings of the thesis will be presented at a ''heat session'' that is organised by Groene Huisvesters. After the presentation, the attending participants can give feedback on the findings. This feedback will be used to enhance the transition image and transition path in the conclusions of the thesis. The feedback will be received in the form of comments during a video meeting and all chats will be saved. The names of reacting participants will be anonymised to ensure privacy.

2.3 Summary

The problem that will be addressed in this thesis is that there seems to be a lack of management of the transition that prevents the housing associations from transitioning forward. This is done by answering the following main research question and four sub-research questions:

MRQ: *What should the transition of Dutch housing associations towards heat-resilient dwellings look like?*

SQ1: *What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?*

SQ2: *What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?*

SQ3: *What should a transition image for the transition to heat-adapted dwellings look like?*

SQ4: *How can transition pathways be composed of housing associations becoming heat-adapted?*

The first study is the content analysis which is a quantitative study that is used to estimate the current state of housing associations by measuring awareness and adaptation to heat. The method is similar to Roders et al. (2012) And Boezeman and de Vries (2019), but the sample size varies. The keywords used in the content analysis are derived from Dutch sources and the literature discussed in Chapter 1.3.3 which both contain measures to counter heat.

The second study is in-depth interviews with the different stakeholders described in Chapter 1.4. The in-depth interviews aim to gain better insights into the current situation of the housing associations, using the results of the content analysis as a base. The interviews also aim to discover barriers, opportunities and conflicting arguments from the stakeholders.

The third study of this thesis is the synthesis of the findings from the content analysis, the interviews and the literature into the transition management tools by Loorbach (2007). The aim is to find a way that enables housing associations to continue the transition of becoming heat-adapted. The transition management tools consist of making a transition image and providing a transition path.

The transition image is composed using the information from the content analysis and the interviews to reflect on the current state of the housing associations, information from the

interviews that address barriers occurring in the transition and information from the interviews that reflect on the ambition level. The transition path will be developed as a set of recommendations based on the insights gained from the executed studies. It aims to address the barriers and conflicting statements identified in the interviews while using the opportunities from the interview results to facilitate progress during the heat transition and tries to advise on stakeholders that should be involved and how to plan these recommendations.

The final part of the research is the presentation of the transition management tools at the Groene Huisvesters after which the audience is asked to comment on the outcomes. This presentation aims to confirm or deny the findings. This will enhance the credibility of the research and provide insights into how the sample size from Rotterdam represents the target group of the Netherlands.

3. Results Content Analysis and Interviews

This section presents the findings from the content analysis and interviews conducted as part of this research. The content analysis is done to answer the sub-question *''What is the current state of awareness of and adaptation to heat stress among housing associations?''* and the interviews are done to answer the sub-question *''What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?''.* The purpose of this results section is to provide a comprehensive overview of the current state of heat management in social housing and the perspectives of various stakeholders involved in the process. The results of the content analysis can be found in Chapter 3.1.
The analysis is done using annual reports, policy plans and the Performance Agreements of the housing associations in Rotterdam. The results will show which documents contain keywords that refer to heat adaptation, which will be used in the discussion to determine awareness and adaptation. The results from the interviews are shown in Chapter 3.2. The interviews were semi-structured, allowing for in-depth exploration of stakeholder experiences and insights and were done with 5 different types of stakeholders. The results are structured thematically, reflecting reoccurring themes and remarkable results.

3.1 Content Analysis

The following sub-chapters show the results of the content analysis, which is done to reveal the current state of awareness and adaptation on heat adaptations among Dutch housing associations. The analysis is performed using annual reports, policy plans and the Performance Agreements of the housing associations in Rotterdam and uses keywords that reflect measures connecting to factors that affect overheating. HEF Wonen does not have any policy documents available, which brings the total amount of housing associations to 10. First, the results of the annual reports are described in Paragraph 3.1.1. After that, the results of the policy plans are shown in Paragraph 3.1.2 and lastly, the results from the Performance Agreements are shown in Paragraph 3.1.3.

3.1.1 Annual reports

A summarized overview of the appearance of notions in the annual reports per year of every housing association is shown in Table 5. Because not all annual reports from every housing association are available from 2021 and back, we will for now only look at the results of 2022, the reference year to measure the current status (Table 5). In 2022, seven out of ten housing associations in Rotterdam had one or more notions of heat stress or heat adaptation and can therefore be marked as 'adapted'. The number of notions found in the annual reports varied per housing association. In Figure 10, the number of direct and indirect notions per housing association in the annual reports is shown for the year 2022. It stands out that the three biggest housing associations have more notions in their annual reports compared to the other housing associations. Next to that, it is remarkable that the keywords ''green'' and ''climate adaptation'' or variations to these terms such as ''greenery'' and ''climate risk'' are most frequently found in the annual reports: ''greenery'' was found in 43 out of the 119 notions and ''climate adaptation'' in 38 of the 119 notions (Table 6). Examples of the notions found are:
''*On Heijplaat, an approach to greening and addressing the water storage problem has started. The two go well together when paving is replaced by greenery in gardens.*'' (Woonbron Jaarrekening, 2018).
''*We also started a pilot with a multifunctional roof. This roof includes water storage, planting and solar panels*.'' (Stichting Havensteder - Jaarstukken, 2022)
The results of all the annual reports of the housing associations in Rotterdam that are publicly available are listed in Appendix 2.

	Havensteder	Woonstad Rotterdam	Hef Wonen	Woonbron	SOR	Ressort Wonen	WVH	Maaswonen	Habion	SSH	Wooncompas
2011										0	0
2012										1	1
2013										0	0
2014										1	0
2015		0								1	0
2016	1	0								0	0
2017	1	0								0	0
2018	0	1		1	0	0				0	0
2019		1		1	0	0				1	0
2020	1	1		1	0	0					0
2021	1	1		1	1	0		0	0	1	1
2022	1	1		1	0	0	1	1	0	1	1

	Legend
	No annual report available
0	No notions on heat adaptation
1	Notions on heat adaptation found

Table 5: Results content analysis annual reports (Own table)

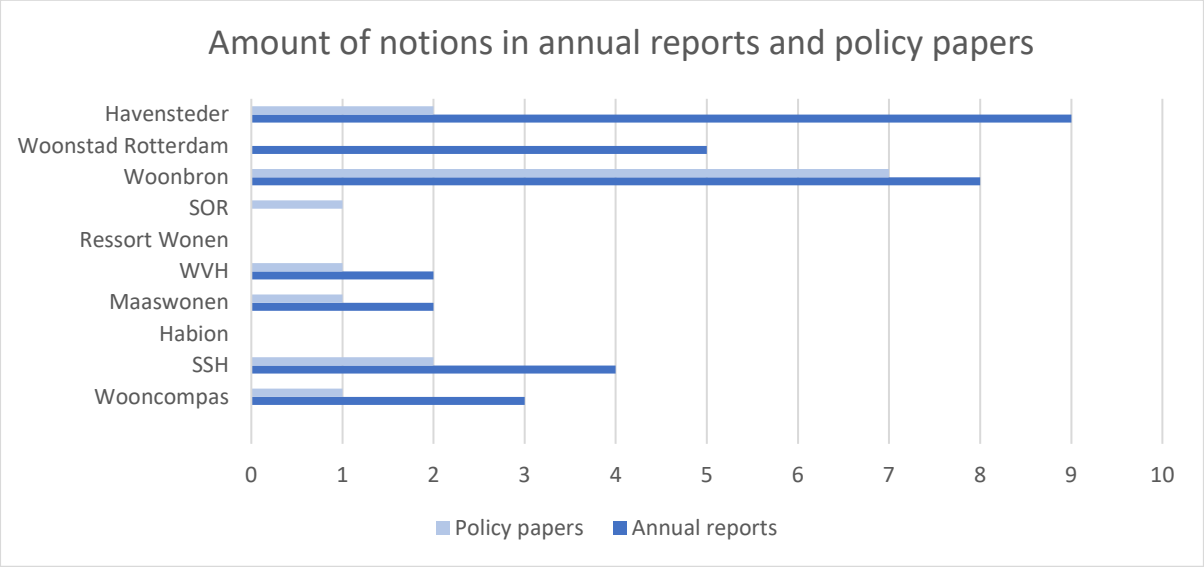

Figure 10: Amount of notions content analysis annual reports and policy papers (Own table)

Keyword	Word count
Green	43
Climate adaptation	38
Heat stress	15
Water	6
Plants	5
Total	119

Keyword	Word count
Heat Stress	7
Green	5
Climate adaptation	3
Trees	2
Cooling	1
Total	19

Table 6: Top word count per keyword, Left: Annual reports, Right: Policy plans (Own Table)

3.1.2 Policy plans

The results of the content analysis on the policy plans of the housing associations in Rotterdam show seven out of ten available housing associations have notions of heat stress or heat adaptation. For

the content analysis of the policy plans of the housing associations, only the direct notions are used. As explained in Chapter 2.1, policy plans are used to measure awareness and indirect notions do not reflect awareness. As shown in the policy plans of Woonbron (2021) *''Green and blue is about attractive green neighbourhoods with space for water. In doing so, we ensure a pleasant living environment where residents can live in balance with nature.''* The indirect notion of adding green and water is to provide an attractive surrounding and is, therefore, no indication of awareness of heat stress or heat adaptation. An example of a direct notion found in the policy plans of WHV (2021) *''This means we also have an eye for circular construction and renovation, for adapting homes and living environments to the changing climate (climate adaptation) and for the sustainable use of the home (tenant behaviour)*''. This direct notion does reflect an awareness of the housing association. It stands out that the keywords ''heat stress'' and ''Green'' are the most common keywords in the policy plans of the housing associations with respectively, 7 and 5 out of 19 notions. Table 7 shows the results for the housing association's policy plans in 2023 and Figure 7 shows the number of notions per housing association. In Appendix 3, a full overview of the notions is available.

	Havensteder	Woonstad Rotterdam	Hef Wonen	Woonbron	SOR	Ressort Wonen	WVH	Maaswonen	Habion	SSH	Wooncompas
2023	1	0		1	1	0	1	1	0	1	1

	Legend
	No policy plans available
0	No notions on heat adaptation
1	Notions on heat adaptation found

Table 7: Results content analysis policy plans (Own table)

3.1.3 Performance Agreements

The content analysis on the Performance Agreements is performed on the documents from the year 2017 until the plans for the coming years, 2024-2025. The analysis showed that only the Performance Agreements of 2024-2025 contain notions of climate adaptation to heat (Table 8). Since the reference year is 2023, this means that the Performance Agreements do not add to the awareness of the housing associations. Figure 11 shows that the Performance Agreements of 2024-2025 have 17 notions. The notions consist of four agreements dealing with climate adaptation in general and three agreements dealing specifically with heat mitigation. The three agreements specifically on heat (Prestatieafspraken woningcorporaties Rotterdam, n.d.) are:

''The municipality is working with partners from the physical and social domains on a heat approach with a special focus on elderly people living independently.''

''The municipality and the corporations are jointly exploring the feasibility of setting a hit standard based on specific data.''

''Corporations examine which residential buildings and meeting areas are most likely to overheat and identify at-risk complexes.''

For the years 2024-2025 and onwards, the Performance Agreements are now created with all housing associations in the city, rather than for each individual housing association. However, there is still a section detailing additional agreements specific to each housing association. Additionally, these agreements will also be based on the national performance standards.

2017	2018	2019	2020-2021	2022-2023	2024-2025
0	0	0	0	0	1

	Legend
0	No notions on heat adaptation
1	Notions on heat adaptation found

Table 8: Results content analysis Performance Agreements (Own table)

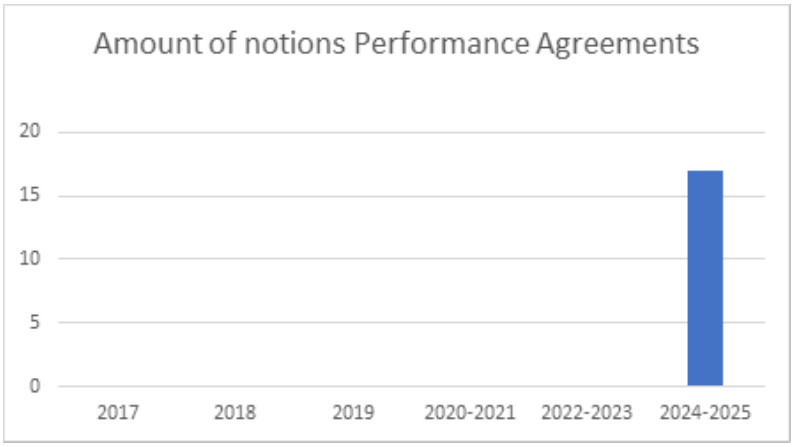

Figure 11: Amount of notions content analysis annual reports and policy papers (Own table)

3.2 Interviews

In the following section, the results of the interviews are described. The aim is to thoroughly examine the current condition of the housing associations, understand the reasons behind their status, and identify the barriers, opportunities and conflicting statements during the heat transformation process. After conducting and transcribing the interviews, they were searched manually to find topics that have a big influence or are a recurring theme. The first topic is the progress, which continues to build on the results from the content analysis in the previous section and after that, four other themes form the results of the interviews. These themes will later be used to structure the barriers needed to construct the transition image in Chapter 5.1 and the transition paths in Chapter 5.2. The results are sorted by themes and subdivided by barriers, opportunities and conflicting statements. The full results from the interview are listed per theme in Appendix 3. A list of participants and their abbreviations used in the tables can be found in the table below. Out of the 11 housing associations in Rotterdam that were approached to do the interview, four responded, which have a relatively large amount of assets. One of the four chose not to participate in the interviews because they have not established policies yet and are still determining their strategic position.

Participant	**Abbreviation**
Housing Association Policy Maker 1	HA PM1
Housing Association Policy Maker 2	HA PM2
Housing Association Policy Maker 3	HA PM3
Housing Association Tenant Relations	HA TR
Municipality/Rotterdams Weerwoord Programme Manager	Mun 1
Municipality Project Manager Climate Adaptation	Mun 2
Tenant Association	TA
Public Bank	PB

Table 8: Interview Participants and their abbreviations (Own table)

3.2.1 Progress

To get a more detailed picture of the current situation of the housing associations, the housing associations that participated in the interviews were asked about their perception of heat becoming a bigger problem if they have any policies to counter heat and what measures they are taking to counter the heat. As mentioned Housing Association 1 stated that they put a lot of effort into creating policies to be able to rate their dwellings on overheating risk. They did this by dividing them

into a traffic light system with green, orange and red houses based on the risk level of the dwelling and the risk level of the tenant that lives in the dwelling. The tenants of the red houses have the most risk of overheating in their dwellings. They are labelling their assets at the moment.

Housing Association 2 indicated they do not have any policy yet and also do not have a view on how big the problem is for their tenants. They do not have an idea of how many complaints there are or which dwellings are most vulnerable. They do state that they are busy trying to set up policies for urgent cases which need to be done preferably before the next summer.

Housing association 3 stated that they have an idea of what part of their dwellings and tenants are vulnerable. They indicate that their current struggle is the lack of benchmarks which will allow the housing association to calculate the exact amount of dwellings that are underperforming and the financial consequences of adapting.

Barriers:

- Housing associations indicate that they miss uniform benchmarks to estimate how much of their portfolio needs to be adjusted.

Opportunities:

- The housing associations indicate that their public character makes it easy to work together in the transition towards becoming heat resilient. The burden on resources, such as money and knowledge gathering, can be shared.
- Smaller housing associations can copy the knowledge and strategies from bigger housing associations.

3.2.2 Finance

The second and most discussed topic is finance. Participants discussed multiple barriers and opportunities. The conflicting statements are also stated below.

Barriers:

- All three housing associations and the tenant association indicate that the housing associations do not have enough resources to adapt their dwellings to make them heat resilient.
- The available subsidies to cover heat transformation costs have difficult requirements and do not align with the housing association's project planning.
- It is unclear where the money for the heat transition will/should come from.
- Housing associations are afraid that if they publish data on the status of their dwellings, financiers will not finance them anymore, because the value of the assets becomes lower.

Opportunities:

- The municipality has subsidies available for housing associations to cover heat transformation costs.
- The public bank stated that they do not have profit maximisation as a goal. That is why they have financial room for topics such as sustainability.

Conflicting:

- A difference in opinion on the subsidies is observed. As the two participants from the municipality and the tenant relations stakeholders indicate there are subsidies available to instigate heat-adapted construction, the housing associations indicate that the subsidies have difficult demands or that applying for grants is not aligned with project planning.
- Housing associations are afraid to share information about their assets for fear that public banks will stop investing, while banks indicate that they have extra budget for sustainability.

3.2.3 Knowledge

The next topic is knowledge. Participants described what methods they used and what information is available on surroundings, building and tenant risk.

Barriers:

- There is no convenient and consistent calculation method available.
- A lot of dwellings in the housing association's portfolio are old, so renovation to heat-resilient dwellings will be expensive.
- The tenant association states that the TO-Juli is not made to measure overheating but to measure how much energy is needed to keep the building warm during winter. The calculation methods are therefore not appropriate for measuring overheating.

Opportunities:

- Housing associations have knowledge of what makes a dwelling vulnerable to heat and what measures counter overheating best.
- Housing associations indicate that the TO-Juli calculation method is convenient to use because this method is already used in the energy transition.
- The municipality of Rotterdam has detailed maps on neighbourhood scale available which can be used to calculate the risk factor of the surrounding.

Conflicting:

- Housing associations see the TO-Juli calculation method as a convenient method to calculate overheating hours. However, the tenant associations question whether this method is sufficient, as it is designed to calculate heat demand.

3.2.4 Regulation

The next topic is regulation. The need for regulation and the existing regulation is discussed.

Barriers:

- The protected cityscape of a lot of buildings in Rotterdam often blocks renovation possibilities such as exterior sun shades.
- The EU Taxonomy rules are not specified enough to be able to measure the portfolios of housing associations.
- The only option for tenants to directly do something is to go to the Rent Tribunal. This takes a lot of time and is difficult to prove.
- There is no regulation ensuring homes are proactively measured against benchmarks.

Opportunities:

- Housing associations and financiers indicated that the Performance Agreements are a useful incentive that stimulates housing associations and municipalities to stick to their made agreements.

Conflicting:

- Even though the performance is seen as a big opportunity to encourage both the municipality and housing association to take action, the tenant relations stated that the Performance Agreements are not specified enough to actually instigate immediate action.

3.2.5 Tenants

Lastly, the participants shared information about the tenants.

Barriers:

- The housing associations and the municipality state that tenant behaviour is 50% of the problem. Adapting dwellings is not enough and if tenants do not adjust their behaviour the measures only will not resolve heat problems.

- The tenant association states that housing associations are too focused on tenant behaviour.
- Housing associations provide housing for a lot of vulnerable groups that do not have the financial resources to adjust themselves or that have health risks, such as the elderly.

Opportunities:

- If tenants are instigated to adapt their behaviour, this is an effective and low-cost solution. The knowledge of residents with different backgrounds, who have experience dealing with heat, can be used to deal with heat.
- The municipality and tenant relations stated the importance of involving tenants in the process, who can take care of their neighbours.

Conflicting:

- Tenant behaviour can be seen as a barrier and opportunity.

3.2.6 Summary

The content analysis examined annual reports, policy plans, and Performance Agreements of 10 Rotterdam housing associations to assess their awareness and adaptation to heat stress. The findings revealed that in 2022, 70% of the associations had notions that refer to awareness in their annual reports. The policy plans showed that 70% of housing associations had notions that refer to awareness in 2023. For 2023, the reference year, the Performance Agreements do not show any notions that refer to awareness but the latest Performance Agreements, 2024-2025, included specific agreements on climate adaptation and heat mitigation which leads to 100% of the housing associations being aware in 2024-2025.

The results of the interviews are presented in this section, aiming to thoroughly examine the current condition of housing associations, understand the reasons behind their status, and identify barriers, opportunities, and conflicting statements during the heat transformation process. Interviews were manually analyzed to identify influential and recurring themes. The primary themes identified include progress, finance, knowledge, regulation, and tenants.

Progress: Housing associations varied in their process of heat adaptation. One of these is actively developing policies and rating systems for overheating risk, while others lack policies and awareness of tenant vulnerabilities.

Finance: Financial barriers included insufficient resources, challenging subsidy requirements, and fears of reduced asset value. Opportunities involved municipal subsidies and the public bank's flexibility for sustainability projects, though there were conflicting views on the availability and practicality of subsidies.

Knowledge: Barriers included the absence of consistent calculation methods and the high costs of renovating old buildings. Opportunities were found in existing knowledge about vulnerable dwellings and available municipal neighbourhood-scale maps for risk assessment of the surroundings. There were conflicting opinions on the effectiveness of the TO-Juli calculation method.

Regulation: Barriers involved protected cityscapes limiting renovation options, insufficient EU Taxonomy specifications, and inadequate proactive measures. Opportunities included the motivating effect of Performance Agreements, though there were disagreements on their specificity and immediate impact.

Tenants: Barriers highlighted tenant behaviour as a significant issue and the fact that a lot of vulnerable groups are housed in the housing association’s dwellings. Opportunities included the potential for tenant behaviour adjustments to effectively mitigate heat issues. There were conflicting views on the focus on tenant behaviour versus structural adaptations.

4. Discussion Content Analysis and Interviews

This discussion chapter aims to interpret and contextualize the findings from the content analysis and interviews, addressing the first two sub-questions of this thesis: *What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?* and *What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?*

The content analysis revealed that for the reference year, 70% of the housing association's annual report showed adaptation and 70% of the housing association's policy papers and Performance Agreements show awareness. The results of the interviews identified barriers opportunities and conflicting statements which were structured in themes: progress, finance, knowledge, regulation, and tenants.

This chapter will aim to situate these findings in the broader landscape of the existing literature. This preliminary discussion is done because the outcomes of the discussions are used for the second part of the research: the management tools. The limitations and suggestions for further research will be discussed in Chapter 6 unless they are relevant to the next chapters. First, the results of the content are interpreted and second, the results from the interviews will be discussed.

4.1 Content Analysis

This discussion aims to interpret the findings from the content analysis of the annual reports, policy plans, and Performance Agreements of 10 housing associations in Rotterdam. By examining the current state of awareness and adaptation to heat stress, the research of Roders et al. (2012) and Boezeman and de Vries (2019) will be followed up. The outcomes will be used to frame part of the transition image, one of the management tools by Loorbach (2007).

A four-quadrant model (Figure 11, left) is used to reflect the current state of awareness and adaptation of the different housing associations in Rotterdam for 2023. As mentioned in the methodology in Chapter 2.2.1, for the content analysis, consciously reflecting knowledge of the problem of overheating in their policy documents means that a housing association is aware and findings of any form of adaptation in the policy documents will mean that a housing association is aware. It is important to keep the definitions of awareness and adaptation and the constraints of the use of these definitions in mind that are used during the content analysis. It makes housing associations easy to compare but it does bring the constraint of housing associations being deemed aware and adapted too quickly. A housing association is now counted as ''adapted'' even if there are only a few notions of measures in the annual reports.

It stands out that most housing associations are either aware and adapted or unaware and unadapted. One housing association is adapted but unaware. This might be caused by the fact that some measures are implemented with another goal, as greenery can be added with the goal of making the surroundings more attractive, in this case, you would only see indirect and unintended notions in the annual reports and no direct notions to heat stress and heat adaptation. Another option is that heat adaptation is a curing measure instead of a preventive measure the problem is solved after it occurs instead of before the problem occurs. This is most likely the case in this example because the notions in this specific annual report are a mix of direct and indirect notions and are all measures with the intention of countering heat stress.

Another housing association is deemed aware but not adapted. This can have multiple causes which are not conclusive from the documents. The reasons can be that the housing association does not have enough financial means to act or that the housing association is adapted, but failed to mention this in their annual reports.

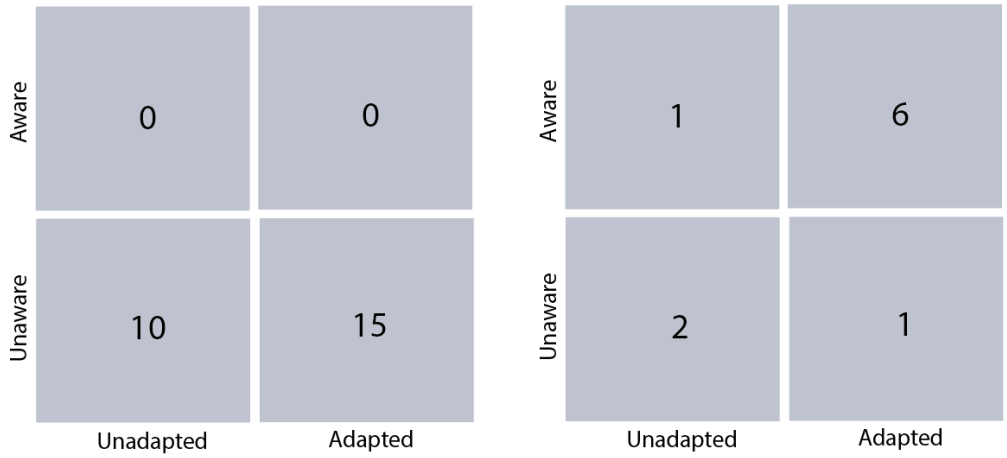

Figure 12: Quadrant model awareness and adaptation (Left: Roders et al., 2012. Right: own illustration)

The results show a rise in awareness of housing associations compared to the results of Roders et al. (2012), shown in Figure 12 on the left. Both studies by Roders et al (2012) and Boezeman and de Vries show not a single housing association is aware. This content analysis shows that 70% of housing associations are aware, which indicates a high increase in awareness among the housing associations which happened between 2017 and now. The study of Roders et al. does show that 60% of housing associations are adapted, which Roders et al. (2012) interpret as a sign of unintended adaptation or curing measures. This would mean that the adaptation now can be seen as an intended adaptation. With currently 70& of housing associations being adapted, we also see a slight increase in adaptation. Because Roders et al. (2012) and Boezeman and de Vries (2019) did the research over the whole of the Netherlands, it could technically be the case that the samples are not comparable and his sample coincidentally left out the aware housing associations. But assuming the sample of Roders et al. and the one of this research are both representative, knowing that this study took all the associations, and Rotterdam is a big city in the Netherlands with a lot of housing, we can assume that the increase of awareness is due to actual focus on the topic.

As shown in Figure 10, the amount of notions in the documents varies from zero notions in the annual report of SOR to nine in the annual report of Havensteder. It stands out that the three biggest housing associations of Rotterdam have more notions of adaptation compared to the other smaller housing associations. It could be a possibility that larger housing associations have more resources to spend on the transition. This would be an interesting topic to cover with the interviews in the second section of this chapter. For awareness, there is not a significant difference in the number of notions. The variation in amount of notions points out a limit to this study. Because of the quantitative nature of the study, the notions can only be used to deem whether a housing association is aware and adapted or not. This makes the study very black-and-white, while awareness and adaptation are very relative terms. Housing associations can differ from being not aware and adapted to fully aware and adapted and everything in between. A question emerges on how adapted the housing associations are. Is it true that a housing association is more aware/adapted if there are more notions found? This brings us to the interviews that zoom in on three housing associations.

4.2 Interviews

In the following paragraphs, the outcomes of the interviews are discussed. Opposing statements, problems, demands and topics that came forward frequently or were remarkable are listed. Trends and developments that occur that influence the stakeholders or the situation are also described. The discussion is structured into five themes: Progress, finance, knowledge, regulation and tenants. The

results will be compared with the outstanding results of the study of Boezeman and de Vries (2019) The outcomes of the discussion on progress and the barriers found will be used in Chapter 5 to compose the transition image. Additionally, the barriers, opportunities and conflicting statements will be used as a base to structure and set up the recommended transition paths.

4.2.1 Progress

In general, it became clear that the housing associations interviewed housing associations differed a lot in how far they were in the process of making policy to transform their portfolio to a heat-resilient one. Figure 13 shows an estimation of the position of the four biggest housing associations projected on the transition curve of Loorbach (2007). Housing Association 1 is seen as the frontrunner in Rotterdam. This is mentioned by the three other housing associations. The results in general show a lot of progress compared to the study of Boezeman and de Vries (2019), who also did in-depth interviews with stakeholders. The lack of awareness that was revealed by their content analysis is reasoned by their interviewees as being caused by a lack of necessity. Most housing associations have yet to experience extreme weather that makes them feel compelled to do something about the state of their assets. All participants of the interviews for this study expressed that they do see the need for asset adaptation, but found barriers that prevent them from adapting. First, their current position is described and in the following sections, reoccurring barriers will be discussed.

As Housing Association 1 is labelling their dwellings at the moment, deciding on which has the highest risk score and needs to be adapted. They are in the middle of the accelerating phase, They had their breakthrough moment and are ready to continue the rest of their transition.

Housing Association 2 is busy making policies currently and do not have a view on how big the problem is for their tenants, they do not track the complaints and have not calculated which dwellings are most vulnerable. They do have an idea of what dwellings will be vulnerable, using the general assumptions that elderly people have a higher risk and dwellings with either a lot or with no insulation have a high risk of overheating. The participant Tenant Relation who is from this housing association does have a better view of how big the problem is as he mentioned complaints, but this did not fully land at the policy side of the housing association. They are in a stage of gaining knowledge, right around the take-off stage. They know what types of dwellings are sensitive, and what tenants are sensitive and are on the edge of applying this knowledge to their portfolio. They are therefore in the phase of gaining knowledge. This outcome is remarkable since the results of the content analysis showed that this housing association can be seen as aware and adapted, with relatively high numbers of notions found in the policy documents.

Housing Association 3 is also making policy at this moment. They do have a very good view of what part of their dwellings and tenants are vulnerable. Their struggle is finding the right benchmarks to decide what exact TO-Juli makes dwellings in need of adaptation. This is a difficult task because calculation methods keep changing and there is a limited budget to do this transformation. They can be considered competent and are ready for the accelerating phase if they overcome the barrier of not having enough resources and consistent benchmarks.

The fourth and last housing association that did not participate in the interviews did indicated that they do not have any policy on heat and do not have any knowledge of how to approach the problem yet. This is because they only exist for a short time. They are aware of the problem and are ready to gain knowledge in the near future. This puts them at the beginning of the transition curve, in the predevelopment phase.

All in all it shows that housing associations are struggling with the stages of gaining knowledge and making policy. It seems that there is a trend of housing associations becoming more aware of the problems that heat can cause, especially in very old housing with high solar gain and in new dwellings with a lot of insulation. The content analysis showed a trend of the largest housing associations being more aware and adapted compared to the smaller housing associations. Given

the fact that the housing associations that have a relatively large portfolio were interviewed and some of them are already struggling with making resources available to start this transformation, it could be the case that the smaller housing associations around the same stage or are less far in the transition. There is an opportunity for the smaller housing associations to use the knowledge of the larger housing associations. The larger housing associations indicate that because of the public character, all associations and other public stakeholders are happy to share knowledge and strategies. This would solve the problem of having less resources to use for the transformation.

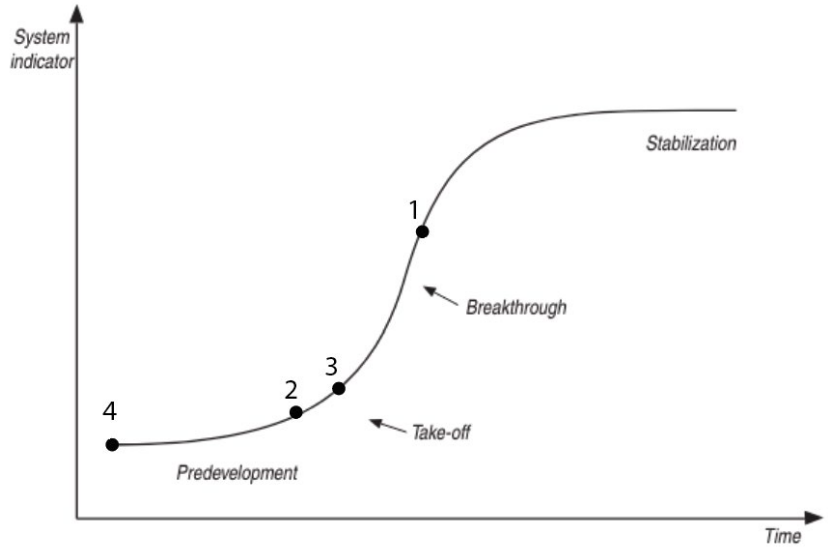

Figure 13: Transition curve with the position of 4 housing associations (Loorbach 2007 with own adjustments)

4.2.2 Finance

All participants of the interviews implied directly or indirectly that the housing associations do not have enough financial resources to transform their portfolio to become heat-adapted fully. A problem that occurs in this transformation, in contrast to transitions such as the energy transformation, is that the investments cannot be earned back in a financial way by the housing associations. The recoveries are in the form of healthy and happy tenants. This is in line with the results of Boezeman and de Vries' (2019) interviews, which state that the costs cannot be passed on in the rent and therefore cannot be funded. As mentioned in Chapter 1.2, tenants living in social housing are vulnerable to heat due to a higher percentage of elderly people, low incomes a potential language barrier. The only financial returns might be the decrease in health care costs, but this leads to a split incentive, where the benefits do not accrue to the person who paid for it (Jaffe & Stavins, 1994). The participants of the interviews of Boezeman and de Vries (2019) had the same findings as housing associations stated adaptation measures are not feasible. They stated that the adaptations cannot be reflected in the rent. Next to that, the lack of regulation on the topic makes housing associations prioritize topics that are regulated, such as the energy transition. A solution mentioned in the interviews to this problem is subsidies. Both participants from the municipality and the housing associations indicate that the municipality has different subsidies available to instigate the transformation to heat. Despite this effort, the housing association's policymaker 3 explained that the subsidies are not being taken into consideration when planning new projects or renovations because those subsidies are often paid out after completion if the subsidy is still available. When planning a project, you cannot assume that the subsidies will still be available at the time of delivery, which is why subsidies are not included in the project budget. This means that subsidies do not encourage extra heat resilient project making, but only reward projects that coincidentally align with the subsidy granting. The question arises if there is a possibility of collaborating with the municipality in a way that both the municipality and housing association are guaranteed that the

money on the one hand can be taken into account whilst budgeting and on the other hand be well spent to a projects that suits the goal of a project.

Looking at the financers' side, housing associations are financed mainly by public banks. The interviews with both of them brought interesting perspectives. Housing associations are reluctant to share information about the state of their dwellings and agree to a ''climate adaptation'' label just like we already have energy labels because they are afraid that banks will not invest in their housing associations anymore if the state of their dwellings turns out to be not good. In opposition to that, the representative of the bank stated that, as their main goal is to support public functions and their goal is not to make a profit, it will never be the case that they would not finance a housing association because of this reason. Precisely for the reasons just mentioned, there is room for public banks to invest in other goals such as sustainability. Both experiences are very far apart whilst it is quite an important and potentially deal-breaking or stimulating factor.

4.2.3 Knowledge (vulnerable surroundings, dwelling and tenant)

The very general conclusion from the interviews is that there is not enough convenient and consistent information and knowledge available yet. All the policymakers from the housing associations indicate that the TO-Juli calculation method has a big advantage in that these calculations are already available for all the dwellings. This is because the calculations have already been done for the energy transition. It is important to keep these advantages in mind, to cope with the limited available resources that can be spent on heat adaptation mentioned by all the interviewees and the experts in Chapter 1.5. A difficulty of the calculation method is that it is still in development. The Tenant Association mentions that the calculations are used in the energy transition which focuses most on keeping the heat inside in winter. The focus in the calculations should go to keeping the cool inside. Housing association's policymakers 1 and 3 pointed out that the TO-Juli method gets adjusted a lot which results in fluctuating outcomes. This indicates that the method is not developed enough to provide consistent outcomes. Since the TO-Juli is a popular calculation method, the question arises of how the TO-Juli can become more developed and constant. Next to that, the housing associations indicate that a big part of their portfolio is old and built in the city. Both of these characteristics make their dwellings vulnerable to heat. The possibility of houses to ventilate properly is very dependent on if you can open windows on opposite sides of the dwellings. If this is not the case, the dwelling is more vulnerable to heat. The Tenant Association mentioned that this is most often the case in student housing and care housing. This is an important addition to the literature studied in Chapter 1.6 on the technical aspects where it was indicated that natural ventilation will still be good enough for the current weather (Baba et al., 2015) (Hooff et al., 2015). It seems to be the case that housing types that are common in social renting, in care and student rooms consisting of a single room have not yet been included in this study

The TO-Juli only calculates the risk of the building itself, but next to that the Dutch Green Building Council emphasises the importance of the surroundings being taken into account when measuring the risk of overheating (*Framework Climate Adaptive Buildings - Dutch Green Building Council*, n.d.-b). The Tenant Association agrees that surroundings need to be taken into account. The Project Manager Climate Adaptation from the municipality expressed that there are a lot of detailed maps available for the risk calculation of the surroundings in Rotterdam, but none of the housing associations implied that they are using the risk of the surroundings to calculate the overheating risk for their tenants.

The last important risk that is mentioned is the tenant's risk. As Housing Association 2 expresses tenant risk is difficult to measure because heat can be a subjective topic, all participants agree that the elderly are the only target group of which we know for sure that overheating has a big impact on their health. The Tenant Associations mentions that most of the complaints are by students and people living in care. It becomes clear from the interviews that The shorter the communication line between the housing association and residents, the better employees understand which residents are most vulnerable. This stresses the importance of this highlights the

importance of short lines of communication from policymakers to residents while designing strategies on how to deal with heat.

4.2.4 Regulation

As mentioned in Chapter 1, there are no national laws regarding heat for the existing building stock. This, and the fact that the heat transformation does not bring a financial return on investment, is the reason that two of the housing association's policymakers stated that they do not prioritise heat as a problem. The new EU Taxonomy seems to be a good start to incentivise, among other, heat adaptation, but the interview with the public banker revealed that these new laws are so general that no harsh consequences can be implemented for not being heat adapted. There are simply not specific enough rules by which the houses can be measured. This is different than expected after the conversation with one of the experts in the field in Chapter 1.5 who thought the Taxonomy would be of importance. Another way of instigating action is the Performance Agreements in which both the municipality and the housing associations agree to work together to accomplish the common goal of providing healthy living for their tenants/inhabitants of the city. The housing associations recognizing the fact that climate adaptation is an effort which requires both the municipality and the housing associations to work together can be seen as progress. This is because, in the study of Boezeman and de Vries (2019) in 2017, the housing associations emphasised that climate adaptation is something that should take place in public spaces and is, therefore, the responsibility of the municipality. While the current Performance Agreements of Rotterdam contain agreements on heat (Appendix 4), the agreements leave a lot of space for interpretation and do not contain adaptation commitments.

This brings us to the next remarkable topic of the interviews, two out of three housing associations would like to have national benchmarks for overheating. As a housing association, it is often not very beneficial to take the lead. Housing associations have contradicting interests as both tenants and finance face each other. As Loorbach (2007) discussed in his research on societal levels, the top levels influence the levels below, so this makes it easier to make a difference if the government or other macro-level institutions shape the landscape. National benchmarks for when dwellings are not sufficient are a fair method when all housing associations and other real estate providers should comply with these rules.

Next to that two out of three housing associations and the manager of climate adaptation from the municipality mention 'Beschermd Stadsgezicht' as a very concerning problem. Even when the housing associations find the resources to make policy and start the transformation, ''Beschermd Stadsgezicht'' will withhold the most effective measure, external sunshades. This is because the external sunshades bring change to the facades of the buildings that ''Beschermd Stadsgezicht'' tries to protect.

4.2.5 Tenants

All the participants who directly or indirectly are in contact with tenants have mentioned that tenant behavior has a big influence on overheating in dwellings. This can be seen as both a risk and an opportunity. Firstly, both municipality participants mention that even without technical measures, tenant behaviour in the form of using natural ventilation and exterior sun shades in the right way, the temperature inside the dwelling can differ by 7° C in comparison with not using ventilation and sun shades in the right way. This means that informing tenants can be an inexpensive and very effective way of increasing the possibility of the dwelling becoming overheated. This simultaneously brings the risk that even when you do adapt and install exterior sun shades, you are dependent on the tenants that live in the dwelling to use them correctly, in combination with ventilation, otherwise, the installation is an expensive and inefficient measure.

Secondly, the characteristics of people living in social housing bring opportunities for countering heat. Some of the participants from the municipality and the housing associations see the multi-cultural tenants as an opportunity to gain knowledge on how different cultures, some

having experience with even warmer weather conditions, counter the heat. It also brings a risk of tenants not speaking Dutch, and not being able to understand instructions about how to deal with overheating.

As mentioned before, the Tenant Association does recognise that tenant behaviour helps in some cases, but it is seen as a cost-efficient and easy solution for housing associations to blame tenants. For the worst cases, which should be fixed soon, tenant behaviour does not solve the heat problems. Next to that, the Tenant Association states is unfair to expect tenants who live in social housing to buy an air conditioner or sun shades. He refers to the duty of housing associations to provide healthy and safe dwellings for their tenants

4.3 Summary

This discussion interprets the findings from the content analysis and the interviews. The discussion analyses the results from the content analysis of the annual reports, policy plans, and Performance Agreements of 10 housing associations in Rotterdam, focusing on their awareness and adaptation to heat stress. Building on the research by Roders et al. (2012) and Boezeman and de Vries (2019), a four-quadrant model is used to reflect the housing association's status in 2023. Most associations are either aware and adapted or unaware and unadapted. The cause of housing associations being adapted but not aware can be caused by indirect measures and the cause of housing associations being aware but not adapted can be caused by the fact that adaptation would be the next step or adaptation is not documented in the annual reports. The study shows a rise in awareness and adaptation compared to Roders et al. (2012), suggesting an increased focus on the issue. The definitions of awareness and adaptation used in the study help compare housing associations but may overestimate their position in the transition. Larger housing associations seem to have more adaptation measures, likely due to greater resources, highlighting an area for further investigation through interviews. The quantitative nature of the study limits its depth, raising questions about the true extent of adaptation and awareness among housing associations.

All in all the interviews show that housing associations are struggling with the stages of gaining knowledge and making policy the most. Given the fact that four relatively large housing associations in Rotterdam were interviewed and some of them are already struggling with making resources available to start this transformation, we may assume that the smaller housing associations are at the same stage or less far in the process. This means that if help is provided for these four housing associations, the others can follow in their footsteps and make use of the fact that these public organisations are happy to share their knowledge to start their transformation to become more heat-adapted. In addition, co-opting solutions with the energy transition could contribute to the feasibility of the heat transition.

On the theme of knowledge, the TO-Juli would be a convenient calculation method if it could be adapted to calculate overheating in housing more accurately. Next to that, dwelling types that are common in social housing, such as one-room apartments that only have one exterior wall are not represented in studies that calculate overheating in dwelling types. This means that not all information on the technical aspects of dwellings in social housing is available.

The financial aspect brings some insecurities. Because of regulations on different topics, the heat transition is not a priority and it is difficult to make funds available. Subsidies from the municipality do not align with the planning schedules of housing associations, which means that they cannot be taken into account while planning new projects. This means that subsidies do not have the preferred effect: instigating extra climate adaptive projects. Next to that, there seems to be a difference in opinion between housing associations and public banks about their willingness to fund housing associations that are scoring badly on heat adaptation.

For now, the EU taxonomy does not have an influence, because of the lack of detailing in the law that the investments should be tested against. The Performance Agreements that the housing associations make together with the municipality do have a big influence. The fact that both institutions agreed to be willing to work together accelerated the process.

Housing associations see tenant behaviour as a big threat and an opportunity, but it is important to acknowledge that tenant behaviour cannot solve the worst cases. If tenants follow specific guidelines to cool their dwellings, that can make a difference of 7 °C. The culturally diverse knowledge that the tenants have can be used to find short-term solutions during heat waves.

5. Synthesis and Results Transition Management Tools

The previous chapters have attempted to shed light on the current situation of Dutch housing associations, the barriers, opportunities and trends that occur during the heat transition and how different stakeholders interact. The studies contribute to the next part of the thesis: synthesising these results with Loorbach's (2007) transition management tools that can help manage a transition at the meso-level, which is the societal level of housing associations. The management tools consist of the transition image and transition paths. The transition image can be seen as the goal of the transition and transition and the transition paths give information on how these goals will be achieved. First, this chapter describes what parts of the transition image are clear, and what parts still need work. Additionally, the information from the interviews and literature is used to compose transition paths. The transition pathways should be considered as advice on how to deal with the barriers that are found in this research. This advice is addressed to all stakeholders that have a role in the transition of creating heat-adapted social housing in the Netherlands. Lastly, an extra feedback loop is added by presenting the transition management tool at the Groene Huisvesters. The audience, which consists of different stakeholders who want to learn more about the heat transition, will get the opportunity to react to the outcomes of the transition management tools.

5.1 Transition Image

The following paragraphs attempt to create the transition image with the results from the previous parts of the thesis. The components that are needed to compile a transition image (Loorbach, 2007) are a description of the current state, the sense of urgency to act and set the ambition level. The description of the current state will be composed of the results from the content analysis and the information from the interviews in Chapter 5.1.1. The sense of urgency to act, in Chapter 5.1.2, is described by Loorbach as the barriers, trends and developments within the society on the topic, and will be described with the results from the interviews and the information from the literature. Lastly, in Chapter 5.1.3, the ambition level is described. This part is also done using the interviews and information from the literature.

5.1.1 Description of the Current State

To find a description of the current state of the Dutch housing associations the results of the content analysis, Chapters 4.1 and 5.1, are used. These results provide insights into the status ‘‘on paper’’ because the policy documents were searched to find signs of awareness and adaptation. 70% of the housing associations can be deemed aware and 70% of the housing associations have some form of adaptation for the year 2023. For the coming years, 2024 and 2025, the Performance Agreements ensure all the housing associations are deemed aware.

Interviews with three of the housing associations with a relatively large amount of assets in Rotterdam specified the position of these housing associations (Figure 13). Even though the frontrunner has passed the breakthrough point, the other two remain around the take-off stage. Next, it can be assumed that the smaller housing associations, have fewer resources available to focus on overheating in their dwellings. This is why they are likely to be in the predevelopment phase as well.

All in all, to describe the current state that the Dutch housing associations are in on the road towards becoming adapted to heat, for the year 2024 all housing associations are aware of the problem of overheating in social housing and they recognise that action should be taken while only 70% of the housing associations have any form of adaptation. Looking at the transition curve (Loorbach, 2007) it can be assumed that most housing associations are in the predevelopment phase.

5.1.2 The sense of urgency to act

Loorbach (2007) describes the second element of composing a transition image, the sense of urgency to act, as ''barriers for change and trends and other developments that influence the development and room for change. It is also important to think through in an integrated and consistent manner which way these external trends and current barriers influence each other''. To find the sense of urgency to act, we will therefore be looking at barriers amongst the different stakeholders, the trends and developments that might instigate transition and the influence that those barriers, trends and developments have on each other. The barriers are discussed in Chapters 3.2 and 4.2 therefore, this chapter will only briefly name the barriers and rends before discussing notable trends and developments and how the three influence each other.

On the topic of progress, we see a trend of housing associations becoming more aware of the problems that heat can cause when the research of Roders et al. (2012) is compared to the findings of the content Analysis in this thesis. This might be caused by the trend of climate change becoming more important. As the main goal of that is to prevent the climate from worsening, more knowledge is gained on how the weather will become warmer and thus heat is going to be a bigger problem.

The most conspicuous barrier that followed from the interviews is the lack of financial resources that are needed to facilitate the heat transition. The priority now goes to the energy transition, because dwellings must be unplugged from natural gas and in 2030 it is not allowed to rent out dwellings with energy labels E, F and G anymore (Vanaf 2030 Geen Huurwoningen Meer met E-, F-of G-label | NUL20, 2022). Currently, there are no rules yet for existing dwellings to counter heat. For this reason, there is a trend going on of only focussing on keeping the heat inside of the winter, which results in insulating buildings while renovating. The consequence is that heat will also be trapped inside the dwellings during summer. The TO-Juli, which is seen by the housing associations as a convenient calculation method to calculate the overheating risk of dwellings, is also made with the energy transition in mind, therefore the calculation method is not fully designed for measuring overheating risk.

The lack of financial resources also influences the knowledge of the housing associations on the topic of overheating of dwellings. Gaining knowledge also costs resources in the form of manpower and thus finance. Fortunately, because of the urgency, we see more and more initiatives emerging that increase knowledge. For example, the Dutch Green Building Council is in the process of composing publicly available calculation methods to calculate the overheating risk of buildings and surroundings (*Framework Climate Adaptive Buildings - Dutch Green Building Council*, n.d.-b) and the municipality of Rotterdam puts a lot of effort in providing detailed information about the characteristics of the public space that influence the Urban Heat Island Effect (*Rotterdams Weerwoord*, 2024). These kinds of developments help housing associations to overcome barriers of knowledge and finance.

In terms of regulation, the trend of increasing interest in sustainability and the climate has prompted multiple regulating bodies to set up laws. The development of the EU Taxonomy provides guidelines to which companies must adhere which could result in more sustainable investments. On the municipality level, the Performance Agreements are also a development that tends to provide regulation on heat in social housing. Both regulations, however, are not specific enough to achieve the level of ambition, nor are they strictly enforced. In the case of the Performance Agreements, the municipality does offer something in return that does encourage compliance. A final influential barrier to regulation is local laws that deal with protected cityscape. With this law, the interests of citizens are opposed to historical interests.

It stands out that on paper, a lot of housing associations and other organizations know what the problems are and how to deal with the situation potentially. However, there are a lot of barriers standing in the way of reaching the goal of having a portfolio adapted to heat. Common barriers are

lack of financial resources, knowledge, priority and regulation. With the vulnerable group of elderly tenants increasing as a consequence of the ageing population, it is unpreferable to keep lingering in this theoretical knowledge. Tenants and their behaviour can be seen both as high-impact barriers, as well as opportunities to accelerate the process.

5.1.3 The Ambition level

The third and last element of composing a transition image is setting the ambition level (Loorbach, 2007), where the desired future state of the system is described. An example of determining the level of ambition could involve aiming for 30% of renewable resources in the overall energy supply by 2030 as part of the energy transition (van Herwijnen, 2003). Currently, there is no concrete ambition level set, and this is one of the bottlenecks that keeps the transition to heat adaptation from accelerating. As multiple housing associations described in the interviews, it would be preferable that the ambition level is set nationally and consistently for the whole real estate market, just like the energy transition ambition level. This makes it more clear and fair for the different housing associations to invest in the transition. There is an ambition level for the newly built houses: new dwellings should not have a TO-Juli higher than 4.8 with a maximum average temperature exceeding 450 hours (E-Difference, 2023b). With the addition of a target year, this is a good example of what the ambition level for existing housing could look like.

There are multiple reasons that there is not yet a defined ambition level. Generally speaking, all stakeholders point towards each other when asked who would be responsible for defining the ambition level. One of the housing association's policymakers explained that the government just does not have enough detailed knowledge of overheating in existing dwellings. Without the specific knowledge, it would be inappropriate to set targets. The government in their turn, look at the housing associations that have more knowledge about the problems to set ambition levels. This is not an optimal situation, since the housing associations have conflicting interests in this situation. On one hand, they are obligated to provide liveable housing for their tenants; on the other hand, setting strict boundaries that could harm their financial situation would be counterproductive. It would be beneficial if an intermediary, such as Aedes or the municipality, could collaborate with both the housing associations and the national government. This collaboration could ensure that practical knowledge from housing associations reaches the government, aiding in setting appropriate ambition levels and this could help the government to provide manageable targets for the housing associations.

5.2 Transition Paths

As we have generated a transition image in the previous, this chapter tries to set up the transition pathways. The different elements needed to set up a transition pathway (Loorbach, 2007) are:

A. Description of changes to achieve the target
B. Indication of which change should take place when
C. Ideas on how these changes should take place and with whom
D. Short-term and mid-term goals

The outcomes of the interviews, together with the literature will provide the information needed to set up the transition paths. Of course, there are different routes to reach a certain goal, therefore the described pathways in this sub-chapter should be seen as advice. The transition paths are organized by the four interview themes: finance, knowledge, regulation and tenants. Per theme, the elements are indicated with the aligning letters A, B, C and D.

5.2.1 Finance

From the interview, there seems to be a difference in opinion about the financing by public financiers. Where the housing associations seem to be held back by the option that banks will not finance them anymore when the risk calculations of their portfolio are insufficient, the public bank mentioned that because of their public status, they have more finance available for sustainable projects. A) Public banks and housing associations should have a dialogue with the housing about

their intentions and what the risk calculation of the portfolio would mean for public banks as housing associations are afraid public banks will not invest if dwellings lose value C) Potentially, the municipality can mediate since they indicated in the interviews that they can operate as a bridge between the social housing sector and the financial sector. B) This change is not as urgent as some other obstacles, but the outcomes of the dialogue are important for strategy-making and project planning since they are dependent on the financing of banks. D) The short-term goal would be to plan a conversation with Aedes, the municipality and a financier. The mid-term goal would be to align perspectives during the conversation.

The next financial point of advice for the municipality is the subsidies. As for this moment, the subsidies do not at all align with the planning phases of their project, the subsidies do not instigate extra heat climate adaptive projects, they only reward projects that would have been executed without the subsidies. It would increase the accelerating factor of the transition to heat when the subsidies can be distributed in such a manner that it would instigate climate-adaptive building. A & C) This can be achieved by promoting collaboration between municipal policymakers responsible for subsidy regulations and housing associations. In this way, the municipality can learn from the housing associations how subsidies can contribute to increasing climate adaptive projects within the social rental. Next to that, the municipality can also ensure that the money for the subsidies goes where it was designated to go. B) This change should happen as quickly as possible because it will instantly increase heat-resilient project planning, but it is expected to be a time-consuming process. D) In the short term a meeting needs to be planned with housing associations and the municipality and the mid-term goal would be to plan a timeframe in which this would be made possible.

Lastly, it is difficult for housing associations which provide social housing to keep a budget for topics that are not forced from ''above''. As housing organizations might have tunnel vision on the forced priorities, they might lose sight of co-opting opportunities. A) Housing associations should make policy on co-opting opportunities with the energy transition to ensure high insulation is combined with ventilation options to prevent overheating risk and facilitate keeping low temperatures in the dwellings. B) This is an urgent matter because energy renovations are happening a lot and there is a need to avoid losing money on already transitioned dwellings. C) consultation must take place between the policymakers of the energy transition and the policymakers of the heat transition. overheating must become part of the energy transition. B) Short-term goals should be aligning strategies from both transitions and mid-term goals would be adjusting the project planning.

5.2.2 Knowledge

To overcome the barrier of lack of knowledge it is advised to make use of the knowledge of all the stakeholders that are willing to share their information. This also makes the financial part as efficient as possible, because by sharing knowledge, the financial burdens can be distributed across different stakeholders. A & C) Firstly, all the housing associations declared that they are happy to share their knowledge, so by using the knowledge of the frontrunner in the heat transformation all the housing associations already have benchmarks and a rating system available. The traffic light system that the frontrunner uses rates dwellings as green, orange or red based on a risk calculation, the TO-Juli, and the risk of the tenant can have an aggravating effect. This is a very effective way of keeping track of the ''red'' dwellings that cannot wait to be renovated and also keeping an eye on the progression of the ''orange'' dwellings. B & D) This information is currently available and ready to use. Therefore the advice would be to instantly start using this information.

A & C) Secondly, It would be needed to make use of the information that the other stakeholders have to offer. As mentioned before, the Dutch Green Building Council is working on providing publicly available calculation methods to calculate the overheating risk of dwellings by multiplying the risk of the surroundings by the risk of the dwelling itself. Next to that, local municipalities sometimes offer detailed information on risk factors of the surroundings, which can make the calculations even more specified. In the case of Rotterdam, Rotterdams Weerwoord has

neighbourhood-level maps available. A) Advice for other municipalities would be to invest in providing maps such as the municipality of Rotterdam does because it adds a lot of value to housing associations. This information, together with the calculation methods of the Dutch Green Building Council and the addition of the tenant risk that the frontrunner did, a complete risk profile of all properties in the portfolios of the housing association can be made, as shown in Figure 14. With this information, and the benchmark of 4.8 TO-Juli, the housing associations should be able to divide their portfolio into green, orange and red dwellings. B & D) This information is also currently available and ready to use. Therefore the advice would be to instantly start using this information.

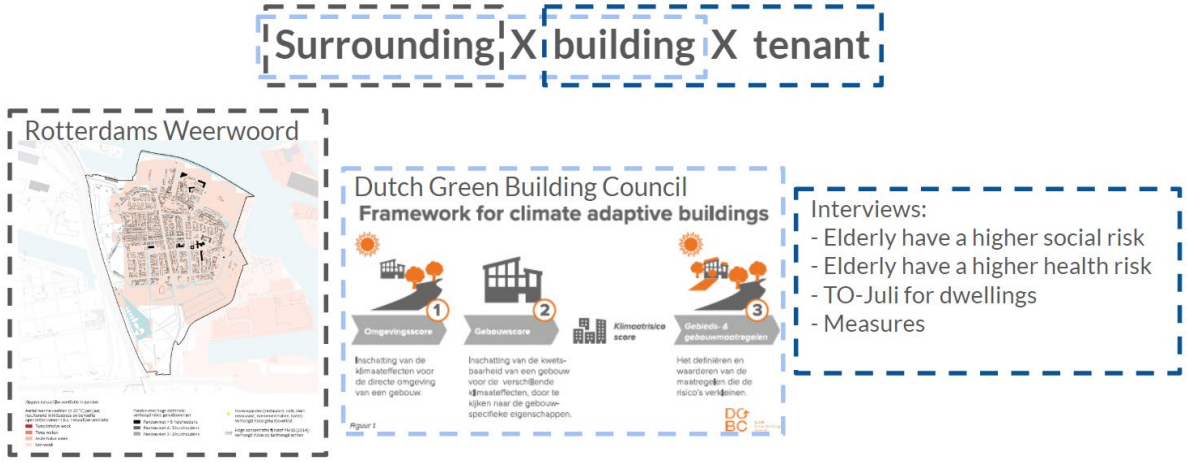

Figure 14: Calculation method overheating risk (Own illustration)

5.2.3 Regulation

The collaboration of the municipality and the housing association in the form of Performance Agreements provides a good starting point to instigate action for all housing associations, not only the bigger ones. The National Performance Agreements do not include heat stress. A & C) As heat is having an impact on the health of the tenants, the government should add heat to the National Performance Agreements and include a benchmark on the vulnerability of dwellings. This also instigates municipalities to add the topic to their local Performance Agreements. B & D) This change should happen now and the National Performance Agreements of 2024-2025 need to be revised.

The Performance Agreements of Rotterdam do contain heat as one of the topics and are written with a focus on testing potential benchmarks and calculating the potential risky assets in the portfolio. Even though this is a good start, there should be more focus on setting goals and deadlines, having those benchmarks ready, and adapting those vulnerable dwellings. A) A solution would be to set deadlines on when agreements should be finished. Next to that, the focus of the Performance Agreements is on the long-term policy and less on the short- or mid-term goals. B & C) The municipality should come together with the housing associations before the end of the year to set those deadlines, otherwise, change might not happen in the coming two years. D) Short-term goals would be to set up a meeting with the housing associations and the municipality to discuss making Performance Agreements have concrete goals with deadlines and benchmarks. The mid-term goal would be to ensure the agreements will be followed.

A & C) Lastly, Aedes must step up and provide help when the National Government is not ready to provide regulation yet. Aedes should set an advisory benchmark that can be used by housing associations to estimate the amount of dwellings in their portfolio that need adaptation. The frontrunners have information on what a target benchmark should look like. B & D) The short-term goal would be to organize a meeting with the frontrunners of the Dutch housing associations and decide on what would be a sufficient benchmark. Mid-term goals would be to incorporate this information in heat sessions and policies for housing associations to use.

5.2.4 Tenants

In terms of tenants, several things need to be adjusted to ensure a successful transition path. A & C) Firstly, it is of great importance that all the housing accusations set up a method by which all complaints about heat can be systematically tracked. This is not done at this moment and this is important to get an estimation of where the problem areas are in the portfolio, most certainly because the knowledge of the vulnerability of the assets is in most cases, not yet determined. C) This is a change with very high urgency and needs to be done as soon as possible so the complaints that come in during the summer of 2024 will be tracked. This is to estimate the size of the problem within the portfolio of the housing association. It is a way of tracking the worst assets without the need to calculate the whole portfolio. D) The short-term goal would be to find a way to label or track heat-related complaints and the mid-term goal would be to set up a good complaints procedure which brings us to the next point.

Next to that, it is important how complaints that residents have are dealt with. A clear complaint policy should be established where residents should feel they are taken seriously. A) This is done by employing people who understand the problem, responding quickly to complaints, and also initiating follow-up after complaints to ensure that problems are resolved. C) Housing associations need to be proactive. Being proactive is a must while dealing with heat in social housing to ensure tenants feel taken seriously. A) Having a cool space available in the neighbourhood where people can escape the heat and making use of all the knowledge that the different cultures that are represented in social housing can prevent part of overheating. Extra attention in complexes where vulnerable tenants are living, like having a tenant property manager who can keep an eye on the other tenants can prevent the most vulnerable sub-groups, such as the elderly with a small social circle. B & D) All the mentioned changes are very urgent and need to be fixed preferably before or during the summer of 2024. The short-term goals would be to assign cool spaces and tenant property managers. Mid-term goals would be to structure a good complaints procedure and hire experts to deal with the heat problems.

5.3 Presentation

The final step of this research involved presenting the synthesized transition management tools at the Groene Huisvesters. This presentation aimed not to introduce new data, but to verify the thesis results, thereby enhancing the study's reliability. During a "heat session" organized by Groene Huisvesters, the thesis findings were shared, followed by feedback from the attending participants.

The presentation consisted of a short overview of the findings from the problem statement, the content analysis and the interviews before moving on to the transition management tools. These were organized per theme: knowledge, finance, regulation and tenant and contained information about the goals, stakeholders involved and advice on how and when these goals should be achieved. The full presentation can be found in Appendix 5 and 30 participants of the heat session had the opportunity to react to the findings.

The feedback received was largely positive. Four participants noted that the presentation and findings were very interesting. Additionally, one participant highlighted that the financial situation for housing associations is becoming increasingly tight, predicting that most will reach their financial limits within the next decade, this comment was supported by another participant. Another comment suggested that part of the responsibility for addressing heat in dwellings should lie with architects, given the significant impact of housing design on indoor temperatures. This view was also supported by another participant. Full comments are available in Appendix 7.

5.4 Summary

This chapter synthesizes findings with Loorbach's (2007) transition management tools, focusing on Dutch housing association's heat transition. The tools, including the transition image and transition paths, guide managing the transition by defining goals and methods.

The transition image is developed using results from previous sections, following Loorbach's framework: the current state, sense of urgency, and ambition level. The current state assessment reveals that 70% of Dutch housing associations are aware of and have some adaptation measures for heat by 2023. By 2024-2025, all associations are expected to be aware of Performance Agreements. Interviews show varied progress, with some frontrunners and others still in the early stages, especially smaller associations.

The sense of urgency considers barriers and trends. Key barriers include financial constraints, prioritization of the energy transition, and insufficient regulation for existing dwellings. Trends include increased awareness due to climate change and initiatives to boost knowledge and resources. Despite understanding the issues, practical barriers impede progress, and the ageing population adds urgency to address these problems.

Setting the ambition level involves defining a desired future state. Unlike the energy transition, there is no national ambition level for heat adaptation which is a crucial element to provide a transition image. Collaboration with intermediaries such as Aedes or municipalities could help establish these ambition levels, given the government's limited detailed knowledge.

Transition pathways outline necessary changes, specifying when and how they should occur and involving various stakeholders. Finance is a significant challenge, with differing views between housing associations and public financiers. Collaboration between associations, municipalities, and financiers can align strategies. Improved subsidy alignment with project phases can accelerate climate-adaptive building, and integrating energy and heat transition plans can avoid financial inefficiencies.

Knowledge sharing among stakeholders can mitigate financial burdens. Housing associations can adopt benchmarking systems to prioritize renovations and use tools from the Dutch Green Building Council and local municipalities for comprehensive risk profiles. Immediate use of available data and resources is recommended.

Regulation through Performance Agreements between municipalities and housing associations should set concrete goals, deadlines, and benchmarks. The current long-term policy focus needs adjustment to include short- and mid-term goals. Regular meetings to update and enforce these agreements can ensure compliance and progress. Additionally, Aedes should provide a advisory benchmark which housing associations can use to start estimations on costs and planning of adapting their portfolio.

Tenant involvement is crucial. Housing associations need systematic methods to track and respond to heat-related complaints. Establishing clear complaint policies and proactive measures, such as assigning cool spaces and tenant property managers, can address immediate issues. Engaging tenants and utilizing their feedback can enhance adaptation strategies.

The final research step involved presenting the transition management tools at a Groene Huisvesters "heat session" to verify thesis results and improve study reliability. Feedback from 30 participants was largely positive, highlighting financial constraints and the role of architects in heat adaptation. This feedback, will refine the transition management tools and ensure they address practical challenges effectively.

6. Discussion and Limitations

This chapter aims to discuss the outcomes of this research, the limitations and suggestions for further research. Additionally, the chapter will elaborate on how the findings of this research can contribute to similar societal challenges. The content analysis and the interviews are interpreted in Chapter 4 and the interpretation of the transition management tools is described during the process of synthesizing in Chapter 5. Therefore, this chapter will focus on contextualizing the outcomes within the broader literature and in practice, the limitations and constraints of the research and follow-up research before moving on to the impact of the thesis on other societal problems. Chapter 6.1 is about the content analysis, 6.2 about the interviews, 6.3 the management tools and lastly, in 6.4 the impact of the thesis will be discussed.

6.1 Content Analysis

The content analysis reveals a significant increase in awareness and a minor decrease in adaptation compared to the study of Roders et al. (2012). Additionally, the analysis indicates that larger housing associations have more adaptation measures in place compared to smaller ones. This trend does not apply to awareness. The content analysis contributes to the knowledge gap that existed due to the lack of data on the current situation of housing associations.
The research brings several limitations and recommendations for further research. The study's quantitative approach results in a black-and-white classification of housing associations as either aware/adapted or not. As mentioned in Chapter 2.2.1, awareness and adaptation are both relative terms as a housing association can also be 60% adapted or aware. Although this method is useful for comparing a lot of housing associations, this limitation underscores the importance of incorporating qualitative insights from interviews to gain a more nuanced understanding.

Furthermore, it is uncertain whether the awareness and adaptation described in the policy documents of the housing associations accurately reflect the actual awareness and adaptation of housing associations in real life. The interviews also attempted to give insights into this matter. The only way to verify these findings is to physically visit the assets in the portfolios of housing associations, but this would be very time-consuming. Further research comparing content analysis with actual awareness and adaptation on a qualitative level would be valuable to assess the reliability of content analysis. For this study, Rotterdam is chosen as the sample size because of the characteristics that make the tenants of Rotterdam's social housing vulnerable to heat. This ensured results that represent a part of the society that would need heat adaptation most but does not necessarily mean that Rotterdam reflects the rest of the Netherlands. Future research can be carried out using a more variable sample size, keeping different types of tenants, sizes of housing associations, types of dwellings and vulnerability of surroundings in consideration.

6.2 Interviews

The interviews are used to find barriers, trends and developments in society. Notably, a lot of housing associations and other organizations know what makes surroundings, dwellings and tenants vulnerable to heat and what measures are best to use. However, numerous barriers hinder the application of this knowledge and the achievement of a heat-adapted portfolio. Common barriers are lack of financial resources, knowledge, priority, tenant behaviour and regulation.

For the interviews, similar to the content analysis, the study focused on housing associations and the municipality of Rotterdam, presenting the same limitation of the sample size not reflecting the entire Netherlands. However, this also provides a valuable opportunity to compare the results of the interviews with those of the content analysis. Next to that, a total of eight stakeholders were interviewed, of which three housing association's policymakers. The fact that, in some cases, only one participant per stakeholder is interviewed can bring the risk of missing out on certain information or the information not being reflective of the average perception of that function.

Another limit, because the attendees were recruited using the snowball effect, the risk occurs of the attendees being similar-minded. This is unavoidable because the participants were hard to reach out to which led to having to ask for participant's contacts via the other participants. Follow-up research could be done with randomly selected attendees from all over the Netherlands to resolve this limitation.

Lastly, not all stakeholders discussed in Chapter 1.4 were interviewed. This has varying reasons. The decision has been made to only interview the tenant association as a reflection of the tenants and also the resident's committees. This approach offers the advantage of obtaining a broad reflection of the average resident. However, it also has the disadvantage of missing insights from residents who, for various reasons, do not complain at the tenant association. Additionally, there is a risk of over-generalizing tenants, which may cause missing out on the perspectives of specific target groups. This can be remedied in a follow-up study by interviewing resident committees and single tenants opting for a different type of survey, such as questionnaires that residents can fill in. Also, stakeholders such as the government, the European Union and insurance companies are not interviewed. This is because, as explained in Chapter 1.4, these stakeholders are currently not involved in the heat transition. Additionally, a conversation with Housing Association 4 and Aedes showed that if a stakeholder does not have priority for this topic right now, they will not be able to answer the questions. As the goal of the interviews is to gain insights into the current position of housing associations and find barriers, opportunities and conflicting opinions, stakeholders must have the specific interest and knowledge to answer the questions. It seems to be the case that they are ''too far'' from the topic. Follow-up interviews on their perspectives could be done when this situation changes.

6.3 Transition Management Tools

This section discusses the transition management tools. The tools are designed to help organizations and systems navigate complex changes, such as those required for heat adaptation (Loorbach, 2007). These tools consist of the transition image and the transition paths and provide a method to assess current states, envision future goals, and plan strategies. The content analysis, interviews and the literature of this thesis were used to compose the transition management tools. Chapter 5 describes the process of how the tools were composed and what they should look like. These outcomes and also limitations, connection to literature and follow-up research recommendations will be discussed in the following paragraphs. First, the transition image will be discussed, second the transition paths and lastly the presentation at the Groene Huisvesters.

6.3.1 Transition Image

The transition image consists of a description of the current state, the sense of urgency to act and the ambition level. As described in Chapter 5.1.1, 70% of housing associations are aware and 70% have any form of adaptation. Looking at the transition curve (Loorbach, 2007) it can be assumed that most housing associations are in the predevelopment phase.

To sketch an image of the sense of urgency to act, the interviews are used to find barriers, trends and developments in society. Barriers include lack of financial resources, knowledge, priority, tenant behaviour and regulation. Tenants and their behaviour can be seen both as high-impact barriers, as well as opportunities to accelerate the process. Trends and developments that stood out were an increase in awareness and strategic planning, the stakeholders being open to sharing their knowledge because of their public character and the focus on vulnerable groups.

The final element of the transition image is the ambition level. The conclusion from the interviews and the literature is that there is no national ambition level set. Housing associations indicate that they express the need for a set ambition level, preferably in terms of a benchmark that indicates the thermal quality of dwellings. An option would be to use the same benchmark that is there for newly built, which is set at a TO-Juli of 4.8.

By making use of the content analysis and the interviews for the transition image, similar limitations and research recommendations discussed in Sections 6.1 and 6.2 apply here: the sample size, the definition of awareness and adaptation, the recruiting participants by the snowball effect and the fact that not all stakeholders were interviewed pose limitations to the research.

Follow-up research can be carried out using a different method to gain insight into the current state of housing associations. Since all the housing associations from the sample size will be aware from 2024, the current state can be calculated using the technical state of the portfolio for example. Using the TO-Juli method, the dwellings can be divided following the traffic light method. In this way, adaptation can be measured in a qualitative manner, while still keeping a large sample size.

6.3.2 Transition Paths

The transition pathways are advice on the changes that should take place to ensure development in the heat transition. It includes specifying the stakeholders, timing and methods that are needed to execute these changes.

Financial challenges are significant, with differing views between housing associations and public financiers. Collaboration between associations, municipalities, and financiers can align strategies, and better subsidy alignment with project phases can speed up climate-adaptive building. Integrating energy and heat transition plans can prevent financial inefficiencies.

Knowledge sharing can reduce financial burdens, and housing associations can use benchmarking systems and tools from the Dutch Green Building Council and local municipalities for comprehensive risk profiles, using available data and resources immediately.

Regulation through Performance Agreements between municipalities and housing associations should include concrete goals, deadlines, and benchmarks, adjusting the focus to include short- and mid-term goals. Regular meetings can ensure compliance and progress.

Tenant involvement is crucial, requiring systematic methods to track and respond to heat-related complaints. Clear complaint policies and proactive measures, such as assigning cool spaces and tenant property managers, can address immediate issues. Engaging tenants and using their feedback can improve adaptation strategies.

The transition paths that have as a constraint the background and surroundings of the researcher might affect the advice on what transition paths are preferable. Efforts have been made to avoid bias by highlighting the problem from many sides and using a lot of sources to gain knowledge, but this bias can never be completely avoided. Follow-up research could consist of doing the same research but with the use of researchers with different backgrounds and in different fields of research. In this way, this bias that might occur could be countered. In further research, the composing of the transition paths could be done using a different approach. For example in the form of scenario planning, to include the margin of uncertainty in the research and be prepared for different scenarios.

6.3.3 Presentation

The presentation at the Groene Huisvesters was done to minimize the risks of the sample group of Rotterdam not reflecting the Netherlands as a whole. If the presentation participants from across the Netherlands agreed with the findings, it may suggest that the sample size is representative of the entire country.

Multiple people agreed with the findings and the only two comments emphasised how difficult the heat transition financially will be and that part of the responsibility of heat-resilient dwellings should be on the architect's side. The first comment seems like an expression of how tight the financial situation for housing associations will be in the future. This aspect is already covered in the interviews where all interviewees agreed that lack of finance is a big barrier. The heat transition cannot earn the investment back because a split incentive is happening: the only financial return will

be fewer health expenditures which will end up on the tenant's side. The second comment on the architects having an important role is an addition to my research. It would be a good option to interview the architect as a stakeholder in follow-up research. For this research, the advice of including heat adaptation as one of the building requirements for future projects is added to Chapter 5.2.2 Knowledge.

One of the limitations of asking for feedback is the fact that all of the participants at the Heat Session attended the session because they were already interested in the topic of heat. This can be seen as a positive aspect because they are more likely to have opinions and knowledge about the topic. However, it could be the case that the group is biased, and the extra feedback loop lacks opinions of people who for some reason do not have interest or time to attend the session. Next to that, in the session, the names are not anonymized, which means that participants could be limited in what they say, because of the judgements of others. To address this issue, an option to follow up via email after the session was offered. Both limitations could be solved by setting up a presentation where the participants are picked from different regions and functions to make the bias as small as possible. The participants should be able to react anonymously to ensure free speech.

6.4 Thesis Impact

With the rise of highly insulated homes to minimise energy waste, rapidly growing cities and new KNMI weather scenarios, the risk of heat stress in homes is increasing. This makes the thesis relevant and much needed to protect all Dutch tenants from the increasing heat. The given solutions use the transition management tools, using the tools to start working on the transition themselves on the one hand. On the other hand, it does not put the full responsibility on a single stakeholder.

The insights gained from this research on the heat transition can provide valuable guidance for addressing similar transition challenges in other contexts. For instance, the approach to increasing awareness and adaptation measures could be applied to other environmental and social issues such as energy efficiency, water nuisance, and circularity. The emphasis on stakeholder collaboration, financial strategies, and tenant engagement offers a framework that can be adapted to different types of transitions. Moreover, the transition management tools used in this study can be a useful model for organizing complex changes in various sectors, from urban planning to public health initiatives. By demonstrating effective strategies for overcoming barriers and making use of opportunities, this research contributes to a broader understanding of how to facilitate problem management in diverse settings.

7. Conclusions and Recommendations

This thesis aims to facilitate the heat transition and enable Dutch housing associations to manage and continue this transition effectively. This, because of the growing concern about overheating in dwellings due to climate change. The main research question is: *How can Dutch housing associations be instigated to improve policies and strategies on heat adaptation?* The transition management tools of Loorbach (2007), consisting of the transition image and the transition paths, are used to answer the main research question.

Starting with the sub-question: *What should a transition image for the transition to heat-adapted dwellings look like?* The transition image reflects the goals of a transition and the components that are needed to compile a transition image (Loorbach, 2007). They consist of a description of the current state, the sense of urgency to act and the ambition level. A content analysis and interviews are used for the first element of the transition image as well as for answering the next sub-question: *What is the current state of awareness of and adaptation to heat stress among Dutch housing associations?* Compared to earlier studies, the content analysis shows a significant increase in awareness of heat stress among housing associations. The content analysis indicates that awareness has risen from 0% in 2012 to 70% in 2023. This shift suggests that housing associations are increasingly recognizing the importance of addressing heat stress and its impacts on their tenants. Additionally, the adaptations increased from 60% to 70%. The data reveals variability in adaptation across different housing associations. Larger associations tend to have more adaptation measures described in their annual reports compared to smaller ones. Interviews with the three largest housing associations in Rotterdam show that the frontrunner passed the breakthrough point and is ready to start adapting their dwellings. The other two associations are further behind and are still in the predevelopment phase, just before the take-off (Loorbach, 2007). As multiple stakeholders indicate that smaller housing associations tend to have fewer resources available compared to larger housing associations, it can be assumed that they are also in the predevelopment phase.

Furthermore, the interviews are used to answer the second element, the sense of urgency to act, which consists of barriers, trends and developments, which will answer the sub-question: *What barriers prevent Dutch housing associations from adapting to heat stress and what opportunities are there?* They reveal a lot of barriers standing in the way of reaching the goal of having a portfolio adapted to heat. Common barriers are lack of financial resources, knowledge, priority, regulation and tenant behaviour. Trends and developments found in the interviews were an increase in awareness among housing associations, the openness of all public stakeholders to share information, the fact that the size of the housing association aligned with the financial resources available to adapt, and an increasing recognition of involving tenants in the process.

The third and last element is the ambition level. Currently, there is no ambition level set, and this is one of the bottlenecks that keeps the transition to heat adaptation from accelerating. As the most impactful barrier is a lack of finance, housing associations are eager to start working with national benchmarks, just like the energy transition ambition level. This helps them be able to estimate the costs of the transition which brings them to the next stage of finding ways to efficiently adapt the dwellings. This is where Aedes should and must contribute. Since the process of regulation-making nationwide is likely to be long and expensive, Aedes can provide an advisory benchmark, against which housing associations can measure their portfolios.

The developed transition image reflects the current state of awareness and adaptation efforts as of the study period. However, ongoing changes in policy, technology, and societal attitudes towards climate change could rapidly alter the landscape of heat adaptation strategies. Therefore, regular updates and revisions of the transition image will be necessary.

The fourth and final sub-question is: *How can transition pathways be composed of housing associations becoming heat-adapted?* The development of transition paths is crucial for guiding

Dutch housing associations towards effective heat adaptation strategies. Through a synthesis of qualitative insights from interviews and literature, the transition paths are composed to outline necessary changes, stakeholder involvement, and strategic actions. These paths serve as blueprints for housing associations and other stakeholders to cope with the heat transition. The transition paths highlight the significance of collaboration between housing associations, municipalities, financiers, and other stakeholders to align strategies and spread resources effectively. The remaining advice is sorted per stakeholder:

Housing associations
Financial challenges are seen as the most significant barrier, which emphasizes the need for subsidy alignment with project planning. Housing associations and municipalities must work together to make sure subsidies instigate extra heat adaptive projects. Additionally, conversations with financiers are needed to align visions on what calculating the overheating risk of dwellings would mean for financing opportunities. Another financial recommendation is incorporating the heat transition in the energy transition. Air-conditioners will counter energy transition goals and heat adaptations should therefore be included in the design of energy-saving dwellings. This needs to be discussed with the architects of the project. Next, a short-term solution would be to involve tenants in the process, e.g. appoint a resident complex manager who checks on the tenants in case of severe conditions or use tenant's multi-cultural backgrounds to help each other find solutions to counter the heat. Also, setting up a solid complaints procedure and making sure complaints are labelled and taken seriously is crucial to track the scale of overheating and to make sure tenants feel heard. Lastly, housing associations should arrange, possibly temporary, solutions such as cool spaces that can be used in case of overheating of dwellings.

Municipality
Regulations, such as Performance Agreements are key for setting specific goals and deadlines for heat adaptation. Policies need to include concrete objectives on heat adaptation for the short- and long-term. Next to that, municipalities should provide detailed maps that help housing associations calculate the overheating risks of the surroundings, as Rotterdams Weerwoord does for Rotterdam.

Industry association (Aedes):
Since the process of regulation-making nationwide is likely to be long and expensive, Aedes should provide an advisory benchmark, against which housing associations can measure their portfolios. Also, at this moment, heat is not on the priority list of Aedes. Aedes should recognize heat adaptation as being a part of providing healthy living and add this to the priority list. Aedes should utilize the information that the frontrunners have, such as the traffic light risk classification method, and share it with the other industry members to ensure further progress.

National government
Currently, heat is not part of the National Performance Agreements. The government should take an example from Rotterdam, which already includes this topic in the Performance Agreements. Lastly, the government should work on a national benchmark for heat in housing, not only for housing associations but for all landlords to ensure the health of tenants.

As both the transition image and the transition paths are based on data primarily from housing associations in Rotterdam, the results may not fully represent the diversity of housing associations across the Netherlands. Future research should consider a larger and more diverse sample size to include associations from different regions.

The last step of the research, the presentation at the Groene Huisvesters is used as an extra feedback loop to make the results of the transition management tools more reliable and to see if the sample size of Rotterdam represents the rest of the Netherlands. The outcome of the presentation is that participants agreed with the findings and underlined the importance of the financial state of the housing associations. Next to that the significance of architects having to include heat stress as a

factor while designing the building was highlighted. The session emphasizes the collaboration of all stakeholders on the need for heat adaptation in Dutch social housing.

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Appendix 1: Dutch Keyword List Content Analysis

☑	airconditioner	☐
☑	airconditioning	☐
☑	bomen	☐
☑	boom	☐
☑	groen	☐
☑	groene	☐
☑	heet	☐
☑	hitte	☐
☑	hittestress	☐
☑	klimaatadaptatie	☐
☑	klimaatrisico	☐
☑	klimaatrisico's	☐
☑	koel	☐
☑	koeling	☐
☑	lamellen	☐
☑	luifel	☐
☑	overstek	☐
☑	plant	☐
☑	planten	☐
☑	schaduw	☐
☑	schaduwdoek	☐
☑	spuiventilatie	☐
☑	ventielatie	☐
☑	ventielatierooster	☐
☑	ventilatieroosters	☐
☑	vergroenen	☐
☑	vergroening	☐
☑	verharden	☐
☑	verharding	☐
☑	warm	☐
☑	warmte	☐
☑	water	☐
☑	zondwerende	☐
☑	zonwerend	☐
☑	zonwering	☐
☑	Nachtventilatie	☐

Appendix 2: Result Content Analysis Annual Reports

Appendix 2A: Results Havensteder

2016

Havensteder - Jaarverslag - 2016 Document Lianna van Gils 03/02/2024 Content 39 - 680 5
In het kader van het Rotterdamse project High Impact Crime kreeg het groen in de Homerusbuurt in Lombardijen een opknapbeurt en vervingen we hang- en sluitwerk in Vreewijk. In samenwerking met gemeente, politie en bewoners uit Buurt Bestuurt halveerden we hier het aantal woninginbraken.

Havensteder - Jaarverslag - 2016 Document Lianna van Gils 03/02/2024 Content 39 - 1137 5
In Vreewijk speelt groen een belangrijke rol in het woongenot, we actualiseerden in 2016 de tuinclausule.

Havensteder - Jaarverslag - 2016 Document Lianna van Gils 03/02/2024 Content 38 - 1670 5
Havensteder stelden een pand beschikbaar, we organiseerden met AIR en de Stichting '100 jaar Vreewijk' een symposium over Vreewijk en plantten bomen terug in de tuinen van bewoners.

2017

Havensteder - Jaarverslag - 2017 Document Lianna van Gils 03/02/2024 Content 26 - 154 5
In Vreewijk speelt groen een belangrijke rol in het woongenot. Ondanks update van de tuinclausule, is het lastig om verwaarloosde tuinen echt aan te pakken. Daarom spraken we af om meer gezamenlijk met partners met het groen aan de slag te gaan. Dat hebben we geleerd van het gezamenlijke achtertuinen-project in de Landbouwbuurt in Vreewijk.

Havensteder - Jaarverslag - 2017 Document Lianna van Gils 03/02/2024 Content 28 - 1356 6
Wat betreft Capelle Noord: In de Ets deden we een pilot rondom groene erfafscheidingen. Doel hiervan is de uitstraling van de buurt te verbeteren. In de Florabuurt in Schenkel ontwikkelde het wijkbeheer een plan voor het verbeteringen op gebied van schoon, heel en veilig in de algemene ruimten. We werkten met de gemeente aan een plan voor veiligere routes en entrees in de Opera/gebouwenbuurt.

2018 – No keywords found

2019

Havensteder - Jaarverslag - 2019 Document Lianna van Gils 03/02/2024 Content 35 - 1979 16
Bij het in stand houden van ons bestaande vastgoed staan veiligheid, gezondheid, wooncomfort en kwaliteit centraal. Onze verantwoordelijkheid komt samen in onze duurzaamheidspijlers: energiebesparing, klimaatadaptatie en circulaire economie.

2020

Havensteder - Jaarverslag - 2020 Document Lianna van Gils 03/02/2024 Content 19 - 2479 16
Klimaatadaptatie Voor een programma klimaatadaptief vastgoed werkten we toe naar het opleveren van het product 'wijkpaspoort'. Het wijkpaspoort moet voor het woningbezit van Havensteder de basis informatie vormen op het gebied van klimaatadaptatie. Hiermee kunnen we in 2021 de klimaatstrategie en het klimaatbeleid verder ontwikkelen: zowel voor ons vastgoed, als voor onze huurders en de wijk.

Havensteder - Jaarverslag - 2020 Document Lianna van Gils 03/02/2024 Content 33 - 2300 16
Bij het in stand houden van ons bestaande vastgoed staan veiligheid, gezondheid, wooncomfort en kwaliteit centraal. Onze verantwoordelijkheid voor betaalbaar wonen, woongenot en de kwaliteit van ons vastgoed komt samen in onze duurzaamheidspijlers; energiebesparing, klimaatadaptatie en circulaire economie.

Havensteder - Jaarverslag - 2020 Document Lianna van Gils 03/02/2024 Content 53 - 941 16
We zien met name risico's bij onze ambitieuze investeringsopgave voor de komende jaren en de verduurzamingsopgave (klimaatontwikkeling en klimaatadaptatie). Dit in combinatie met grotere druk op betaalbaarheid en beschikbaarheid, en de oplopende belastingdruk en stijgende bouwkosten. De houdbaarheid van ons businessmodel op de lange termijn staat onder druk. Het risico is dat we onvoldoende balans vinden in het bieden va

2021

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 1266 5
In dat kader ontwikkelden we een Duurzame Daken Kansenkaart. Op basis van openbare data en onze eigen dakdata is gekeken welke duurzame dakoplossing het meest haalbaar is. Bijvoorbeeld opwekking van energie (zonnepanelen), waterberging (bij hevige regenval), een groen dak of een combinatie daarvan. Bij de ontwikkeling van onze dakstrategie maken we gebruik van deze kaart.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 1539 5
Vooruitlopend op die dakstrategie en het bijbehorende beleidskader voor 2023 en verder, starten we in 2022 met een pilot voor een multifunctioneel dak (groen, water én zonnepanelen). En daken die erg heet worden en niet geschikt zijn voor een ander soort dakbedekking, maken we tijdens het dakonderhoud wit. Zo wordt zonlicht gereflecteerd en het dak minder heet.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 2139 5
Dan stroomt het niet naar kelders, over de drempel het huis in of in een overvolle riolering. Daarnaast maakt meer groen de leefomgeving koeler in de zomer en is het goed voor de biodiversiteit.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 962 5
Klimaatadaptatie Het klimaat verandert in snel tempo. De zeespiegel stijgt, het wordt steeds warmer, er valt meer neerslag in kortere perioden, maar er zijn ook langere perioden van droogte. Een mondiaal proces met lokale gevolgen. Voor Havensteder betekent het onder andere dat ons vastgoed bestand moet zijn tegen zowel meer als minder water en hogere temperaturen.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 27 - 2354 16
kwaliteit van ons woningbezit en een rendabelere en langere exploitatie van onze woningen. We vragen van de onderhoudsorganisatie om snel, met hoge kwaliteit en tegen een verantwoorde prijs onderhoud uit te voeren waar de bewoner tevreden over is. Onze duurzaamheidsambities hebben betrekking op de energietransitie (zoals energiebesparing), klimaatadaptatie en circulaire economie.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 612 16
Klimaatadaptatie Het klimaat verandert in snel tempo. De zeespiegel stijgt, het wordt steeds warmer, er valt meer neerslag in kortere perioden, maar er zijn ook langere perioden van droogte. Een mondiaal proces met lokale gevolgen. Voor Havensteder betekent het onder andere dat ons vastgoed bestand moet zijn tegen zowel meer als minder water en hogere temperaturen.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 1806 10

In Lombardijen deden we ervaring op met het vergroenen van tuinen om regenwater beter te laten wegstromen. De tuin mag nog maar voor maximaal 40% bestraat zijn. Vergroenen zorgt ervoor dat het regenwater bij hoosbuien langzaam de bodem in kan zakken.

Havensteder - Jaarverslag - 2021 Document Lianna van Gils 03/02/2024 Content 32 - 2319 5

We stelden in juli een Hitteplan vast. Dit is gericht op het in gesprek gaan met bewoners over hitte en het bieden van een tijdelijke oplossing in de vorm van een ventilator, waterkoeler of mobiele airco in extreme gevallen.

2022

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 32 - 714 5

toekennen. In 2022 startten we met een verkenning hiervoor. Ook startten we een pilot met een multifunctioneel dak. Dit dak bevat waterberging, beplanting en zonnepanelen. Een andere pilot, met alleen een groen dak, rondden we af. Bij deze pilot brachten we beplanting aan op een gebouw aan de Hoofdweg in Rotterdam. De beplanting bleek een positief effect te hebben op waterberging.

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 37 - 528 5

St. Lalibela en Paal & Perk (Middin). Zo hebben bewoners één centraal aanspreekpunt in de wijk. Andere voordelen zijn: middelen worden gedeeld en krachten worden gebundeld, vrijwilligers hebben meer (doorgroei)mogelijkheden en we borgen het groen en de biodiversiteit in de wijk. De samenwerkingsovereenkomst is met alle partijen getekend en er zijn vrijwilligers aangesteld.

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 24 - 3293 16

van de gebaande paden om onze woningen toekomstbestendig te maken. We gaan nieuwe samenwerkingen aan. We zetten in op isolatie, aardgasvrij wonen, CO2-neutraal wonen, circulariteit en klimaatadaptatie. We zetten ons bedrijfsonroerend goed (BOG) in voor ontmoetingen tussen mensen. In 2022 wilden we de volgende resultaten bereiken: o We isoleren 800 woningen en we maken 600 woningen aardgasvrij.

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 25 - 4217 16

naar voldoende geïsoleerde en gasvrije woningen in 2050 Isoleren en aardgasvrij maken: • 800 isoleren per jaar • 600 aardgasvrij per jaar • 1.000 duurzaamheidsaanpak (EFG-labels) • 2.000 verbeteraanpak (EFG-labels) • 1.200 isoleren per jaar • 600 aardgasvrij per jaar • 10.000 zonnepanelen • Programma klimaatadaptatie • 10.000 zonnepanelen • Programma klimaatadaptatie

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 32 - 54 16

32 | Havensteder ruimte leent zich bij uitstek voor klimaatadaptatie. Vanuit die gedachte werkten we in 2022 aan een dakstrategie. Daarvoor lieten we eerst een dakpotentiestudie uitvoeren. Daaruit kwam voort dat we onze daken op de volgende manieren kunnen inzetten: 1. Zonnepanelen (geel dak).

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 4669 5

Voor Havensteder betekent het onder andere dat onze woningen en gebouwen bestand moeten zijn tegen zowel meer als minder water en hogere temperaturen.

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 4273 5

Die laten wij dan weer plaatsen in onze woningen. Zo verminderen we onze hoeveelheid afval en de uitstoot van CO2. En er worden minder bomen gekapt!

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 5140 11

en renovatie te doen. Het convenant is gemaakt door de provincie Zuid-Holland, lokale overheden, bedrijven en maatschappelijke organisaties. Samen maakten zij afspraken over klimaatadaptief bouwen. Die afspraken moeten bij nieuwbouw en herontwikkeling leiden tot minder wateroverlast, minder hittestress, meer biodiversiteit en minder schade door langdurige droogte en bodemdaling.

Havensteder - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 39 - 2794 7

Onderdeel van de Gebiedsvisie is de aanleg van een buurttuin. Bewoners kunnen in de buurttuin samen genieten van bloeiende planten, groenten verbouwen en fruit telen. De buurttuin is ontworpen en aangelegd door bewoners. De bewoners gaan het onderhoud samen doen.

Appendix 2B: Results Woonstad Rotterdam

2015 – No keywords found

2016 – No keywords found

2017 – No keywords found

2018

Woonstad Rotterdam - Jaarverslag - 2018 Document Lianna van Gils 04/02/2024 Content 3 - 1272 16

Het klimaatakkoord is in volle discussie. Voor de bebouwde omgeving wordt behoorlijke druk op woningcorporaties gelegd om als startmotor in de energietransitie te fungeren. Ook circulariteit en klimaatadaptatie in de bouw zijn onderwerpen waar gemeenten een voortrekkersrol van woningcorporaties verlangen. Bouwkosten zijn in 2018 opnieuw behoorlijk gestegen en het gebrek aan personeel in de bouw heeft een vertragend effect op

Woonstad Rotterdam - Jaarverslag - 2018 Document Lianna van Gils 04/02/2024 Content 39 - 2474 16

bij het plaatsen van zonnepanelen. Het zijn bewoners die uit eigen ervaring vertellen dat zonnepanelen zorgen voor een lagere energierekening. Ook maken we gebruik van bewonerscoaches rondom klimaatadaptatie. Veel bewoners realiseren zich niet dat door verharde tuinen het water niet wegzakt en blijft staan in straten en op pleinen. Alle coaches die voor ons de wijk ingaan, worden eerst opgeleid en krijgen tools mee. 38 Woo

Woonstad Rotterdam - Jaarverslag - 2018 Document Lianna van Gils 04/02/2024 Content 36 - 2163 6

CO2 reductie (meer dan 50%). All-electric In Spangen startten we in 2018 de bouw van dertig all-electric eengezinswoningen. Het gaat om gasloze vrijesectorwoningen. De woningen hebben slimme zonnepanelen, driedubbel isolatieglas, lucht-warmtepomp, groene daken en slimme ventilatie. In fase 2 bouwen we nog eens vijftig van dergelijke woningen. 35 Woonstad Rotterdam Jaarstukken 2018

Woonstad Rotterdam - Jaarverslag - 2018 Document Lianna van Gils 04/02/2024 Content 37 - 313 6

door de stad. In totaal liggen er 8.823 zonnepanelen op 2.160 woningen. Voor 2019 kiezen we een meer gebiedsgerichte aanpak. De Aktiegroep Het Oude Westen maakt zich sterk voor een duurzame en groene woonomgeving. In nauwe samenwerking plaatsen we zo'n 150 zonnepanelen op daken in de wijk. Renovaties verhogen duurzaamheid en comfort Woonstad Rotterdam zet jaarlijks stappen om het aantal woningen met een

Woonstad Rotterdam - Jaarverslag - 2018 Document Lianna van Gils 04/02/2024 Content 39 - 1570 11

onder het Staringplein. Pas als die verzadigd zijn, vindt overstort plaats naar het gemeenteriool. Sociale duurzaamheid Woonstad Rotterdam wil de kennis van bewoners over energieverbruik, hittestress en waterberging vergroten. Met respect voor de individuele keuzes van bewoners, willen wij ander gedrag stimuleren. In 2018 hebben we de rol van energiecoach steviger en structureler ingezet. Zo hebben we voor de reno

2019

Woonstad Rotterdam - Jaarverslag - 2019 Document Lianna van Gils 04/02/2024 Content 40 - 672 16

Duurzaamheid: energietransitie, circulair en klimaatadaptie Duurzaamheid: energietransitie, circulair en klimaatadaptatie Woonstad Rotterdam is ambitieus en vooruitstrevend op het gebied van duurzaamheid. De energietransitie is inmiddels flink op stoom. Wij willen dat voor 2050 onze hele woningvoorraad C02-neutraal is. Door hergebruik van sloopafval en bouwmaterialen willen we een belangrijke bijdrage leveren aan de ci

Woonstad Rotterdam - Jaarverslag - 2019 Document Lianna van Gils 04/02/2024 Content 46 - 1237 16

Klimaatadaptatie In het programma Klimaatadaptatie verleggen we de aandacht van maatregelen die gericht zijn op oplossen naar maatregelen die gericht zijn op voorkomen. Dit doen we met ingrepen die bijdragen aan een klimaatrobuuste leefomgeving.

Woonstad Rotterdam - Jaarverslag - 2019 Document Lianna van Gils 04/02/2024 Content 38 - 1282 5

We onderzoeken hoe we bewoners kunnen helpen en stimuleren bij beheer en onderhoud van hun eigen woonomgeving, bijvoorbeeld van groen, binnenplaatsen en portieken.

Woonstad Rotterdam - Jaarverslag - 2019 Document Lianna van Gils 04/02/2024 Content 46 - 1626 11

Het programma hanteert een gebiedsprioritering op basis van de klimaatrisico's hevige regenval, grondwaterproblematiek, bodemdaling en hittestress. Het Oude Noorden, Oude Westen, Kralingen en de Tarwewijk vallen op in dit verband.

2020

Woonstad Rotterdam - Jaarverslag - 2020 Document Lianna van Gils 04/02/2024 Content 20 - 56 16

20 4 Duurzaamheid Energietransitie, circulair en klimaatadaptatie.

Woonstad Rotterdam - Jaarverslag - 2020 Document Lianna van Gils 04/02/2024 Content 23 - 495 16

Maatregelen op het vlak van klimaatadaptatie vergen vaak een wijkgerichte aanpak, waarbij afstemming met verschillende partners noodzakelijk is. In 2020 zijn we daarmee gestart in het Oude Noorden, samen met de gemeente en het Hoogheemraadschap. Het doel is om het hemelwater zoveel mogelijk in de wijk te borgen. De aanleg van een Polderdak aan de Moerkapellestraat maakt hiervan deel uit.

Woonstad Rotterdam - Jaarverslag - 2020 Document Lianna van Gils 04/02/2024 Content 23 - 295 6

Hierdoor kan tijdens regenbuien meer water worden opgenomen in de bodem en wordt het riool minder belast. Ook hebben we bij een aantal complexen groene daken aangelegd. Groene daken hebben zowel effect op het terugdringen van waterafvoer via het riool als op het binnenklimaat van het gebouw bij warme zomers.

Woonstad Rotterdam - Jaarverslag - 2020 Document Lianna van Gils 04/02/2024 Content 23 - 2288 11

Klimaatadaptatie Het klimaat verandert, met nu al voelbare effecten als hittestress, overtollig regenwater, bodemdaling en grondwaterproblemen. Voorheen was onze aandacht vooral gericht op het oplossen van klimaatgerelateerde problemen, maar met het programma klimaatadaptief stellen we preventie voorop. Dit doen we met ingrepen die bijdragen aan een klimaatrobuuste leefomgeving. We hanteren een gebiedspri

2021

Woonstad Rotterdam - Jaarverslag - 2021 Document Lianna van Gils 04/02/2024 Content 31 - 466 6

Groene daken Groene daken helpen bij het bestrijden van regenwateroverlast. Ze vangen een deel van het regenwater voor langere tijd op en ontlasten zo het riool. Het afgelopen jaar zijn uiteindelijk drie (grote) groene daken aangelegd. We experimenteren met verschillende soorten groene daken en onderzoeken de effecten. Zo ligt er op een complex in de Moerkapellestraat in het Oude Noorden nu een

Woonstad Rotterdam - Jaarverslag - 2021 Document Lianna van Gils 04/02/2024 Content 26 - 59 16

Energietransitie, circulair en klimaatadaptatie Woonstad Rotterdam is ambitieus en vooruitstrevend op het brede vlak van duurzaamheid. De energietransitie is flink op stoom, op weg naar een CO2 - neutrale woningvoorraad in 2050. Door hergebruik van sloopafval en bouwmaterialen dragen we bij aan een circulaire economie. Ook treffen we maatregelen voor een klimaatadaptieve leefomgeving. We vinden het onze maatschap

Woonstad Rotterdam - Jaarverslag - 2021 Document Lianna van Gils 04/02/2024 Content 31 - 1058 5

soorten groene daken en onderzoeken de effecten. Zo ligt er op een complex in de Moerkapellestraat in het Oude Noorden nu een polderdak en op een complex ertegenover een detentie-dak. In deze stenige wijk is er vaak wateroverlast bij forse regenbuien door overlopende rioleringen. De innovatieve daken vangen het water op en voeren het vertraagd af aan het afvoersysteem.

Woonstad Rotterdam - Jaarverslag - 2021 Document Lianna van Gils 04/02/2024 Content 31 - 2829 5

Klimaatadaptatie De noodzaak om ons vastgoed klimaatbestendig te maken, is groot. Het klimaat verandert, met nu al voelbare effecten als meer hitte, overtollig regenwater, bodemdaling en grondwaterproblemen. Met het programma Klimaatadaptief stellen we preventie voorop. Dit doen we met ingrepen die bijdragen aan een klimaat-robuuste leefomgeving. We geven voorrang aan wijken met klimaatrisico'

Woonstad Rotterdam - Jaarverslag - 2021 Document Lianna van Gils 04/02/2024 Content 32 - 2442 5

Samen met de gemeente en vele andere partijen maken we de wijk klaar voor de toekomst: de Next Generation Woonwijk (NGW). Goed voor ouderen, duurzaam, gezond, betaalbaar, bereikbaar en sociaal. Maar ook klaar voor een veranderend klimaat, hitte en heftige regen. Wat we geleerd hebben, staat in het boekje. Samen met acht tips voor wie zelf aan de slag wil met de nieuwe wijkaanpak.

2022

Woonstad Rotterdam - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 223 5

31 Verder hebben we meer inzicht gekregen in welke oplossingen werken. Zo zijn groene daken vooral goed om water op te vangen en minder effectief tegen hitte in een woning. Ook blijken de onderhoudskosten van een groen dak significant hoger. Daarom oriënteren we ons nu meer op oplossingen voor waterberging en groen op straatniveau.

Woonstad Rotterdam - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 1631 15

maar met het programma Klimaatadaptie stellen we preventie voorop. Dit doen we met ingrepen die bijdragen aan een klimaatrobuuste leefomgeving. We krijgen steeds meer inzicht in de klimaatrisico's rondom ons bezit, bijvoorbeeld voor hitte in woningen en regenwateroverlast op complexniveau. We zoeken nu nog naar goede oplossingen om deze risico's te beperken en het woongenot van onze bewoners te vergroten, nu en i

Woonstad Rotterdam - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 158 5

31 Verder hebben we meer inzicht gekregen in welke oplossingen werken. Zo zijn groene daken vooral goed om water op te vangen en minder effectief tegen hitte in een woning. Ook blijken de onderhoudskosten van een groen dak significant hoger. Daarom oriënteren we ons nu meer op oplossingen voor waterberging en groen op straatniveau.

Woonstad Rotterdam - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 26 - 59 16

Energietransitie, circulair en klimaatadaptatie Woonstad Rotterdam is ambitieus en vooruitstrevend op het brede vlak van duurzaamheid. We vinden het onze maatschappelijke verantwoordelijkheid om in duurzaamheid een voortrekkersrol te nemen, want we zijn er zowel voor onze huurders van nu, als voor de huurders van de toekomst. De energietransitie is inmiddels flink op stoom gekomen, op weg naar een CO_2-neutrale w

Woonstad Rotterdam - Jaarverslag - 2022 Document Lianna van Gils 04/02/2024 Content 31 - 1198 16

De geoogste materialen worden aangeboden op gebruiktebouwmaterialen.com Klimaatadaptatie Het klimaat verandert, met nu al voelbare effecten als hittestress, overtollig regenwater, bodemdaling en grondwaterproblemen. Voorheen was onze aandacht vooral gericht op het oplossen van klimaatgerelateerde problemen, maar met het programma Klimaatadaptie stellen we preventie voorop. Dit doen we met ingrepen die bijdragen aa

Appendix 2C: Results Hef Wonen

No documents available

Appendix 2D: Woonbron

2018

Woonbron - Bestuursverslag - 2018 Document Lianna van Gils 04/02/2024 Content 25 - 929 5

Op Heijplaat is gestart met een aanpak voor vergroening en het aanpakken van het waterbergingsprobleem. Deze twee gaan goed samen als verharding wordt vervangen door groen in de tuinen.

Woonbron - Bestuursverslag - 2018 Document Lianna van Gils 04/02/2024 Content 25 - 803 11

Op Heijplaat is gestart met een aanpak voor vergroening en het aanpakken van het waterbergingsprobleem. Deze twee gaan goed samen als verharding wordt vervangen door groen in de tuinen.

Woonbron - Bestuursverslag - 2018 Document Lianna van Gils 04/02/2024 Content 25 - 897 10

Op Heijplaat is gestart met een aanpak voor vergroening en het aanpakken van het waterbergingsprobleem. Deze twee gaan goed samen als verharding wordt vervangen door groen in de tuinen.

2019

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 13 - 1786 16

Op het gebied van klimaatadaptatie zetten we een aantal stappen. Op kleine schaal experimenteerden we in 2019 al met vergroening van tuinen en maatregelen voor waterberging bij nieuwbouw. Ook overlegden we met de gemeente Rotterdam en de gemeente Dordrecht over de benodigde stappen om het hoofd te bieden aan de wateropgaven en hittestress. Dat werken we in 2020 verder uit.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 23 - 1178 16

Op Heijplaat en in Pernis namen we maatregelen in het kader van de klimaatadaptatie. Met nieuwe huurders spreken we af dat maximaal de helft van de tuin uit verharding mag bestaan. Met onze huidige huurders proberen we afspraken te maken over het vervangen van tegels door groen om de waterberging te verbeteren.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 23 - 1438 16

Over klimaatadaptatie is in brede zin gesproken met de gemeente Rotterdam in een gezamenlijke werksessie van ons directieteam en de projectleiding van de gemeente. Daarnaast wordt intensieve samenwerking met het ingenieursbureau van de gemeente voorbereid om in concrete projecten elkaars kennis te benutten en concrete uitvoering te geven aan klimaatadaptieve maatregelen.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 55 - 844 16

Ontwikkelingen in de externe omgeving (opgelegde duurzaamheidsambities, klimaatadaptatie en een ongunstige bouwmarkt) zetten druk op het doen van (niet-rendabele) investeringen in bestaand bezit tegen een hogere prijs.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 56 - 935 16

Klimaatadaptatie Het risico dat het aantal en de ernst van klimaat gerelateerde calamiteiten (storm, extreme droogte/hitte, zware regenval) toeneemt.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 57 - 428 16

Bestuursverslag 2019 57 Woonbron Bestuursverslag 2019 Bijlage 1 Risico's met impact in het verslagjaar Er is de afgelopen jaren bij Woonbron sprake van toename van onderhoudskosten. De begroting voor niet-planmatig onderhoud is in 2019 ruim overschreden. De geïdentificeerde strategische risico's met betrekking tot klimaatadaptatie en datakwaliteit zijn factoren die hierin een rol spelen.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 56 - 1426 10

De beheersing richt zich in 2020 op visievorming en actief bijdragen aan de dialoog in de regio. Op kleine schaal kunnen al snel stappen worden gezet, bijvoorbeeld door grenzen te stellen aan verharding van tuinen en openbare ruimte.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 23 - 1270 10

Op Heijplaat en in Pernis namen we maatregelen in het kader van de klimaatadaptatie. Met nieuwe huurders spreken we af dat maximaal de helft van de tuin uit verharding mag bestaan. Met onze huidige huurders proberen we afspraken te maken over het vervangen van tegels door groen om de waterberging te verbeteren.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 56 - 1426 10

De beheersing richt zich in 2020 op visievorming en actief bijdragen aan de dialoog in de regio. Op kleine schaal kunnen al snel stappen worden gezet, bijvoorbeeld door grenzen te stellen aan verharding van tuinen en openbare ruimte.

Woonbron - Bestuursverslag - 2019 Document Lianna van Gils 04/02/2024 Content 13 - 2104 11

Op het gebied van klimaatadaptatie zetten we een aantal stappen. Op kleine schaal experimenteerden we in 2019 al met vergroening van tuinen en maatregelen voor waterberging bij nieuwbouw. Ook overlegden we met de gemeente Rotterdam en de gemeente Dordrecht over de benodigde stappen om het hoofd te bieden aan de wateropgaven en hittestress. Dat werken we in 2020 verder uit.

2020

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 13 - 3782 16
In 2020 stelden we daarom een nieuwe duurzaamheidsvisie op, in aanvulling op de 'duurzaamheidsagenda vastgoed' die we eerder al maakten en die vooral doelen en activiteiten beschreef op het gebied van de energietransitie en isolatie. Nu hebben we nieuwe doelen gesteld op het terrein van circulariteit en klimaatadaptatie, die we in 2021 concreter maken.

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 14 - 2775 16
Circulair en klimaatadaptatie Al enkele jaren doen we onze sloopprojecten volgens het principe van circulair slopen. De materialen worden bij de sloop 'geoogst' en daarna zoveel mogelijk opnieuw gebruikt. Ook in 2020 deden we dit bij onze sloopprojecten. Op deze manier dragen we bij aan het verminderen van afvalstromen. De komende jaren breiden we de circulariteit verder uit. We houden steeds meer rekening hiermee doo

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 14 - 3336 16
Voor klimaatadaptatie experimenteren we steeds meer. Zo leveren we nieuwe woningen op met een tuincontract voor de huurders. Dat houdt in dat we een maximum stellen aan het aandeel verharding in de tuin, waardoor groen en waterberging gegarandeerd zijn. Dit deden we in 2020 onder meer bij de nieuwbouwwoningen in de Vogelbuurt in Dordrecht en in de Sagenbuurt en Kreekhuizen in IJsselmonde. Daarnaast werkten we op Heijpl

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 55 - 580 16
Ontwikkelingen in de externe omgeving (opgelegde duurzaamheidsambities, klimaatadaptatie en een ongunstige bouwmarkt) zetten druk op het doen van (niet-rendabele) investeringen in bestaand bezit tegen een hogere prijs.

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 56 - 1011 16
Klimaatadaptatie Het risico dat het aantal en de ernst van klimaat gerelateerde calamiteiten (storm, extreme droogte/hitte, zware regenval toeneemt.

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 24 - 491 5
opgeleverd. Het gaat hier om energiezuinige woningen. Na de oplevering van de laatste woningen zijn de vier gemeenschappelijke tuinen inclusief wadi's aangelegd. In een wadi wordt regenwater tijdelijk opgevangen en langzaam weer afgegeven aan de bodem (infiltratie). Infiltratie van regenwater voorkomt onnodige belasting van het riool en daaropvolgende waterschade. Daarbij zorgt dit voor een natuur

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 14 - 3516 10
Voor klimaatadaptatie experimenteren we steeds meer. Zo leveren we nieuwe woningen op met een tuincontract voor de huurders. Dat houdt in dat we een maximum stellen aan het aandeel verharding in de tuin, waardoor groen en waterberging gegarandeerd zijn. Dit deden we in 2020 onder meer bij de nieuwbouwwoningen in de Vogelbuurt in Dordrecht en in de Sagenbuurt en Kreekhuizen in IJsselmonde. Daarnaast werkten

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 56 - 1502 10
De beheersing richtte zich in 2020 op visievorming en actief bijdragen aan de dialoog in de regio. Op kleine schaal kunnen al snel stappen worden gezet, bijvoorbeeld door grenzen te stellen aan verharding van tuinen en openbare ruimte.

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 14 - 3548 5
experimenteren we steeds meer. Zo leveren we nieuwe woningen op met een tuincontract voor de huurders. Dat houdt in dat we een maximum stellen aan het aandeel verharding in de tuin, waardoor groen en waterberging gegarandeerd zijn. Dit deden we in 2020 onder meer bij de nieuwbouwwoningen in de Vogelbuurt in Dordrecht en in de Sagenbuurt en Kreekhuizen in IJsselmonde. Daarnaast werkten we op Heijpl

woonbron - Bestuursverslag - 2020 Document Lianna van Gils 04/02/2024 Content 14 - 3800 10
de tuin, waardoor groen en waterberging gegarandeerd zijn. Dit deden we in 2020 onder meer bij de nieuwbouwwoningen in de Vogelbuurt in Dordrecht en in de Sagenbuurt en Kreekhuizen in IJsselmonde. Daarnaast werkten we op Heijplaat en in Hoogvliet verder aan het vergroenen van tuinen en binnenterreinen bij bestaande woningen. Dit draagt bij aan de waterberging en verkoeling in de zomer.

2021

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 16 - 740 7
wij op Heijplaat een binnentuin klimaatadaptief. En in Dordrecht legden we een 'proeftuin biodiversiteit' aan: een stuk gazon van 7 bij 9 meter is omgeploegd en ingezaaid met inheemse planten. En met resultaat! Daar waar aanvankelijk 36 soorten te vinden waren, zijn het er nu 149. De spin-off hiervan begint te werken: inmiddels hebben we ook op de plaats van gesloopte panden een dergelijke 'tuin'

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 38 - 2262 7
Duurzaamheid is in de Vogelbuurt een vliegwiel voor sociaal contact. Samen met omwonenden wordt in de Vogelbuurt een groene long gerealiseerd in de Fuutstraat en Waterhoenstraat waarbij 'Insecten en planten die voorheen niet meer voorkwamen in deze gebieden zijn teruggekeerd' 38

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 41 - 2690 7
In de wijken Wielwijk en Crabbehof experimenten we op braakliggende terreinen met de aanleg van proeftuinen met een diversiteit van planten om zo de biodiversiteit te stimuleren, met mooie resultaten. Insecten en planten die voorheen niet voorkwamen in deze gebieden zijn teruggekeerd.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 48 - 2136 5
• Vooruitlopend op een invoering hiervan voor de hele regio ZWSP zorgden we bij tien tuinen in ons gebied dat bij de tuin bij verhuur na mutatie voor minimaal 60% groen was.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 48 - 2204 5
• We plaatsen twaalf regentonnen bij huurders die een groen tuin hebben of deze groener maakten.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 49 - 2368 5
Alle huishoudens hebben € 1.000,- aan waardebonnen ontvangen, te besteden bij drie lokale ondernemingen voor zonwering, groen en raambekleding. Deze drie onderwerpen werden bij het ophalen van de behoefte het meest genoemd.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 41 - 2969 6
In de Vogelbuurt is een achtertuin ingericht als proeftuin biodiversiteit. Dit om de bewoners te laten zien dat een groene tuin kan bijdragen aan biodiversiteit en ook geen grote onderhoudsbehoefte heeft. Daarbij spreken we bij nieuwe verhuringen af dat maximaal 40% van de tuin betegeld mag worden.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 16 - 160 16
Natuurlijk in balans Woonbron heeft de intentieovereenkomst Klimaatadaptatie met het Rotterdamse Weerwoord ondertekend. Hierin onderkennen wij dat d gevolgen van het veranderend klimaat effect hebben op de stad Rotterdam, haar inwoners, de openbare ruimte, gebouwde omgeving en het bezit van woningcorporaties. We spraken af dat klimaatadaptatie een afgewogen plek krijgt in onze werkzaamheden.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 35 - 1016 16
Onder het terras zorgen infiltratiekratten voor opname van het regenwater in de grond. Het Hoogheemraadschap van Delfland droeg financieel bij via de stimuleringsregeling klimaatadaptatie.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 48 - 1947 16
Vandaag voor morgen We boekten de eerste resultaten in drie pilots klimaatadaptatie.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 48 - 2554 10
• We vergroenen in Hoogvliet door bij herstel van de voortuinen aan de Tijmweg de tuinen direct te vergroenen en hiermee wateroverlast tegen te gaan.

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 35 - 2347 9
onderhoud. Een woongebouw wordt volledig verhuurd aan stichting Perspektief. We zagen kans om hier meteen de woonkwaliteit en de veiligheid te verbeteren. De woningen kregen isolerend en zonwerend glas wat voor een goed binnenklimaat zorgt. Een greep uit de andere werkzaamheden zijn de plaatsing van nieuwe voordeuren die voldoen aan Politiekeurmerk Veilig Wonen. Met de toevoe - ging van een videofoo

Woonbron Bestuursverslag 2021 Document Lianna van Gils 04/02/2024 Content 49 - 2357 9
Alle huishoudens hebben € 1.000,- aan waardebonnen ontvangen, te besteden bij drie lokale ondernemingen voor zonwering, groen en raambekleding. Deze drie onderwerpen werden bij het ophalen van de behoefte het meest genoemd.

2022

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 47 - 898 5
Vandaag voor morgen Nissewaard heeft meegedaan met het Nederlands kampioenschap 'Tegelwippen'. Als gezamenlijke partijen proberen we daarbij bewoners te bewegen om tegels in tuinen te vervangen door groen.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 52 - 553 5
Groen in de buurt Op Heijplaat werd de binnentuin achter café Courzand vergroend. Ook werd de hemelwateraf - voer van de omliggende woningen afgekoppeld.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 43 - 1767 6
was daarin een leidend thema. In 2022 zijn diverse projecten op het gebied van duurzaamheid gerealiseerd. Zo is er een kli - maatadaptieve proeftuin aangelegd. Daarnaast zijn er sedumdaken aangelegd op bergingen. Nieuwe bewoners hebben een groen hart en leggen andere buurtbewoners graag uit welke voordelen hun groene tuin heeft ten opzichte van een bete - gelde tuin.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 17 - 859 11
De pilots uit 2021 met betrekking tot vergroening van binnentuinen kregen in 2022 een vervolg. Per regio zijn er enkele projecten gestart op het gebied van biodiverse inrichting van binnentuinen met inheemse beplanting. Ook zijn er bijenhotels geplaatst, stoeptegels 'gewipt' en geveltuinen ingericht.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 46 - 377 11
Samen werken we niet alleen aan betaalbare woningen, maar ook aan de leefbaarheid en vergroening van Spijkenisse.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 43 - 2169 11
het Vogelnest' heeft een par - ticipatietraject plaatsgevonden waarbij bewoners wonend aan twee grasvelden hun wensen konden meegeven. Uiteindelijk zijn er drie ontwerpen gemaakt waarvan er twee zijn uitgekozen. Ook hier - bij is gedacht aan waterberging, hittestress en bio - diversiteit. Daarnaast zijn er biodiverse tuinen bij de Zoutmanflat en Eemsteynplaat aangelegd.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 17 - 476 15
Natuurlijk in balans De gemeente Rotterdam heeft als instrument het 'Buurtpaspoort' ontwikkeld, om op project - en complexniveau inzicht te geven in klimaatrisico's.

Woonbron Bestuursverslag 2022 Document Lianna van Gils 04/02/2024 Content 17 - 1264 9
Bij nieuwbouwwoningen met een tuin hanteren we in het huurcontract voortaan een verplichting om maximaal 40% van de tuin te verharden. Deze regel gaan we vaker toepassen, ook bij bestaande woningen die een nieuwe huurder krijgen. De eerste ervaringen zijn goed.

Appendix 2E: Results SOR

2018 – No keywords found

2019 – No keywords found

2020 – No keywords found

2021

SOR_Jaarstukken_2021_DEF Document Lianna van Gils 04/02/2024 Content 29 - 1921 5
en seniorvriendelijke wijken. Maar het gaat net zo goed om een veilige, toegankelijke, uitdagende en inclusieve openbare ruimte. Met duidelijke routes die de belangrijkste sociale knooppunten met elkaar verbinden, voldoende bankjes, schaduw en groen dat mooi is om naar te kijken, maar ook aanzet tot beweging en bijvoorbeeld tuinieren, en die contact en vertrouwdheid faciliteert.

SOR_Jaarstukken_2021_DEF Document Lianna van Gils 04/02/2024 Content 36 - 611 6
Op locaties waar we woningen op bestaande bouw willen toevoegen (optoppen), kijken we naar mogelijkheden om bijvoorbeeld groene daken toe te voegen.

SOR_Jaarstukken_2021_DEF Document Lianna van Gils 04/02/2024 Content 44 - 374 5

Het borgen van voldoende aanbod van huurwoningen in het sociale segment heeft onze prioriteit. De opgave rond de energietransitie pakken we gezamenlijk op. We gaan slim om met hitte en (hemel)waterproblematiek in nieuwbouw en hebben hierbij ook aandacht voor circulariteit. Het gezamenlijk streven is om eventuele betaalbaarheidsproblemen bij de bron aan te pakken met het toepassen van maatwerk. Sommig

2022 – No keywords found

Appendix 2F: Results Ressort Wonen

2018 – No keywords found
2019 – No keywords found
2020 – No keywords found
2021 – No keywords found
2022 – No keywords found

Appendix 2G: Results WVH

2022

Punt 4 Jaarstukken WVH 2022 Document Lianna van Gils 10/02/2024 Content 13 - 724 16

We hanteren een brede duurzaamheidsdefinitie. Dit betekent dat we oog hebben voor circulair bouwen en renoveren, voor het aanpassen van woningen en woonomgeving aan het veranderende klimaat (klimaatadaptatie) en voor een duurzaam gebruik van de woning (bewonersgedrag). Maar we zijn geen voorloper bij innovaties op het vlak van duurzaamheid. We zijn volgend en maken gebruik van bewezen technologie en concepten.

Punt 4 Jaarstukken WVH 2022 Document Lianna van Gils 10/02/2024 Content 13 - 2173 11

en dak- en vloerisolatie moeten de woningen op termijn naar een A-label brengen. Het verbeteren van de leefbaarheid in de buurten is ook onderdeel van het grote plaatje. Denk hierbij aan vergroening van de erfafscheidingen/tuinen en het vergroten van de algemene veiligheid. Ook wordt een aantal woningen qua woonoppervlak vergroot om binnen de wijk meer te differentiëren in woningaanbod en bijbehorende doelgroep

Appendix 2H: Results Maaswonen

2021

Jaarverslag-en-Jaarrekening-2021-MaasWonen Document Lianna van Gils 04/02/2024 Content 31 - 2067 16

4.4 Duurzaamheid Energietransitie, circulair en klimaatadaptatie MaasWonen streeft naar een gemiddeld energie label A voor alle woningen. De eerste woongebouwen waar de verduurzaming is gestart betreft de Bertrand Russell en de Anatole France in Rotterdam Ommoord. De verduurzaming betekent een verbetering van het energielabel van gemiddeld D naar A. De voorbereiding van de renovatie van de Bertrand Russell is gestart in

2022

Jaarverslag-2022-MaasWonen-vastgesteld-20230615-wasgetekend-incl-controleverklaring Document Lianna van Gils 04/02/2024 Conte

In de prestatieafspraken staan de volgende hoofddoelen centraal: • Realiseren aantrekkelijke woonmilieus: Wijken in balans • Woningvoorraad met toekomstwaarde: Energietransitie, Klimaat, groen en circulariteit, Kwaliteit van de bestaande woningvoorraad • Basis op orde: Beschikbaarheid, Betaalbaarheid, Huisvesting specifieke doelgroepen, Leefbaarheid In 2022 zijn met de gemeente Barendrecht nog gee

Jaarverslag-2022-MaasWonen-vastgesteld-20230615-wasgetekend-incl-controle\ Document Lianna van Gils 04/02/2024 Content 34 - 689 16

4.4 Duurzaamheid Energietransitie, circulair en klimaatadaptatie MaasWonen streeft naar een gemiddeld energie label A voor alle woningen en in 2025 is de ambitie dat alle woningen gasloos zijn. Voor twee complexen (320 woningen) is in 2022 een overeenkomst gesloten om deze in 2023 aan te sluiten op het stadsverwarmingsnet. In 2022 zijn voor vijf complexen verduurzamingsaanpakken uitgewerkt waarvan de gewenste maatregelen

Appendix 2I: Results Habion

2021 – No keywords found
2022 – No keywords found

Appendix 2J: Results SSH

2011 – No keywords found
2012 – No keywords found
2013 – No keywords found
2014 – No keywords found
2015 – No keywords found
2016 – No keywords found
2017 – No keywords found
2018 – No keywords found
2019

Jaarverslag 2019 SSH Document Lianna van Gils 05/02/2024 Content 34 - 2642 5

stadswarmte van de nieuwe biocentrale van Eneco, warmte-terug-win-units, zonnepanelen op het dak, ledverlichting met bewegingssensor, gebruik van onderhoudsarme materialen, voorzieningen als een collectieve waskamer en deelauto's, bunkervijver als waterberging, aanleg van een groen stadspark, tien vleermuiskasten en toepassing van circulair materiaal bij de inrichting van de buitenruimte.

2020 – Annual report not available

2021

Jaarverslag 2021 Document Lianna van Gils 05/02/2024 Content 39 - 2399 5

Groen dak op gebouw Krommerijn Terug naar de inhoudsopgave

Jaarverslag 2021 Document Lianna van Gils 05/02/2024 Content 42 - 2277 5

NK tegelwippen Samen met de gemeente Utrecht hebben we bewoners van stadspanden verleid om stoeptegels te vervangen voor groen. De gemeente stelde tuingereedschap ter beschikking en voerde materiaal af. De SSH stelde budget beschikbaar voor de aanschaf van plantjes. Zeven huizen hebben actief gebruik gemaakt van het aanbod. Deze samenwerking smaakt naar meer en zetten we voort in 2022.

Jaarverslag 2021 Document Lianna van Gils 05/02/2024 Content 40 - 1799 11

eventueel op te slaan ■ We beperken onze belasting op het milieu - Door bewuste keuzes te maken in gebruik van materialen - Door waar mogelijk ruimte te creëren om water op te vangen - Door hittestress in onze gebouwen te voorkomen - Door maatregelen te nemen voor behoud van de biodiversiteit Onze koers werken we concreet uit op het gebied van nieuwbouw, bestaande bouw, bewoners en de eigen organisatie. Nieuwbo

2022

Jaarverslag SSH 2022 Document Lianna van Gils 05/02/2024 Content 44 - 893 6

onze eigen bedrijfsvoering te verduurzamen, ZHUNHQZHVDPHQPHW'H&OLTXH=LMKDOHQRQVNR͵HGLNRSHQUHF\FOHQKHW(QLQGHFHPEHU hielden we een lunchlezing over de toepassing van duurzame, groene daken die door 30 FROOHJDëVZHUGEH]RFKW Grootschalige inkoop van groene energie Het grootste deel van onze bewoners maakt gebruik van gas en elektra die wij voor ze inkopen. Voor de woningen die zijn a

Jaarverslag SSH 2022 Document Lianna van Gils 05/02/2024 Content 42 - 77 11

42 Jaarverslag 2022 gebruikgemaakt van duurzame, gerecyclede materialen en vergroening speelt er een centrale rol. De woontorens hebben bijvoorbeeld sedumdaken en in de gevelbekleding is ruimte gemaakt voor fauna. Zonnepanelen op de daken wekken duurzame energie op. Een ELM] RQGHUÊGHWDLOëGHYRRUPDOJHDWRRPEXQNHUWGH.RXGH2RUJRHWQXGLHQVWDOVYLMYHU en waterberging.

Jaarverslag SSH 2022 Document Lianna van Gils 05/02/2024 Content 43 - 490 11

rol in de verduurzaming van onze woningen. Ons beleid richt zich daarom nadrukkelijk op bewustwording, zodat zij hun gedrag leren aanpassen en daarmee positief bijdragen aan energiebesparing en vergroening. De animo hiertoe nam in 2022 merkbaar toe vanwege de stijgende energieprijzen. Studenten betalen daarvoor de rekening, terwijl zij vooralsnog niet in aanmerking kwamen voor de energietoeslag. Om hun daarin

Jaarverslag SSH 2022 Document Lianna van Gils 05/02/2024 Content 41 - 127 11

41 Jaarverslag 2022 Q:HEHSHUNHQRQ]HHODVWLQJRSKHWPLOLHX - door bewuste keuzes te maken in materiaalgebruik; - door hittestress in onze gebouwen tegen te gaan; - door maatregelen te nemen voor het behoud van biodiversiteit.

Appendix 2K: Results Wooncompas

2011 – No keywords found

2012

Wooncompas - 2012 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 28 - 1919 6

College voor het beheer en de wekelijkse restaurantfunctie. Onze bewoners nemen deel aan seniorengym, koersbal, kaarten, creaclub en leveren hun bijdrage als vrijwilliger. De kinderopvang in de plint is dankzij de "groene" wijk buitengewoon succesvol, tegen de wind in. In 2012 is de gemeente dan ook verzocht om de tijdelijke bestemmingswijziging om te zetten in een permanente bestemming.

2013 – No keywords found

2014 – No keywords found

2015 – No keywords found

2016 – No keywords found

2017 – No keywords found

2018 – No keywords found

2019 – No keywords found

2020 – No keywords found

2021

Wooncompas - 2021 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 28 - 3446 5

jaar. Echter, in de periodes tussen de lockdowns hebben we kans gezien om samen met bewoners op te trekken om hun buurt een beetje mooier te maken. Er was met name aandacht voor onderhoud van groen en tuinen. Ook kregen binnenhofjes een opfrisbeurt met hulp van omwonenden. Een overzicht van participatieactiviteiten: - In het centrum praten we met bewoners over de inrichting van hun binnentuin.

Wooncompas - 2021 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 31 - 2112 9

is de houdbaarheid van het systeem onderzocht. Uit dit onderzoek is gebleken dat afkoppeling van het systeem en vervanging door individuele systemen voor de deurbediening en bediening van de zonwering de meest voor de hand liggende oplossing is. In 2021 heeft de VvE hiertoe besloten. De persoonsalarmering is eveneens aangesloten op het domoticasysteem. Aan de huurders is geadviseerd een individueel abonneme

2022

Wooncompas - 2022 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 32 - 1670 5

vóór het ontwikkelbesluit bij de planvorming. We gaan niet alleen inloopavonden organiseren, maar ook workshops waarbij de huurders en omwonenden mee kunnen praten over thema's als inrichting buitenruimte, groen en woningtypologie. Ook dit is vooruitlopend op de invoering van de Omgevingswet en uitvoerend vanuit onze klantvisie. In 2023 gaan we deze vorm van participeren evalueren.

Wooncompas - 2022 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 32 - 2342 5

Een onderdeel van het duurzaam slopen van het complex was de inzet van struikroven. Alle planten en struiken konden uitgegraven en meegenomen worden door toekomstig huurders en omwonenden. Op deze manier kreeg het groen een tweede kans.

Wooncompas - 2022 - Jaarsverslag Document Lianna van Gils 05/02/2024 Content 21 - 3566 16

Renovatie (Ridderkerk) In de Bloemenbuurt renoveren we 158 woningen duurzaam door middel van een BENG (BijnaEnergieNeutraalGebouw) ingreep. Ook is veel aandacht in en om de woning voor klimaatadaptatie. Ruim 95% van de bewoners heeft akkoord gegeven op de uitvoering van de plannen. Dit na goed overleg met de bewoners via de klankbordgroep, waarbij door invloed van bewoners enkele aanpassingen zijn gemaakt in het plan. D

Appendix 3: Results from the content analysis Policy papers

Appendix 3A: Results Havensteder

Meerjarenplan 2022-2025

Havensteder - Meerjarenplan - 2022-2025 Document Lianna van Gils 04/02/2024 Content 19 - 2170 11

waterberging (blauw). Op deze manier kunnen onze daken bijdragen aan het terugbrengen van het CO2-gebruik of het bergen van overtollig regenwater. Daarnaast bieden onze daken ook kansen om hittestress in onze complexen te verminderen, bijvoorbeeld door de daken groen te maken. De komende vijf jaar krijgt elk Havenstederdak een strategie en zorgen we dat een kwart van onze daken een specifieke functie kr

Havensteder - Meerjarenplan - 2022-2025 Document Lianna van Gils 04/02/2024 Content 19 - 1652 6

4. In 2025 hebben al onze geschikte daken een dakstrategie gekregen. 25% van het dakoppervlak heeft een blauwe (waterberging), groene (begroeid), gele (zonnepanelen) of witte (verkoeling) functie.

Appendix 3B: Results Woonstad Rotterdam

Ondernemingsstrategie 2022 en verder – No keywords found

Appendix 3C: Results Hef Wonen

No policy plans available

Appendix 3D: Results Woonbron

Koersdocument 2021

Woonbron - Koersdocument - 2021 Document Lianna van Gils 04/02/2024 Content 2 - 961 6

Als je via een schoon portiek het gebouw verlaat valt je oog op de 'oases' in de wijk: groene plekken, waar het regenwater wordt opgevangen en met bomen die de zomerse hitte in toom houden. Woningen zijn gemaakt van materialen die bijdragen aan dat prettige leefklimaat én duurzaamheidsdoelen.

Woonbron - Koersdocument - 2021 Document Lianna van Gils 04/02/2024 Content 10 - 130 6

Daarom zorgen we samen met al onze partners voor prachtige groene wijken, waar je aangenaam woont." 3. Vandaag voor morgen Duurzaamheid is een belangrijke prioriteit voor ons. We hebben er allen baat bij als we goed met onze leefomgeving omgaan. Op termijn is het drastisch beperken van onze negatieve invloed op klimaat en milieu letterlijk van levensbelang.

Woonbron - Koersdocument - 2021 Document Lianna van Gils 04/02/2024 Content 11 - 1384 6

• Groen en blauw gaat over aantrekkelijke groene wijken met ruimte voor water. Daarmee zorgen we voor een aangename woonomgeving waar bewoners in balans met de natuur kunnen leven. De lucht is er schoon, de biodiversiteit neemt toe, schaduw van bomen voorkomt hitte in de zomer, regenwater vangen we op, ook met groene daken die bovendien koelen in de zomer en isoleren in de winter. Samen met gemeen

Woonbron - Koersdocument - 2021 Document Lianna van Gils 04/02/2024 Content 5 - 1543 5

die daar zelf een bijdrage aan leveren. Elke wijk kent vrijwilligers en actieve bewoners die zich inzetten voor de buurt, koplopers die activiteiten organiseren of helpen om de wijk schoon en groen te houden. Wij koesteren ze! En ondersteunen ze waar mogelijk. Soms is het al genoeg om een garagebox of een berghok beschikbaar te stellen waar ze hun tuingereedschap opslaan of activiteiten voor de

Woonbron - Koersdocument - 2021 Document Lianna van Gils 16/02/2024 Content 11 - 1609 5

voor water. Daarmee zorgen we voor een aangename woonomgeving waar bewoners in balans met de natuur kunnen leven. De lucht is er schoon, de biodiversiteit neemt toe, schaduw van bomen voorkomt hitte in de zomer, regenwater vangen we op, ook met groene daken die bovendien koelen in de zomer en isoleren in de winter. Samen met gemeenten kunnen we dergelijke initiatieven stimuleren en mogelijk make

Woonbron - Koersdocument - 2021 Document Lianna van Gils 16/02/2024 Content 11 - 3673 5

vlakken dan energie. Isolatiematerialen hebben veelal een grote milieu-impact bij productie en transport en maximaal isoleren van woningen kan in de zomer juist leiden tot problemen met hitte in huis. Een iets minder zwaar geïsoleerd huis dat verwarmd wordt met duurzaam opgewekte energie is misschien wel beter voor de planeet dan een huis dat nauwelijks energie gebruikt maar dat met veel (foss

Woonbron - Koersdocument - 2021 Document Lianna van Gils 16/02/2024 Content 10 - 559 4

Het gaat om een aanpak waar de bewoner nu direct profijt van heeft, door de opvang van water bij hevige regen, een koel huis in de hete zomer en een lage energierekening voor de verwarming in de winter.

Appendix 3E: Results SOR

Ondernemingsplan 2023-2026

SOR_Ondernemingsplan-2023-2026_210x297mm_FINAL_RGB Document Lianna van Gils 16/02/2024 Content 8 - 1136 16

Bij het toevoegen van woningen aan onze vastgoedportefeuille, bij transformatie en bij onderhoud zijn duurzaamheid, circulariteit en klimaatadaptatie onderdeel van het programma van eisen. SOR heeft een relatief jonge woningvoorraad en een gemiddeld goede energie-index waarde. Enkele woningen scoren niet goed. De woningen met de slechtste scores gaan we verduurzamen.

Appendix 3F: Results Ressort Wonen

Strategisch meerjarenplan 2017 – No keywords found

Strategisch meerjarenplan 2019 (Very short document) – No keywords found

Appendix 3G: Results WVH

Koersplan 2021

WVH DEFINITIEF Koersplan 2021 boekje Document Lianna van Gils 10/02/2024 Content 8 - 1795 16

een brede duurzaamheidsdefinitie. Dit betekent dat we ook oog hebben voor circulair bouwen en renoveren, voor het aanpassen van woningen en woonomgeving aan het veranderende klimaat (klimaatadaptatie) en voor een duurzaam gebruik van de woning (bewonersgedrag). Maar we zijn geen voorloper bij innovaties op het vlak van duurzaamheid. We zijn volgend en maken gebruik van bewezen technologie en concepten.

Appendix 3H: Results Maaswonen

Ondernemingsplan 2022-2027

20221201-Ondernemingsplan-2022-2027-definitief Document Lianna van Gils 15/02/2024 Content 11 - 1968 11

De klimaatverandering brengt ook voor de woningcorporatie uitdagingen met zich mee. Inzetten op het verbeteren van de energielabels is gemeengoed geworden, maar er liggen ook vraagstukken op het vlak van biodiversiteit en opvangen van de extremen in het weer. Waterberging is een vraagstuk en in de steden is de hittestress een probleem, zeker voor de oudere senioren die onze doelgroep is.

Appendix 3I: Results Habion

Flyer Duurzaamheid 2021 – Nokeywords found

Habion Visie 2023 – No keywords found

Appendix 3J: Results SSH

Ondernemingsplan 2020-2023 – No keywords found

Duurzaamheidsbeleid 2023

Duurzaamheidsbeleid SSH_def herrijking 2023 Document Lianna van Gils 16/02/2024 Content 2 - 1573 11

o Door hittestress in onze gebouwen te voorkomen.

Duurzaamheidsbeleid SSH_def herrijking 2023 Document Lianna van Gils 16/02/2024 Content 4 - 1969 11

• Vraagstukken als hittestress, gasloos koken en flora en fauna.

Appendix 3K: Results Wooncompas

Online policy plan:

Appendix 4: Results from the Content Analysis Performance Agreements

Performance Agreements 2017 – No relevant keywords found

Performance Agreements 2018 – No relevant keywords found

Performance Agreements 2019 – No relevant keywords found

Performance Agreements 2022-2023 – No relevant keywords found

Appendix 4: Content Analysis Results Performance Agreements

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 20 - 288 16
2024-2025 20 C. Duurzaamheid De transitie in Rotterdam naar een duurzame gebouwde omgeving is complex en vraagt nadrukkelijk om samenwerking tussen gemeente, corporaties en huurders, met als doel CO2- uitstoot terug te dringen. Deze inspanningen zien ook toe op klimaatadaptatie en circulariteit. Al deze inspanningen zijn nodig voor een veerkrachtige en duurzame gebouwde omgeving.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 23 - 1556 16
Voor een goede samenwerking ten aanzien van klimaatadaptatie is het van belang dat het meerjarenprogramma van de gemeente en die van de corporaties goed op elkaar afgestemd worden. Hiervoor dient het Programma Overleg Buitenruimte, dat 2 keer per jaar plaatsvindt.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 23 - 1914 16
24. Corporaties worden hiervoor uitgenodigd. Corporaties en het Rotterdams WeerWoord gaan dit overleg benutten om de kansen voor klimaatadaptatie te optimaliseren.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 23 - 2007 16
Gemeente nodigt corporaties uit voor een gratis training klimaatadaptatie die de gemeente samen met de Hogeschool Rotterdam heeft opgesteld.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 23 - 2943 16
Corporaties kunnen bij de gemeente buurtpaspoorten aanvragen, om een meer actueel en specifiek beeld per buurt ten aanzien van klimaatadaptie te krijgen, waarop corporaties hun beslissingen kunnen baseren. In de buurtpaspoorten zijn per buurt diverse gegevens beschikbaar met betrekking tot klimaatadaptatie.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 24 - 35 16
Prestatieafspraken 2024-2025 24 Klimaatadaptatie: Hittestress 26. De gemeente werkt met partners uit het fysieke en het sociale domein aan een hitte-aanpak met speciale aandacht voor zelfstandig wonende ouderen.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 24 - 427 16
De gemeente maakt een lokaal hitteplan en zal jaarlijks de uitvoering evalueren en actualiseren. In de periode 2024-2026 stelt de gemeente subsidie beschikbaar voor fysieke maatregelen die bijdragen aan klimaatadaptatie, waaronder maatregelen voor vastgoed tegen hitte.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 37 - 1084 16
Innovatieve technieken, klimaatadaptatie en groen 9. Bij nieuwbouw en renovatie onderzoekt Habion de mogelijkheden van conceptueel bouwen, circulair slopen en duurzame regenwaterafvoer.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 44 - 35 16
Prestatieafspraken 2024-2025 44 Klimaatadaptatie 4. Havensteder neemt klimaatadaptieve maatregelen mee bij nieuwbouw, zoals deze zijn vastgesteld in ons interne 'Programma van Eisen nieuwbouw' (o.a. in projecten Tuinbuurt Vrijlandt en de Vinkenstraat).

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 54 - 1712 16
Klimaatadaptatie/groen 5. Bij het toekomst klaar isoleren van de 425 woningen is naast het binnenhouden van warmte in de winter, ook aandacht voor het weren van warmte in de zomer om hittestress in de (senioren)wooncomplexen van MaasWonen te voorkomen door de toepassing van zonwerend glas en/of zonwering.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 54 - 2111 16
6. Bij de herinrichting van de gemeenschappelijke tuinen van wooncomplexen wordt klimaatadaptatie meegenomen in het ontwerp door aandacht te hebben voor beschutting, waterbuffering en biodiversiteit. In 2024/2025 betreft het de tuinen van de wooncomplexen Anatole France, Nieuw Verlaat en Laurens.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 59 - 1597 16
Klimaatadaptatie/groen 5. Ressort Wonen geeft uitvoering aan haar beleid om huurders te stimuleren om tuinen te vergroenen in plaats van te bestraten. Zo zijn er verschillende acties (tegel eruit, groen erin) en is er aandacht voor extra groen in tuinen bij mutaties. Ressort Wonen zet het groene tuinenbeleid voort en evalueert het.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 59 - 2001 16
6. Bij de inrichting van de buitenruimte Nieuw Welgelegen is klimaatadaptatie één van de belangrijkste doelen, naast het organiseren van ontmoeting. Gemeente Rotterdam, Ressort Wonen werken hierin samen. DIA (dat is de welzijnsorganisatie die de opdracht heeft om door deze activiteit participatie van vitale ouderen te bevorderen) wordt daarbij betrokken.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 68 - 1924 16
Klimaatadaptatie/groen 3. De SSH heeft op momenteel groene daken op Leidsche Veem en Hatta en een binnentuin bij Caland. In 2024 onderzoeken we verder hoe we onze complexen in Rotterdam meer klimaatadaptief en groener kunnen maken.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 73 - 2119 16
Klimaatadaptatie/groen 4. WVH tekende de partnerverklaring 'Klimaatkrachtig Delfland' van het Hoogheemraadschap van Delfland. WVH en gemeente gaan in gesprek over uitvoeringsprogramma van Weerwoord.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 78 - 2455 16
Klimaatadaptatie/Rotterdams WeerWoord 7. Bij buurtprojecten werkt Woonbron aan het vergroenen van (binnen)tuinen. We zetten de buurtpaspoorten samen met de gemeente in om effectieve maatregelen tbv klimaatadaptatie te kunnen nemen.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 89 - 538 16
Klimaatadaptatie/groen 9. Aanleg van in totaal 100 groene tuinen bij mutatie in 3 wijken waar regenwateroverlast het grootst is (Oude Noorden, Bloemhof en Oude Westen).

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 23 - 1470 5
23. Gemeente stelt een subsidieregeling voor klimaat adaptieve maatregelen (t.a.v. waterberging, groen en hitte) ter beschikking voor corporaties.

Rotterdamse-Prestatieafspraken-2024-2025-deel-A-en-B-met-handtekeningen Document Lianna van Gils 17/02/2024 Content 88 - 1889 5
C. Duurzaamheid Bewonerscommunicatie 1. Woonstad Rotterdam (incl. Stadswonen Rotterdam) zet communicatie naar bewoners voort over wat ze zelf kunnen doen aan: energie besparen, hitte in de woning tegengaan en tuinen vergroenen.

Appendix 5: Results Interviews

Code	Participant	Quote
Finance	HA Policy Maker 1	Demolishing buildings is often cheaper than adjusting for all the transformations needed.
	HA Policy Maker 2, HA Policy Maker 3, HA Manager Tenant Care, Tenant Association	HA does not have enough resources to fully commit to heat transition.
	HA Policy Maker 2 , Municipality Project Manager Climate adaptation, Municipality/Rotterdams Weerwoord programme manager	The municipality has subsidies to cover heat transformation costs.
	HA Policy Maker 2	Not very clear how much the transformation is going to cost and where that money should come from.
	HA Policy Maker 3	Subsidies are never budgeted, because not sure if available when investments are finished.
	HA Policy Maker 3	Subsidies have difficult demands to get them.
	Municipality Project Manager Climate adaptation	Financing becoming heat resilient is a big problem.
	Municipality/Rotterdams Weerwoord programme manager, Municipality Project Manager Heat Plan, HA Manager Tenant Care	The municipality has multiple subsidies available for the transition.
	Municipality Project Manager Climate adaptation	HA's investments in adaptation measures are so big, that if investments fail they often stop trying.
	HA Policy Maker 1	Financiers can back off if they see the impact of heat on the dwellings, therefore it's hard to be open about problems.
	Financier/Public bank	Because banks do not have profit maximization, they have room to prioritize topics such as sustainability.
	Municipality Project Manager Climate adaptation	Banks act such as they prioritize sustainability, in the end, only money matters.
	Financier/Public bank	Banks are not able to exclude HA that are not acting how they want because they have such an important function for

		the public, this is why banks cannot exclude HA.
	Municipality Project Manager Climate adaptation	Open data imposes risk on insurance companies.
Regulation	HA Policy Maker 1, HA Policy Maker 3, Municipality Project Manager Climate Adaptation	'Beschermd Stadsgezicht' makes it hard to adjust dwellings. Exterior sunshades are not allowed.
	Financier/Public bank	There is a new European law ÉU Taxonomy' but this law is not specified enough to imply harsh rules for finance investments.
	Municipality Project Manager Climate adaptation	The only option for tenant is going to Rent Tribunal which hard to prove.
	Municipality Project Manager Climate adaptation	'Beschermd Stadsgezicht' is changing their mind towards important transitions.
	HA Policy Maker 2, HA Policy Maker 3	Ha would such as to have consistent country-wide benchmarks to calculate how much of the portfolio needs to be adjusted.
	Tenant Association	It is, by law, the responsibility of the HA to provide liveable housing.
	HA Policy Maker 1	Collaboration from both parties, so the municipality works on public outside areas.
	Financier/Public bank	National Performance Agreements are of big influence.
	HA Policy Maker 2	Performance Agreements are a positive stimulant to work together with other HA's.
	Municipality Project Manager Climate adaptation	Municipality can be a bridge between HA and the financial sector.
	HA Manager Tenant Care	Performance Agreements are too general to make a lot of difference.
	Tenant Association	It should be a priority to adapt worst cases, before the summer. Making long-term policy is the second priority.
Knowledge	HA Policy Maker 1	The dwellings in portfolio are very old, so very costly to adjust.
	HA Policy Maker 3	Houses are built in the city and often not built to counter heat.
	HA Manager Tenant Care	For houses that have flat roofs, exterior sun shades and ventilation will not be sufficient.
	Tenant Association	Specific Housing types have higher risks.

	Tenant Association	Energy transition is only focused on comfortable temperatures in winter, not in summer.
	HA Policy Maker 3	A non-static database is preferred, where the HA can adjust information themselves.
	HA Policy Maker 3	Calculation methods keep changing which makes results fluctuate.
	Financier/Public bank	Both banks and HA do not have enough knowledge yet to make policies about heat. It will take a long time before knowledge is that far that they can adjust rents for heat-resilient investments.
	Municipality Project Manager Climate adaptation	Rotterdams Weerwoord has a lot of detailed maps that can be used to calculate risk factors of the surroundings.
	Municipality Project Manager Climate adaptation	Rotterdams Weerwoord introduced neighbourhood passports which are even more detailed info.
	Municipality Project Manager Heat Plan	Making dwellings cooler is the solution for if cooling cannot be found outside anymore.
Progress	HA Policy Maker 1	HA is labelling its portfolio at this moment. Labels dependent on the technical state of the building and risk of the tenant.
	HA Policy Maker 1	Have been policy-making about heat for a long time.
	HA Manager Tenant Care	There are no definite plans yet.
	HA Policy Maker 2, HA Policy Maker 3, HA Policy Maker 1	The public character of the HA makes sharing information and collaborating easy.
	HA Policy Maker 3	The HA work together well, it is efficient to use information from frontrunner.
Tenants	HA Policy Maker 1, HA Policy Maker 3	Dutch people are used to opening windows when it's warm outside, which causes heat inside.
	HA Policy Maker 1, HA Policy Maker 2	Tenants can perceive heat very differently.
	HA Policy Maker 3	Tenant behaviour can also be seen as a cheap solution.
	Municipality Project Manager Heat Plan, HA	The community can be used to help vulnerable groups during heat.

	Manager Tenant Care	
	Municipality Project Manager Heat Plan	Make use of habits from different cultures that live in social housing.
	Tenant Association	It is too easy to just blame tenant behaviour.
	HA Policy Maker 1, HA Policy Maker 2, HA Manager Tenant Care	Elderly people are the most vulnerable tenants.
	HA Policy Maker 2	The portfolio consists of a lot of elderly tenants.
	Municipality Project Manager Heat Plan	The people of Rotterdams Weerwoord have a good view of vulnerable groups.
	Municipality Project Manager Heat Plan	We have sub-groups within vulnerable groups that are even more vulnerable, such as the elderly with small social circles.
	HA Manager Tenant Care	Elderly people get extra financial help.

Appendix 6: Full results from the content analysis annual reports

Hitte in de sociale huur

Lianna van Gils

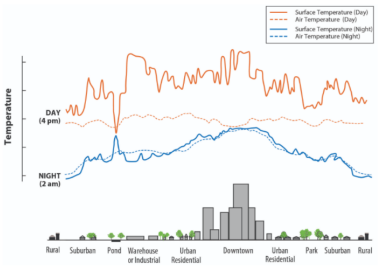
Architectuur - Management in the Built Environment

Ik ben benieuwd naar jullie mening over mijn bevindingen, positief en negatief.

Hitte in de sociale huur

Doel van de thesis: Uitzoeken waar we nu staan in het proces van de transitie naar hitte-proof maken van sociale huurwoningen en uitzoeken wat er moet gebeuren om dit proces te verbeteren.

- Hitte wordt een steeds groter probleem
  - Weerscenario's KNMI
  - Energytransitie
  - Veel woningen in de stad
- Kwetsbare bewoners
  - Staan financieel niet sterk
  - Bewoners met migratie achtergrond



Wat heb ik onderzocht? - Content analyse

Documenten van woningcorporaties bestudeerd (Rotterdam, 2023)

- Jaarverslagen
- Beleidsdocumenten
- Prestatieafspraken

Op zoek naar:

- Hoe bewust zijn de woningcorporaties van het probleem?
- Zijn woningcorporaties al bezig met aanpassingen?

Wat heb ik onderzocht? - Interviews

Doel: De barrières en kansen van verschillende stakeholders' perspectieven verzamelen en interacties tussen stakeholders onderzoeken (Rotterdam)

- 3 Woningcorporaties die bezig zijn met hitte beleid
- 1 Manager zorgzaam wonen
- 2 Gemeente Rotterdam - Rotterdams Weerwoord
- 1 Publieke bank
- 1 Woonbond

Resultaten - Content analyse

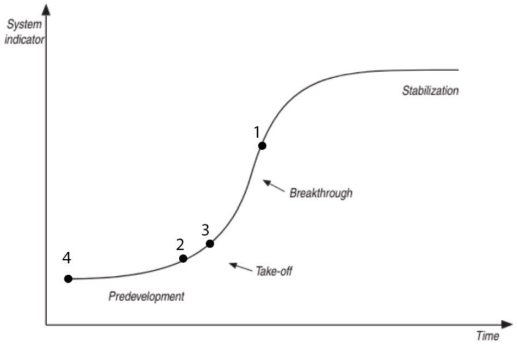
Jaarverslagen: Wel wat maatregelen, maar vaak onbedoeld

- Vergroening
- Waterberging
- Zonneschermen

Beleidsdocumenten: Niet veel beleid, enkele opmerkingen

Prestatieafspraken: 2023 niks, 2024 veel afspraken

Resultaten - Interviews



Resultaten - Interviews

Opvallend:

- Grootste barrière is geld/prioriteit
- Prestatieafspraken
- Behoefte aan benchmarks en regelgeving

Tegenstrijdigheden:

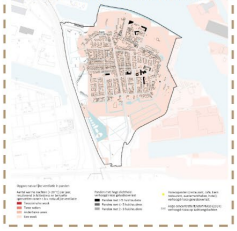
- Maatregelen - bewonersgedrag
- Financiering
- Subsidies
- EU Taxonomy

Wat nu? - Kennis

Deel kennis, tussen woningcorporaties en andere instellingen

Gebied X Gebouw X Gebruiker

Rotterdams weerwoord



Dutch Green Building Council
Framework for climate adaptive buildings

Interviews:
- Elderly have a higher social risk
- Elderly have a higher health risk

Literature:
- Elderly have higher health risks

Wat nu? - Afspraken, wetten regels

De prestatieafspraken zijn niet specifiek genoeg - Deadlines stellen

Benchmarks helpen portfolio te beoordelen - Misschien vanuit Aedes?

Klimaatadaptatie: Hittestress

26. De gemeente werkt met partners uit het fysieke en het sociale domein aan een hitte-aanpak met speciale aandacht voor zelfstandig wonende ouderen.

De gemeente maakt een lokaal hitteplan en zal jaarlijks de uitvoering evalueren en actualiseren. In de periode 2024-2026 stelt de gemeente subsidie beschikbaar voor fysieke maatregelen die bijdragen aan klimaatadaptatie, waaronder maatregelen voor vastgoed tegen hitte.

27. De gemeente en de corporaties onderzoeken gezamenlijk de haalbaarheid van het instellen van een hittenorm op basis van specifieke data.

Deze data is afkomstig uit VABI, datasoftware op het gebied van vastgoed en duurzaamheid, en richt zich specifiek op de beoordeling van 'thermische overlast' (TO) in juli. Volgens de stichting W/E adviseurs wordt hierbij een waarde aangehouden van hoger dan 4,8.

28. Corporaties onderzoeken welke woongebouwen en ontmoetingsruimtes meeste kans op oververhitting hebben en stellen vast of er risicocomplexen zijn.

Wat nu? - Financieel

Misverstanden over Geldstromen: Gesprek aangaan

- Subsidies van gemeenten
- Financiering van banken

10

Wat nu? - buurtniveau/woningniveau

Inzetten op buurt:

- Pro-actief
- Huismeester
- Beschikbare koele ruimtes
- Kennis van cultuur delen

11

Wat nu? - Korte en lange termijn

Korte termijn:

- Goede klachtenprocedure opzetten
- Goede tijdelijke oplossingen beschikbaar stellen voor aankomende zomer
- Gebruik maken van bewoners' achtergronden

Lange termijn:

- Werken aan beleid
- Gebruik kennis die stakeholders willen delen
- Communiceren met gemeente en financiers

12

Bedankt!

Ik hoor graag jullie mening: Komt dit overeen met het beeld wat jullie hebben?

lianna.vangils@hotmail.com

Appendix 7: Comments Presentation

corporatiehuur onder de liberalisatiegrens (sociale huur)
02:15:27 [redacted] @Lianna probleem is focus icm alle andere dingen die corporaties al moeten doen zoals nieuwbouw en verduurzaming. De uitgaven zijn hoog. De inkomsten stijgen niet mee. Vrijwel alle corporaties lopen binnen uiterlijk 10 jaar tegen hun limieten van de ICR en LTV. Zonwering gaat op termijn leiden tot heel veel onderhoudskosten en handling waar geen inkomsten tegenover staan.
Het is uiteindelijk daarmee een dossier waar corporaties mee worstelen.
02:16:17 [redacted] Reacted to "@Lianna probleem is ..." with 👍
02:16:34 [redacted] We hebben vanmorgen gehoord en gezien dat voorzieningen en type woning invloed hebben op het ontstaan en voorkomen van hitte stress. Het begint dus bij het ontwerp. Mijn ervaring is dat architecten meestal kiezen voor uitstraling (buitenzijde) van het gebouw. Hier gaat veel geld in zitten wat beter aan de voorzieningen en typering van de woning besteed kan worden. Architeken zouden dus ook meer aan nazorg moeten doen om ervaringen en kennis op te halen.
02:16:56 [redacted] Reacted to "We hebben vanmorgen ..." with 👍
02:17:18 [redacted] Interessant Lianna, dankje!
02:17:35 [redacted] Reacted to "Interessant Lianna, ..." with 👍
02:17:36 [redacted] Bedankt Lianna, interessant onderzoek!
02:17:45 [redacted] Veel dank!
02:17:58 [redacted] Reacted to "Interessant Lianna, ..." with 👍