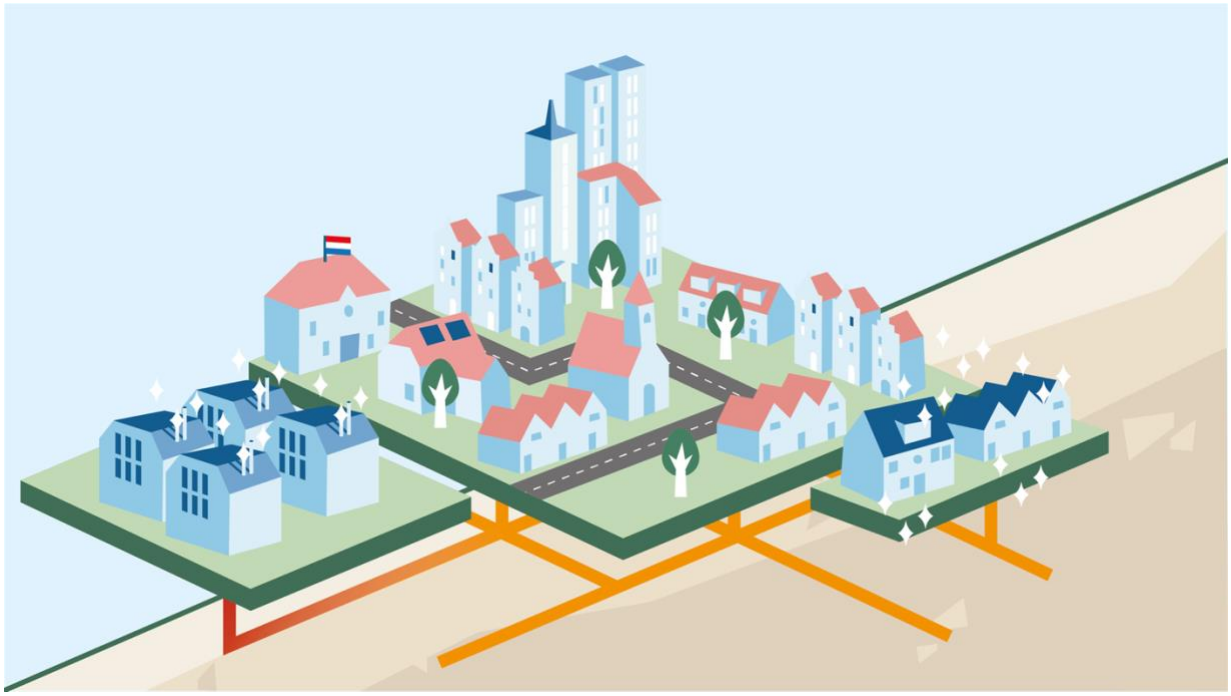
Master Thesis – Sustainable Development

Performance Agreements in the Dutch Social Housing Sector - A Powerful Policy Tool to Promote Sustainability and Alleviate Energy Poverty?



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Abstract

This research examines the content and quality of the agreements made in performance agreements between Dutch municipalities, social housing associations and their tenant associations in the case study area of the Amsterdam metropolitan area, focusing on the issues of achieving a sustainable built environment and alleviating energy poverty among their tenants. A mixed methods approach consisting of qualitative content analysis and the development and application of a sustainability and energy poverty indicator was applied to this novel research, which examined a total of 48 performance agreements signed by 32 municipalities and 36 social housing associations. The results of the content analysis show that while the identified sustainability and energy poverty themes are generally reflected in the PAs, there is considerable variation in the coverage of each theme. In addition, the findings of this study indicate that a very high level of specification in the agreements is only achieved for a few issues. The two indicators developed show that in both cases the overall quality of the performance agreements analysed achieves an average low-medium score. However, the indicators also show that while some individual agreements excel in their level of quality, others fall significantly short, with a wide range between the best and worst performing agreements. Another interesting finding is that the performance agreements that were supplemented with addenda due to the abolition of the landlord levy were among the best performing documents in terms of quality, indicating an improvement of the agreements in time. The conclusion suggests that the policy instrument of Performance Agreements is already a widely used tool to promote sustainability and alleviate energy poverty in the Dutch housing stock, while still offering considerable potential to improve both the content and the quality of the agreements.

Keywords: Social housing associations • Performance Agreements • Energy Transition • Energy Poverty • Content Analysis • Indicators

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III. List of translations

As many Dutch terms had to be translated into English, Table 1 provides a list of the original Dutch terms for reference.

Table 1: List of translations

Dutch	English
Duurzaamheidslening	Sustainability loan
Huurdersorganisatie	Tenant Association
Klimaatakkoord	Dutch Climate Agreement
Lokale Driehoek	Local triangle
Metropool Regio Amsterdam (MRA)	Amsterdam Metropolitan Area (AMA)
Nationaal Programma Regionale Energie Strategie (RES)	Regional Energy Strategies
Nationaal Programma Circulaire Economie 2023 – 2030	National Circular Economy Programme 2023-2030
Nederland circulair in 2050	National circular economy strategy
Prestatieafspraken	Performance Agreements
Programma aardgasvrije wijken (PAW)	Natural Gas Free Districts Programme
Transitievisie Warmte (TVW)	Transition Vision Heat
Verduurzamen	Measures to increase the sustainability
Vereniging van Nederlandse Gemeenten (VNG)	Association of Dutch Municipalities
Verhuurderheffing	Landlord Levy
Volkshuisvestingsbeleid	Public Housing Policy
Waarborgfonds Sociale Woningbouw	Sectoral guarantee fund for social housing
Warmtetransitie	Heat transition
Wijkuitvoeringsplannen	Neighbourhood implementation plans
Woningcorporaties	Social Housing Associations
Woningmarktregio	Housing market region
Woningwet	Dutch Housing Act
Woonlastenmodel	Housing cost model
Woonlastenneutraliteit	Housing Cost Neutrality
Woonvisie	Municipal Housing Vision

IV. List of abbreviations

The abbreviations used as well as their translation in Dutch and English are depicted in Table 2.

Table 2: List of abbreviations

Abbreviation	Dutch	English
AEDES	Vereniging van Woningcorporaties	Dutch Umbrella Organisation for social housing
AMA	Metropoolregio Amsterdam (MRA)	Amsterdam Metropolitan Area
BZK	Ministerie van Binnenlandse Zaken en Koninkrijksrelaties	Ministry of the Interior and Kingdom Relations
CBS	Centraal Bureau voor de Statistiek	Statistics Nederland's
EP	Energiearmoede	Energy Poverty
EZK	Ministerie van Economische Zaken en Klimaat	Ministry of Economic Affairs and Climate Policy
PA	Prestatieafspraken	Performance Agreements
PAW	Programma Aardgasvrije Wijken	Natural Gas Free Districts Programme
PBL	Planbureau voor de Leefomgeving	Netherlands Environmental Assessment Agency
RES	Hernieuwbare energie	Renewable energy sources
SHA	Woningcorporatie	Social Housing Association
TA	Huurdersorganisatie	Tenant Association
TVW	Transitievisie Warmte	Transition Vision Heat
VNG	Vereniging Nederlandse Gemeentes	Association for Dutch Municipalities

1 Introduction

1.1 Societal Background

The Netherlands is currently in the process of transitioning from a natural gas-dependent economy to a carbon-free economy by the year 2050. In alignment with the Paris Agreement, the Dutch government implemented the Dutch Climate Agreement (*Dutch: Klimaatakkoord*) in 2019, which serves as the primary policy framework for climate change mitigation in the Netherlands. This agreement has set legally binding targets for the reduction of greenhouse gas (GHG) emissions across all sectors, requiring a significant reduction in GHG emissions of 49% by 2030 and a substantial reduction of 95% by 2050, both compared to 1990 emission levels (Klimaatakkoord, 2019). In addition to meeting emission reduction targets, the occurrence of earthquakes in the natural gas producing region of Groningen and escalating energy prices following Russia's invasion of Ukraine are providing further momentum for the transition to a low-carbon economy (CE Delft, 2022). One sector that poses a particular challenge to the decarbonisation of the system is the built environment, which makes up around a quarter of Dutch final energy demand (IEA, 2020). Moreover, since around 90 % of Dutch buildings are depended on natural gas for heating and cooking, a shift towards renewable heating technologies such as heat pumps, geothermal energy or district heating networks, in combination with improved insulation levels, is required, which is known as the heat transition (*Dutch: Warmtetransitie*) (CBS, 2021). However, several practices, such as circular economy and climate adaptation approaches, are recognised in the literature as key contributors to achieving a comprehensive sustainable development approach to the built environment and to reducing GHG emissions (Stagrum et al., 2020; van Oorschot et al., 2023).

To enforce the heat transition measures, the national government has shifted responsibilities from a central to a more regional and local governance approach, reflecting the local nature of heat, while aiming at the two key principles of affordability and feasibility of this transition (CE Delft, 2022; Herreras Martínez et al., 2022). At the regional level, provinces, together with municipalities and other stakeholders, are expected to develop Regional Energy Strategies for the transition to renewable electricity and heat (*Dutch: Nationaal Progamma Regionale Energie Strategie*) (IEA, 2020). The municipalities, however, support the implementation of the pilot projects of the Natural Gas Free Districts Programme (*Dutch: Programma aardgasvrije wijken*). In addition, each municipality is required to develop a Transition Vison Heat (*Dutch: Transitievisie Warmte*) by 2021, which gives direction to the local heat transition by specifying the timeframe and the type of low-carbon heating source to be used at neighbourhood level (BZK, 2022; IEA, 2020). This district-based approach identifies municipalities as the primary facilitators of the heat transition in the built environment, as they can be seen as having the most relevant local knowledge and strong connections to the key stakeholders needed to implement this transition (CE Delft, 2022; Viale Pereira et al., 2020).

One key stakeholder in this transition is the Dutch social housing sector, which consists of private, non-profit companies. Of the 8 million homes in the Netherlands, 3.4 million are rental dwellings, of which about 2.3 million, or 67%, are provided by social housing associations (SHAs, *Dutch: Woningcorporaties).* These associations thus account for approximately 28.6% of the total housing stock in the Netherlands (CBS, 2024), while also providing affordable housing for vulnerable low-income groups (AEDES, 2016). Due to the urgency of the heat transition, vulnerable low-income groups are particularly at risk of losing out from these transformations, requiring an effective governance system to steer this transition (Vringer et al., 2021). Furthermore, as the level of energy poverty has increased in recent years, and around 75% of households exposed to energy poverty live in houses provided by the Dutch social housing sector, the importance of this sector in achieving a just socio-

technical-economic heat transition is further growing (Mulder, Dalla Longa, et al., 2023).[1] On the one hand, there is therefore a strong need to increase the annual renovation rate of the existing housing stock and to implement strong sustainability measures to meet climate targets, which will require large investments. On the other hand, the affordability of this transition needs to be ensured, especially to protect these vulnerable and low-income households, emphasising the crucial role of this sector in the ongoing transition (Broers et al., 2022). Nevertheless, a rapid and deep heat transition in the built environment also has the potential to reduce energy poverty by reducing energy consumption and deploying renewable energy, especially if supported by strong governance (Muhammad et al., 2023).

In line with the local governance approach, municipalities, SHAs and their tenant organisations jointly agree on the development of public housing performance in strategic policy documents. As stipulated in the Dutch Housing Act (*Dutch: Woningwet*), the associations have to report on their plans and ambitions regarding several issues, including the sustainability and affordability of their housing stock (Koninkrijksrelaties, 2020). These agreements are recorded in so-called performance agreements (PAs, *Dutch: Prestatieafspraken*) (AEDES, 2016). According to CE Delft (2018), these agreements can be seen as an essential policy tool for municipalities to steer the development of the Dutch social housing sector. While a general trend towards urban-focused environmental governance can be observed, the literature suggests that the contributions of the local approach need to be critically reviewed to assess their impact (Wolfram et al., 2019).

1.2 Problem definition and knowledge gap

Limited academic research has examined the role of SHAs in the energy transition and their interactions with local authorities. Henrich et al. (2021) recognised that engagement with SHAs is essential for a successful heat transition due to their housing stock within municipalities. However, they focused exclusively on the development of the Transition Vision Heat and suggested that further synergies could be achieved in this context by synchronising SHAs renovation plans with local authority heat transition plans. In their study, Jansma et al. (2020) pointed out that although private homeowners and SHAs tenants perceive local authorities as the most important actor in the heat transition, tenants consider SHAs to be the responsible actor for actually carrying out the necessary adaptations. Focusing on the affordability of housing for social housing tenants, Broers et al. (2022) draw conclusions from the energy renovation process of SHAs from a justice perspective. They point out that social housing tenants are particularly vulnerable to energy poverty and provide recommendations for achieving a just energy transition in the social housing sector, highlighting the crucial role of policy makers and SHAs in this process. The Dutch network organisation AEDES, which represents the interests of Dutch social housing organisations, identifies low income and high energy costs as the two main factors contributing to energy poverty. However, according to them, SHAs are already undertaking a range of measures to reduce tenants' energy bills, including major housing renovations, the installation of sustainable heating systems or solar panels to generate renewable electricity. In addition to these larger interventions, SHAs are promoting initiatives such as workshops with energy coaches and smaller measures such as draught strips to help tenants take action themselves to reduce their energy expenditure (AEDES, 2022). Some studies have examined different sustainability efforts by SHAs. Eikelenboom et al. (2021) explored the adaptation of circular economy practices by SHAs, incorporating ecological and social elements to achieve long-term environmental benefits. Looking at the application of nature-based solutions to improve climate resilience in the social housing sector, the authors of another study concluded that the knowledge of this concept and its application is still insufficient for both SHAs and municipalities (Snep et al., 2023). While an earlier

[1] Energy poverty can be understood as a situation where households lack access to essential energy services and products (European Commission, n.d.-b). For a more detailed explanation of energy poverty, see chapter 2.3.

study by Filippidou et al. (2016) found that the energy efficiency measures taken by SHAs are mostly focused on minor rather than major renovations, thus jeopardising the long-term achievement of improved energy performance, a report by AEDES points out that the SHAs have the relatively smallest share of buildings with energy labels E, F and G compared to all homeowners in the Netherlands. Nevertheless, in 2023 about one in five dwellings owned by SHAs still had a label of D or lower, of which 11.8% had an E, F or G label (AEDES, 2022). A particular research gap was identified in relation to the PAs and the specific agreements made in these documents. Boezeman & de Vries (2019) investigated the materialisation of climate adaptation strategies to limit climate-related risks to the built environment in the Dutch social housing sector. Their findings suggest that deliberate action and awareness to promote climate adaptation was very limited in the analysed PAs. The research project by Klostermann (2021), which also focused on climate adaptation strategies, developed key performance indicators for SHAs and municipalities to assess the achievement of objectives for these actions. However, no academic research was found to shed light on the issue of energy poverty alleviation in PAs. In addition, no academic studies have systematically and comprehensively reviewed and analysed how well the sustainability and energy poverty alleviation efforts of the SHAs are translated into actual agreements in the PAs, thus shedding light on their level of ambition.

In conclusion, although SHAs are seen as key players in achieving a sustainable built environment due to their large housing stock, relatively little academic research has examined their actual ambitions for this transition. As these SHAs provide a large housing stock to vulnerable low-income tenants, who are particularly vulnerable to energy poverty, the self-proclaimed level of ambition of these actors should be critically examined, especially in light of the existence of low energy labelled dwellings. Although PAs can be seen as the central steering mechanism of municipalities for SHAs, a particular research gap was identified in relation to the issues covered and the specific agreements made in these documents.

1.3 Research objective and research questions

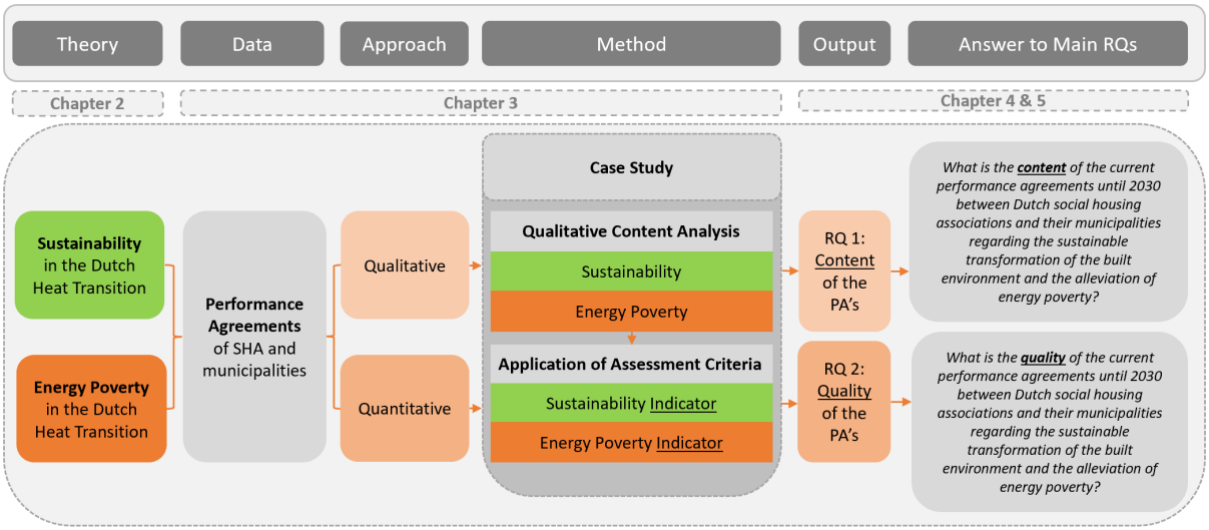
Based on the research gap regarding the content, objectives and specific agreements in the PAs, the aim of this study is to critically assess the content and quality of these documents between SHAs and municipalities in the Netherlands, and to shed light on the current role of these agreements in making the housing stock more sustainable and in reducing energy poverty levels among their tenants. The temporal scope is set to analyse currently published agreements until 2030. Two main research objectives will be pursued. The first objective is to qualitatively analyse the content of the selected agreements, with a particular focus on achieving sustainability in the built environment and alleviating energy poverty in the social housing sector (see chapter 3.3.1). The second objective is to quantitatively assess the quality of these agreements with regard to the latter issues, using a set of predefined indicators (see chapter 3.3.2).

The research gap, aim and objectives thus lead to the following two research questions, which will be critically assessed in this study:

Research Question 1	*What is the content of the current performance agreements until 2030 between Dutch social housing associations and their municipalities regarding the sustainable transformation of the built environment and the alleviation of energy poverty?*
Research Question 2	*What is the quality of the current performance agreements until 2030 between Dutch social housing associations and their municipalities regarding the sustainable transformation of the built environment and the alleviation of energy poverty?*

Figure 1 illustrates the analytical framework for analysing the content and quality of the PAs, based on the theory of sustainability and energy poverty considerations in the Dutch built environment. It also outlines the individual research steps taken in this project to address and answer the two main research questions.

Figure 1: Analytical research framework for assessing the content and quality of the performance agreements.



Following the outline presented in the analytical framework, the remainder of this research is structured as follows: Chapter 2 presents the theoretical background by introducing the concepts of sustainability and energy poverty in the Dutch heat transition. Chapter 3 provides an overview of the data collection and outlines the applied research methods used for the data analysis. In Chapter 4, the results of this research are presented in relation to the two formulated main research questions and put into perspective by the discussion in Chapter 5.

2 Theory

This chapter presents the theoretical background and concepts used in this scientific research. Chapter 2.1 provides an introduction to the role of SHAs in the Dutch heat transition. In chapter 2.2, important conditions for achieving sustainability in the Dutch built environment are identified, while chapter 2.3 discusses current research and theory on energy poverty in Europe and specifically the Netherlands. The theory will then be used to develop and inform the assessment criteria for analysing the performance agreements, as discussed in detail in the methods section in chapter 3.3.2.

2.1 The role of social housing associations in the Dutch heat transition

The following chapter provides an overview of the development of the social housing sector in the Netherlands (Chapter 2.1.1). Chapter 2.1.2 presents the role of performance agreements as a policy steering instrument between the municipality and the (local) SHAs.

2.1.1 Social housing associations in the Netherlands

The share of social housing in the Netherlands is the highest in Europe (AEDES, 2016). As a result, about 28.6% of the total housing stock, or 2.3 million rented dwellings (CBS, 2024), are provided by SHAs. In total, approximately 4 million tenants (AEDES, 2023) are housed by a total of 279 active SHAs operating in the Dutch social housing sector (Ministerie van Infrastructuur en Waterstaat, 2023a), making these associations a relevant actor in the built environment (Boezeman & de Vries, 2019). In the Netherlands, SHAs are organised as private non-profit organisations that provide affordable housing to the primary target group of low-income tenants. Due to their hybrid role, they perform a public function while operating at the interface between government, market and society (Nieboer & Gruis, 2016). The policy discourse on the role of SHAs has thus shifted over the past decades, driven in part by these competing and conflicting interests (Boezeman & de Vries, 2019).

Starting in the late 1950s, a critical discourse emerged on the privileged position of SHAs in the Dutch housing market, focusing on possible distortions and disadvantages for other market actors in this sector (Boezeman & de Vries, 2019). Finally, during the period of neoliberalism and increased market orientation in the late 1980s and 1990s, the sector moved away from government support and control. As a result, while retaining its social role in the housing market, the social housing sector became subject to financial liberalisation and privatisation (Broers et al., 2022). This increased market orientation was accompanied by a reduction in government regulation, which was from then on limited to the supervision of SHAs on the basis of general 'fields of performance', the introduction of rent regulations and the need for SHAs to report to monitoring bodies to a limited extent. From a financial perspective, capital market loans were established, jointly guaranteed by the government and the sector. In addition, direct financial support from the government was widely discontinued and SHAs were required to become financially independent (Nieboer & Gruis, 2016). This privatisation and deregulation was aimed at reducing government expenditure in the social housing sector and encouraging home ownership (Boezeman & de Vries, 2019). As a result of these changes, SHAs have gained autonomy in the allocation of resources and in their activities within this framework. The need for SHAs to be self-financing has meant that market activities, such as the sale of new and existing housing to generate income, have become more prominent. The financial benefits of developing and selling housing enabled SHAs to expand their scope, diversifying their roles and activities beyond the provision of housing for low-income households. In addition to developing buildings for the commercial market, they diversified into non-housing activities such as the provision of welfare, care and education, further distancing themselves from the government (Nieboer & Gruis, 2016). However, in 1997 a lively debate began about taking back more control over the autonomous and financially

independent SHAs, which were identified as key actors in the delivery of social policy. As the government supported the social actions of SHAs, it required them to engage more as social entrepreneurs and encouraged them to deepen their collaboration with civil society organisations such as home care organisations (Boezeman & de Vries, 2019; Nieboer & Gruis, 2016; Rijksoverheid, 2013).

In 2005, the European Commission concluded that the SHAs had received illegal state aid from the Dutch government. As the SHAs were also active in the commercial housing market, this had led to distortions and the creation of an uneven playing field for the other market players. This finding, in turn, triggered a political debate about regulating the activities of the SHAs and restricting them back to their initial target group (Boezeman & de Vries, 2019).

The credit crunch that followed the global financial crisis in 2008 had a particularly severe impact on the Dutch social housing sector, halting the previous expansion of SHAs' activities (Boelhouwer, 2020). Construction of new housing fell sharply, while the value of SHAs' property assets was adversely affected. In addition, financial institutions were more reluctant to lend money, which in turn negatively impacted the SHAs' ability to invest in new construction, further challenging their financial position (Nieboer & Gruis, 2016). Furthermore, some of the SHAs were involved in financially risky projects at the time, which consequently challenged their ability to meet their financial obligations. As a result, a political discourse emerged about the role and activities that SHAs should perform, calling for more government control over the social housing sector and a return to their core activities, namely the provision of housing for low-income households (Boezeman & de Vries, 2019). This debate was complemented by the intervention of a European competition directive on state aid, which targeted the privileged role of SHAs in the housing sector. The enforcement of this EU regulation in 2011 led to the implementation of new rules for the allocation of social housing, which required SHAs to refocus on their traditional role of housing low-income groups to remain eligible for government support (Nieboer & Gruis, 2016).

In 2013, the restricted investment capacity of SHAs was further exacerbated by the introduction of an additional property tax for the regulated rental sector, the Landlord Levy (*Dutch: Verhuurderheffing*) (Broers et al., 2022), which amounted to an expenditure of €1.9 billion for SHAs in 2015 (Boelhouwer, 2020). The introduction of this new tax was strongly criticised by municipalities and SHAs, as it reduced the capacity of SHAs to invest in the heat transition and increased rents for the low-income groups. Although intended as a temporary intervention to mitigate the effects of the financial crisis, it became a long-term measure until its abolition in 2023 (Broers et al., 2022), as described in chapter 2.1.2.

The objective of refocusing SHAs on their core business was legally implemented with the introduction of the revised Housing Act (*Dutch: Woningwet*) in 2015, which was a response to the financial crisis and followed intense debates about bringing the development of the social housing stock back under government control (Boezeman & de Vries, 2019; Nieboer & Gruis, 2016). Unfavourable market conditions thus pushed SHAs to further withdraw from activities outside their traditional social housing functions, while political developments pulled SHAs closer to the government (Nieboer & Gruis, 2016). The Housing Act introduced a number of changes. SHAs' commercial activities had to be legally separated from social housing activities of general economic interest in order to remain eligible for state aid. In addition, commercial activities outside of the core activities had to be approved by the Authority Housing Associations, and control mechanisms and supervision were strengthened, further restricting the activities and size of SHAs (Boezeman & de Vries, 2019). Instead of receiving direct subsidies from the government for their construction projects, SHAs had to finance their projects with their own equity and bank loans. Moreover, a sectoral guarantee fund was established (Dutch: *Waarborgfonds Sociale Woningbouw*), consisting of the collective assets of the SHAs, which served as a collateral for investments and also helped to manage risk. However, the Dutch State and municipalities acted as potential guarantors for the bank loans and backed them up, thus enabling

more favourable financing conditions through guaranteed capital market loans. As the social housing sector is a closed system, it requires the reinvestment of all surplus funds and revenues (AEDES, 2016; Boezeman & de Vries, 2019). In addition, housing legislation regulates the allocation of affordable social housing by defining target groups in the context of rent regulation. These national and local regulations increasingly focus on the provision of housing to low-income households who have difficulties finding suitable accommodation as the main target group (Boezeman & de Vries, 2019). Finally, the Housing Act promotes tenant participation. SHAs are required to obtain tenants' consent to renovate more than ten flats. Renovation plans that extend beyond maintenance work, such as painting, replacing window frames and repairs must be approved by 70% of tenants. Although this can be challenging, it ensures that tenants are involved (Broers et al., 2022). In addition, tenants are formally represented by tenant associations. These organisations have several legal rights to monitor SHAs and act as advisory partners to local authorities (Boezeman & de Vries, 2019). All these changes led to SHAs reducing their activities outside their core functions, which was most visible in the reduction of project development activities for sale. In addition, efficiency considerations have become more prominent, such as the reduction of staff and maintenance costs (Nieboer & Gruis, 2016).

2.1.2 Performance agreements between municipalities and social housing associations

As outlined in the previous chapter, after an era of liberalisation and deregulation, the social housing sector returned to greater state control with the implementation of the National Housing Act of 2015. As a result of the growing housing shortage in the Netherlands, the SHAs were expected to align themselves more closely with the Public Housing Policy (Dutch: *Volkshuisvestingsbeleid*), in order to fulfil their core-task of provide sufficient affordable housing for low-income groups. As described by Jonker-Hoffrén (2023), the National Housing Act provides the legal framework within which SHAs and municipalities operate and requires municipalities to develop a Housing Vision (*Dutch: Woonvisie*). This Municipal Housing Vision is a policy document that sets the direction, policy and expectations for the housing market and often derives longer-term strategies for housing development. SHAs are expected to contribute appropriately to the implementation of these local plans (BZK, 2020). The subsequent housing policy agreements are made in the local triangle (*Dutch: Lokale Driehoek*) consisting of the municipality, the SHA, and its tenants' association (TA, *Dutch: Huurdersorganisaties*). The legal instruments for recording these agreements are called performance agreements (PAs), as Broers et al. (2022) specify. In the local PAs, the parties agree on the activities that the SHA will carry out in the following year. These documents have the status of a non-binding agreement, as they cannot be legally enforced by the local authority. Nevertheless, these documents can be considered 'morally binding' (Jonker-Hoffrén, 2023) and creating and agreeing on these PAs is imperative (Plettenburg et al., 2021). In 2022, the national performance agreements were updated for the time period up to and including 2030, covering the five topics *availability*, *sustainability*, *affordability*, *liveability* and *collaboration and implementation*. In addition, the implementation of national performance agreements has been linked to the abolition of the Landlord's Levy with effect from 1 January 2023. The abolition of this tax is intended to free up additional financial capacity and is expected to increase the efforts and ambitions of SHAs (BZK, 2022). However, several SHAs and the Dutch Minister of Housing have already indicated that the financial resources may not cover the increased ambitions due to increased construction costs and rising interest rates, thus calling into question the financial planning of SHAs (BZK, 2023b).

2.2 Achieving sustainability in the Dutch built environment

The following chapter discusses key considerations for achieving a sustainable built environment in the Netherlands. Chapter 2.2.1 outlines the importance of long-term planning to achieve sustainability goals. Chapter 2.2.2 presents the reduction of energy consumption as an important pillar of the sustainability transition, while chapter 2.2.3 discusses the promotion of renewable energy in connection with the phase-out of fossil fuels. The importance of implementing a circular economy is presented in chapter 2.2.4 and the promotion of climate adaptation is discussed in chapter 2.2.5.

2.2.1 Long-term goals and ambitions

As described in chapter 1.1, the Netherlands has set ambitious targets in the National Climate Agreement to reduce its national GHG emissions by 49% and 95% in 2030 and 2050, respectively. To be consistent with the targets of the European Union's Fit-For-55 package, the national targets are expected to be further increased to 55% in 2030 and to reach zero net GHG emissions in 2050 (CE Delft, 2022). Achieving these targets is a major societal challenge that requires timely and far-reaching contributions from all actors in this transition (European Commission, n.d.-a). For the built environment sector, these sustainability targets mean in practice that CO_2 emissions must reach zero by 2050 by switching from natural gas supply to sustainable low-carbon technologies, as described in detail in chapter 2.2.3 (BZK, 2022). For sustainable and far-reaching transformations such as the heat transition, the existence of long-term visions and clear targets is considered a crucial factor (CE Delft, 2022). These plans and targets not only provide a framework, but also give a direction for action and stability for financial planning, which is especially important in the built environment due to the usually longer payback periods for investments (Andrić et al., 2019). Furthermore, the development and implementation of a long-term strategy is also essential to avoid path dependencies and associated lock-in effects that can hinder the transition when new infrastructure is introduced. This is particularly relevant for the heat transition in the Netherlands, where the presence of an extensive natural gas distribution network may hinder the eventual goal of phasing out fossil fuels (Braunger, 2023). Therefore, SHAs should provide long-term targets and their plans for emission reductions. In addition to a long-term strategy that allows decision-makers to plan the actions needed to achieve this longer-term goal, interim targets that require immediate action are essential. They underline the commitment and accountability of actors and avoid the need for deeper emission reductions due to delayed action (Day et al., 2023). Furthermore, the implementation of a monitoring system to quantify CO2 emissions plays a critical role in supporting and informing policy and decision making, as well as tracking progress over time (IEA, 2023).

However, there are several different long-term approaches to tackling climate change, with varying levels of ambition. CO_2 or carbon neutrality defines a state in which the carbon emitted into the atmosphere is balanced by the absorption of carbon in carbon sinks, such as soils, forests and oceans, or by artificial carbon sinks created by technological processes. Carbon neutrality can however also be achieved by simply offsetting all CO_2 emissions. Emissions can be offset by reducing carbon outside the organisation, for example by purchasing carbon credits to implement energy efficiency measures or low carbon technologies elsewhere (European Parliament, 2023). The concept of climate neutrality is more comprehensive than CO_2 neutrality, as it focuses not only on CO_2 emissions, but also includes other GHG emissions that need to be reduced (UNFCCC, 2021). While carbon neutrality and climate neutrality may be a possible intermediate step, they are not considered to be a valid final goal, according to the University of Oxford (n.d.). Instead, the term net zero emissions is considered to be the most ambitious target and implies that all anthropogenic GHG emissions are fully offset, whether by reduction, avoidance or compensation, and therefore reduced to zero. It is also consistent with the Paris Agreement, which emphasises the need for net zero emissions to halt global warming (University of Oxford, n.d.).

2.2.2 Reducing energy consumption

Reducing energy consumption can be seen as one of the main pillars for achieving a sustainable built environment. This is particularly the case for existing buildings, as the housing stock usually exists for several decades (Filippidou et al., 2019). The implementation of energy efficiency measures, such as major building renovations through insulation, is considered the most important measure to achieve a reduction in energy consumption (Ebrahimigharehbaghi et al., 2019; Kieft et al., 2020). Since 2002, the energy performance level and thus the energy efficiency of an existing building in the EU has been determined by energy labels ranging from A (most efficient) to G (least efficient) (Broers et al., 2022). The Dutch Climate Agreement set a target for the social housing sector to reach an average B energy label in 2021, as this results in a level of insulation that is generally 'gas-free ready', which is an important necessity for switching to, for example, a low-carbon heat pump (CE Delft, 2022). Therefore, reducing energy consumption through insulation is generally seen as a no-regret measure that curbs emissions without limiting technological choices. Herreras Martínez et al. (2022) found that, for this reason, insulation is one of the key measures in the strategic plans developed by municipalities and is seen as the first step towards decarbonising the housing stock. Furthermore, they note that citizens are often in favour of insulating their buildings (which offers lower energy bills) rather than implementing a new low-carbon heating technology. Next to the technical characteristics of the building, tenant behaviour can have a great influence of the consumption of energy (Vogiatzi et al., 2018). Therefore, for instance, educating tenants in how to reduce their energy consumption can have significant effects, while additionally helping to reduce energy poverty (see chapter 2.3.2). Another key aspect of reducing energy consumption in buildings is to improve the efficiency of equipment. For example, deploying energy efficient LED-lighting, appliances and other equipment can play an important role in this respect due to the long lifespan of the products, which determine energy consumption for many years (IEA, 2023).

2.2.3 Deploying renewable energy and phasing out fossil fuels

After reducing energy consumption in the built environment, switching to low-carbon renewable energy sources therefore plays a key role in decarbonising the remaining energy demand. This can be achieved by increasing the share of renewable gas, heat, and electricity in the overall energy mix and eventually phasing out fossil energy carriers (CE Delft, 2022). With the aim of achieving a climate neutral built environment in 2050, the Dutch Climate Agreement has set a number of supporting targets. To accelerate the transition to a sustainable built environment, 200,000 existing homes per year should be phased out of natural gas and a total of 1.5 million homes out of approximately 8 million in the Netherlands should be decarbonised by 2030 (Klimaatakkoord, 2019). Moreover, as stipulated in the national PAs, SHAs have the responsibility to gradually disconnect 450,000 existing buildings from the natural gas grid by 2030 (BZK, 2022). To reach this goal, significant infrastructure changes are needed, especially for the provision of heat.

2.2.4 Implementing a circular economy

While in the past the focus on achieving a sustainable built environment was mainly on reducing the consumption of fossil fuels through energy saving measures, improved insulation and the use of renewable energy, in recent years there has been an increasing focus on reducing the environmental impact of the construction phase of buildings and the materials used (Ministerie van Infrastructuur en Waterstaat, 2023b; van Oorschot et al., 2023). This is because the Dutch construction sector is responsible for about half of the total raw material consumption (van Leeuwen et al., 2018) and generates about 35% of the total annual waste in the Netherlands (Coenen, 2022). As GHG emissions from the use phase of buildings have decreased over time due to gradual improvements in energy performance, the environmental impact of the construction phase has therefore further increased in

relative terms, bringing it into the focus of policymakers (Coenen, 2022; van Oorschot et al., 2023). In addition, the limited availability of building materials is a potential bottleneck in the ongoing transition, which circular economy practices can help alleviate (CE Delft, 2022). In its national circular economy strategy (*Dutch: Nederland circulair in 2050*), the Netherlands has set itself the goal of achieving a fully circular economy by 2050. To accomplish this goal, the following four leading measures have been identified: Reducing resource consumption, substituting raw materials, extending product lifetime and implementing high-quality recycling (Rijksoverheid, 2022). These measures have been further specified in the National Circular Economy Programme 2023-2030 (NPCE) (*Dutch: Nationaal Programma Circulaire Economie 2023 – 2030*), which defines concrete actions and transition agendas for the five supply chains with the highest environmental impact. For the construction sector and the built environment, the NPCE focuses on reducing the use of (primary) building materials and switching to alternative building materials, extending the life of buildings through maintenance and reuse of existing buildings, implementing adaptive, flexible and circular building techniques and designs for new buildings, and promoting high-quality recycling of building materials at the end of their life. In addition, an interim target has been set for 2030 to halve material consumption for the construction of new buildings (Ministerie van Infrastructuur en Waterstaat, 2023b). A widely used tool for measuring circularity in the Netherlands is the 'R-ladder', which consists of 6 to 10 ladders representing the level of ambition for circularity. The lowest level consists of energy recovery through incineration (recovery), while the highest level of ambition is reflected by 'refuse', i.e. refusing to use a certain product or material (Rijksdienst voor Ondernemend Nederland, 2020).

2.2.5 Fostering climate adaptation

In recent years, at the latest since the adoption of the Paris Climate Agreement, the issue of global climate change has increasingly come to the fore, leading in many cases to the adoption of measures to mitigate climate change. Nevertheless, it is becoming apparent that measures to mitigate climate change must be accompanied by measures to adapt to the new realities and associated risks. This is due to the fact that even far-reaching measures will not be able to halt climate change due to the timescales of climate change and the imminent overshoot of natural systems that compensate for this development (Daniel et al., 2023). Adaptation to climate change therefore refers to the adjustment of social, ecological and economic processes, practices and structures to the current and projected impacts of climate change. In this context, adaptation measures need to be tailored to local conditions and circumstances and should be actively supported and implemented by national, regional and local stakeholders across all sectors to ensure an effective long-term response to climate change (UNFCCC, n.d.). Adapting to climate change in the built environment sector is particularly important as rising global temperatures can negatively affect the thermal performance of buildings. As people today typically spend around 90% of their time in buildings, indoor environmental quality can have a significant impact on their health, comfort and well-being. As a result, increasing average and extreme temperatures can promote overheating of buildings, adversely affect indoor air quality and increase heat-related health risks, which can lead to higher mortality risks (Dong et al., 2023). Moreover, the study of Hamdy et al. (2017) investigated in the Dutch context and identified several building archetypes as prone to overheating. For these reasons, there is a growing consensus that climate change adaptation should be as high on the political agenda as climate change mitigation, and that effective policies and actions are needed to protect the built environment from the negative impacts of rising temperatures (Dong et al., 2023; Hamdy et al., 2017). As Boezeman & de Vries (2019) highlight, private actors in the built environment, such as SHAs, are increasingly recognised as potentially large contributors to mainstream climate change adaptation efforts due to their large building stock. However, they also point out that anticipatory and deliberate climate adaptation efforts by SHAs have been at a very modest level of ambition and have been accompanied by low awareness of the issue.

2.3 Reducing energy poverty in the Dutch social housing sector

The following chapter provides an overview of the concept and measurement of energy poverty in Europe and the Netherlands (chapter 2.3.1) and the implications of energy poverty for the Dutch heat transition in the social housing sector (chapter 2.3.2).

2.3.1 The concept and measurement of energy poverty in the Netherlands

The concept of energy poverty (EP) can be divided into two understandings of socio-economic inequalities, according to their respective geographic locations. For developing or low-income countries, EP mainly describes a situation where households do not have an adequate access to energy services such as cooking, heating and lighting. It also includes the use of outdated technologies, inefficient fuels or fuels that are hazardous to health, such as firewood for cooking (Maxim et al., 2016). The concept of EP in developed countries emerged from early reflections on the phenomenon of *fuel poverty*, which developed following the oil crisis in the United Kingdom (UK) in the 1970s (Dalla Longa et al., 2021). Bradshaw & Hutton (1983) were the first to introduce the concept of fuel poverty, distinguishing it from the notion of poverty and providing an initial definition of fuel poverty as the inability to afford adequate heating. They also recognised the complex nature of fuel poverty and identified income, fuel expenditure combined with the adequacy of heating as important parameters. Furthermore, they developed initial policy recommendations to reduce fuel poverty in the UK. Boardman (1991) further refined the concept of fuel poverty by attempting an initial quantification, referring to households whose total expenditure on fuel exceeded ten per cent of their household income. However, Maxim et al. (2016) critically add that the use of a strict threshold can lead to an underestimation of the problem, and that fuel poverty can also apply to households that deliberately limit their heating consumption or temperature level to remain affordable. Therefore, the definitions have been modified in order to include the *needed* expenditure on energy services rather than actual expenditure. In the UK and Ireland, Boardman's (1991) findings have been widely discussed and have led to targeted policies to alleviate fuel poverty, such as the UK's 2001 Fuel Poverty Strategy (Maxim et al., 2016). While the scientific and public recognition and attention to EP, as well as the systematic introduction of targeted support schemes and policies focused on EP mitigation, was mainly limited to the aforementioned countries, it gradually became an area of interest for researchers and policymakers across the EU (Bouzarovski, 2014; Maxim et al., 2016). In 2009, the concept of EP was first explicitly mentioned in the Directive (2009/72/EC) together with the goal of protecting vulnerable consumers. The establishment of the Energy Poverty Observatory (EPOV) in 2016 introduced an institution focused on systematically measuring the extent of EP and its alleviation, underlining the increasing attention paid to this issue. In addition, as part of its Clean Energy for All Europeans package, the EU has required Member States to address and monitor EP in their National Energy and Climate Plans (NECPs). The focus on EP was further strengthened by the 'Fit for 55' package in 2021 and the revised Energy Efficiency Directive in 2023 (European Commission, n.d.-b). Due to the COVID-19 pandemic and rising energy prices in February 2022, the number of people struggling to keep their homes adequately warm in 2022 increased to 9.3% of the European population, or around 41 million people (Agnieszka, 2023). Based on these developments and after a long period of relative neglect, EP has finally become a key policy priority in the EU (Bouzarovski et al., 2021).

Although fuel poverty and EP are often used to describe the same phenomena, there are slight differences between these concepts (Maxim et al., 2016). While fuel poverty focuses on the inability to afford adequate heat, Thomson et al. (2017) argue that EP has a broader focus and includes the deprivation of energy services such as heating, cooling, lighting and the use of electronic devices. Building on this, the European Commission considers EP as 'a situation where households are unable to access essential energy services and products' (European Commission, n.d.-b). Although a consensus on the definition of EP has not yet been reached, several indicators have been proposed by

several EU institutions and national governments (Filippidou et al., 2019). Maxim et al. (2016) critically point out that the lack of a definition may contradict efforts to measure EP, develop effective policies and address the roots of the problem. Although no consensus was reached yet to define EP, multiple indicators were proposed by several EU institutions and were already used by multiple national governments (Filippidou et al., 2019). These indicators can generally be divided into objective and subjective measures (Maxim et al., 2016). However, several factors complicate the measurement of EP. The information required is often culturally sensitive or considered a private matter, and is subject to high temporal and spatial dynamics. In addition, the level of measurement (macro vs. micro) and the availability of data strongly influence the measurement of EP (Thomson et al., 2017).

In the Netherlands, the concept of EP has only been studied to a limited extent (Straver et al., 2017) and a lack of concrete policies and measures to monitor, quantify and address EP has been identified by Dalla Longa et al. (2021). Although the European Commission required its member states to monitor energy poverty as part of their NECPs, this was not included until 2023 (EZK, 2023). However, the sharp rise in energy prices as a result of Russia's war on Ukraine has led to increased interest and focus on energy poverty in the Netherlands, bringing it to the forefront of policy making (Mulder, Dalla Longa, et al., 2023). In their paper, Mulder et al. (2023) present the first multi-dimensional spatial analysis of energy poverty in the Netherlands on both a national and local level. Based on these findings, the first national energy poverty monitor was developed by the Dutch National Statistical Institute (CBS, Statistics Netherlands). The findings shows that 602,000 households or 7.4% of the Dutch population were affected by EP in 2022, representing an increase of one percent compared to 2020 (Mulder, Batenburg, et al., 2023).

2.3.2 Implications of energy poverty on the heat transition within the social housing sector

Several studies have shown that social housing tenants are particularly at risk of experiencing EP. In the Dutch context, Mulder, Dalla Longa, et al. (2023) found that 75% of households affected by EP live in a building owned by a SHA. As the social housing sector is primarily focused on providing housing to low-income households, this target group is naturally more vulnerable to experience poverty or social exclusion, which is one of the main contributors to EP, as identified by Maxim et al. (2016). Furthermore, around 64% of tenants in the social housing sector were not participating in the labour market in 2018, making them one of the lowest income groups in the Netherlands (Boelhouwer, 2020). In addition, Straver et al. (2017) found that almost one in five of the low-income households they studied were exposed to high-risk debt, problematic debt or were in a debt assistance process during the study period. Furthermore, more than 1.2 million households were part of the invisible debtor group, meaning that they were in risky or problematic debt but did not access formal debt help. However, EP is not just a consequence of poverty. A broad scientific consensus identifies a combination of low household income, high energy prices and, in particular, poorly insulated buildings as the main causes of EP (European Commission, n.d.-b; Maxim et al., 2016; Mulder, Dalla Longa, et al., 2023). Several authors agree that the inability to access adequate levels of heating and energy services can have a significant negative impact on quality of life, such as on physical and mental health (Bouzarovski, 2014; Croon et al., 2023). Moreover, EP can exacerbate social exclusion and lead to loneliness when tenants reduce inviting guests to limit their energy costs (Maxim et al., 2016; Mulder, Dalla Longa, et al., 2023). Cold indoor temperatures can also lead to the occurrence of indoor dampness or mould, which can eventually lead to respiratory diseases (Maxim et al., 2016).

Several policy measures can be taken to alleviate energy poverty. For example, direct subsidies and support schemes can reduce high energy costs (CE Delft, 2022). In addition, low-income households that are vulnerable consumers should be particularly protected from disconnection (Maxim et al., 2016). However, one of the most effective measures and long-term solutions to alleviate EP is to promote the energy efficiency of the housing stock (Mulder, Dalla Longa, et al., 2023). This requires

deep interventions such as extensive renovation (BZK, 2022). To maximise the impact, the dwellings with the highest energy poverty or the lowest energy labels should be targeted first, according to Maxim et al. (2016). Improving energy efficiency can lead to a number of indirect benefits, such as reduced costs and increased quality of life and comfort. Furthermore, EP is closely linked to the goal of achieving a sustainable built environment, as housing renovations contribute significantly to GHG reductions (Maxim et al., 2016).

However, while mitigating EP can help promote the energy transition, the latter can lead to increased levels of EP. As the transition to a low-carbon built environment requires large investments, it can lead to increased annual costs for tenants if these costs are passed on to end users (CE Delft, 2022). In addition, Bouzarovski (2014) points out that the introduction of renewable energy sources (RES) can lead to cost increases for households. Muhammad et al. (2023) add to this that the deployment of RES does not necessarily reduce EP, but can also increase it, especially in developed countries. They argue that in developing countries, RES tend to reduce inequality by facilitating access to electricity for parts of the population in rural or remote areas that would otherwise not have access. In contrast, developed countries, which are generally more advanced in their energy transitions, tend to pass on the costs of RES to consumers, especially in the early stages of the transition. This can have a negative impact on the affordability of electricity and put vulnerable groups at risk. However, they stress that when the share of RES in the energy supply system becomes dominant, they actually help to support the reduction of EP. Moreover, current research shows that increasing energy justice for tenants through an active role in the heat transition can, for example, increase residents' access to decision-making processes and increase and promote tenants' influence and ownership over the production of energy resources (Kaandorp et al., 2024).

In order to counteract these negative effects, the Dutch policy for the heat transition is based on the two key principles of affordability and feasibility. According to the affordability approach, the implementation of alternative low-carbon heating systems must be 'living cost neutral', meaning that the cost of alternative systems should not be higher than the cost of the previous natural gas-based systems (Herreras Martínez et al., 2022). Although CE Delft (2022) point out that the affordability approach is a major challenge, as low-carbon sources often do not yet provide a financial benefit, they emphasise, together with Broers et al. (2022), that this approach is particularly important for vulnerable low-income households in the social housing sector in order to avoid increasing EP through the heat transition.

In summary, several key implications for mitigating EP in the Dutch built environment can be derived. As shown, low-income groups are particularly vulnerable to experiencing EP. While SHAs have no direct influence on the income level of their tenants, SHAs and municipalities can, for example, implement targeted support programmes for tenants with debts or financial problems as an important measure to reduce the preconditions for EP. The implementation of major energy efficiency renovations in the housing stock can be seen as a key measure to address the root causes of EP, while at the same time contributing significantly to the achievement of sustainability goals. Priority should be given to phasing out low energy labelling. Furthermore, the transition to a low-carbon built environment should not lead to higher costs for tenants and should follow the 'living cost neutral' approach for stable energy costs. In addition, the participation of tenants in the energy transition should be ensured by giving them an active role to enable a just transition and reduce underlying vulnerabilities and inequalities, as well as educating them on how to reduce their energy consumption.

3 Methods

The following chapter describes the case study selection (chapter 3.1), data collection (chapter 3.2) and the data analysis (chapter 3.3) for this research. To answer the two main research questions, as described in chapter 1.3, a mixed-methods approach was adopted, including both qualitative and quantitative research methods. A detailed explanation of the methods used to analyse the data can be found in the data analysis chapter (3.3).

3.1 Case study selection

In this paper, a case study approach was adopted to allow for a feasible scope of research within the given timeframe, while at the same time providing relevant and meaningful results. The case study method is particularly valuable when investigating real-world novel phenomena, especially when there is limited theoretical knowledge about the phenomenon in question, such as the emerging topics of sustainability in the built environment and energy poverty (Lehtimäki et al., 2022; van Berkel, 2019). In addition, case studies are a common research method in sustainability science, allowing complex issues to be explored in-depth through descriptive and contextual analysis, and can lead to transformative insights for other cases (Corcoran et al., 2004). However, the selection of appropriate case studies is essential for the relevance and quality of the research and should ensure adequate representativeness (Herreras Martínez et al., 2022).

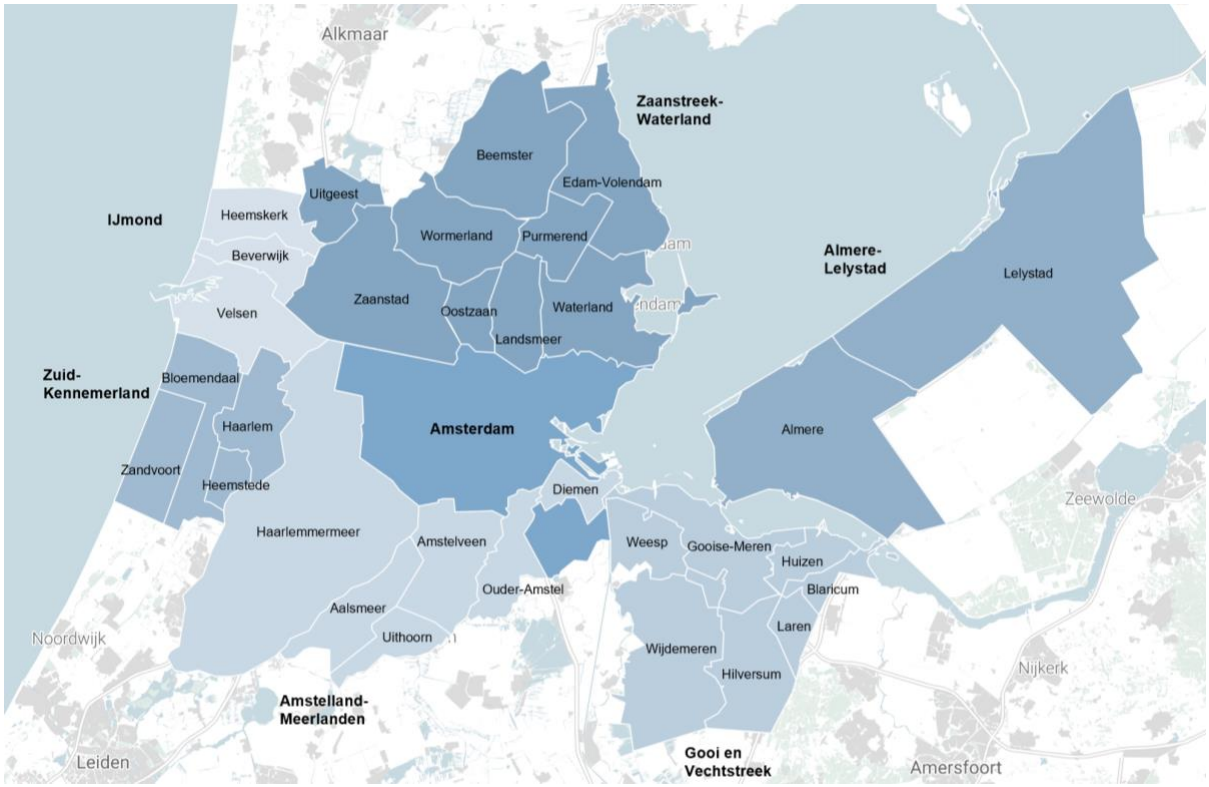
The Amsterdam Metropolitan Area (AMA) (*Dutch: Metropool Regio Amsterdam - MRA*) was selected as a case study for the analysis of the different PAs and represents the geographical scope of this research. This choice was based on several considerations. Firstly, the AMA represents one of the 19 housing market regions (*Dutch: Woningmarktregio's*) in the Netherlands, which constitute the operating areas of housing associations. Thus, from a governance perspective, this region represents a demarcated area for investigation.[2] Secondly, with approximately 2.5 million people living in the AMA (Metropoolregio Amsterdam, 2023), this region represents about 14% of the total Dutch population, making it a relevant case study selection. Thirdly, this region reflects a high feasibility for this research, as the existing energy poverty levels ranged from 3% (Uitgeest) to 10.7% (Amsterdam) in 2022, representing a range from the lowest to the highest national energy poverty levels (TNO, 2022).[3] Furthermore, the selection of this case study will allow a manageable number of PAs to be collected, organised and analysed within the given research timeframe.

In 2021, the AMA comprised a total of 32 municipalities, divided into seven sub-regions, as depicted in Figure 2 below (Metropoolregio Amsterdam, 2023). The PAs of these municipalities and the corresponding SHAs operating within them will be assessed in this analysis.

[2] The municipality of Uitgeest is part of the housing market region "Noord-Holland Noord". The municipalities Beemster and Purmerend were merged in 2022 and are not included in any housing market region. The municipality Weesp was merged with Amsterdam in 2022 (BZK, n.d.; CBS, 2023). However, the mentioned municipalities were additionally included in the PA analysis since they were part of the AMA in 2021 (Metropoolregio Amsterdam, 2023).

[3] Uitgeest had the 9th lowest national level of energy poverty in 2022, while Amsterdam was ranked 324th out of the 345 municipalities analysed. These municipalities thus represent values of both the 3rd and 93rd percentile (both values related to the category: "Huishoudens met LIHE of LILEK (%) - Schatting 2022"). Based on the "cijfers per gemeente" (TNO, 2022).

Figure 2: Geographical representation of the Amsterdam Metropolitan Area (AMA) in 2021 including the respective 32 municipalities selected for this case study and the seven sub-regions. Adapted from *Metropoolregio Amsterdam (2023)*.



A description of the characteristics of each municipality in the AMA in 2021, including the number of dwellings in the municipality, the number and share of dwellings provided by SHAs, the number of inhabitants and the population density per municipality, can be found in Appendix A.

3.2 Data collection

Chapter 3.2.1 describes the primary data collection and processing of the performance agreements, while chapter 3.2.2 addresses potential ethical issues related to the data collection.

3.2.1 Document collection and pre-processing of the performance agreements

According to the *Woningwet*, PAs should be publicly available and published online, for example on the website of the SHA (Rijksoverheid, 2020b). Several steps were conducted for collecting the individual PAs between the municipalities and the SHAs for the AMA. Firstly, the website 'Prestatieafspraken op kaart' (Rijksoverheid, 2020a) was used as a primary reference for the initial collection. This website provided an interactive map and list overview of the municipalities in the Netherlands and the corresponding SHAs operating within them, as well as the status of the respective PAs. The status of the PAs was differentiated in the categories ''Ja'', ''Nee'' and ''Verlopen'', indicating whether a PA was ''found'', ''not found'' or was ''found but expired''. This information was then manually extracted and entered into an Excel spreadsheet, which formed the basis for the next step and subsequent data analysis.

Secondly, as the website only provided an overview of the active PAs in the municipalities and indicated the status of the PAs, but did not provide the actual documents, a manual collection of the PAs was necessary. Therefore, an online search for the respective PAs was carried out using the Google search engine with the combination of the following search terms: 'prestatieafspraken' + 'gemeente X' +

'woningcorporatie Y'. The search terms 'gemeente X' and 'woningcorporatie Y' were alternated according to the previously created spreadsheet, while the search term 'prestatieafspraken' remained constant. The documents were then downloaded and saved locally. In addition, as the aforementioned website was discontinued in 2020, a supplementary search was carried out using the Google search engine, searching only for the terms 'prestatieafspraken' and 'gemeente X'. This step was performed to identify and add SHAs that were not active in the municipality before 2020 and to detect SHAs that were no longer active in the municipality at the time of the research.

Thirdly, in addition to the manual collection of publicly available online documents, several stakeholders were contacted to verify and complete the dataset. To this end, the Association of Dutch Municipalities (*Dutch: Vereniging van Nederlandse Gemeenten, VNG*) and AEDES, the national organisation representing the interests of social housing associations in the Netherlands, were approached. Furthermore, all 32 municipalities covered by this study and 27 of the 36 SHAs were contacted. New or updated documents received from stakeholders were then included in the database. In total, 7 new or updated documents were added by the municipalities, whereas no documents were added through the personal communication with the SHAs.

In some cases, additional documents with increased levels of ambition were added to the original PAs following the abolition of the Landlords Levy (see Chapter 2.1.2). As these so-called addenda cannot be considered as independent documents, but only as an addition to the SHAs' ambitions, they were merged with the original PAs and considered as a single document for the results analysis. This reduced the original number of documents analysed from 52 to 49. In addition, the two neighbouring municipalities of Beverwijk and Heemskerk agreed to sign a joint PA, which resulted in the same document being used for both municipalities. This reduced the number of individual PAs used for the results section to a total of 48 documents.

Fourthly, detailed information about the collected PAs was extracted from the documents themselves and added to the Excel spreadsheet, such as the time period covered by the documents, or whether a single SHA individually or several SHAs collectively signed the PAs within the respective municipalities. In order to harmonise the timeframe of the different PAs for later data analysis and visualisation of the results, it was decided to present PAs that ran until 1 January of the following year as if they had run until the end of the previous year. For example, a PA covering the timespan from 01.01.2020 - 01.01.2025 was converted into the time format 01.01.2020 – 31.12.2024. This was applied to all selected PA's. In addition, unique identification codes (IDs) were generated and assigned to each PA to ensure that the documents can be unambiguously attributed for the later coding and data analysis as described in chapter 3.3. The ID consists of the name of the municipality where the PA was signed and contains an ascending number starting with one after a hyphen, e.g. 'Amsterdam-1'. The next document added to the Excel file was then given the next higher number, e.g. 'Amsterdam-2'. In most cases, several SHAs operated within a single municipality. Therefore, when several SHAs agreed on a jointly developed PA, the same document ID was assigned to the respective SHAs. When a document was merged with an addendum as described above, the suffix '-Add' was added after the number. Furthermore, data from CBS (2023a) was used to assign information such as the municipality code to enable later linking to other databases, such as data on energy poverty per municipality (which was outside the scope of this research). This was also done because the number of Dutch municipalities has decreased in recent years, following a trend of merging municipalities. As different databases, such as the data on energy poverty, are based on different reference years, these developments were recorded to ensure later comparability in the analysis.

Fifthly, the documents relevant for the actual data analysis were selected. This decision was based on selecting the most recent documents covering the current time period. If stakeholders provided documents through personal communication and indicated that these agreements were the most

recent ones, they were used for the analysis. If no document were found or received for the current time period, the next most recent document was used for the analysis.

Sixthly, to prepare the selected documents for the content analysis software (see Chapter 3.3.1), the collected PAs that were only available as scans were converted into a searchable PDF or Word document file format using optical character recognition (OCR) software.

Finally, to ensure the use of the most recent data, the initial online search as described above was repeated for a second and final time on 1 December 2023. This resulted in no new documents being added to the dataset. PAs received or published after this date were not included due to the time constraints of this study.

3.2.2 Ethical issues related to data collection

Where relevant, the ethical aspects of data collection, handling and storage were considered. This was ensured by providing the participants with an informed consent form and asking for written permission to use their statements for this study. In addition, respondents were given the opportunity to remain anonymous. This applies to communication with stakeholders (see chapter 3.2.1) and with the experts who were contacted for the purpose of weighting the indicators (see chapter 3.3.3). Data management, processing and analysis were carried out in accordance with GDPR regulations, for example by storing the data on the University's servers.

3.3 Data analysis

Chapter 3.3.1 describes the content analysis applied in this research to qualitatively and quantitatively assess the content of the PAs. Chapter 3.3.2 explains the development and application of the scoring scheme to analyse the quality of the agreements, while Chapter 3.3.3 specifies the weighting that was applied.

3.3.1 Content analysis

Document analysis was used as a qualitative and quantitative research method to review and evaluate the content of the PAs in order to provide an answer to the first sub-question of this research. Document analysis reflects a systematic approach to assessing, reviewing and interpreting different types of documents. Several approaches can be used to review and evaluate the data with the aim of producing meaningful and applicable knowledge, and content analysis was chosen as the main method and analysis strategy to identify and evaluate the publicly available documents (Armstrong, 2021; Fischer, 2005). As described by Armstrong (2021), content analysis follows a positivistic approach to document analysis and aims to examine the presence of particular themes, concepts or words within the qualitative data. The underlying meaning and relationships between these words and concepts can then be assessed and conclusions drawn. In addition, content analysis can be used both qualitatively to assess the content of the documents and quantitatively to analyse, for example, the number of mentions of particular words and concepts (Cardno, 2019). The concept of content analysis can be divided into three different types to identify content from the analysed documents, namely conventional, directed and summative approaches. As stated by Pandit (1996), these distinct concepts differ mainly in the way they derive coding categories from the initial qualitative data. While conventional coding derives coding categories directly from the qualitative data, summative coding focuses more on the basic context of the data. In contrast, the directed approach uses an underlying theoretical background as a starting point for the initial coding. For this research, a directed content analysis approach was used, informed by the theory section on as presented in Chapter 2.

For the actual content analysis of the various performance agreements, the qualitative data analysis software NVivo version 14 was used to organise, store, and ultimately analyse the data. A comprehensive list of the documents to be analysed, including the names of the municipalities and SHAs involved, can be found in Appendix B. The analysis and interpretation of the data was carried out in several steps. First, the PAs previously collected as described in Chapter 3.2 were imported into NVivo to gather all documents in a central repository. Second, a subset of fifteen performance agreements were selected to develop an efficient and applicable coding structure and category system based on the identification of recurring themes and topics within these documents. As the focus of this research is on the issues of sustainability and energy poverty, the documents were analysed with a particular focus on these issues, based on the theoretical background in chapter 2. This means that specific agreements from other areas, such as 'housing and care', were not included unless there was a clear link to one of the above themes. Nevertheless, all documents were read and analysed to ensure a complete, systematic and transparent representation and analysis of the data. Third, based on these identified themes, initial codes and categories were created to guide the coding process and applied to the qualitative data. The coding process was iterative and consisted of several iterations in which codes were created, merged and deleted in order to capture recurring themes and topics and to refine the coding structure and subsequent analysis process. Where appropriate, parent codes and sub-codes were created to represent finer nuances in the data and hence the findings. The coding for the content analysis was then applied in a systematic and consistent way. The final codebook (containing the individual codes and explanations) was added to Appendix C to increase the transparency and reproducibility of this research.

In order to gain further insight into the content and level of specification in the agreements, the following scheme was developed and applied to the individual PAs. As shown in Table 3, attention was paid to whether the documents identified specific actions, numbers, dates, locations and responsibilities of municipalities and TAs. These were then further classified into the following three categories: Clear, Not Clear and Not Mentioned. The table gives examples of how each category was assigned. The results of the content analysis were then presented both qualitatively and quantitatively by providing insights into the main topics, themes and level of detail of the PA content, as specified in the results chapters 4.1 and 4.2.

Table 3: Classification of the level of specification of the agreements within the PAs.

Category	Clear - Explicit	Not clear - Implicit	Not mentioned
Action (What)	Concrete project or action mentioned, active language	An action mentioned, but not clear, e.g., through passive language, vague description	Action not mentioned
Number (How many)	Concrete number mentioned in the text or with clear connection to an action, e.g., 100 houses get renovated, 100%, mentioning of a specific project, All, exclusively	Mostly, a number of, where possible, a number was mentioned (e.g., 100 houses), but could not clearly be connected to the respective action	Numbers not mentioned
Time (When)	Clear date mentioned, e.g., in/ until 2025	During the period of the PAs, date mentioned for a PA agreement, but not specifically clear for the action	Date or timeframe not mentioned
Location (Where)	Clear location mentioned, e.g., street name or district, or e.g., all buildings of a specific type	In the municipality, in The adjacent building,	Location not mentioned
Responsibilities Municipality	Clear responsibility which requires an action of the municipality mentioned	Municipality mentioned within an action, but no clear responsibility connected. Included in 'the parties'	Responsibilities of municipalities not mentioned
Responsibilities Tenant Association	Clear responsibility which requires an action of the tenant association mentioned	Tenant association mentioned within an action, but no clear responsibility connected. Included in 'the parties'	Responsibilities of tenant associations not mentioned

3.3.2 Development and application of the scoring scheme

Several systematic steps were taken to develop a quantitative scoring system that would indicate the quality of the PAs and thus provide an answer to the second research question. Two distinct indicators were constructed to allow a specific analysis of the two themes and to assess how well these individual issues were being addressed in the PAs. Therefore, a *sustainability indicator* and an *energy poverty indicator* were developed, based on the theoretical background (see chapter 2) and the results of the content analysis (see chapter 3.3.1). The development of the indicators followed an iterative process based on the data and findings gathered throughout the research process, which allowed for a step-by-step improvement and refinement of the indicators to ensure that the indicators generated were fit for purpose.

The first step was to identify and define relevant criteria and parameters for assessing the agreements. The scoring system was based on key aspects derived from the theoretical background on sustainability in the built environment and energy poverty considerations as discussed in chapters 2.2 and 2.3. Therefore, key considerations for achieving sustainability and alleviating energy poverty were extracted and translated into a set of categories, indicators and scoring criteria to be applied to the research data, reflecting the quality of the PAs. These criteria were aligned with the research objective to ensure their relevance. The indicators have three levels. The first level reflects the overarching category that the indicator assesses, such as 'Clear long-term goals, vision and objectives' (see the developed *sustainability indicator* as presented in Figure 3).

The second level consists of the actual indicators, e.g. 'Present sufficiently ambitious long-term goals for climate-proofing their housing stock by 2050'. As a second step, relevant scoring criteria were then developed and applied to the specific indicators. The third level therefore comprises the actual scoring criteria, which consist of three different categories reflecting how well each PA performs against the specific indicator. Thirdly, numerical values were assigned to each scoring criterion based on the level of performance indicated in the agreement, thus allowing the quality of the qualitative PAs to be quantified. For the indicators, the specification of the 'actions' as described in chapter 3.3.1 were used, to reflect a higher ambition level. Well-defined and specific actions were given a higher score (100), while less developed or vague agreements were given a lower score (50). If an issue was not mentioned at all, zero points were awarded. Thus, the qualitative data derived from the content analysis of the PAs were transformed into ordinal variables using ranked categories.

Figure 3: The developed sustainability indicator, including the final categories, indicators, scoring criteria and scores. The weighting factors included are for illustrative purposes only.

Category		Indicators	Scoring Criteria	Score	Weighting Factor
	**Clear Long-Term Goals, Visions & Objectives**	1. Present sufficiently ambitious long-term goals for climate-proofing their housing stock by 2050	Long term aims and goals clearly mentioned and specified	100	0,1
			Long term aims and goals mentioned, but not or only limited specified	50	
			Long term aims and goals not mentioned	0	
		2. Present clear intermediate reduction targets	Intermediate targets or emission reduction plans clearly mentioned and specified	100	0,1
			Intermediate targets or emission reduction plans mentioned, but not or only limited specified	50	
			Intermediate targets or emission reduction plans not mentioned	0	
		3. Introduction of a CO_2-Monitoring system	CO_2-Monitoring system clearly mentioned and specified	100	0
			CO_2-Monitoring system mentioned, but not or only limited specified	50	
			CO_2-Monitoring system not mentioned	0	
	**Reducing Energy Consumption**	4. Reducing energy consumption by improving insulation when renovating existing buildings	Reducing energy consumption through renovation of existing buildings clearly mentioned and specified	100	0,43
			Reducing energy consumption through renovation of existing buildings mentioned, but not or only limited specified	50	
			Reducing energy consumption through renovation of existing buildings not mentioned	0	
		5. Reducing energy consumption by replacing inefficient appliances with more efficient ones (heating/electricity)	Reducing energy consumption through efficiency (heating/electricity) clearly mentioned and specified	100	0,15
			Reducing energy consumption through efficiency (heating/electricity) mentioned, but not or only limited specified	50	
			Reducing energy consumption through efficiency (heating/electricity) not mentioned	0	
		6. Reducing energy consumption by promoting changes in tenant behaviour	Reducing energy consumption through tenant behaviour clearly mentioned and specified	100	0,03
			Reducing energy consumption through tenant behaviour mentioned, but not or only limited specified	50	
			Reducing energy consumption through tenant behaviour not mentioned	0	
	**Deploying Renewable Energy**	7. Ambitions to deploy RES or reduce fossil fuel use for heating	Ambitions to deploy RES or reduce fossil fuel use for heating clearly mentioned and specified	100	0,03
			Ambitions to deploy RES or reduce fossil fuel use for heating mentioned, but not or only limited specified	50	
			Ambitions to deploy RES or reduce fossil fuel use for heating not mentioned	0	
		8. Ambitions to deploy RES or reduce fossil fuel use for electricity	Ambitions to deploy RES or reduce fossil fuel use for electricity clearly mentioned and specified	100	0,03
			Ambitions to deploy RES or reduce fossil fuel use for electricity mentioned, but not or only limited specified	50	
			Ambitions to deploy RES or reduce fossil fuel use for electricity not mentioned	0	
		9. Ambitions to deploy RES or reduce fossil fuel use for cooking	Ambitions to deploy RES or reduce fossil fuel use for cooking clearly mentioned and specified	100	0,03
			Ambitions to deploy RES or reduce fossil fuel use for cooking mentioned, but not or only limited specified	50	
			Ambitions to deploy RES or reduce fossil fuel use for cooking not mentioned	0	
	**Implementing Circular Economy**	10. Implementation of circular economy practices	Circularity clearly mentioned and specified	100	0,05
			Circularity mentioned, but not or only limited specified	50	
			Circularity not mentioned	0	
	**Enabling Climate Adaptation**	11. Implementation of climate adaptation practices	Climate Adaptation clearly mentioned and specified	100	0,05
			Climate Adaptation mentioned, but not or only limited specified	50	
			Climate Adaptation not mentioned	0	

As a fourth step, a pilot test was carried out in which the categories, indicators and scoring system were tested on a sample of PAs to identify potential problems or areas for improvement. The pilot testing also helped to validate the effectiveness and practicality of the developed scoring system. Finally, the scoring system was applied to the full set of PAs to assess their quality based on the selected criteria, and the weighting and average scores per PA and indicator were calculated. The results were then presented in a comparison matrix for the Sustainability Indicator and the Energy Poverty Indicator, which will identify low performing agreements and forerunners (see chapter 4.2).

The developed *energy poverty indicator* with the four categories it covers, the ten specific sub-indicators and the differentiation of the scoring criteria is presented in Figure 4.

Figure 4: The developed energy poverty indicator, including the final categories, indicators, scoring criteria and scores. The weighting factors included are for illustrative purposes only.

Category		Indicator	Scoring Criteria	Score	Weighting Factor
Problem Awareness Energy Poverty	1.	Awareness of SHAs of the concept of energy poverty through coverage in performance agreements	Energy poverty clearly mentioned and specified	100	0,08
			Energy Poverty mentioned, but not or only limited specified	50	
			Energy poverty not mentioned	0	
	2.	Targeted actions to reduce energy poverty in place	Targeted actions to reduce energy poverty clearly mentioned and specified	100	0,16
			Targeted actions to reduce energy poverty mentioned, but not or only limited specified	50	
			Targeted actions to reduce energy poverty not mentioned	0	
	3.	Implementing energy poverty monitoring programmes for their tenants	Energy poverty monitoring programmes clearly mentioned and specified	100	0,08
			Energy poverty monitoring programmes mentioned, but not or only limited specified	50	
			Energy poverty monitoring programmes not mentioned	0	
Support of low-income groups	4.	Programs for supporting tenants with financial problems / debts	Programs for tenants with financial problems / debts clearly mentioned and specified	100	0,08
			Programs for tenants with financial problems / debts mentioned, but not or only limited specified	50	
			Programs for tenants with financial problems / debts not mentioned	0	
	5.	Protecting tenants from increases in housing costs due to renovations or other sustainability measures	Aim that energy transition should not lead to higher costs for tenants clearly mentioned and specified	100	0,2
			Aim that energy transition should not lead to higher costs for tenants mentioned, but not or only limited specified	50	
			Aim that energy transition should not lead to higher costs for tenants not mentioned	0	
Improving Energy Labels	6.	Monitoring the development of the energy labels in the housing stock	Monitoring for energy labels clearly mentioned and specified	100	0,1
			Monitoring for energy labels mentioned, but not or only limited specified	50	
			Monitoring for Energy labels not mentioned	0	
	7.	Energy label improvement goals are set with a target year	Energy label improvement goal clearly mentioned and specified	100	0,1
			Energy label improvement goal mentioned, but not or only limited specified	50	
			Energy label improvement goal not mentioned	0	
	8.	Phasing out buildings with low energy labels (E, F, G) prioritised	Phasing out E, F, G labels with priority clearly mentioned and specified	100	0,2
			Phasing out E, F, G labels with priority mentioned, but not or only limited specified	50	
			Phasing out E, F, G labels with priority not mentioned	0	
Promoting Tenant Participation	9.	Tenants receive education programmes to reduce their energy consumption through behavioural change	Educational programmes to reduce energy consumption of tenants clearly mentioned and specified	100	0
			Educational programmes to reduce energy consumption of tenants mentioned, but not or only limited specified	50	
			Educational programmes to reduce energy consumption of tenants not mentioned	0	
	10.	Tenants play an active role in the energy transition	Active role of tenants in the energy transition clearly mentioned and specified	100	0
			Active role of tenants in the energy transition mentioned, but not or only limited specified	50	
			Active role of tenants in the energy transition not mentioned	0	

3.3.3 Application of weighting factors

In order to take into account the different relative importance of the indicators and categories in determining the overall quality of the agreements, a weighting was applied when calculating the indicator scores and the overall score. The weighting was based on the budget allocation approach. For this purpose, a total of eleven experts within TNO were contacted, who met the criteria of having sufficient expertise in achieving a sustainable built environment and alleviating energy poverty. Three steps were taken to prepare and carry out the weighting. First, the experts were asked individually to provide feedback on the initially developed sustainability and energy poverty indicator, as derived from the theoretical foundations (see chapters 2.2 and 2.3), resulting in the responses from ten experts. This step helped to validate the relevance of the indicators developed, to refine them where necessary by adding, deleting or modifying indicators, and to identify unclear wording.

Secondly, the indicators were revised to their final form after the ten experts had provided their input. As a result, the following changes were made to the sustainability indicator: No categories were added or deleted. However, the second indicator 'Present clear intermediate reduction targets' was added. The fourth, fifth and sixth indicators were clarified to reduce ambiguity. This resulted in changing ‘Reducing energy consumption through renovation of existing buildings’ to ‘Reducing energy consumption by improving insulation when renovating existing buildings’, second ‘Reducing energy consumption through efficiency (heating/electricity)’ to ‘Reducing energy consumption by replacing inefficient appliances with more efficient ones (heating/electricity) and lastly by redefining ‘Reducing energy consumption through tenant behaviour’ to ‘Reducing energy consumption by promoting changes in tenant behaviour’. For the energy poverty indicator, the feedback resulted in the following changes: No categories were added or removed. Nevertheless, an originally included indicator related to the category 'Promoting tenant participation' was removed, namely 'Tenant organisation actively involved in the performance agreement process representing the interests of tenants'. This was due to the fact that the process of developing PAs legally requires the involvement of the municipality, the SHA and respective TAs, as described in chapter 2.1.2. In addition, the second indicator 'Targeted actions to reduce energy poverty in place' has been added. Two indicators were revised. Firstly, the first indicator was changed from 'Awareness for the concept of energy poverty' to ‘Awareness of SHAs of the concept of energy poverty through coverage in performance agreements ' to make it more specific, and secondly, the fifth indicator was changed from 'Protecting tenants from the costs of the energy transition' to 'Protecting tenants from increases in housing costs due to renovations or other sustainability measures'.

Thirdly, the refined indicators were sent back to the experts, who were asked to apply a budget allocation approach, i.e. to distribute 100 points among the indicators according to their perceived importance for achieving a sustainable built environment and alleviating energy poverty, respectively. To further strengthen the validity of the approach and the robustness of the results, the experts were first asked to weight only the categories with 100 points, and then again to weight the individual indicators with a total of 100 points. Of the eleven experts initially contacted, five participated in the weighting process. The results of the expert weighting for each sustainability indicator category are shown in Figure 5, while the results for each indicator are shown in Figure 6.

Figure 5: Outcomes of the expert weighting for the individual categories of the sustainability indicator.

Nr.	Categories	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Average	Median
1.	Clear long term goals and ambitions	25	25	10	35	10	21	25
2.	Reducing energy consumption	55	50	30	20	30	37	30
3.	Deploying renewable energy	15	5	20	20	30	18	20
4.	Implementing a circular economy	0	10	20	10	15	11	10
5.	Enabling climate adaptation	5	10	20	15	15	13	15
		100	100	100	100	100		

Figure 6: Outcomes of the expert weighting for the respective indicators of the sustainability indicator.

Nr.	Indicators	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Average	Median	Category Average	Category Median
1.	Present sufficiently ambitious long-term goals for climate-proofing their housing stock by 2050	10	5	4	15	4	7,6	5		
2.	Present clear intermediate reduction targets	10	15	3	10	4	8,4	10	20,8	17
3.	Introduction of a CO2-Monitoring system	0	15	2	5	2	4,8	2		
4.	Reducing energy consumption by improving insulation when renovating existing buildings	43	5	15	10	10	16,6	10		
5.	Reducing energy consumption by replacing inefficient appliances with more efficient ones (heating/electricity	15	5	10	10	10	10	10	36,2	30
6.	Reducing energy consumption by promoting changes in tenant behaviour	3	20	5	10	10	9,6	10		
7.	Ambitions to deploy RES or reduce fossil fuel use for heating	3	5	7	10	14	7,8	7		
8.	Ambitions to deploy RES or reduce fossil fuel use for electricity	3	5	7	10	14	7,8	7	21	19
9.	Ambitions to deploy RES or reduce fossil fuel use for cooking	3	5	7	10	2	5,4	5		
10.	Implementation of circular economy practices	5	10	20	5	15	11	10	11	10
11.	Implementation of climate adaptation practices	5	10	20	5	15	11	10	11	10
		100	100	100	100	100				

As can be seen from the two figures above, the category average in Figure 5 is very similar to the category average of the aggregated indicators in Figure 6 for categories 1, 2 and 4. Only for categories 3 and 5 a more significant difference can be seen. In terms of category medians, categories 2, 3 and 4 are quite similar, while categories 2 and 5 are more distinct. A detailed analysis of the indicators in Figure 6 shows that the means and medians differ quite significantly for indicators 1, 3 and 4 and to a lesser extent for the second indicator. The remaining indicators differ less.

Figure 7 shows the results for each category of the energy poverty indicator. The results for the individual energy poverty indicators are presented in Figure 8. The category means in Figure 7 differ most significantly from Figure 8 for the energy poverty indicator for categories 1 and 3. There is also a noticeable difference, but to a lesser extent, for categories 2 and 4. The category medians all show some quite significant differences between the two figures, which may indicate some ambiguity on the part of the experts as to the content of the categories in Figure 7, e.g., due to an unclear formulation of the categories.

Due to this discrepancy, it was therefore decided to use the weighting of to the individual indicators for the final development of the indicators, rather than using the aggregated categories alone. A more detailed analysis of the indicators in Figure 8 shows that the most significant differences in mean and median values were observed for indicators 5, 6 and 9. Indicators 2, 3 and 7 differed to a lesser extent, while the remaining indicators were more similar.

Figure 7: Outcomes of the expert weighting for the individual categories of the energy poverty indicator.

Nr.	Categories	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Average	Median
1.	Problem Awareness Energy Poverty	20	10	20	20	10	16	20
2.	Support of low-income groups	25	50	30	30	40	35	30
3.	Improving Energy Labels	50	35	30	20	40	35	35
4.	Promoting Tenant Participation	5	5	20	30	10	14	10
		100	100	100	100	100		

Figure 8: Outcomes of the expert weighting for the respective indicators of the energy poverty indicator.

Nr.	Indicators	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Average	Median	Category Average	Category Median
1.	Awareness of SHAs of the concept of energy poverty through coverage in performance agreements	8	5	10	15	2	8,0	8	26,4	26
2.	Targeted actions to reduce energy poverty in place	16	10	10	15	6	11,4	10		
3.	Implementing energy poverty monitoring programmes for their tenants	8	10	5	10	2	7,0	8		
4.	Programs for supporting tenants with financial problems / debts	8	30	15	5	20	15,6	15	31,6	35
5.	Protecting tenants from increases in housing costs due to renovations or other sustainability measures	20	20	10	10	20	16,0	20		
6.	Monitoring the development of the energy labels in the housing stock	10	5	10	10	5	8,0	10	30	30
7.	Energy label improvement goals are set with a target year	10	5	5	5	5	6,0	5		
8.	Phasing out buildings with low energy labels (E, F, G) prioritised	20	5	15	10	30	16,0	15		
9.	Tenants receive education programmes to reduce their energy consumption through behavioural change	0	5	10	10	10	7,0	10	12	15
10.	Tenants play an active role in the energy transition	0	5	10	10	0	5,0	5		
		100	100	100	100	100				

In addition, it was decided to use the median rather than the average for the indicators. This decision was based on a number of considerations. Firstly, the median is more robust to outliers, whereas the average can be disproportionately influenced by more extreme values. The lower sensitivity of the median thus increases the robustness of the results. In addition, the relatively small sample size of five respondents could further exacerbate the influence of outliers on the mean. Furthermore, as discussed above, in some cases the data appear to be skewed rather than normally distributed, resulting in a greater difference between the mean and the median. The median therefore provides a more robust estimate of central tendency. Despite the considerations described, the weighting applied is considered to be robust. This is based on the fact that, apart from the examples discussed, the other indicators appear to be more normally distributed. Furthermore, removing the most extreme value from each dataset results in a more normally distributed dataset, supporting the outlier theory.

4 Results

The following section presents the results and key findings of this research. In line with the themes of the analytical framework, Chapter 4.1 provides insights into the content of the PAs, while Chapter 4.2 gives an overview of the quality of the individual PAs based on the scoring scheme developed.

4.1 Content of the Performance Agreements

The findings of the qualitative data analysis described in chapter 3.3.1 are discussed in the following sections. Chapter 4.1.1 covers the content of the PAs on sustainability, while chapter 4.1.2 describes the content of the issues related to energy poverty.

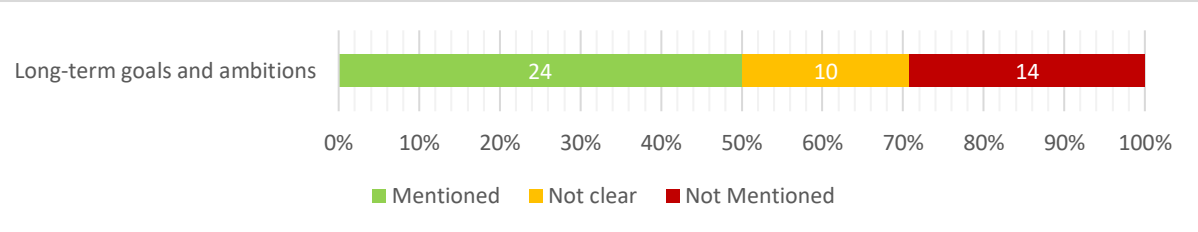
4.1.1 Sustainability

The following chapters present the qualitative results of the content analysis of the agreements made in the PAs on the issue of sustainability. They are organised according to the coding categories used in the analysis. Chapter 4.1.1.1 presents the SHAs' long-term goals and ambitions, while Chapter 4.1.1.2 gives an overview of their ambitions for reducing energy consumption. Chapter 4.1.1.3 describes the introduction of renewable energy and the phasing out of natural gas. Chapters 4.1.1.4 and 4.1.1.5 deal with the implementation of climate adaptation and circular economy measures.

4.1.1.1 Long-term goals and ambitions

Of the 48 PAs analysed, about 50% of the documents mention clear long-term goals and ambitions, as shown in Figure 9 below. In addition, approximately 21% of the PAs contain agreements on long-term goals without being clear about them, while around 29% of the agreements do not contain them.[4]

Figure 9: Coverage of long-term goals and ambitions in the PAs.



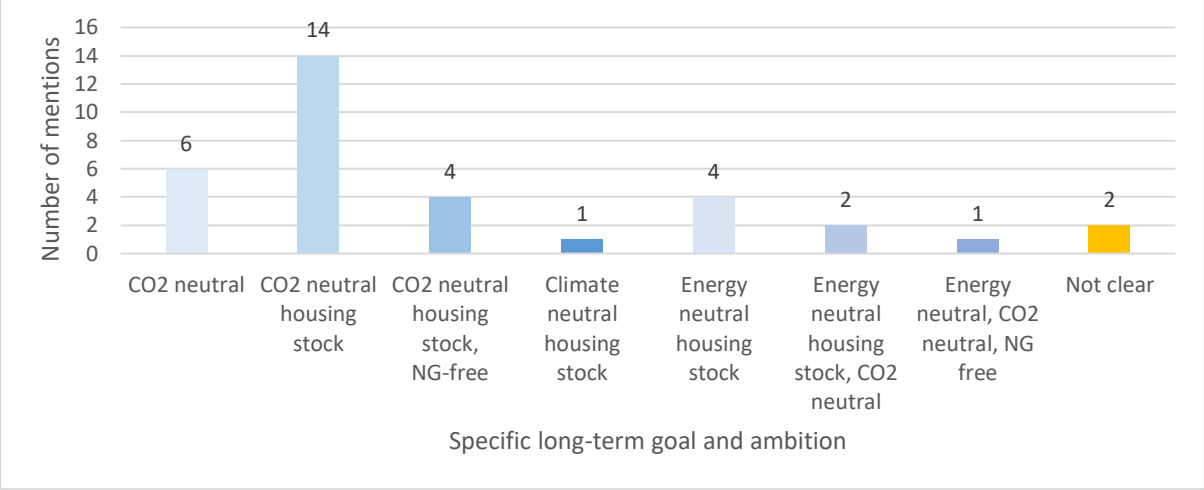
The PAs that could not be clearly identified as having a long-term strategy often only briefly stated the ambition without specifying it further. For example, the three PAs Aalsmeer-1, Landsmeer-2 and Ouder-Amstel-1, published by the same SHA called Eigen Haard, only mentioned the heading 'From energy efficient to CO_2 neutral by 2050'. Although the goal of CO_2 neutrality by 2050 was mentioned, it was not clear, for example, whether this was the goal of the municipality or the SHA. Several documents describe that the parties are working on a roadmap for sustainability and mention that AEDES also offers a roadmap for CO_2 neutrality in 2050 (e.g., Amstelveen-3). The same applies to Beemster-2, which is a little more specific, stating that the aim of the roadmap is to gain insight into

[4] Following the presentation of the table showing the number of PAs that mentioned, did not clearly mention and did not mention the issue, the following figures and percentages in the text refer to the subsection of PAs that mentioned and did not clearly mention the issue. This approach also applies to all subsequent chapters.

their long-term strategy towards CO_2-neutral housing. However, they do not specify whether they are committed to this goal. In Amstelveen-4, the municipality states a clear long-term goal to become CO_2 neutral. However, while the SHA intends to contribute to this goal, it does not present a clear long-term strategy of its own. Laren-1 states that the parties are working towards a CO_2 neutral housing stock, but does not give a target year for this, while in Blaricum-1 only one of the two SHAs has a long-term ambition to achieve a CO_2 neutral housing stock.

As shown in Figure 10, a number of different targets were mentioned in the documents that clearly or ambiguously addressed the issue of long-term targets. The most common goal was achieving a CO_2-neutral housing stock, followed by achieving CO_2-neutrality. In the case of the latter, it was not clear whether this covered only the building stock or also, for example, the operational emissions of the SHAs themselves. Four documents combined achieving CO_2 neutral dwellings with becoming NG-free, while one PA aimed to achieve a climate neutral housing stock. Four documents referred to achieving energy neutral homes and two documents combined the concept of energy neutral houses with becoming CO_2 neutral. For two documents the ambition was not clear. One was Amstelveen-3, which stated that the SHA had developed and was updating a long-term sustainability roadmap with a target year of 2050, which should be aligned as far as possible with the Municipal Heat Transition Vision and, where appropriate, with the national performance agreements. However, the SHAs did not specify the content or carbon reduction target of this roadmap. The second unclear target comes from Huizen-2, where the municipality set a target to become climate neutral in 2050. The SHA added that it will continue to improve the energy quality of its housing stock to contribute to this vision, but did not clearly state whether, for example, its entire building stock should also be CO_2 neutral in 2050 or not. With the exception of two documents that did not specify a target year, all of the above PAs mentioned 2050 as their target year. However, one document, Uithoorn-1, mentioned a more ambitious target year of 2040. This PA stated that they wanted to achieve an energy and CO_2 neutral housing stock and, if possible, to become NG-free.

Figure 10: Specification of long-term goals and number of mentions.

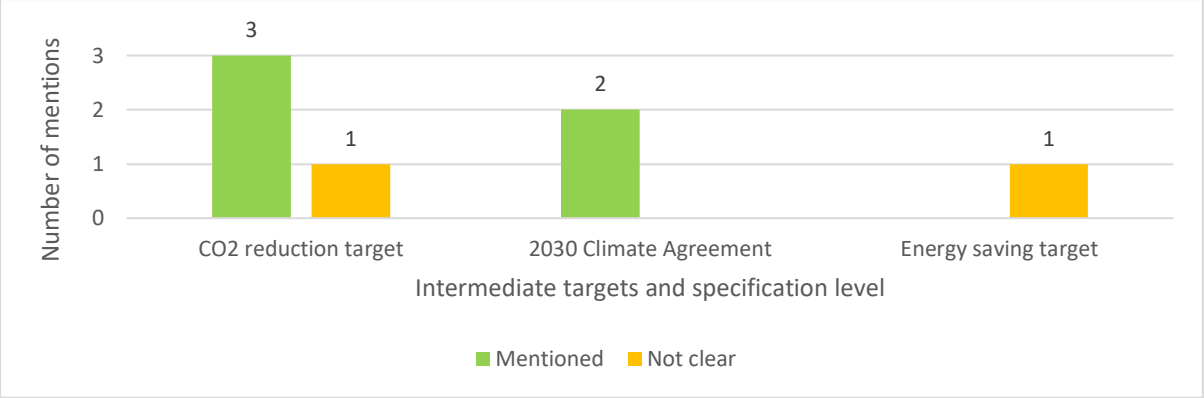


Five PAs set clear intermediate reduction targets (15 %), while a further two set intermediate targets that were not clear (6 %). As shown in Figure 11, four of these targets were CO_2 reduction targets, two mentioned the 2030 climate agreement targets and one set an energy savings target.[5] The Amsterdam-

[5] Energy labelling improvement targets have not been included here. However, the energy label improvement targets are discussed in detail in chapter 4.1.1.2.2. Only the Amstelveen-2 PA included a target to improve its energy labels to an average label B or better by 2024, which was in the same section of the text as the long-term targets.

1 PA set a target to increase the pace of CO_2 reduction from 1.5% per year to 3% per year or more in 2023. Wormerland-1 also set a percentage target, stating that the SHA aims to reduce CO_2 emissions from the housing stock by 20% by the end of 2025, compared to emissions in mid-2018. In Lelystad-1, a numerical target was set to achieve a linear decrease to a maximum average CO_2 emission of 2350 kg per dwelling in 2027. In Weesp-1, the SHA and the municipality planned to agree on a CO_2 reduction target and a sustainable energy production target. However, as no target year, numerical or percentage target was known, this statement was coded as 'not clear'. The SHAs of Edam-Voldendam-1 and Haarlem-3-Add both stated that they supported the 2030 interim target of the climate agreement. While the former referred to the original target of a 49% reduction, the latter included the already increased target level of 55% by 2030. In Heemstede-1, the municipality had set an annual energy saving target of 1.5% for the existing housing stock. However, as it was not clear whether this included the SHA or not, it was coded as 'not clear'. Velsen-1 also mentioned an intermediate target of the municipality to reduce CO2 emissions by 49% by 2030. However, as this target was not related to the housing stock, it was not counted towards the intermediate targets and therefore was coded as 'not mentioned'.

Figure 11: Specification of intermediate targets and number of mentions.



Of the 34 documents that clearly or ambiguously mentioned long-term goals, 9 or 26 % also mentioned specific long-term goals of the municipalities. As shown in Table 4, there are some inconsistencies between the long-term goals of the municipalities and the corresponding long-term goals of the SHAs. For example, while the municipality of Amstelveen aims to be CO2 neutral by 2040, the SHA plans to achieve this goal 10 years later (Amstelveen-4). In the Amsterdam-1 PA, the municipality has a higher ambition than the SHA, aiming to become climate neutral in 2050. Furthermore, the municipality of Haarlem aims to be NG-free by 2040, but the SHA plans to reach this target in 2050 (Haarlem-3-Add). In addition, the municipality of Weesp aims to be energy neutral by 2030, while the SHA plans to have a CO2-neutral housing stock by 2050 (Weesp-1).

Table 4: Long-term goals of the municipalities and respective long-term goals of the SHAs.

Performance Agreement	Long-term goal of the Municipality	Long-term goal of the respective SHA
Amstelveen-4	CO_2 neutral by 2040	CO_2 neutral by 2050
Amsterdam-1	Climate-neutral by 2050, NG-free by 2040	CO_2 neutral housing stock by 2050
Haarlem-2	Not clear: Climate neutral 2030, NG-free by 2040	Energy neutral by 2050
Haarlem-3-Add	Not clear: NG-free by 2040	CO_2 neutral housing stock by 2050, NG-free by 2050
Heemstede-1	Climate neutral by 2050	Climate neutral housing stock by 2050
Huizen-2	Climate neutral by 2050	Not clear: Climate neutral housing stock by 2050
Landsmeer-1	CO_2 neutral by 2050	CO_2 neutral by 2050
Velsen-1	Energy neutral by 2050	CO_2 neutral housing stock by 2050
Weesp-1	Energy neutral by 2030	CO_2 neutral housing stock by 2050

To monitor progress in improving the quality of buildings, 26% of the PAs mention the introduction of a CO_2 monitoring system. The four PAs Amsterdam-1, Diemen-1, Weesp-1 and Zaanstad-1 are explicit about this, while the other five PAs are more vague about their intentions. Lelystad-1 and Wormerland-1 are both coded as ambiguous as they only specify concrete CO_2 reduction targets, leaving room for interpretation as to whether or not they will implement a CO_2 monitoring system to track progress towards these targets. The other three mention that the SHAs intend to measure their CO_2 emissions or mention monitoring. For example, Purmerend-1 states that 'where possible they [the SHAs] will conduct a joint baseline measurement to then develop a usable [CO_2] monitoring system for Purmerend'. Interestingly, Diemen-1 and Haarlemmermeer-4, as well as Purmerend-1, mention a CO2 monitoring system either explicitly or implicitly, although both PAs did not specify a long-term target.

4.1.1.2 Reducing the energy consumption

4.1.1.2.1 Renovation leading to reduced heat demand

As shown in Figure 12, around 88% of the documents clearly mentioned renovations related to measures such as insulation to reduce the heat demand of the dwellings.[6] In a further 4%, this was not clearly mentioned, while 8% of the PAs did not mention this issue.

Figure 12: Coverage of renovations leading to reduced heat demand.

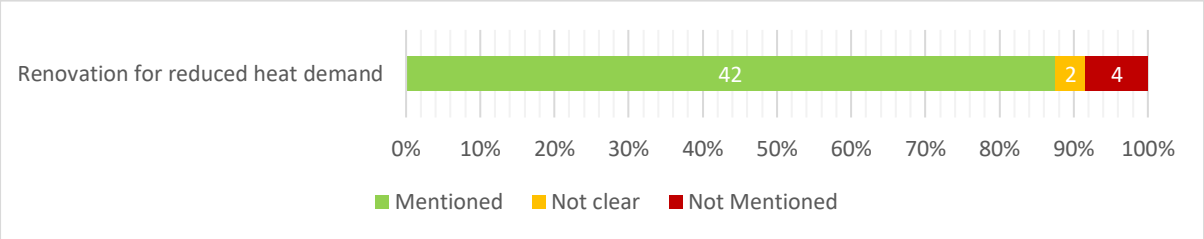


Figure 13 provides an overview of the specifications on this topic. As depicted, specific actions were mentioned in 57% of the PAs where this issue was clearly or somewhat clearly mentioned, and less clearly in 39%. In 5% of the documents, no actions were mentioned at all.

Figure 13: Specification of renovations leading to reduced heat demand among the PAs which explicitly or implicitly mention this issue.

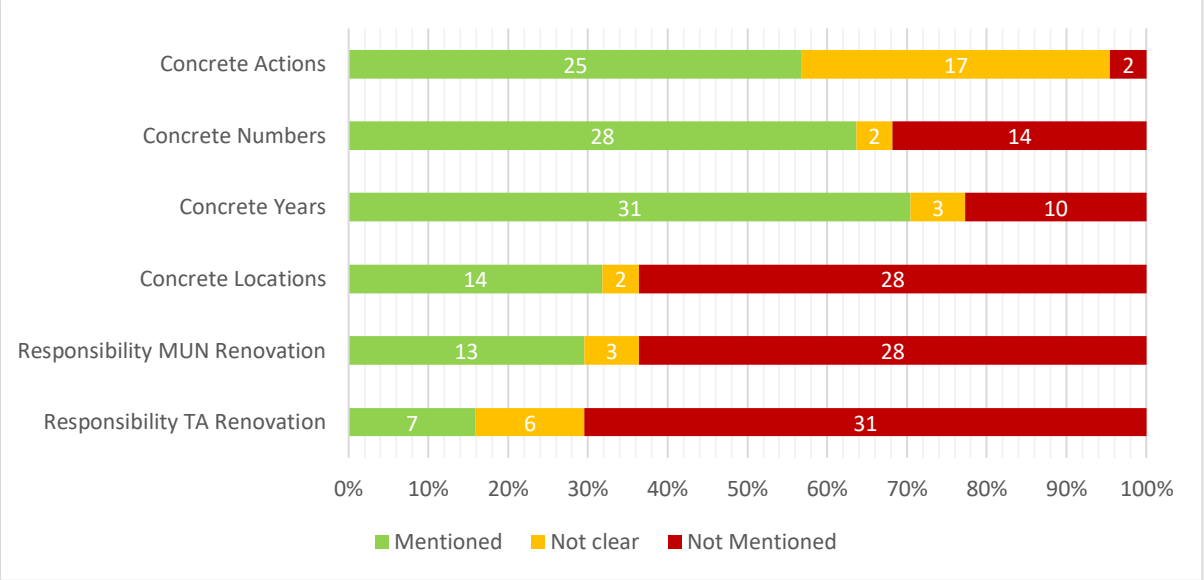
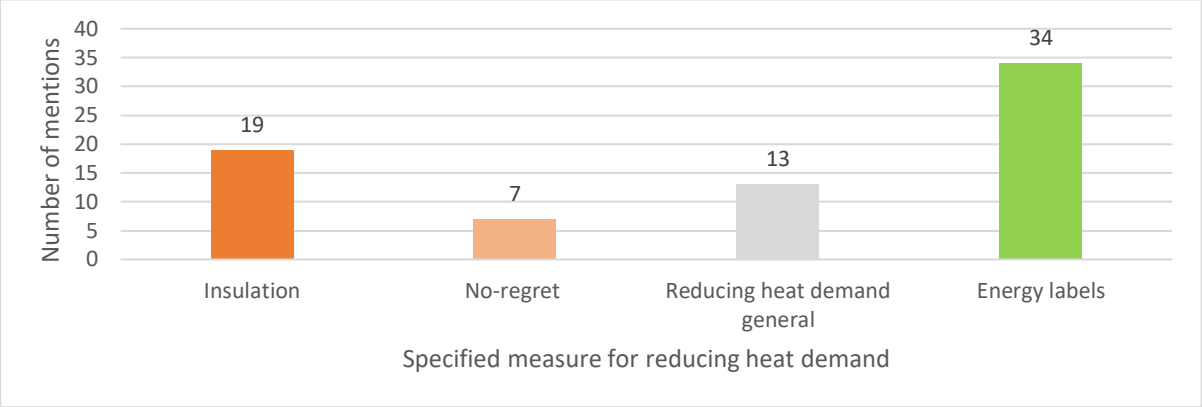


Figure 14 below gives an overview of the specific measures mentioned in the different PAs to reduce heat demand in buildings. Over 81% of these PAs mention that their aim is to make the housing stock more 'sustainable' (*Dutch: Verduurzamen*). However, as it was not always clear whether this included measures to reduce heat demand or not, and not just e.g. the installation of solar panels, these measures were only counted if they explicitly mentioned the aim of reducing heat demand. In 19

[6] Measures that do not specifically mention insulation, but which clearly refer to the effect of renovations leading to a reduction in heat demand have also been included. For example, this section also includes, measures focusing on energy labelling, which are analysed in more detail in section 4.1.1.2.2.

documents the word 'insulation' was clearly mentioned. For example, Beemster-2 mentions that in 2019 they will install an insulation package for 97 houses, including floor, wall and roof insulation. Amstelveen-3 adds that due to the increased price of natural gas, they currently prefer to install insulation rather than other measures such as solar panels. Seven documents specified the implementation of no-regret measures. For example, the Zaanstad-1 PA states that the SHAs plan to make 2,500 of their dwellings 'transition ready' over the next four years by prioritising the implementation of no-regret measures. However, as specified in Haarlemmermeer-1, these measures are not limited to insulation, but may also include, for example, the installation of solar panels or the phasing out of natural gas cooking, leading to ambiguity. In 13 documents it is mentioned that the SHAs plan to take measures to reduce the heat demand of the buildings, e.g. in Hilversum-1 where 'the parties want to make the existing rental housing stock more sustainable, thereby improving the energy efficiency of the rental stock'. As discussed in more detail in section 4.1.1.2.2, a total of 34 documents mentioned more or less specific actions related to energy labelling.

Figure 14: Specification of the measures for reducing heat demand. Multiple mentions possible.

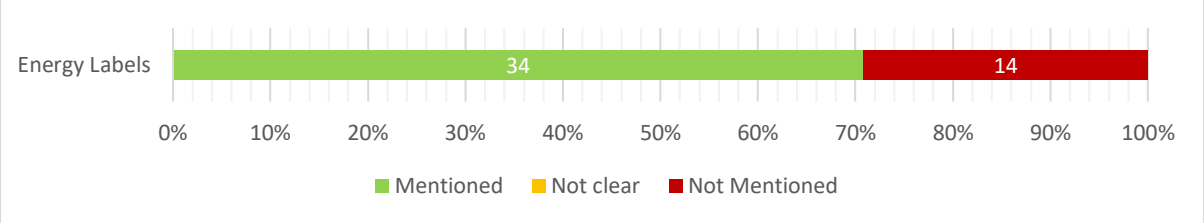


As can be seen in Figure 13, 64% of the PAs clearly mentioned concrete numbers and a further 5% less clearly. For example, Beemster-2 mentions a specific number of dwellings to be insulated, while Gooise-Meren-1 mentions that they want to improve 1,000 buildings to achieve a B label. In the two cases where it was less clear, more vague formulations were used. For example, Laren-1 stated that they wanted to achieve an average B label for their dwellings by reducing the heat demand of these buildings, but did not specify a specific number of buildings to be renovated. Specific years were given in 70% of the PAs and less clearly in a further 7%. All of these timeframes focus on the renovation of buildings, such as in Huizen-1, where the SHA will renovate 400-500 buildings in the period 2020-2024. In the three SHAs where the timeframe was not clear, for example, a longer timeframe was mentioned without being specifically linked to actions (e.g. Waterland-1). Specific locations were mentioned in 32% of the documents and less clearly in 5%, while 64% did not mention any locations. The clear examples focus on the renovation of e.g. a single building (e.g. Haarlemmermeer-1) or several buildings (Amstelveen-4). In the unclear cases, Landsmeer-2 mentions a certain number of buildings to be renovated but points out that it is still to be decided which locations this applies to, while Lelystad-1 specifies that houses built in the 1970s and 80s are to be renovated. Responsibilities of the municipalities were clearly defined in 30% and not clearly defined in 7%. In Aalsmeer-1, for example, it is clearly stated that the municipality is responsible for obtaining the necessary permits on time as a precondition for the implementation of the renovation projects, while in Haarlem the municipality, together with the SHAs, draws up a plan for the renovation of buildings and the financial resources it could make available to the SHA (Haarlem-3-Add). In the less clear cases, the municipality is simply informed about the renovations (e.g. Wijdemeren-1). In the 16% of PAs where the responsibilities of the TAs are clear, they play, for example, a central role in communicating the renovation plans to the tenants (Landsmeer-2), while in the 14% where it is less clear, they are simply included in the term 'the parties' (e.g. Huizen-1).

4.1.1.2.2 Energy labels

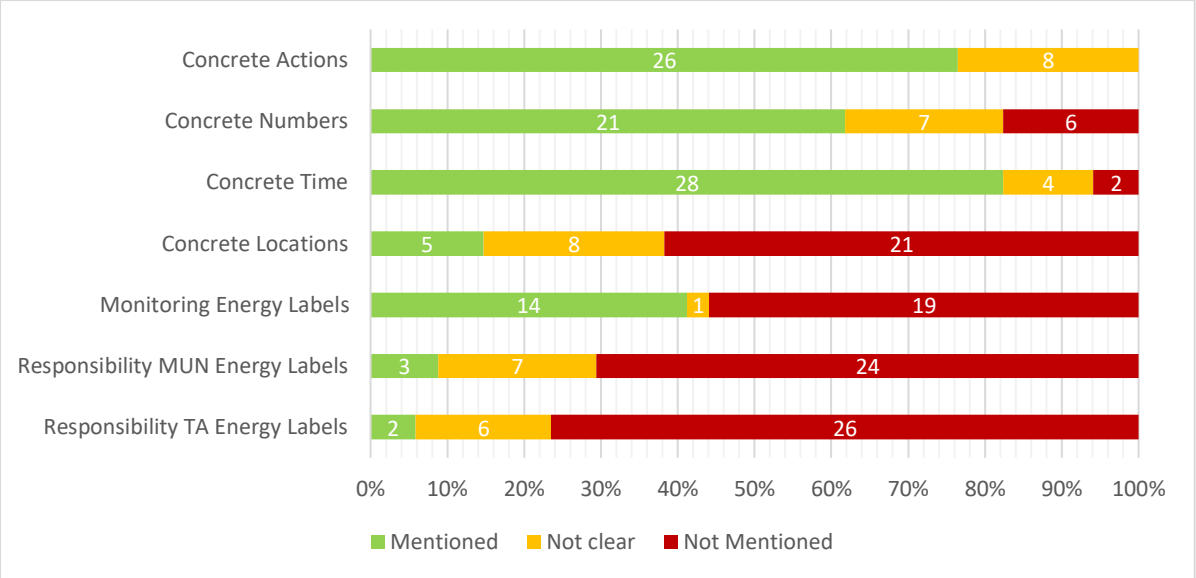
Figure 15 depicts the coverage of energy labels in the analysed documents. As can be seen, about 71% of the PAs mention energy labels and none of them is unclear. The remaining 29% of documents do not mention energy labels.

Figure 15: Coverage of energy labels in the PAs.



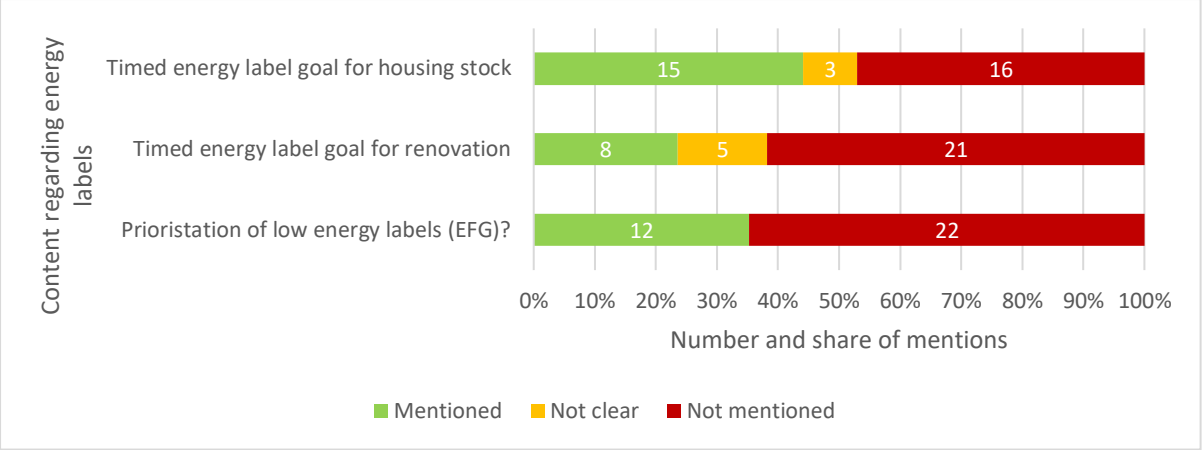
The specification of energy labels is shown in Figure 16. As can be seen, about 76% of the documents clearly specify actions related to energy labels, while a further 24% are less clear.

Figure 16: Specification of energy labels among the PAs which explicitly or implicitly mention this issue.



As the detailed analysis in Figure 17 shows, 44% of the documents either clearly state long-term energy labelling objectives for their housing stock and a further 9% are less clear. About 44% of the documents do not mention long-term energy label targets. Ten documents aim to achieve an average energy level, e.g. Beemster-1 where 'by 2020 all social housing will have an average energy label B'. Three documents add to the target of a B label that they want to achieve an average A label in 2027 (one mention) and in 2030 (two mentions). In addition, three PAs mention targets as shares they want to achieve, such as 70% of the housing stock to be labelled B in the next three years (Haarlemmermeer-4) or that 'at the beginning of the period 2023-2033, 51% of the stock will be labelled A or B' (Zaanstad-1). Two documents mention that they want to achieve an average energy label B and that 75% will have a label better than B by the end of 2022 (Amstelveen-2) and '80% will have a minimum label C in 2025' (Bloemendaal-1). In the unclear documents, for example, they only mention that they want to develop a plan to improve energy labels, without specifying further (Amstelveen-1).

Figure 17: Content regarding the actions for improving energy labels.



In eight clearly stated cases (24%), the energy label improvements are linked to individual renovation projects. In one document, they aim for an average energy label of B in the renovated buildings. In three others they aim for a B label, which means that there will be no buildings with an energy label worse than B after the renovation (e.g. Beemster-2). Three PAs go even further and state that they want to achieve at least a B label, while one aims for a mix of A and B labels (Velsen-1). In a further 15% these measures are less clearly mentioned. For example, Haarlem-2 states that all buildings with an energy label worse than C should be renovated, but does not clearly state the target label.

35% of the documents clearly mention the ambition to phase out E,F,G labels as a priority, while 65% do not. While three of the PAs do not mention a target year and one has already successfully phased out all E,F,G labels (Lelystad-2), seven others mention 2028 as their target year. Only the document of Haarlem-3-Add is more ambitious, stating the end of 2026 as its target year. In addition, the latter document aims to renovate the E,F,G label buildings to a mix of A to D labels, exceeding the national target of renovating SHA buildings to D label in 2028. Nine documents also set out clear renovation plans, stating the number of buildings and the timeframe in which they intend to renovate them, in order to phase out E,F,G label buildings. Seven documents also mention that they exclude buildings for which there are demolition plans according to national regulations. While the TA in Haarlem-3-Add expresses the concern that rents should not increase for tenants after renovation, the municipality is investigating how it can support tenants of buildings that have not been renovated to a D label or better in 2028 (e.g. buildings that are to be demolished). In comparison, Oostzaan-1 states that tenants in an E, F, G label building will not receive a rent increase in 2023.

Most of the numbers given refer to a clear amount of buildings to be improved in terms of their energy label (see Figure 16). For example, the SHA in Gooise-Meren-1 states that it intends to upgrade more than 1,000 dwellings to label B over the period of the PAs. However, some of the PAs also gave a maximum energy performance they wanted to achieve, for example '150 kWh/m2/year' in the case of Lelystad-1. In the documents where numbers were given only indirectly, for example, measures for the PAs' buildings were mentioned without making it clear whether these measures applied to all or only a selection of them (Lelystad-2).

Almost 82% of the PAs give clear timeframes and a further 12% are more vague. The overall majority of documents refer to measures to improve the energy label, such as in Aalsmeer-1, which aims to start these measures for 125 dwellings in 2021. However, some of them also link them to other targets, such as achieving a B label for three quarters of their buildings in 2022 (Amstelveen-2). With regard to the unclear timeframes, they referred, for example, to the SHA's goal of achieving a certain energy level along all municipalities, but not specifically for this one municipality (e.g. Ouder-Amstel-2).

In five documents clear locations were given. While Haalem-2 only mentions the current energy label of the respective houses, all other documents mention clear locations for buildings whose energy labels should be improved (e.g. Uithoorn-1). The PAs that only indirectly mention locations either state that the concrete locations will be further worked out in the future (Aalsmeer-1) or mention the entire housing stock of the SHAs (e.g. Beverwijk-1+Heemskerk-1-Add).
Furthermore, while 41% clearly mention monitoring of energy labels and 3% do not clearly mention it, the majority of 56% do not mention it. Beemster-1 states that 'through monitoring, both SHAs provide insight into how their stock in Beemster is structured in terms of energy labels/performance and provide a forecast of how this will develop up to 2020'. In the one case where it is not clear, it is mentioned that the agreements will be monitored from the framework agreements. However, it is not entirely clear which initial agreements are meant.

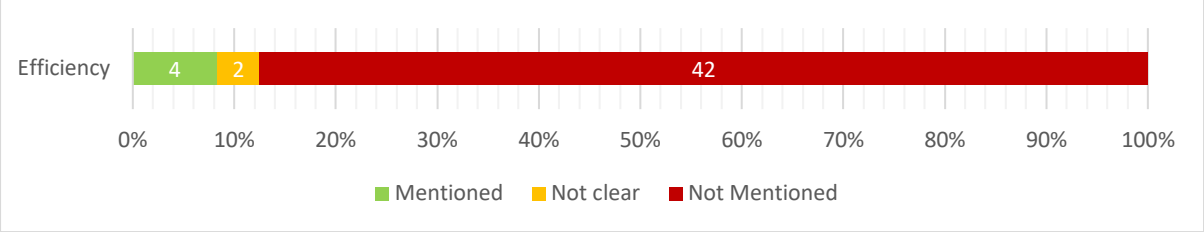
Clear responsibilities of the municipalities were mentioned in only three cases. These were, for example, a municipal subsidy for sustainability advice, which can be used to identify concrete sustainability measures to be taken (Amstelveen-3), or the development of a plan for the phasing out of low-energy labels, including a specific section on what capacities and financial resources the municipality can contribute to this (Haarlem-3-Add). In the seven cases where the responsibilities were not clear, they referred, for example, to unspecified agreements between the SHAs and the municipality to improve the energy labels (Blaricum-1), a reference to 'the parties' (Haarlem-2) or a statement that municipal planning permissions and permits are a prerequisite for accelerating the implementation of improved energy labels, without any clear action linked to this (Velsen-1).

Similarly, only in a few cases were the responsibilities of the TAs clearly stated (6%) or less clearly stated (18%). A clear responsibility was e.g. the preparation of the implementation plans for the energy label improvements on behalf of the TA (Oostzaan-1), whereas less clear responsibilities were e.g. the integration of the TA's perspective in the planning developed by the SHAs (Amstelveen-1) or the consultation of 'the parties' to examine the extent of the energy label improvement for a specific building (Haarlem-2).

4.1.1.2.3 Efficiency

As shown in Figure 18, only about 12% of the PAs mention efficiency improvements to reduce energy consumption. Of these, 8% are clear and 4% are less clear. The vast majority, 88%, do not mention this issue at all.

Figure 18: Coverage of efficiency improvements in the PAs.

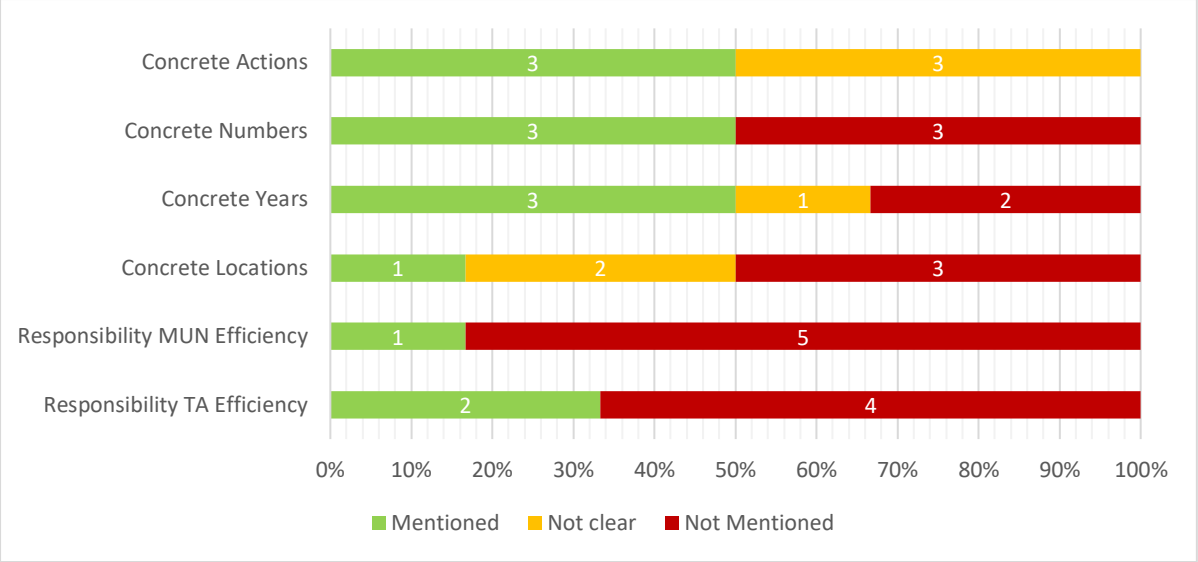


As can be seen in Figure 19, in three cases concrete actions were specified, while in three others these were less clear. The actions focused on heating, lighting and, more generally, appliances. Amsteveen-1 described that the SHA DUWO has started a trial in 2019 to use a hydrogen boiler for tap water and heating in a housing complex. If the hydrogen boiler proves to be beneficial during the PA period in terms of reducing natural gas consumption, reducing energy costs for tenants and reliability, the SHA will investigate the possibility of connecting the boiler to the neighbouring building. However, as the action started before the PA period and it was not yet clear whether the boiler would be connected to the other building, this action was rated as not clear. In Haarlemmermeer-4, the SHA clearly stated that they will install more efficient central heating boilers during changes of occupancy to improve the sustainability of their housing stock, while Lelystad-1 provided the other clear action. There, the municipality and the SHA are carrying out a pilot project in one of the building complexes, where (hydraulic) balancing of the central heating systems will be undertaken, with the aim of achieving energy savings and CO_2 reductions, as well as reducing costs for tenants. Landsmeer-2 also mentions that they want to modify heating systems as part of the Together Sustainable (SAVE) project, but does not specify whether this means switching to low-carbon heating technologies or increasing efficiency.

Diemen-1 clearly mentions that SHA Rochdale is replacing lighting with LEDs at the same rate as the houses are painted and that they are aiming for 100% LED lighting. However, as they indicate that these measures are aimed at cost efficiency, it is not entirely clear whether a reduction in energy consumption is also a driver for this action. The second SHA in this municipality, Stadgenoot, is working with an external party to install solar panels and LED lighting. In addition, they state that they plan to replace all lights and lamps in the common areas of all complexes with LEDs. The PA of Landsmeer-2 mentions more superficially that the SHA and the TA will ensure that tenants are informed about sustainability measures and that tenants' needs for improving their homes, e.g. through LED lighting, will be reassessed. However, they do not specify whether they plan to install LED lighting or not.

In Amstelveen-3, the SHA states that it will replace installations with even more sustainable ones when the life cycle justifies it. Although this statement is not very clear, it was counted as an energy efficiency measure, but with the label "not clear". In Lelystad-1, in addition to the hydraulic balance, it was mentioned that the municipality is developing a plan that includes the replacement of high energy consuming appliances with the aim of reducing energy poverty among its tenants. However, as this is a clear energy efficiency measure, it has been included here as such.

Figure 19: Specification of efficiency improvements among the PAs which explicitly or implicitly mention this issue.



Three of the PAs reported concrete numbers. Amstelveen-1 stated that they are running a pilot project with a hydrogen boiler and that this boiler could possibly be connected to the adjacent building. In Diemen-1, both PAs indicated that they wanted to replace 100% of the lighting with LED lights, while Lelystad-1 indicated that they wanted to test hydraulic balancing in a pilot project in one building. However, none of the documents specified, for example, energy reduction targets to be achieved through energy efficiency measures.

Specific years were given in three PAs and less clearly in another. Amstelveen-1 stated that a monitoring will be carried out in 2020 to see if the hydrogen boiler delivers the desired results. In Diemen-1, the SHA announces that all LED lighting will be installed in the period 2020-2023 and Lelystad-1 mentions 2023 for the implementation of the hydraulic balance and the development of the plan to replace high energy consuming appliances. Haarlemermeer-4, on the other hand, only states that more efficient central heating boilers will be installed when the occupancy changes and therefore gives a rather vague timeframe. Therefore, it was counted as unclear.

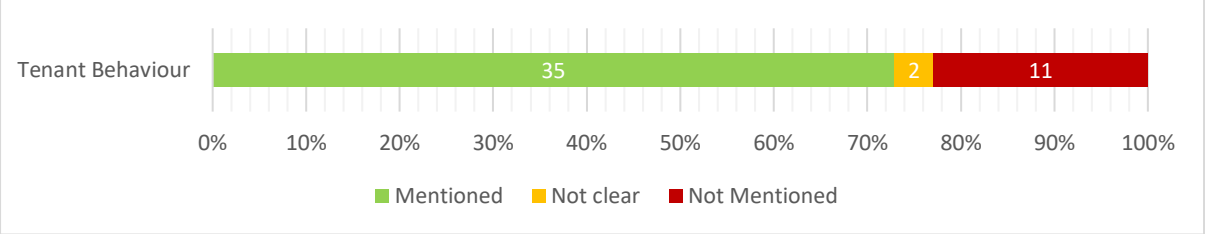
Three documents specify the locations where the measures are to be implemented. Only the one for Diemen-1 was considered to be clear. Although it does not mention a specific address, it states that the conversion to LED lighting will take place in the common areas of all complexes. Amstelveen-1, on the other hand, is more vague, stating that the hydrogen boiler may be connected to the adjacent building, while Lelystad-1 mentions that the hydraulic balancing of central heating systems will take place in building complexes where both private homeowners and tenants live.

A clear responsibility of the municipality was only mentioned in Lelystad-1, where the local government motivates individuals to use the possibilities of hydraulic balancing and develops a plan that includes the replacement of high energy consuming appliances as part of the energy poverty programme. In the same municipality, the TA is clearly mentioned as being involved in encouraging tenants to participate in the former programme. In addition, the TA in Landsmeer-2 is informing tenants about sustainability measures in the municipality and reassessing tenants' needs for improving their homes and surroundings, e.g. through LED lighting.

4.1.1.2.4 Tenant Behaviour

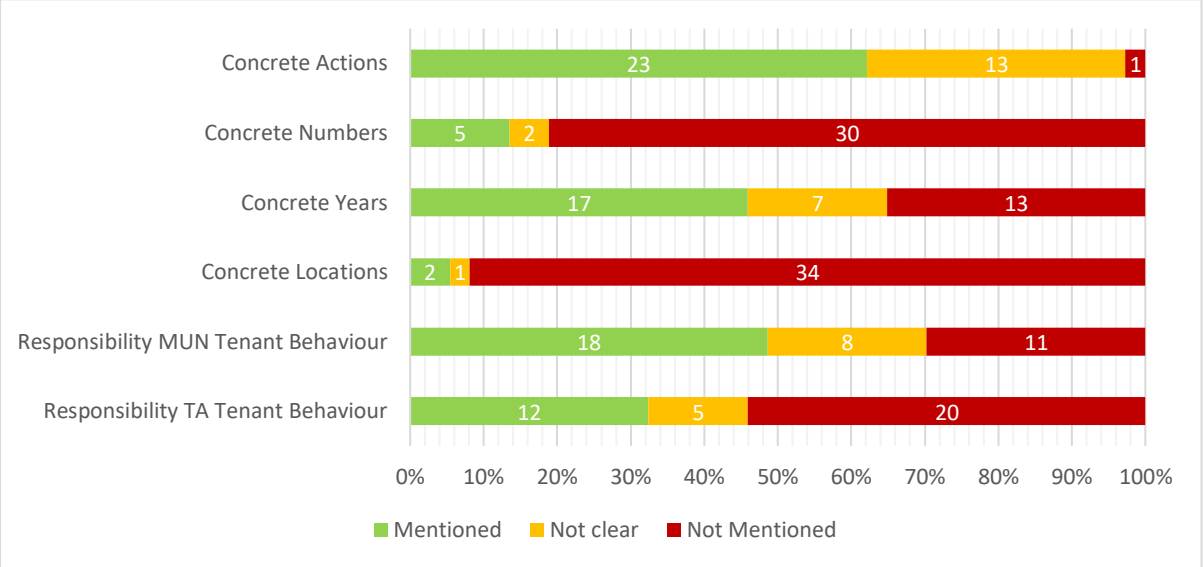
As shown in Figure 20, almost 73% of PAs clearly mention tenant behaviour in their documents, while a further 4% are more ambiguous. The remaining quarter (23%) do not address tenant behaviour.

Figure 20: Coverage of tenant behaviour in the PAs.



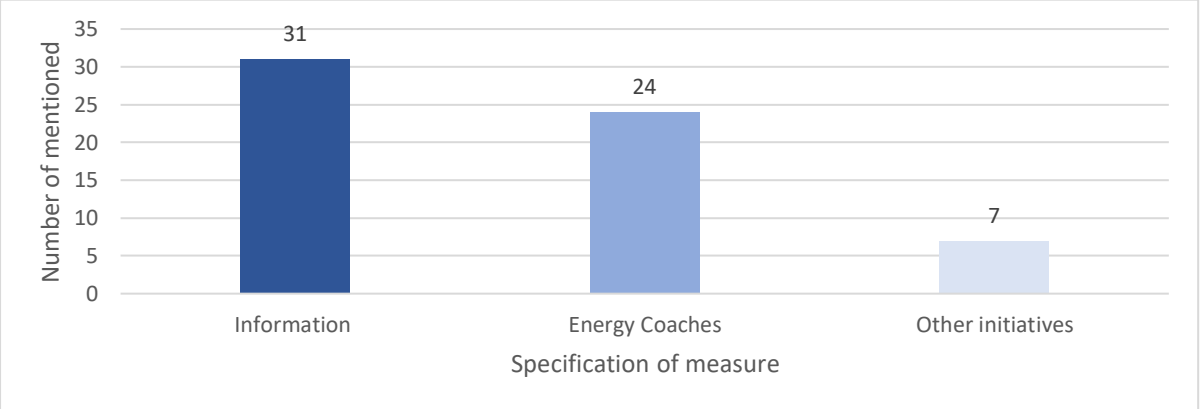
The level of specification for tenant behaviour is presented in Figure 21. As shown, around 62% specify clear actions, whereas a further 35% define more ambiguous measures.

Figure 21: Specification of tenant behaviour in the PAs which explicitly or implicitly mention this issue.



As illustrated in Figure 22, a total of 31 documents mention informing tenants and promoting awareness of energy consumption through behavioural means as their core actions.

Figure 22: Specific measures taken for tenant behaviour.



For example, in the Edam-Voldendam-1 document, tenants are informed by the SHAs and TAs about energy saving options. In addition, the parties conduct a joint information campaign and raise awareness through their own and joint communication channels. The Lelystad-1 document adds that examples are shown, tips and advice are given and ambassadors are used. In addition, some municipalities provide energy advice after the completion of a renovation or sustainability project (e.g. Haarlemmermeer-3), while others organise an information evening for residents on the topic (Beemster-2). The second most common measure was the use of energy coaches, mentioned in 24 documents. These energy coaches actively visit residents on request and help them find ways to use less energy in their homes. In Diemen-1, for example, the municipality provides funding to train energy coaches to promote energy saving among residents. Other initiatives were mentioned in seven cases. The SHA in Haarlemmermeer-1 and Amstelveen-1 organise the 'Student Energy Race', where student houses from several municipalities compete to save the most energy, with the aim of raising energy awareness. In another case, the SHAs and the municipality want to support partnerships between tenants' associations and an energy cooperative (Beverwijk-1+Heemskerk-1-Add), while two other SHAs want to support residents' initiatives for energy saving and home improvement more broadly. Waterland-1 mentions an energy saving campaign without further specification, while Weesp-1 states that energy saving initiatives by residents (including tenants) will be rewarded by the municipality.

As depicted in Figure 21, five documents give clear numbers and two others are less clear. In one of the former, an information evening will be organised for a number of houses to be made more sustainable (Beemster-2), while another specifies the number of energy coaches in the municipality, which should increase by one coach per year (Uithoorn-1). Velsen-1 specifies the number of households that can benefit from energy coach advice per year, while in Zandvoort-1-Add all tenants should be offered energy saving advice by 2022. In another case, it is stated that the municipality will launch a programme to provide residents with practical help in implementing energy saving measures (Edam-Voldendam-1). The two unclear PAs vaguely mention a building to be enabled to participate in the student energy race (Haarlemmermeer-1, Amstelveen-1).

Seventeen documents mention clear dates in their PAs. In six cases these are linked to actions aimed at informing tenants about their influence on reducing energy consumption. In Uitgeest-1, for example, the PAs inform tenants during the general meeting in 2023 about the importance and possibilities of energy saving measures and the influence of tenants' behaviour. In Beemster-2, the parties inform tenants through their own channels and means (residents' magazine, residents' evenings, municipality website) to raise awareness of sustainability options in the period of 2018-2021. In nine documents, the dates are connected to measures related to energy coaches. In some documents, these measures are still being investigated, such as in Landsmeer-1, where the municipality is exploring the possibility of training energy coaches and is looking for coverage in its budget from fiscal year 2022. Similarly, in Gooise-Meren-2, the parties are investigating support for the use of energy coaches in the period 2019-2025. In other cases, these measures have already been implemented. For example, Velsen-1 states that at least 1,250 households will benefit from this programme in 2023. In two other documents, the years were associated with less clear actions, such as an unspecified savings campaign for 2021 and 2022 in Waterland-1. Of the seven documents where the timing is less clear, four state that energy advice will be given to their tenants after the completion of a renovation or sustainability project. Aalsmeer-1 adds that new sustainable systems are extensively tested upon delivery and checked for proper functioning in the initial phase. One document mentions that the municipality's activities and results in promoting energy-conscious behaviour among tenants are monitored annually (Hilversum-1), while another states that it intends to appoint a new energy coach every year (Uithoorn-1).

Only in two cases were specific locations mentioned. Amstelveen-1 and Haarlemmermeer-1 each mention a specific building to be enabled to participate in the Student Energy Race. The PA of Heemstede-1 vaguely states that the use of energy coaches should be continued at regional level.

Eighteen PAs mention clear responsibilities for municipalities. Four of them focus on raising the awareness of their inhabitants to reduce their energy consumption. For example, Beemster-1 publishes information on the municipal website, while Lelystad-3 is investigating the role of the 'energy counter' in raising awareness among residents. In seven other municipalities, the focus of the municipal role is on using energy coaches to inform residents on how to reduce energy consumption, such as in Diemen-1, where the municipality plans to release budget to train energy coaches who will promote energy saving among residents. In four cases, the municipalities combine the provision of information with the use of energy coaches. For example, in Amsterdam-1 the municipality supports residents' initiatives to save energy and at the same time uses energy coaches, while in Heemstede-1 an 'energy evening' was organised in addition to the energy coach programme. In three other documents the PAs focused on similar campaigns to reduce energy consumption, such as the installation of small energy saving devices in their homes in two cases and an undefined energy saving campaign in one case. In eight cases, the role of municipalities was implicitly mentioned. In four of these cases, the focus was on raising tenants' awareness of energy consumption and initiating campaigns or education programmes for them. In addition, cooperation with municipal energy coaches should be coordinated (Amstelveen-4) and municipalities should support tenants' organisations, e.g. in partnership with energy cooperatives (Beverwijk-1+Heemskerk-1-Add). In two other cases the municipalities are only vaguely included in 'the parties'. These also focus on raising awareness among tenants (Bloemendaal-1) and evaluating the use of energy coaches (Purmerend-1).

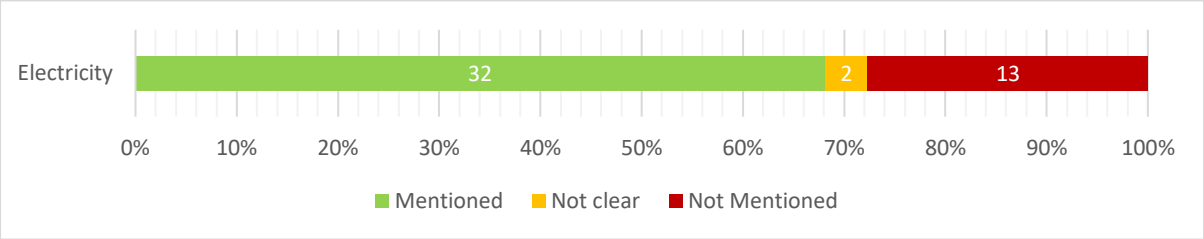
The vast majority of the twelve PAs describe the focus of the TA's responsibilities as informing tenants about how to reduce their energy consumption and what measures are available in the municipality, which is the case in ten of them. In Beemster-1 and Beemster-2, for example, the TA informs tenants about how they can live more energy-efficiently when renovations are carried out. They also provide relevant information at residents' evenings and publish it in their residents' magazine. Only in the two other PAs, TAs have a responsibility related to the energy coaches. In Edam-Volendam-1 they have a pioneering role and are supported by the municipality and the SHAs, whereas in Velsen-1 both the municipality and the TA are responsible for the implementation of this measure. Of the five PAs that only vaguely mentioned the responsibilities of TAs, one focused on the role of TAs in relation to energy coaches, while the rest only implicitly included TAs in the term 'the parties'. In all four of these documents, the role of the parties was seen as providing information to tenants on how to reduce energy consumption through tenant behaviour.

4.1.1.3 Deploying renewable energy and phasing out fossil fuels

4.1.1.3.1 Electricity

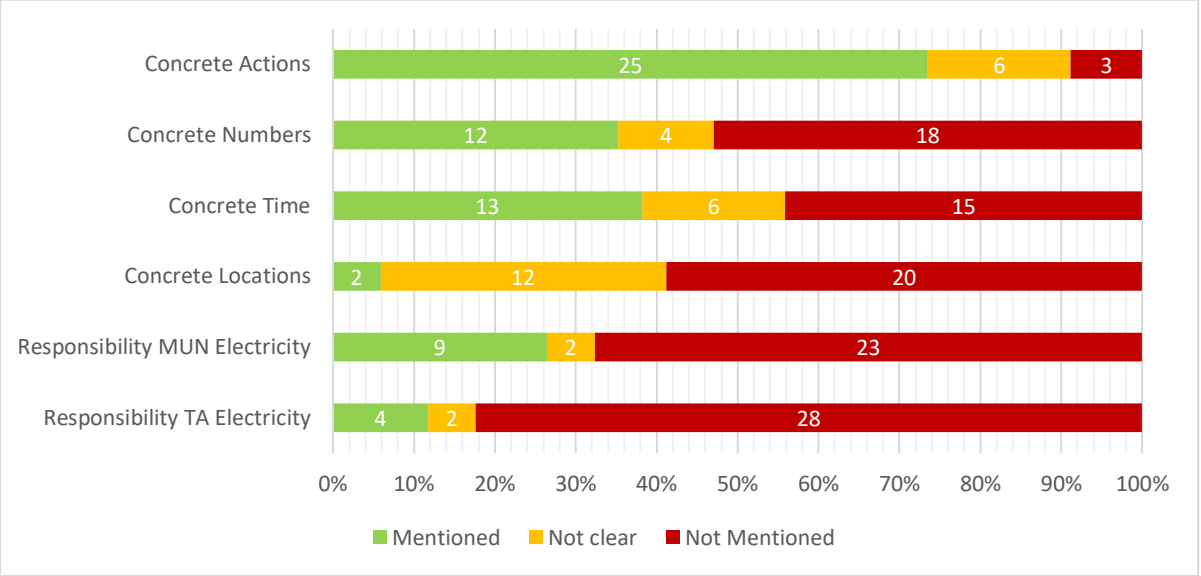
Electricity is mentioned in about 68% of the PAs, as shown in Figure 23. In a further 4% it is not clearly mentioned, while the remaining 28% do not address the issue. In the case of the two documents that do not explicitly mention it, they only vaguely describe the objective of producing sustainable energy and reducing the use of fossil fuels.

Figure 23: Coverage of electricity in the PAs.



The level of specification is shown in Figure 24. Some 74% of the documents mention specific actions, while a further 18% being more vague. Only 9% of the PAs do not mention any actions at all.

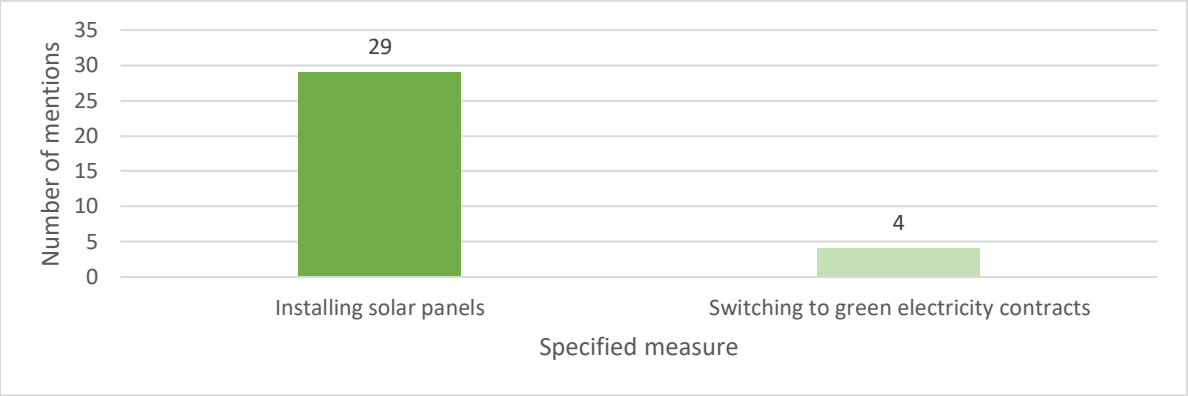
Figure 24: Specification of electricity in the PAs which explicitly or implicitly mentioned this issue.



As can be seen in Figure 25, the main measure mentioned was the installation of solar panels, which appeared in 29 documents. Switching to renewable energy contracts was also mentioned in four documents (multiple mentions possible). For the installation of solar panels, a complex-based approach is mentioned in six documents, five of which are published by the SHA of 'Eigen Haard'. They state that Eigen Haard offers tenants of single-family houses the possibility to install solar panels on a complex-by-complex basis and that the complex-by-complex approach aims to increase the speed and number of solar panels installed. Some documents mention the role of the tenants, as at least 70% have to agree for panels to be installed (e.g. Diemen-1), and an active role of the tenants in the installation of solar panels. In Hilversum-1, for example, the SHAs offer their tenants the option of solar panels and support residents' initiatives (see chapter 4.1.2.4 for more details).

For the measure to switch to green electricity, the PA of Ouder-Amstel-2, for example, states that all energy purchased for the complexes is green energy and that suppliers are selected accordingly. However, it does not specify whether this applies only to electricity or also to heat. In Amstelveen-3, they also state that they are promoting sustainable energy sources by switching to a green energy supplier. However, the document also states that they prioritise tenants' housing costs over energy labels or CO2 reduction targets, and therefore prefer to install insulation rather than solar panels.

Figure 25: Specification of the measures for electricity.



In the case of the documents where no clear action was mentioned, for example in Huizen-2, it is stated that the municipality and the SHA inform each other and coordinate sustainability measures together, such as the use of solar panels in the neighbourhoods, but without further specification. Another example stems from Landsmeer-1, where it is stated that based on the municipal heat transition plan, the SHA will make a long-term plan for sustainability measures, including solar panels.

As illustrated in Figure 24, 35% of the agreements mention clear numbers and a further 12% are vague. The remaining majority (53%) of documents do not mention numbers. Among the PAs that clearly mention numbers, the following differences can be identified. Two municipalities mention the number of solar panels they plan to install and the amount of electricity they plan to produce. For example, the SHA in Haarlem-3-Add plans to produce at least 32 terajoules in 2025 with 30,000 solar panels. Two other documents indicate the number of solar panels they plan to install and their maximum electrical capacity, e.g. that 108 solar panels of 300 watts peak each will be installed in 2019 (Haarlem-1). In two other documents only the number of houses is given, while another two give a percentage target, e.g. that at least 3% of their houses should be equipped with solar panels each year (Edam-Voldendam-1). In the remaining four cases it is stated, for example, that all energy purchased by the SHA is green energy (Ouder-Amstel-2). The four more vague documents mention, for example, the municipal target of producing 14% of the energy consumption from renewable energy sources, with no clear reference to the SHAs or their ambitions (Heemstede-1), or that solar panels should be installed if possible (Uithoorn-1).

Of the thirteen documents that clearly mention a timeframe, nine are linked to a clear and planned action to install solar panels, e.g. '2023: An additional 300 houses will be equipped with solar panels' (Velsen-1), while one document defines a clear target that all building related energy consumption will be sustainable in 2021-2023 (Haarlemmermeer-1). Finally, the remaining three documents all mention plans related to solar panels, but at a less clear planning stage. For example, the Haarlem-2 document discusses that the parties plan to accelerate the construction of solar energy in 2019, including the possibility of making rooftops available to other parties. The six documents where the timing is unclear often mention a longer timeframe of several years without a clear link to the deployment of renewable electricity.

The two PAs with clear locations refer to a specific building on whose roof solar panels are to be installed. The other twelve documents are more vague. Ten of these PAs specify the type of dwelling on which the solar panels will be installed. For example, Diemen-1 states that solar panels will be installed on the roofs of single-family houses, and that they will also install solar panels on apartments if the roofs are suitable. Zandvoort-1-Add also examines multi-storey complexes, while in Uithoorn-1, for example, a study will be carried out in cooperation with the municipality to see if the use of solar panels can be extended to apartment blocks. The other two less clear documents state that the annual plan, which is not included, will list the complexes/neighbourhoods where the measures will be implemented (Hilersum-1), while the other document vaguely states that solar panels will be installed throughout the residential area, without specifying this further.

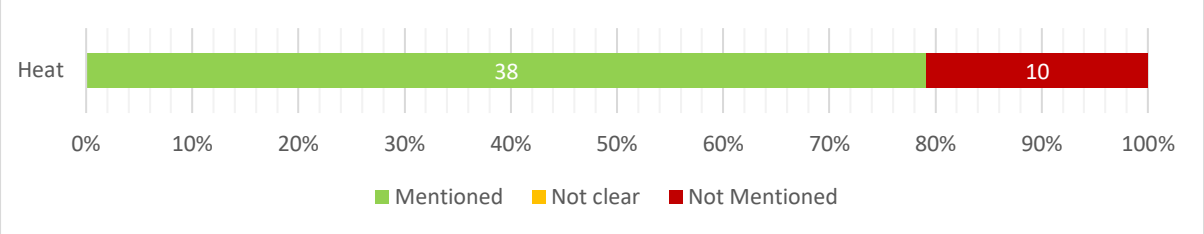
Nine documents identify clear responsibilities for municipalities. In three of these documents, the focus of the municipality's responsibility is to provide funding and subsidies to the SHAs to support the installation of solar panels. In Amsterdam-1, for example, the municipality will provide funds for the implementation of solar energy on (mixed) housing of the SHAs. In three other documents, the municipalities contribute by creating the right framework conditions, e.g. by adapting building regulations to allow the installation of solar panels (Hilversum-1), by removing regulatory and infrastructure bottlenecks (Haarlem-3-Add) and by making rooftops available to other parties (Haarlem-2). In Huizen-2, however, the municipality and the SHA want to inform each other about the installation of solar panels in order to better coordinate these projects. In the other two documents, the municipalities support the use of solar panels in general, e.g. by installing solar panels in the residential area (Lelystad-2). In two documents the responsibilities of the municipalities are not clearly mentioned. In both cases, they are implicitly included in the term 'the parties', as in Haarlemmermeer-1, where the parties agree to purchase 100% CO2-neutral energy for their housing.

Only four, or 11%, of the documents explicitly mention the responsibilities of the TAs, while a further two (6%) mention them implicitly. In the first case, all the responsibilities of the TAs mentioned focus on informing tenants about the possibilities of PV and motivating them to use it. For example, in Haarlem-3-Add, the TAs are available to answer tenants' questions and encourage tenant participation in relation to PV. In the latter case, the TAs are implicitly included in the term 'the parties' and cover the same issues as mentioned above for the implicit responsibilities of the municipalities.

4.1.1.3.2 Heat

The coverage of heat in the PAs is presented in Figure 26. Of all documents, 79% mention the issue of sustainable heat in their PAs, with no ambiguity existing regarding unclear mentions. In 21% of the documents, heat is not mentioned at all.

Figure 26: Coverage of heat in the PAs.



The specifications for heat are shown in Figure 26. About 71% of the documents specified clear actions regarding heat, while a further 24% mentioned less concrete actions. Only 5% of the documents did not mention any measures regarding heat.

Figure 27: Specification of heat in the PAs which explicitly or implicitly mention this issue.

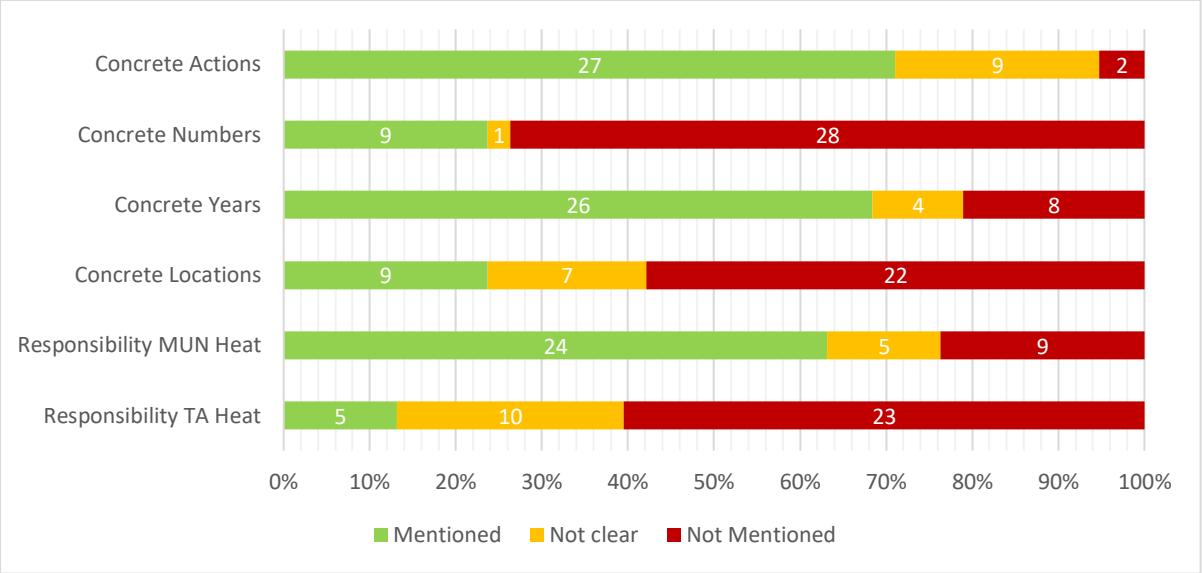
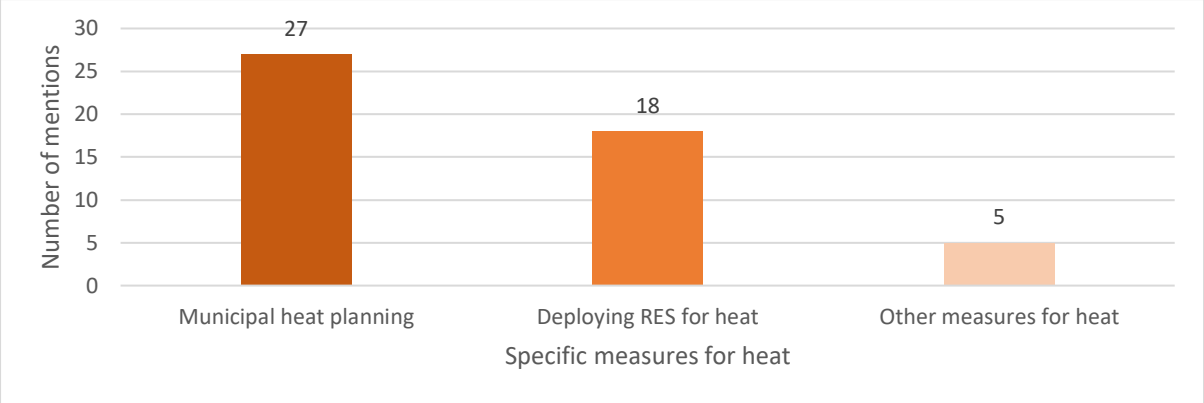


Figure 28 shows the specific actions discussed in the PAs (multiple mentions possible). As can be seen, the majority of documents that clearly or not clearly specify actions, with 27 mentions, focus on municipal heat planning. Most of the PAs describe the leading role of the municipality in the energy transition. Some documents only describe the municipal process of developing the heat transition vision, while others also include the neighbourhood implementation plans (Dutch: Wijkuitvoeringsplannen). For example, 'the municipality of Aalsmeer will deliver a final [...] Transition Vision Heat in 2021' (Aalsmeer-1), while the municipality of Heemstede mentions that 'the municipality will draw up the Transition Vision Heat in 2021 and work on neighbourhood implementation plans, involving both SHAs and tenants' (Heemstede-1). Only a few documents, such as Amstelveen-4, mention the specific neighbourhoods in which the measures will be implemented as a priority. The two documents from Amstelveen-4 and Amsterdam-1 mention the 'Heat Motor' project, which focuses on accelerating connection to heat networks in order to further reduce CO2 emissions (Amsterdam-1). The documents which where coded as not being clear mostly only vaguely described

initiatives, without a binding action. E.g., ‘At local level, parties agree to actively inform each other about new sustainability initiatives. For example, the roll-out of new sustainability programmes by housing corporations, the disconnection of rainwater drains, the construction of heat networks, et cetera.’ (Blaricum-1).

Figure 28: Specific measures for heat.



In 18 documents more specific renewable heat technologies were mentioned. Connection to a local district heating network was mentioned in 13 cases. However, the planning stages of the different PAs vary considerably. Lelystad-2 is the only document that states that all dwellings are already connected to district heating and therefore already meet future energy requirements. In two other documents there are concrete plans with a clear timeframe to connect a certain number of dwellings to district heating (e.g. Amsterdam-1). In a further two cases it is mentioned that connection to a district heating network is currently being investigated. For example, in the Beverwijk-1+Heemskerk-1-Add, it is stated that the parties are currently investigating the feasibility of building a heat network and that they will jointly decide, with the experience gained, whether this is a viable application for the future. The remaining 8 documents are more vague about their ambitions. While Amstelveen-1 states that connection to the municipal district heating network is necessary to achieve the sustainability goals, Blaricum-1 states that 'it is too early to agree on the concrete details of the energy transition', while also mentioning heat networks as a viable solution. Three of these documents state that heat networks, but also other technologies such as all-electric (Uitgeest-1), are suitable for the heat transition.

In six other cases, technologies other than district heating were mentioned. Amstelveen-1 states that a hybrid hydrogen boiler has been installed in one building and may be connected to the neighbouring building after 2020. Two PAs indicate that they want to share knowledge on geothermal energy (Heemstede-1) and that they have signed a letter of intent to extend an aquathermal energy plant to the nearby SHA site (Waterland-1). Three cases mention the replacement of gas-fired central heating boilers with hybrid heat pumps, in two cases combined with solar panels and solar boilers (e.g. Uithoorn-1).

The five other measures found could not be categorised as either municipal heat planning or the use of specific renewable heat technologies. In three cases these measures were aimed at adapting the heating system, e.g. Haarlem-1, where the SHA states that 'during the ongoing annual maintenance, the central heating boilers will be replaced with HR++ boilers at the end of their service life'. In the other two cases there is mention of an unspecified pilot project aimed at phasing out the use of natural gas in neighbourhoods (e.g. Laren-1).

Regarding the mention of explicit numbers, Lelystad-2 states that all of their buildings are already connected to a district heating network, whereas two documents mention a number of 2.000 (Amsterdam-1) and 5.200 buildings which they want to disconnect from natural gas in the timeframe 2020-2023 and until 2030 (Haarlem-3-Add). Moreover, the document of Amsterdam-1 mentions the programme 'City Deal Aardgasvrij', in which the parties work together to decarbonise 45.000 buildings until 2030. In four cases, the documents specify one neighbourhood or pilot project, which should be disconnected from natural gas (e.g. Lelystad-2). The remaining two PAs mention one single building each which should be equipped with an alternative heating technology or decarbonised (e.g. Amstelveen-1). The only unclear numbers stem from Amstelveen-4, where the municipality mentions several neighbourhoods and states that in some of them, the neighbourhood implementation plans should be initiated.

Most of the clear timeframes are based on the municipal heat planning, e.g. in the case of Heemstede-1: 'The municipality is drafting a heat transition vision in 2021 and is working on neighbourhood implementation plans, involving both SHAs and tenants'. In fewer cases, the disconnection of houses from natural gas and connection to an alternative heat source, such as a district heating network, is mentioned in combination with a clear target year (e.g. Haarlem-3-Add). Four documents only give unclear time frames, of which two mention a longer time frame but without a clear link to the measure (e.g. Landsmeer-2), while the other two use vague wording such as 'in the coming years' (Haarlemmermeer-4).

Clear locations are given in nine documents. In three cases the locations refer to neighbourhoods where the municipality is developing its Transition Vision Heat or the neighbourhood implementation plans (e.g. Amstelveen-4). In the other six cases the locations refer to the connection to an alternative heat source, e.g. in Waterland-1: 'Extension of the aquathermal plant from the Galgeriet in Monnickendam to the nearby housing estate of the SHAs'. A further seven documents give only vague locations, six of which refer to one or more neighbourhoods without naming them, which would improve traceability. The remaining document mentions the neighbouring building (Amstelveen-1).

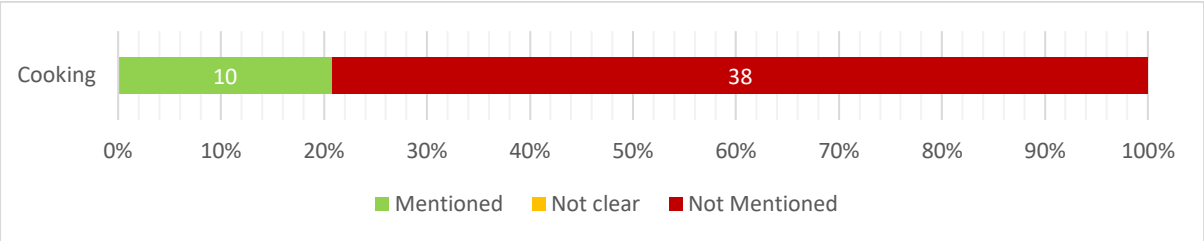
In all 24 documents where the responsibilities of the municipalities are mentioned, they are related to the development of the local heat transition and implementation plans. Amstelveen-4 adds that the municipality should investigate the options with the lowest social costs for the respective alternative heating options. In Laren-1 the municipality is also investigating whether a pilot project can be started to make a neighbourhood gas-free, while in Waterland the municipality is also carrying out a feasibility study to extend the existing aquathermal plant to the buildings of the SHAs. In the case of the five unclear responsibilities, only 'the parties are mentioned, such as in Blaricum-1, or the role of the municipality is not clearly formulated, such as in Haarlemmermeer-2.

The five clear responsibilities of the TAs are all linked to the municipal heat planning, where they play an active role in the development of the Transition Vision Heat or the neighbourhood implementation plans. In Lelystad-1 and Velsen-1 it is further emphasised that the TAs have an active role in involving and informing residents. Ten PAs do not clearly mention the responsibilities of the TAs, but only refer to 'the parties'. In seven cases they are linked to the local heat planning, e.g. 'the parties will specify how the heat transition will be continued in other districts and cores after 2026' (Edam-Voldendam-1). In the other three cases, the parties share their knowledge about geothermal energy, are involved in a pilot project or investigate the connection to a geothermal energy plant (e.g. Heemstede-1).

4.1.1.3.3 Cooking

As shown in Figure 29, switching from natural gas based cooking to electric cooking was mentioned in only about 21 % of the PAs, while 79 % did not mention this issue. There was no ambiguity in any of the documents analysed as to whether they mentioned this issue or not.

Figure 29: Coverage of cooking in the PAs.

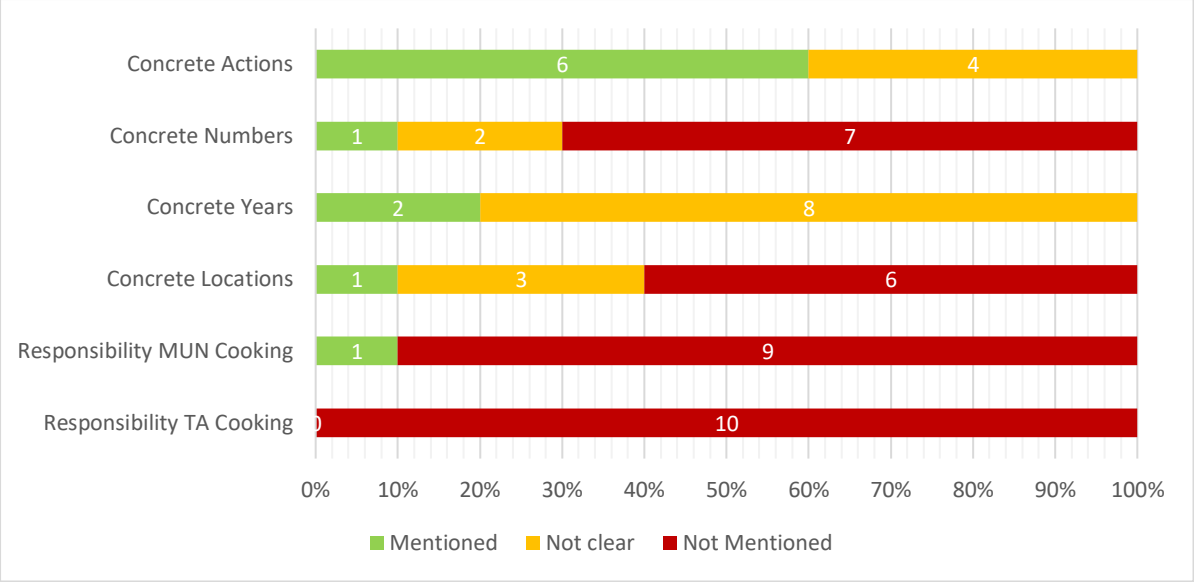


As presented in Figure 30, all ten documents mention measures, of which 60% are rather clear and 40% are rather vague. However, most of these measures remain at a superficial level, stating only that they want to switch from natural gas cooking to electric cooking. For example, Amstelveen-2 states: 'It is the policy of Woonzorg Nederland to remove the gas connection for cooking when there is a change in occupancy. New residents must cook electrically [...]'. In the case of the five PAs that were less clear, Amstelveen-4 mentioned that the conversion to electric cooking would be done 'if possible'. Similarly, Haarlemmermeer-1 stated that the SHA DUWO 'is also exploring the possibility of converting kitchens to gas-free cooking'. In the case of Lelystad-3 and Uitgeest-1, there is some ambiguity, as both PAs state that they want to install an electric cooking connection in the kitchen to enable and prepare the conversion from NG-based cooking to electric cooking, but leave open whether they will actually implement this or not. Although Uitgeest-1 states that tenants can apply for electric cooking, this was considered to be a less certain measure than, for example, the statement that electric cooking must be installed at each change of occupancy, as described below in the timeframes for action.

Amstelveen-2 states that the aim of switching to electric cooking is to improve fire safety in the tenants' homes. Haarlem-2 also mentions this and adds that this measure should also improve sustainability. However, SHA Rochdale in Diemen-1 points out that from a cost perspective, switching from NG-based cooking to electric cooking is not financially viable for the reduced CO2 emissions. Therefore, electric cooking has to be requested by tenants. These requests are then passed on to a company with whom agreements have been made to carry out the work at a discount. Although Rochdale is organising the conversion, they are not funding it. Instead, they are referring to an expected grant from central government that will be available from 2020. In Lelystad-3, the accelerated installation of an electric cooking connection at no cost to tenants is seen as a measure to alleviate energy poverty while contributing to the SHA's sustainability goals.

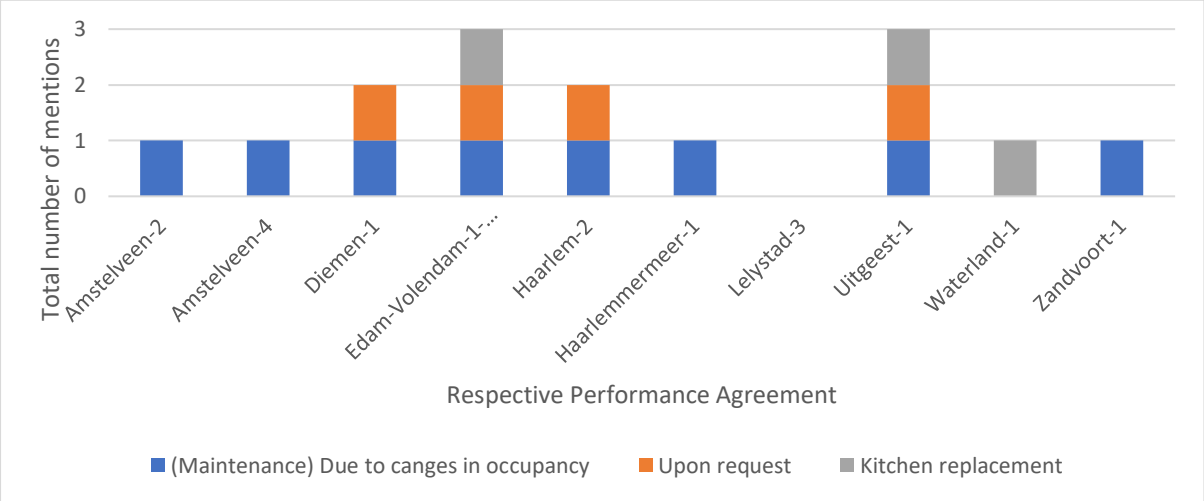
Concrete numbers were given in only three cases, one of which was clear. In Waterland-1, the PA stated that the municipality will establish a sustainability fund for the residents of Waterland amounting to € 325,000. However, it does not specify, for example, how many residents will receive this fund or the amount available per resident. In Diemen-1 and Edam-Volendam-1, the numbers only focus on the amount of houses that will receive insulation improvements. However, as it is not clear whether all these houses will also receive electric cooking, as indicated below for the locations, these numbers were counted as unclear. Furthermore, although ten PAs stated more or less clearly that they wanted to promote electric cooking, none of them then specified the number of households to be equipped with electric cooking.

Figure 30: Specification of cooking among the PAs which directly or indirectly mentioned this issue.



While two PAs provide clear timeframes for a single activity, the other PAs remain vague about the implementation of the measures. Uitgeest-1 states that they will prepare for the implementation of electric cooking in 2023 when replacing kitchens, while Waterland-1 states that the municipality will establish the sustainability fund with subsidies in 2021-2022. The remaining 80% of the documents are vague about when they will implement the measures. As can be seen in Figure 31, the timing of when the SHAs plan to convert to electric cooking varies, with the most common mention being during maintenance and/or changes in occupancy with eight mentions. In second place, SHAs convert to electric cooking at the request of their tenants (four mentions), while in three documents kitchen replacement is mentioned as a natural time for conversion (multiple mentions were possible). However, Lelystad-3 does not give a timeframe, but only vaguely describes that its measures will be implemented over the next few years.

Figure 31: Timing and reason of switching to electric cooking.



In terms of clear locations, only one SHA states its ambition to phase out NG for cooking and immediately after this identifies a specific building complex that still has gas connections, providing a clear link between the actions and the specific building. In three other PAs, locations were also mentioned, but with some ambiguity. The documents of Amstevelveen-4, Edam-Voldendam-1 and

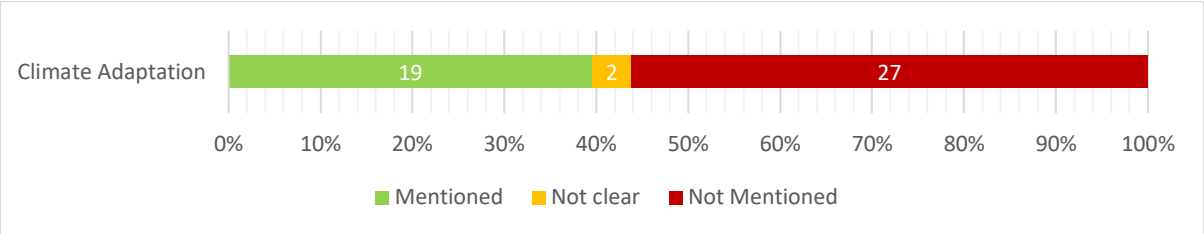
Haarlemmermeer-1 only mention specific districts or buildings where renovation or insulation measures are planned. They then describe their general ambitions to phase out NG for cooking, leaving room for interpretation as to whether these measures apply to these buildings or to the SHAs' building stock in general.

The responsibilities of the municipalities are only specified in one case (10%). The PA of Waterland-1 mentions that in 2021/2022 the municipality will establish a sustainability fund for the residents of Waterland which will also be used to grant subsidies to residents to switch to a natural gas-free cooker and will be initiated and implemented by the municipality. Diemen-1 mentions that a subsidy from the central government should be available in 2020, but the document does not elaborate on this and does not specify, for example, whether the municipality plays a role in accessing the subsidies. Therefore, it was not included in the municipality's responsibilities. No responsibility was found on the part of the tenants' organisation to phase out natural gas for cooking.

4.1.1.4 Climate Adaptation

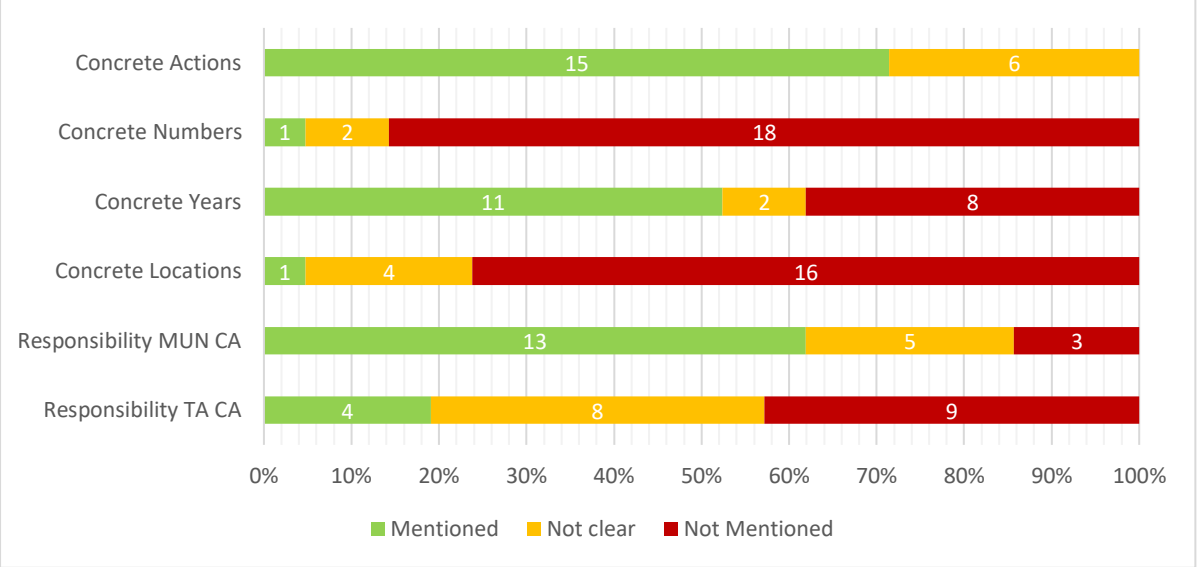
As shown in Figure 32, climate adaptation (CA) is directly mentioned in about 40 % of the PAs. In 4 % of all documents, it is not clear whether the SHAs report on CA, while the majority of 56 % do not mention the issue. In the two cases where it is not clear, one of the SHAs plans to apply nature-inclusive construction and design in the construction of new buildings (Amsterdam-1), while the other SHA plans to separate rainwater from the sewerage system (Laren-1), without directly linking these actions to the concept of CA.

Figure 32: Coverage of climate adaptation in the PAs.



Approximately 71% of the agreements that explicitly or implicitly mention CA specify concrete actions, while 29% mention more vague ambitions, as can be seen in Figure 33.

Figure 33: Specification of climate adaptation among the PAs which directly or indirectly mention this issue.

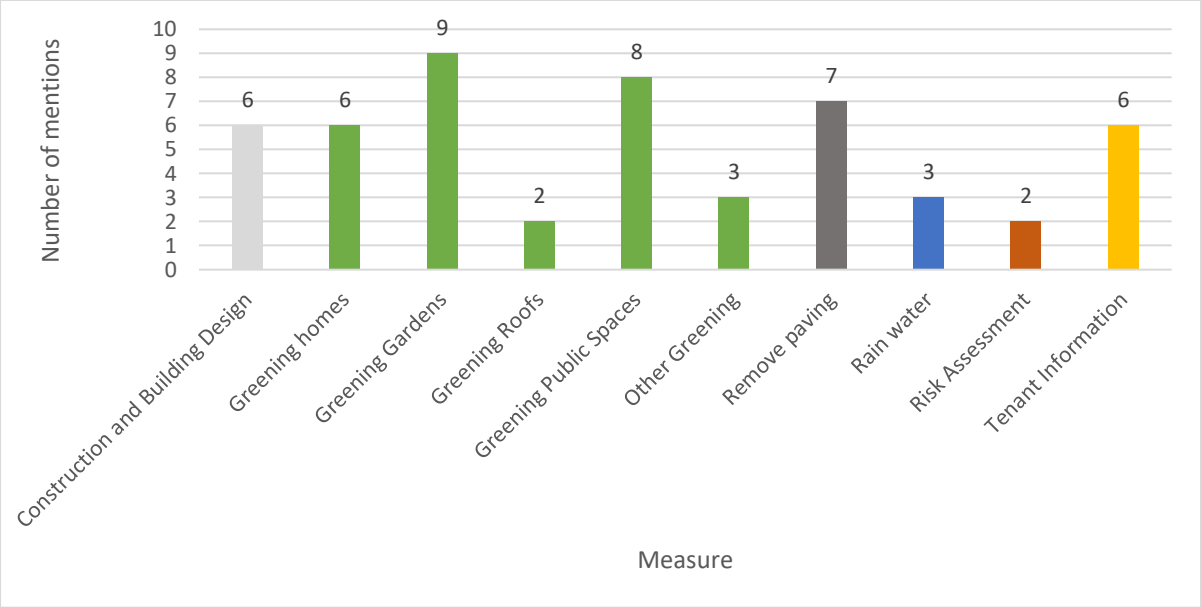


The specific actions mentioned in the documents are described in more detail in Figure 34. The application of CA to the construction of new buildings and the building design process is mentioned in six cases. In Amsterdam-1, the SHAs are encouraged to apply the ideas of the 'Handbook for nature-inclusive construction and design' to the construction of social housing, but no concrete agreements have yet been made. In Diemen-1, the parties want to promote climate adaptive construction and renovation, while in Lelystad-1 the covenant 'future-proof housing' is mentioned, which integrates several sustainability frameworks such as CA and circular economy, without further specifying its application. In Zandvoort-1-Add, the parties want to promote and encourage CA (re)construction and agree to share knowledge and good examples and coordinate concrete actions on an annual basis. In contrast, Heemstede-1 wants to include CA approaches in the design of public spaces, as well as Beverwijk-1+Heemskerk-1. The latter also specify that they want to promote nature-inclusive construction for new building projects, giving the example of the building's own water treatment and

the aim that new buildings should not lead to additional heat retention. However, none of these mention specific projects in which CA is already being implemented or which are currently planned.

As it can be seen, the majority of measures focus on greening of houses, gardens, roofs, public spaces and other greening measures. While six PAs indicate that they intend to green tenants' homes, this is only related to the measure of greening the façade in Waterland-1, while the remainder do not indicate what actions they plan to take to achieve this. Greening of tenants' gardens is the most frequently mentioned CA measure, with nine mentions. In addition, the PAs of Amstelveen-4 and Waterland-1 mention that the SHAs want to green the roofs of the garden sheds. In the case of the former, a municipal subsidy is available and the SHA states that it will agree to green the roofs of the sheds, but at the tenants' expense. Greening of public spaces is the second most frequently mentioned measure with eight mentions. Other greening measures include the greening of parking areas and the planting of trees and plants (Edam-Voldendam-1 and Waterland-1), and less concrete measures to maintain and increase green areas in the area (Haarlem-3-Add). Seven documents mention the removal of pavements as a CA measure. While six of them link this to the measure of greening tenants' gardens, only one PA specifies this measure for public spaces in the municipality (Edam-Volendam-1).

Figure 34: Measures for implementing climate adaptation.



Three measures focus on rainwater specifically. While Edam-Voldendam-1 and Waterland-1 plan to deploy rain barrels to their tenants, Laren-1 wants to disconnect the rainwater from the sewage drain. The two PAs Huizen-1 and Wijdemeren-2 specify as their single concrete measure that the municipality will conduct a risk assessment in the field of CA in which they involve the corporations. Tenant participation or information on CA is mentioned in six cases. Velsen-1 states that through the local climate agreement, residents of the municipality and tenants of the SHA will be informed about CA measures, without further specification. In the other PAs the information campaigns focus on the greening of gardens. For example, Amstelveen-4 informs tenants about the disadvantages of hardening gardens and wants to facilitate a challenge among its residents to remove pavement, while the municipality of Uitgeest-1 wants to motivate tenants to remove pavement by supporting resident initiatives. Similarly, Purmerend-1 wants to raise awareness among its tenants about making their gardens more climate-resilient through education, and Waterland-1 and Beverwijk-1+Heemskerk-1 are organising a behavioural campaign for their tenants on greening and CA, as well as informing tenants about interventions they can make in their homes and gardens, without specifying these.

Of the six PAs that were the least concrete, Lelystad-3, for example, states that they are committed to a green and healthy environment and want to discuss the policy on CA with the municipality, while the parties in Ouder-Amstel-1 plan to discuss how they will jointly implement CA in 2023 and 2024, but without specifying any concrete actions or measures, which also applies to Diemen-1. The documents of Aalsmeer-1, Haarlemmermeer-4 and Zaanstad-1 are the least concrete, only mentioning CA and vaguely stating that they will e.g. investigate possible measures they can take.

Numerical figures are only given in three PAs (see Figure 33), of which only the document of Zaanstad-1 gives clear figures and states that they plan to jointly develop at least one project to learn and experiment with the concept of CA. The PA of Edam-Volendam-1 states that the SHA Wooncompagnie has a financial budget of €50,000 which it intends to invest in CA projects. However, as this amount is spread over all municipalities where this SHA is active and is not exclusively focused on Edam-Volendam, this was counted as less concrete. In Lelystad-1, the SHA named a total of 118 housing corporation homes which should be energetically improved. Subsequently, it is stated that the public area and gardens will also be addressed, but without specifying whether this will be the case for all the houses or only a subset of them.

Specific years are given in 52% of the PAs, while 10% are not explicit and the remaining 38% do not mention them at all. In five cases where target years are given, they are linked to less clear actions, as they are still being examined or planned. In Amstelveen-4, Haarlem-3-Add and Velsen-1, the SHA will investigate in a specific year whether the greening of gardens can be included in the tenant agreement, whether the SHA can join the 'Green deal timber construction' covenant in the AMA and what measures can be taken in the existing housing stock or public areas to promote CA. In Amsterdam-1, the SHA and the municipality will make concrete agreements on the application of nature integration measures in 2021, and in Ouder-Amstel-1 the parties will discuss how to implement the concepts of CA and nature integration in 2023 and 2024. In four cases, the measures are more specific, as a specific measure will be implemented in that year. In Edam-Volendam-1, the parties will invest in several CA measures in 2023. Heemstede-1 describes that the SHA will inform its tenants in 2021 about the possibilities of greening their garden, while in Uitgeest-1 the parties want to involve residents in CA in 2023. Waterland-1 links several actions to concrete dates, such as the organisation and implementation of a behavioural campaign for tenants regarding greening and CA in 2021/2022. The PAs of Beverwijk-1+Heemskerk-1-Add and Lelystad-1 are the most specific, as they specify that the actions should be completed in a certain target year, such as the implementation of the CA plan or the completion of the physical work to make the public areas and gardens more climate-resilient. The two unclear dates come from Purmerend-1 and Zaanstad-1. In both cases, the PAs state that the CA measures should be implemented during the period of the performance agreements.

Only the PA Haarlem-3-Add mentioned a clear location by naming a specific neighbourhood where climate adaptation measures should be implemented. Aalsmeer-1 and Amstelveen-4 only vaguely state that climate adaptation measures should be implemented in both existing and new neighbourhoods. In the case of Heemstede-1, the SHAs are targeting new tenants of single-family houses with information on how to green their gardens, while Velsen-1 mentions targeting the upper floors of stacked buildings to reduce heat stress.

In terms of municipal responsibilities, 62% of the documents clearly state responsibilities, a further 24% are less clear and 14% do not mention any municipal responsibilities. Most of the responsibilities focus on informing or assisting tenants in greening their garden (Amstelveen-4, Beverwijk-1+Heemskerk-1-Add, Heemstede-1, Lelystad-1, Purmerend-1). In Uitgeest-1, Waterland-1 and Amstelveen-4 the municipality also organises and facilitates the collection of old paving. In Heemstede-1, the municipality also focuses on the greening of public spaces, as well as in Velsen-1, where the municipality, together with the SHA, is also investigating possible measures to make the

existing housing stock more climate-adaptive. Two municipalities finance CA measures. In Amstelveen-4 there is a municipal subsidy for green roofs, and in Laren-1 the municipality finances the separation of rainwater by increasing the sewerage charges. In Huizen-1 and Wijdemeren-2 the municipality is responsible for carrying out a risk assessment for CA, while Edam-Volendam-1, Haarlem-3-Add and Velsen-1 explicitly mention that the municipality is developing or implementing a local policy specific to CA. Haarlem-3-Add is the only PA that mentions that the municipality is responsible for discussing and implementing CA measures at neighbourhood level.

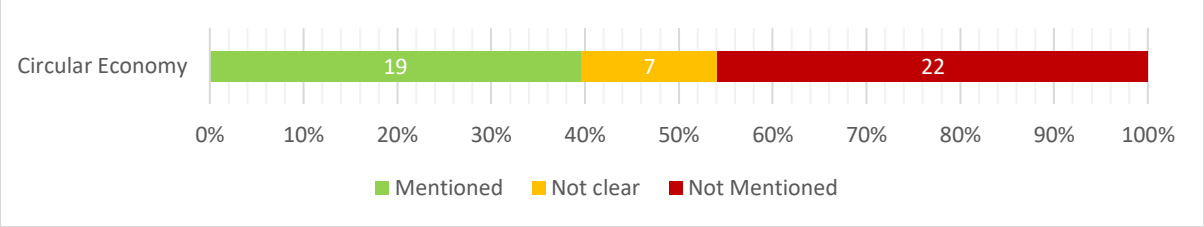
Two of the PAs where the municipal responsibilities are not clear are Lelystad-3, where a policy on CA and biodiversity is mentioned, but without specifying whether this is a municipal policy or not, and Zaanstad-1, where the municipality has a vague responsibility to participate in learning and experimenting with CA. The other three PAs only implicitly mention the municipalities by mentioning the 'parties' (Diemen-1, Ouder-Amstel-1 and Zandvoort-1-Add).

Regarding the responsibilities of the TAs, only the TAs of Beverwijk-1+Heemskerk-1-Add, Lelystad-1, Waterland-1 and Haarlem-3-Add are explicit. In the first PA, the TA informs tenants about CA measures they can take in their own home or garden. In the second PA, the TA will lead the tenant participation process to make the public area and garden more climate-adaptive and resilient. The third PA specifies that the TA will organise an information and behaviour campaign for tenants on greening and CA, and together with the municipality and the SHA, initiate first experiments to promote a more climate-adaptive environment. Finally, the Haarlem-3-Add document states more vaguely that the municipality, SHA and TA agree on the importance of sufficient green spaces in the city and that they will create clear measures to maintain and expand the green spaces in the area. However, they also state that the TA, together with the SHA, will investigate whether it is possible to limit stone gardens by including a clause in the tenant's lease for the gardens. In Zaanstad-1 it is stated that during the performance agreement period one CA project will be developed jointly by the SHA and in consultation with the TA and the municipality. In addition, a further seven PAs are vague as to whether or not they specifically involve the TAs, referring only to the parties working together to implement the actions as described above.

4.1.1.5 Circular Economy

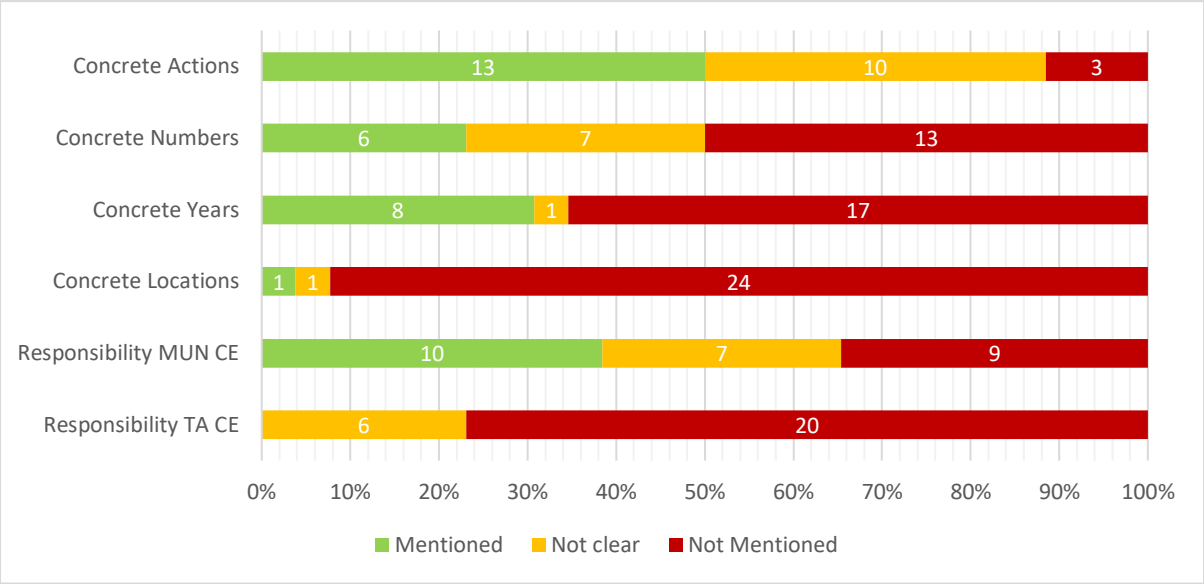
Figure 35 illustrates the coverage of circular economy approaches in the PAs. Out of all the documents, about 40% mention it clearly, while a further 15% of the PAs mention it with some ambiguity. The remaining 46% of documents do not mention circularity at all.

Figure 35: Coverage of circular economy in the PAs.



As depicted in Figure 36, thirteen PAs stated rather clear actions, whereas a further ten only specified them unclearly or vague. In three cases, no concrete actions were specified.

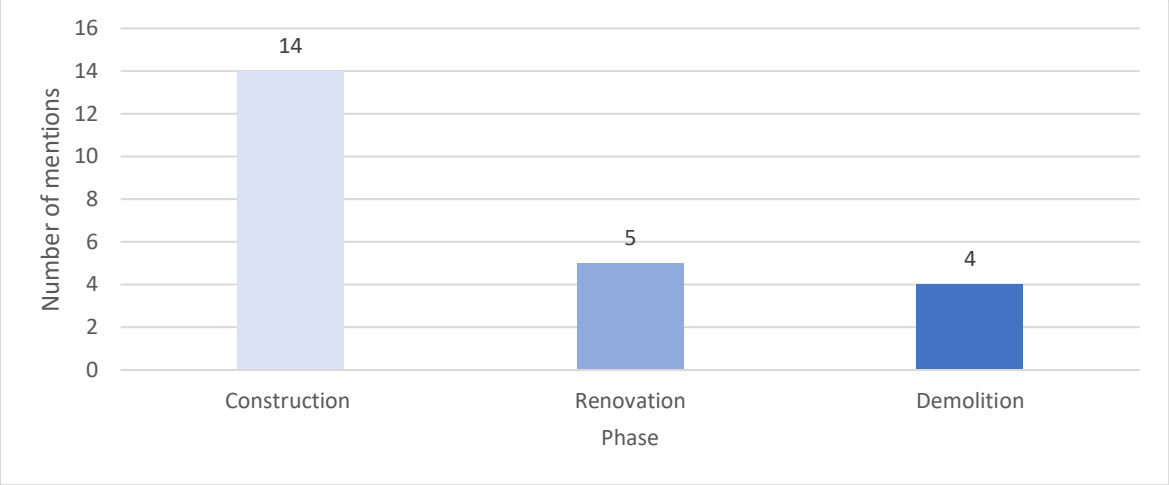
Figure 36: Specification of circular economy among the PAs which directly or indirectly mention this issue.



The use of sustainable and biobased building materials is most frequently mentioned in fifteen PAs, most of which mention the increased use of wood as an action. Amstelveen-4 promotes the importance of separate waste collection and Velsen-1 introduces a new recycling rate. In addition, Amstelveen-4 is following a materials list that includes the materials used in maintenance. Zaanstad-1 and Zandvoort-1-Add mention that they are using or investigating circular procurement to promote circular actions. Seven municipalities also point out that learning and experimenting play a crucial role in their circular economy ambitions, emphasising the role of municipalities and other market partners in this.

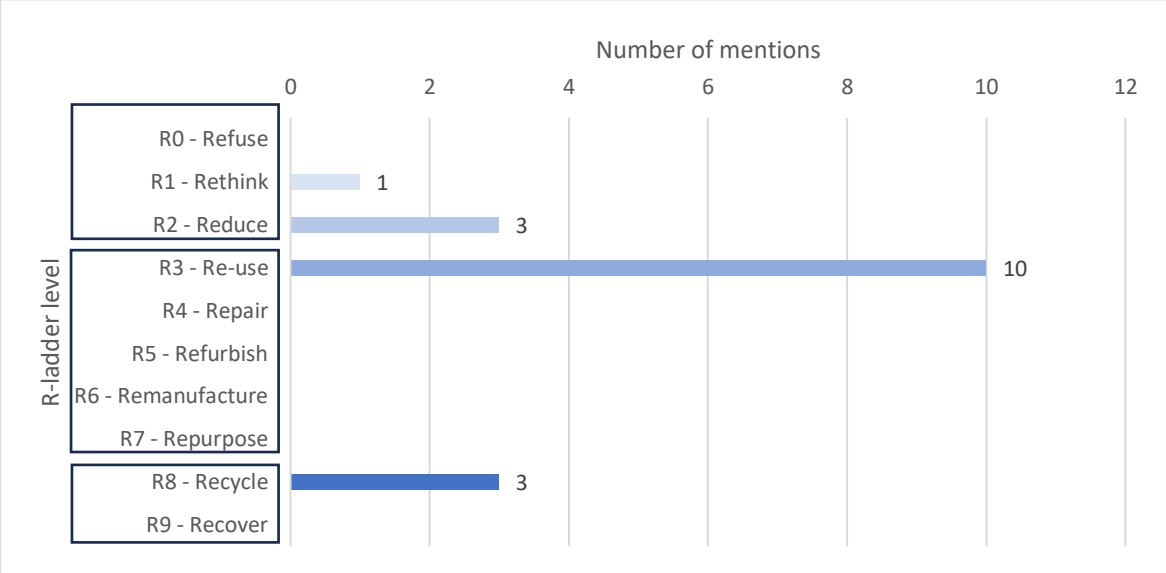
In the documents that mention circularity more or less clearly, fourteen of them state that the circularity measures they intend to take are aimed at the construction phase of new buildings. In five cases, the PAs state that the actions will target the renovation phase, while four documents specifically mention the demolition phase, as shown in Figure 37.

Figure 37: Specification of the phase in which circularity measures should be applied.



Moreover, in the content of the PAs, several R-ladder levels are mentioned, as depicted in Figure 38. However, the level of specification remains mostly very low.

Figure 38: R-ladder level of the content regarding circularity.



In the case of Amsterdam-4, which is applying a rethink strategy, they mention that they are exploring flexible construction concepts to make homes more adaptable for all stages of life. They also state that, where possible, when renovating or building a complex, they will build flexibly so that the size of the flats can be easily adapted to current and future needs. Beverwijk-1+Heemskerk-1 and Zandvoort-1-Add state that they will reuse existing building materials as much as possible and also reduce the use of new building materials and raw materials. Haarlem-3-Add mentions the interim target of the national circularity ambition to reduce resource consumption by 50% and states that the SHA is in line with this target. Similarly, the level of ambition for reuse remains very vague. Aalsmeer-1, Amstelveen-4, Landsmeer-2, Ouder-Amstel-1 state that they use sustainable materials and increasingly reuse them. Beverwijk is a bit more specific, stating that when demolishing houses, the SHAs ensure that existing building materials are reused wherever possible. Haarlem-3-Add adds that they want to ensure that resources are conserved as much as possible and that new materials are reusable. They also state that they have already gained experience in reusing building materials and mention two projects. However, like the other PAs, they are vague about future projects. Lelystad-1 mentions that they want to reuse

materials whenever possible, if this leads to lower costs. While Zandvoort-1-Add describes that the municipality and the SHA will promote the reuse of existing building materials and reduce the use of new building materials and raw materials as much as possible, Uithoorn-1 states that the parties will use sustainable and minimally polluting materials that are of high quality and reusable, and that released materials will be recycled. The other two PAs that mention recycling are Heemstede-1, which states that the recyclability, origin and composition of building materials will be considered during demolition, while Velsen-1 introduces a new recycling rate in 2023.

The quantification is clear in six cases and unclear in another seven. Clear figures come from Almere-2, Edam-Volendam-1 and Lelystad-1, which specify the municipal target of 20% timber construction by 2025. In the latter two cases, the SHAs also state that they intend to achieve or contribute to this target. Beverwijk-1+Heemskerk-1-Add mentions one circular construction project and one circular demolition project that they intend to investigate, while Weesp-1 mentions that the SHA is continuing on the path of using 80% sustainable materials, without specifying whether this is already achieved or a future target. In Zaanstad-1, the SHAs jointly develop at least one project during the cooperation agreement period in which they learn and experiment with circularity in consultation with tenant organisations and the municipality. The documents, which contain only vague specifications, mostly use formulations such as 'Eigen Haard aims to use circular materials as much as possible' (Amstelveen-4) or 'During renovations and annual maintenance, as many products and materials with quality and sustainability labels as possible will be used' (Haarlem-3-Add).

Specific years were mentioned in about 31% of the selected PAs, and less clearly in a further 4%. Zaanstad-1 is the one that mentions it less clearly, indicating that the one circularity project aimed at learning and experimenting should be implemented during the period of the PA. In Almere-2, Edam-Volendam-1, Lelystad-3 and Lelystad-1, the target year refers to the municipalities' plans to achieve 20% timber construction from 2025. However, only in the latter document the SHA combines this with its own target to explore the possibilities of using timber construction in 2023 with the aim of implementing a pilot project. In Ouder-Amstel-1 the parties will discuss how to implement circularity together in 2023 and 2024, while in Velsen-1 the municipality will introduce a new recycling rate for better waste separation in 2023. Wormerland-1 describes that a tour was planned by the SHAs in 2020 to explore circularity in this municipality, which could not be done due to the COVID-19 pandemic and should be done as soon as possible. In the Beverwijk-1+Heemskerk-1-Add the PA identifies a specific circular construction project to be evaluated in 2022. It also mentions a second circular demolition project to be evaluated in 2022-2023.

The latter document is also the only PA where a clear location is mentioned by specifying the project. In the Edam-Volendam-1, the parties only vaguely describe that they are looking for suitable sites to implement modular construction.

In four cases where municipal responsibilities were mentioned, these were linked to the signing of the AMA's 'Green Deal covenant Timber Construction'. Lelystad-3, Almere-2, Edam-Volendam-1 and Lelystad-1 mention that by signing this covenant the municipalities committed themselves to building 20% of the housing production from wood and other bio-based materials by 2025. Almere-2 states that the municipality and the SHA want to explore possibilities and share knowledge and possibly implement a pilot project together. Edam-Volendam-1, on the other hand, describes that the municipality is working together with the SHA to achieve this goal and that the municipality is looking for and identifying suitable locations for timber and modular construction. In Lelystad-1, the SHA states less clearly that it aims to contribute to the achievement of this objective where possible. The municipality takes responsibility for monitoring the implementation of the planned housing programme, including the proportion of wood and other bio-based materials, on a quarterly basis. In Velsen-1 and Amstelveen-4, the municipality's responsibilities focus on recycling. In the first case, the

municipality will introduce a recycling rate in 2023 and evaluate the change in the average municipal charges for waste the following year. In the second case, the municipality provides communication material to promote awareness and the importance of separate waste collection to achieve resource recovery. In the other four documents, the responsibilities of the municipalities with regard to circularity are more general. In the Beverwijk-1+Heemskerk-1-Add, the municipality and the SHA strive for circularity in new construction and renovation wherever possible. In addition, both parties make concrete agreements on the level of ambition and the associated costs for each project. In Zaanstad-1, the SHAs jointly develop at least one project within the PA period and consult with the municipality and the TA. In addition, the municipality shares its own experiences to enable a learning process and accelerate development. Also in Haarlem-3-Add, the municipality and the SHAs deepen their knowledge about circularity, including the tools to measure it, the opportunities that exist and how best to align with the national circularity targets. In Heemstede-1, the municipality makes agreements with the SHAs to implement circularity, also including the design of public spaces.

In seven cases the responsibilities of the municipalities are only implicitly mentioned. The document of Zandvoort-1-Add mentions that the municipality and the SHA promote the reuse and reduction of building materials as much as possible. However, as it is not specified which actions they take or investigate, the municipal responsibility was considered unclear. In the PAs of Aalsmeer-1, Haarlemmermeer-3, Landsmeer-2 and Ouder-Amstel-1, issued by the SHA Eigen Haard, the SHA mentions the municipality as a learning partner for circularity. In the latter case it is vaguely added that in 2023 and 2024 the parties will discuss how to implement various topics together, including circularity. In Diemen-1 and Purmerend-1, the parties are also mentioned as promoting circular construction and renovation, as well as new sustainable construction techniques.

The responsibilities of TAs were mentioned in seven documents, but remained vague. Zaanstad-1 was the only document that directly mentioned TAs, stating that SHAs should develop a circularity project in consultation with TAs and municipalities. In all the other cases, TAs were only indirectly included in the term 'the parties'. While the parties in Amstelveen-4 jointly promote awareness of the importance of separate waste collection to achieve resource recovery, the parties in Diemen-1, Haarlem-3-Add, Purmerend-1 and Zandvoort-1-Add expressed the intention to promote circularity approaches in the future.

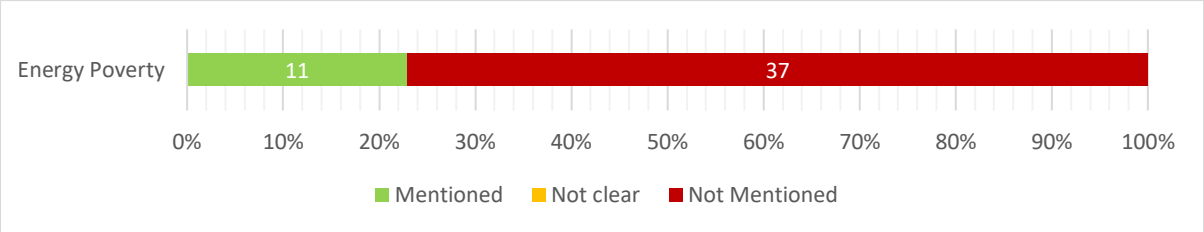
4.1.2 Energy Poverty

The following chapters cover the content of issues related to energy poverty in the PAs. Chapter 4.1.2.1 discusses the awareness of energy poverty among SHAs, while Chapter 4.1.2.2 covers programmes aimed at supporting low-income tenants. Finally, chapter 4.1.2.3 presents the content related to the impact of sustainability measures on housing costs.

4.1.2.1 Awareness of Energy Poverty

Of the 48 documents analysed, 11 PAs, or 23%, mention the issue of energy poverty, reflecting an awareness of the issue, as shown in Figure 39. In none of the cases was it unclear whether the concept was mentioned or not.

Figure 39: Coverage of energy poverty in the PAs.



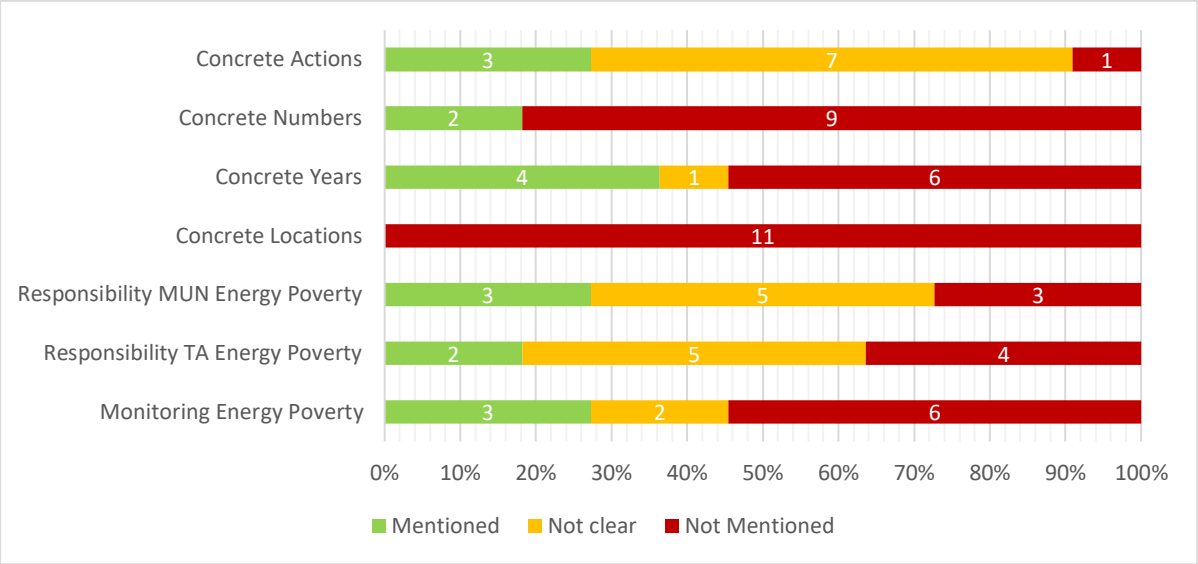
Several SHAs recognise and identify possible causes of energy poverty in their PAs. For example, Haarlem-3-Add and Lelystad-3 point out that sharply rising energy prices for gas and electricity can lead to energy poverty and could lead to even higher levels of energy poverty in the future. Edam-Voldendam-1 and Amstelveen-3 also mention rising energy prices as a cause. While the former adds that tenants who are already less financially stable are more vulnerable to energy poverty, the latter stresses that energy poverty particularly affects tenants who may be living in less insulated dwellings that have not yet been made sustainable. Similarly, Lelystad-1 and Haarlem-3-Add point out that a reduction in energy consumption that leads to a decrease in housing costs plays an important role in combating energy poverty.

As can be seen from Figure 40 below, while around 91 % of the SHAs are committed to taking action to prevent or alleviate energy poverty among their tenants, only 27% specify concrete actions, while 73% are not explicit. Lelystad-1, Lelystad-3 and Velsen-1 have specific but varying actions. While Lelystad-1 plans to carry out 1,500 renovations in its housing stock in order to reduce net energy consumption and also aims to increase knowledge about energy saving measures through a communication campaign and the use of energy coaches, Lelystad-3 plans to accelerate the switch to electric cooking at no extra cost to tenants and to replace gas-fired central heating boilers with hybrid heat pumps. Finally, Velsen-1 plans to provide its tenants with the knowledge and energy-saving appliances to achieve energy savings through the use of energy coaches for 1,250 households.

Regarding the less concrete actions, several SHAs state in their PAs that they will first identify and map energy poverty among their tenants and then define and implement additional efforts to alleviate EP for them, such as Beverwijk-1+Heemskerk-1, Haarlem-3-Add and Zandvoort-1-Add. However, Haarlem-3-Add is the most specific compared to the other two, adding that as part of their social energy transition considerations, they and the municipality are targeting and implementing measures for residents who face financial, technical or organisational challenges in making the energy transition, in which they consider EP to play an important role. The SHAs of Amstelveen-4 and Ouder-Amstel-1 both mention that a housing cost survey was carried out in 2021 and that they, together with the municipality and the tenants' organisation, will take measures to improve the affordability of their

tenants in the broadest sense, including energy poverty considerations. Almere-1 and Amstelveen-3 remain very vague, stating only that they are committed to preventing energy poverty within their sphere of influence in the first case, and that they are keen to make a difference and combat energy poverty among their tenants in the short term in the second case. Edam-Volendam-1, on the other hand, does not state any intention to take action, but only that they are concerned about energy poverty among their tenants.

Figure 40: Specification of energy poverty in the PAs.



Only two SHAs provide clear numerical targets. In Lelystad-1, the SHA states that it intends to renovate 1,500 dwellings in 2023 with the aim of reducing net energy consumption, but does not specify an energy target level. Velsen-1 specifies its action regarding the use of energy coaches and states that at least 1,250 households will be able to benefit from this action in 2023. In addition to the two timeframes mentioned above, Lelystad-1 adds that the municipality will develop measures to alleviate energy poverty in 2023, after conducting the initial inventory. Amstelveen-4 and Ouder-Amstel-1 describe that in the first half of 2023 the parties will specify which additional measures they intend to take to improve the financial situation of tenants, while Lelystad-3 only vaguely indicates that the implementation of the measures will take place in the coming years. However, none of the PAs specifies any locations where the actions are going to take place.

With regard to the responsibilities of the municipalities, these are clearly defined in about 27 % of the PAs and less clearly defined in another 45 %, while 27% of the documents do not mention any responsibilities of the municipalities. In Amstelveen-3, the SHA states that they are keen to work with the municipality to help their tenants to alleviate EP in the short term, but they also stress that they want the municipality to play an initiating and coordinating role in identifying and alleviating EP. In Lelystad-1, the municipality is responsible for a communication campaign that focuses on showing examples, providing tips and advice, and using energy coaches and ambassadors to raise awareness among SHA tenants about what they can do to reduce their energy costs. It is also noted that the one-time government contribution will be used by the municipality to structurally tackle energy poverty at a local level. In addition, the municipality is expected to develop a plan to adapt buildings, e.g. through insulation, replacing high energy-consuming appliances and influencing tenant behaviour. In addition, the municipality should coordinate with the TA and SHA on how best to use new potential subsidies to tackle energy poverty and prepare an action plan to be shared with the SHA and the TA. In Velsen-1, however, the municipality's role is to offer the deployment of energy coaches to inform and motivate tenants about the energy coaches who will distribute and install energy saving products.

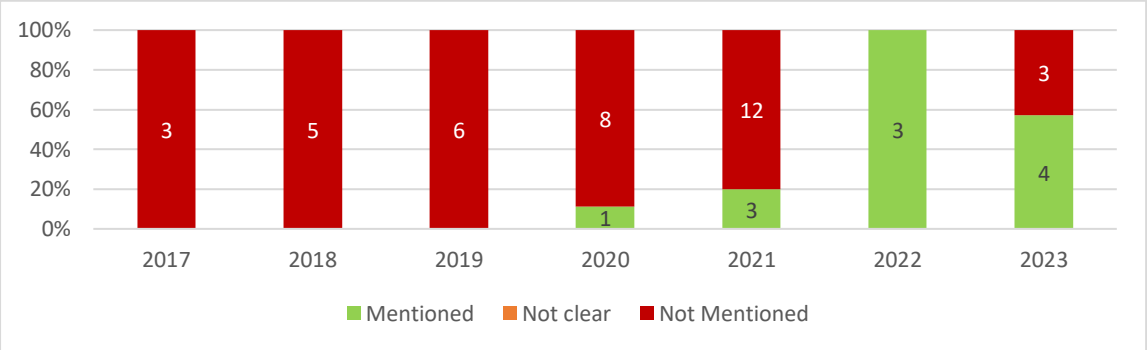
In the PAs where the responsibility of the municipalities to alleviate EP is less explicitly mentioned, Amstelveen-4 and Ouder-Amstel-1 mention that the SHAs, their TAs and the municipalities will jointly identify additional measures to improve affordability in the broadest sense, including energy poverty considerations, and improve the visibility of these measures to their tenants. In the PAs Beverwijk-1+Heemskerk-1-Add, Haarlem-3-Add, and Zandvoort-1-Add the municipalities and TAs are less explicitly included in the term 'the parties', who are responsible for mapping EP and developing additional efforts to alleviate it. In Haarlem-3-Add, however, the municipality and the SHA also run programmes for tenants who face financial, technical or organisational difficulties in the energy transition, as described above.

The responsibilities of the TAs are clearly mentioned in 18% of the cases and more vaguely in 45%. In Lelystad-1, the TA actively works with the municipality and the SHA to coordinate how new subsidies can be used effectively and efficiently. In addition, but more passively, the TA also receives the results of the action plan developed by the municipality. In Velsen-1, the TAs are actively involved in an open dialogue with their SHAs about energy poverty and the impact of sustainability on housing costs. Furthermore, the TA, together with the municipality, offers the use of energy coaches to inform residents about sustainability measures in their homes, with the aim of motivating residents to adopt sustainable practices. In the PAs where the responsibilities are less clear, the TA jointly defines measures to improve affordability for tenants, which also includes energy poverty, in the PAs of Amstelveen-4 and Ouder-Amstel-1. In addition, in the Beverwijk-1+Heemskerk-1-Add, Zandvoort-1-Add and Haarlem-3-Add PAs, the TA is only indirectly mentioned as part of the 'parties' that map energy poverty among their tenants in order to reduce EP, and then determine additional efforts based on this. The PA Haarlem-3-Add adds that the TAs promote affordability measures in which also energy poverty plays a role.

Overall, 27% of the PAs are fairly clear that they monitor energy poverty among their tenants, 18% are not clear and more than half (55%) make no reference to monitoring. Two of the relatively clear documents state that 'the parties map (possible) energy poverty based on existing data', which is the case of Beverwijk-1+Heemskerk-1-Add and Haarlem-3-Add. Very similarly, Zandvoort-1-Add states that the municipality and the SHA identify (possible) energy poverty. The other two documents are less clear about this, as for example Amstelveen-3 states that the municipality should detect and combat energy poverty, implying some kind of monitoring system. In the case of Lelystad-1, the PA states that the municipality should develop an action plan based on the energy poverty inventory. However, none of the PAs specify the specific data or approach to be used, nor, for example, the measurement interval.

As shown in Figure 41, the frequency of mention increased significantly from the first mention in 2020. However, after the year 2022, when all evaluated PAs mentioned this topic, only about 60% mentioned it the following year.

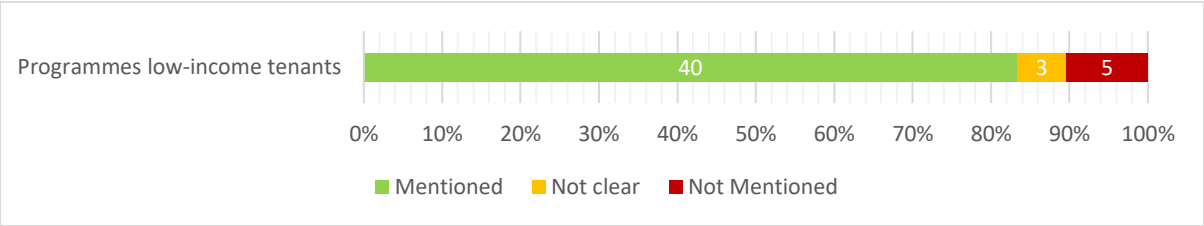
Figure 41: Mentions of energy poverty by publication date.



4.1.2.2 Programmes for low-income tenants

As shown in Figure 44, around 83% of the documents mention programmes to support low-income tenants, with a further 6% referring to them vaguely. Only 10% of PAs make no mention of schemes to improve the financial situation of tenants.

Figure 42: Coverage of programmes for low-income tenants in the PAs.



The level of specification for these programmes is shown in Figure 43. As can be seen, over 77% of the documents that clearly or vaguely mention this issue specify clear actions to support low-income tenants, while the remaining 23% are less clear about these actions.

Figure 43: Specification of programmes for low-income tenants in the PAs.

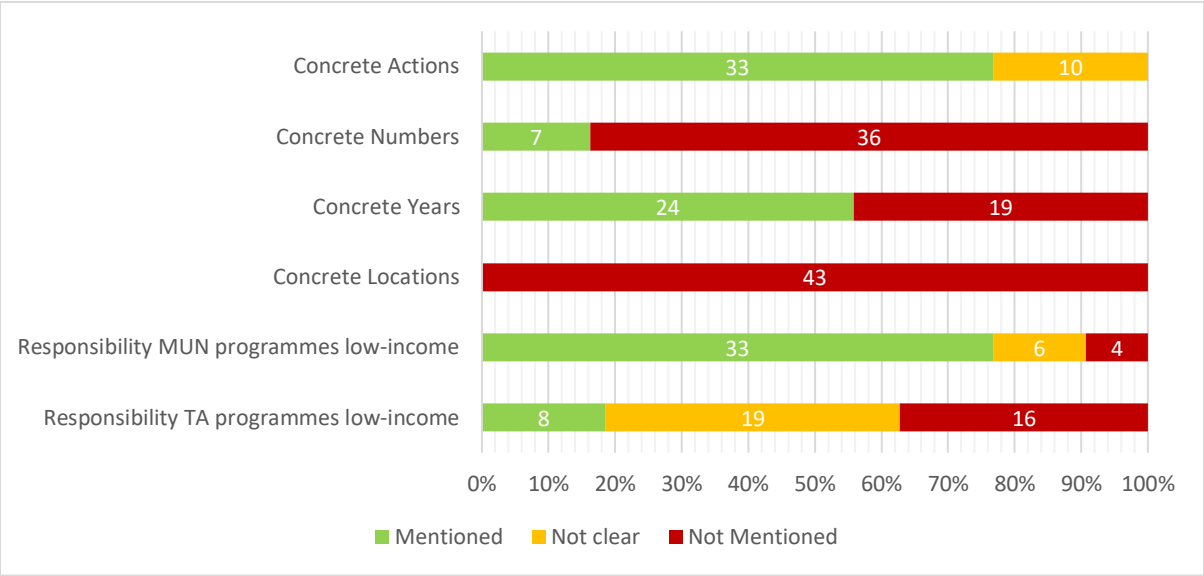
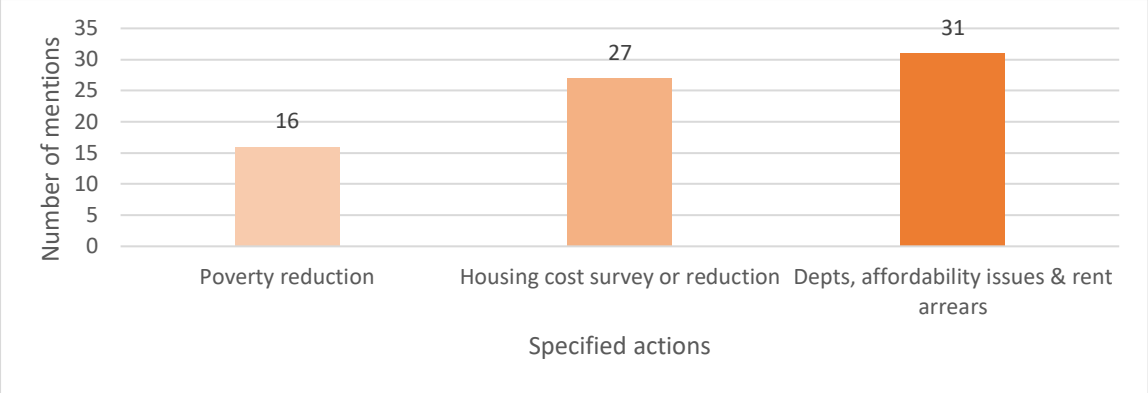


Figure 44 provides further insight into the specific actions mentioned. In 16 documents measures to reduce poverty among tenants are mentioned. In all cases they refer to a municipal poverty policy. In Blaricum-1, for example, the municipality has a poverty policy aimed at supporting vulnerable low-income tenants, and the other parties support the municipality in this role by actively informing each other about cases and working together to find a solution. The municipality of Gooise Meren states that it takes measures to support low-income residents with mini-grants to fight poverty and at the same time improve the participation of these households (Gooise-Meren-2). In the PA of Waterand-1, the municipality emphasises that they want to put an additional focus in their poverty programmes on helping residents who are less (digitally) literate.

Figure 44: Specification of actions for low-income tenants



The second most frequently mentioned measure was to carry out a housing cost survey with the aim of reducing the total housing costs for tenants. For example, the PA of Beemster-1 states that the parties involved should critically examine the impact of rent policy, energy costs, service and administration costs and municipal charges on the total housing costs for tenants. In several PAs the municipalities should contribute to this. In Velsen-1, for example, the municipality 'ensures that municipal taxes for residents are as low as possible and is transparent about what it is doing to ensure affordability for tenants'. The SHA in Amstelveen-2 wants to improve transparency and information for tenants on housing costs by including a housing cost indicator in its housing advertisements, including rent, service charges and energy prices. Finally, the most frequently mentioned measure focuses on tenants with depts, affordability problems or rent arrears, with 31 mentions. Almost all of these documents refer to the importance of early signalling of debt and financial problems and dealing with rent arrears. Several PAs stress that this is important to prevent evictions (e.g. Heemstede-1). This requires good cooperation and coordination, such as 'organising data exchange between the parties involved (municipalities and SHAs) within the legal possibilities' (Huizen-2). In other cases, the SHA and the municipality work together to agree on ‘a (joint) allowance, rent freeze or rent reduction’, as in Landsmeer-1.

Specific numbers were mentioned in seven PAs. Lelystad-1 mentioned that the municipality and the SHA were using a tool to raise awareness of housing cost savings, which would be available to 500 residents in 2023. In the other six documents, the target group of beneficiaries of the low-income programmes was specified as those with an income at or below 120% of the social assistance threshold (e.g. Amsterdam-1). In 24 documents, specific time frames were clearly mentioned and linked to actions. In most cases this was linked to the implementation of a housing cost survey or the analysis of its results, such as in Aalsmeer-1 where such a study was planned for 2021. However, in some documents the timeframes were linked to other actions, such as the continuation of a municipal income guarantee for low-income tenants until 2025 or the annual information meeting on the development of municipal levies (Hilversum-1). None of the documents specified a location. Local government responsibilities were clearly mentioned in 33 documents and less clearly in six others. The responsibilities included, for example, the development of measures in line with the municipal poverty policy (Aalsmeer-1), a reduction of municipal taxes for low-income groups (Amstelveen-3) or the implementation of measures for the early detection of debt problems among residents (Heemstede-1). Unclear formulations included 'together with the municipality we are exploring possible partnerships [...]' (Haarlemmermeer-2). In eight cases, the responsibilities of the TAs were clearly stated, e.g. to use their communication channels to make their tenants aware of the programmes (Edam-Voldendam-1). The 19 unclear responsibilities include, for example, formulations such as 'the parties' (Haarlemmermeer-4) or vague formulations such as that the TAs are committed to keeping housing costs as low as possible and investigate ways to do so (Beemster-1).

4.1.2.3 *Effect of sustainability measures on the affordability*

Figure 45 shows the coverage of the commitment not to increase total housing costs after implementing sustainability measures. As can be seen, almost half (46%) of the agreements clearly state that costs should not increase, while 33% of the agreements are less clear or ambiguous. In 21% of the PAs this is not mentioned.[7]

Figure 45: Coverage of commitments to not increase costs after sustainability measures.

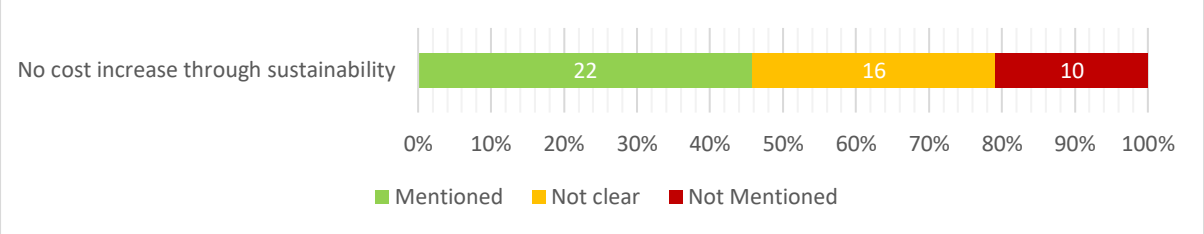
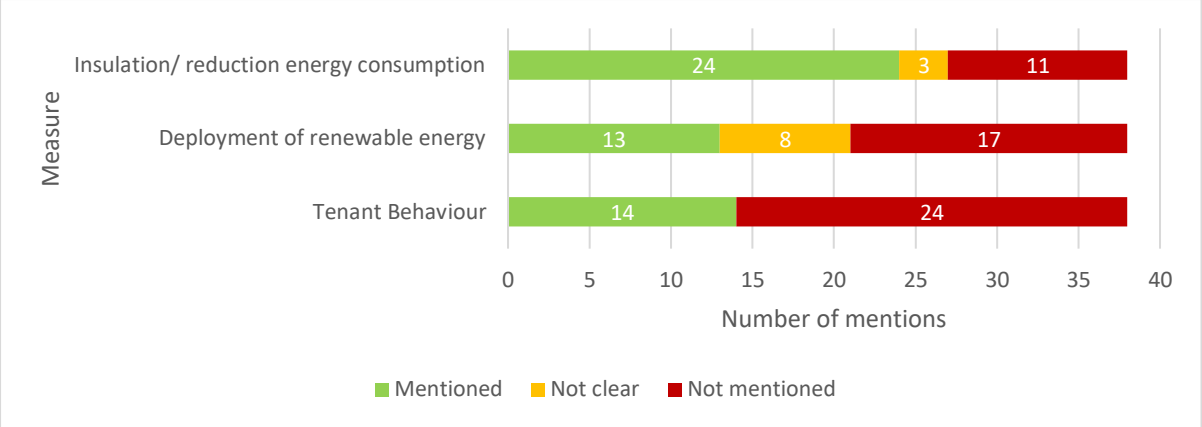


Figure 46 provides a more detailed description of the content of these commitments, which are clearly or less clearly mentioned in their documents. As can be seen, the majority of PAs (63%) clearly state that they expect insulation and other measures to reduce energy consumption to make a positive contribution to stabilising or even reducing overall housing costs. For example, Hilversum-1 states that 'improving the energy performance of existing housing by SHAs will be aimed at achieving a lower or equal housing cost (rent + energy) after renovation (compared to the total housing cost before renovation).' The Amstelveen-3 document adds that since reducing heating demand has a direct impact on natural gas consumption and therefore on energy costs, this measure is preferred to the installation of renewable energy technologies such as solar panels in times of rising gas prices. In 8% this objective is not clear. For example, Aalsmeer-1 states that they use the housing cost model (Dutch: Woonlastenmodel), which aims to inform tenants at an early stage about the housing costs after the renovation. However, while they state that improving the level of insulation also has a positive effect on reducing energy consumption, they do not clearly state whether the total housing costs for tenants should remain stable or may possibly increase. Other documents remain vague about their commitment, for example by stating that they are exploring options to minimise housing costs for their tenants through sustainability projects. The remaining 29% of documents made no reference to the impact of energy reduction measures on housing costs.

In 34% of the documents it is clearly stated that connecting to renewable energy for electricity or heating will result in stable or even reduced costs. However, this is not clearly defined in 21% of the PAs and is not mentioned in 45% of the documents. Of the PAs that are clear or somewhat clear, 60% specifically mention the use of sustainable heat, while 20% focus on electricity and a further 20% cover the energy transition more broadly. An example of a clear statement comes from Amstelveen-4, which states that the cost of renewable heat should not increase compared to the current situation with natural gas, while another one comes from Purmerend-1, where the local district heating network should not lead to increased costs for the tenants. A less clear statement can be found in Weesp-1, which states that they are currently working on heating plans that take into account affordability for tenants, but does not specify whether this means that costs should remain the same or even decrease.

[7] Due to the overlap with the issues of tenant behaviour, renovation and the deployment of renewable energies, no specification of the agreements covering, e.g. the definition of clear timeframes or responsibilities has been included here. A detailed description of these can be found in the relevant chapters.

Figure 46: Specification of measures for not increasing costs.



A total of 37% of the documents clearly link stable or reduced total housing costs to changes in tenant behaviour after reducing energy consumption through insulation. The document from Uithoorn-1 emphasises that 'a dwelling is only energy efficient if the occupants use it in the right way', while Velsen-1 states that 'the objective of all parties remains to minimise the energy consumption of the tenants by modifying the dwelling and by encouraging energy efficient behaviour of the tenants'. Therefore, this measure is seen as important to reduce the energy consumption of the tenants and therefore the total costs, e.g. energy costs and rent. In the remaining 63% of documents, there was no clear link between changes in tenant behaviour and the objective of keeping tenant costs stable or even reducing them. The specific actions related to tenant behaviour, such as the use of energy coaches, are described in Chapter 4.1.1.2.4.

A total of eight documents state that they are planning to implement the above mentioned sustainability measures according to the 'Housing Cost Neutrality' (*Dutch: Woonlastenneutraliteit*) approach, as stipulated in the Dutch Climate Agreement (e.g., Haarlem-3-Add). This means that the use of renewable energy will not increase the total cost of housing more than it would if the fossil fuel-based energy system were to continue.

4.1.2.4 *Active role of tenants in the heat transition*

In Figure 47 the coverage of an active role of tenants in the heat transition is presented. As can be seen, about 17% of the documents clearly mention this issue and a further 17% mention it less clearly, while the remaining 67% of the documents do not cover this issue.

Figure 47: Coverage of active role of tenants in the heat transition.

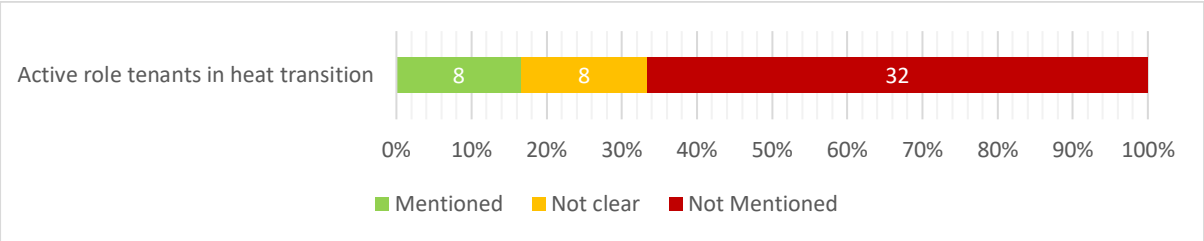
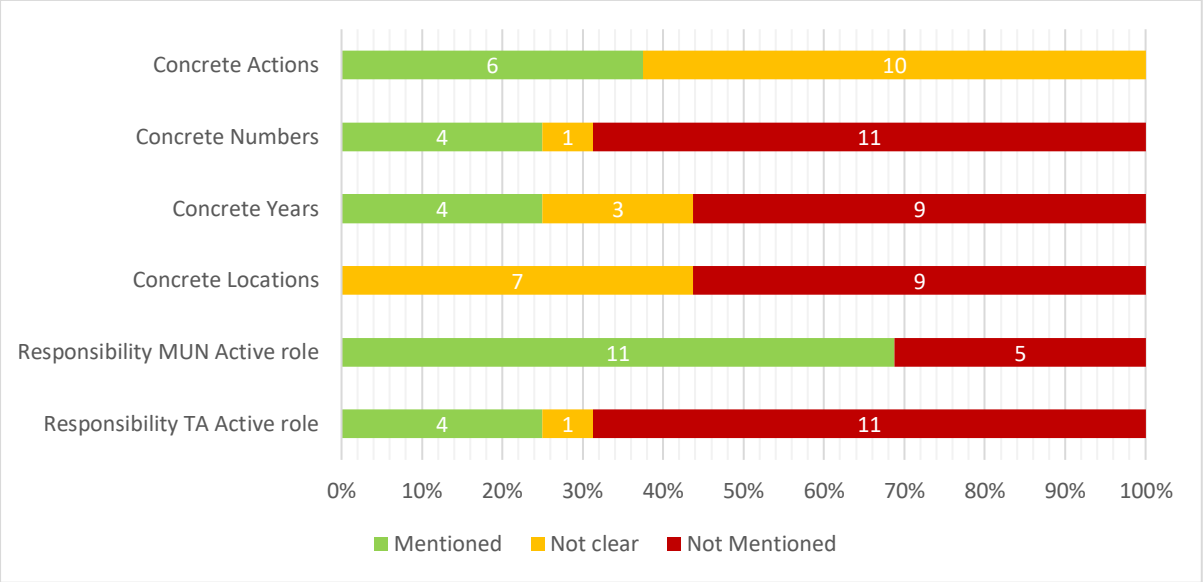


Figure 48 depicts the specifications for an active role of tenants in the heat transition. While 38% of the PAs clearly specify actions related to this issue, they are less clear in the remaining 63% of the documents.

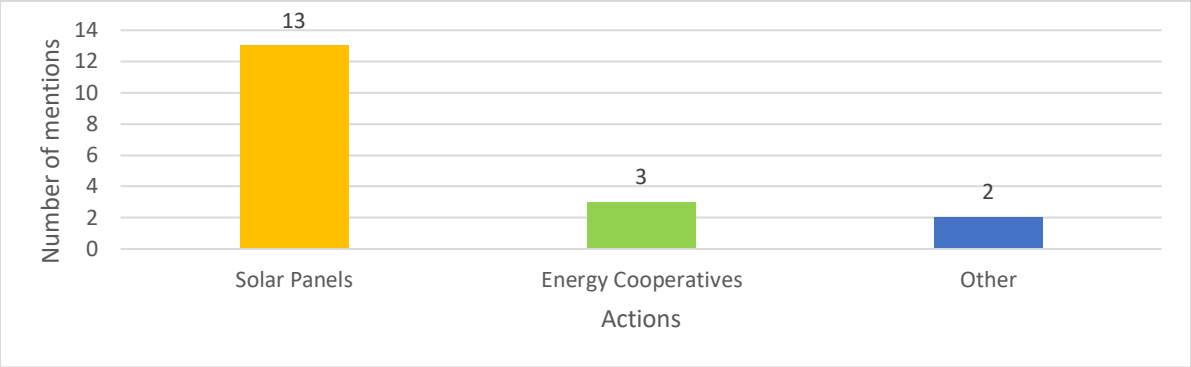
Figure 48: Specification of active role of tenants in the heat transition.



As shown in Figure 49, the majority of measures, with 13 mentions, relate to the installation of solar panels by tenants with the support of the SHAs (multiple mentions are possible). Five of these are clearly specified, such as in Amstelveen-4, where 'individual tenants can, after obtaining permission, carry out their own energy saving measures, such as the installation of solar panels, on the basis of the self-assembly policy'. A second example comes from Hilversum-1, where 'initiatives by cooperating residents to install solar panels on their homes are met with goodwill and cooperation' by the SHAs. In the other eight cases, the active role of tenants is less clear. While the possibility for tenants to install solar panels on their roofs is mentioned, it is not entirely clear whether the SHAs are promoting this as an opportunity for active participation, or whether they are simply aiming for 70% of tenants to agree to install solar panels on their roofs, as in Zaandvoort-1. In three cases, measures to establish or support a local energy cooperative were mentioned. The PA of Beverwijk-1+Heemskerk-1-Add mentions that the SHA wants to contribute to a structural solution for its tenants due to rising energy costs and therefore supports the partnership with energy cooperatives together with the municipality

and the TA. Diemen wants to adapt the sustainability loan (*Dutch: Duurzaamheidslening*) so that tenants without suitable roofs can invest in solar panels elsewhere in the municipality (Diemen-1). In two cases, which were less clear, other measures were mentioned, such as setting up a municipal sustainability fund for tenants to finance, for example, a natural gas-free cooker (Waterland-1) or setting up 'climate tables' to involve residents in the energy transition (Zaanstad-1).

Figure 49: Content of actions to promote active tenant participation in the heat transition.



In four cases, concrete numbers were given, such as in Beverwijk-1+Heemskerk-1-Add, where the SHA wants to support 2,000 households to generate their own energy by equipping their roves with solar panels, or the amount of the sustainability fund in Waterland-1 (see Figure 48). In the less clearly defined case, the SHA wants to implement as many solar panels as possible (Weesp-1). In a further four documents, specific times were given and linked to clear actions, such as the use of solar panels in three PAs and the involvement of residents through 'climate tables' in Zaanstad-1. In a further three cases, the times given could not be clearly linked to actions, such as in Waterland-1 where a multi-year period was mentioned for the sustainability fund. Locations were only vaguely mentioned in seven documents, and in all cases related to the specification of the type of housing on which the solar panels were to be installed, such as detached houses and apartment blocks in Beverwijk-1+Heemskerk-1-Add. Eleven clearly defined responsibilities of the municipalities were mentioned, of which one focuses on the provision of the sustainability fund (Waterland-1) and three others support the establishment of an energy cooperation (e.g. Diemen-1). The remaining responsibilities focus on solar panels and aim at informing tenants (e.g. Weesp-1) or adapting local building regulations to allow the installation of this technology (e.g. Hilversum-1). Four clear responsibilities of the TAs were mentioned, three of which focus on solar panels and also mention their supporting and informing role (e.g. Haarlem-3-Add). In the Beverwijk-1+Heemskerk-1-Add document, the TAs have a leading role in the partnership with the energy cooperatives. In the one less clear responsibility, the term 'the parties' is used to support local energy production among tenants.

4.2 Quality of the Performance Agreements

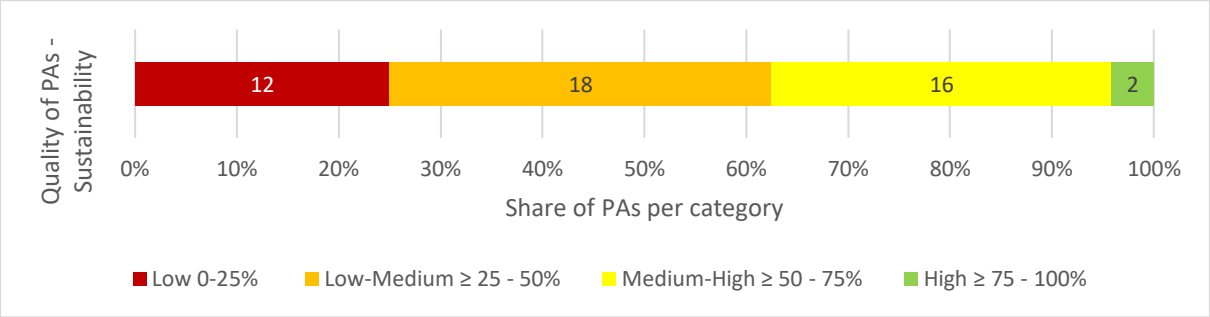
The quantitative results on the quality of the PAs are described in the following two chapters. While chapter 4.2.1 presents the results of the sustainability indicator, chapter 4.2.2 provides the outcomes of the energy poverty indicator.

4.2.1 Sustainability Indicator

The results for the sustainability indicator are shown in Figure 51, which reflects the scores for each indicator as well as the overall quality for each PA covering all indicators. As can be seen, the worst performing PA is Wijdemeren-1 with an overall score of 6%, as it only vaguely reported on the implementation of renovations to reduce heating demand without mentioning any of the other indicator topics. The best performing PA is Lelystad-1 with a score of 89%. Apart from not mentioning any ambitions to phase out natural gas based cooking and being vague on the use of RES for electricity as well as the introduction of a CO_2 monitoring system, it clearly mentions the topics of all the remaining indicators. The best performing indicator category concerns the implementation of renovations to improve the thermal quality of dwellings, with an average score of 70% across all PAs. This indicator was clearly mentioned in 25 of the PAs (52%) and more vaguely described in a further 17 PAs (35%). Only six documents did not mention it. On the other hand, the worst performing indicator concerns the replacement of inefficient appliances with more efficient ones. This indicator only achieves an average quality of 9% across all PAs and was mentioned clearly in three cases and less clearly in another three (6% each). As shown, the average score across all indicator categories and across all PAs is 42%, which reflects the overall quality of the PAs for the sustainability indicator.

The three documents updated by an addendum were among the seven highest scoring PAs. The PA of Zandvoort-1-Add reached the third place with an overall quality of 74%, followed by the documents of Haarlem-3-Add and Beverwijk-1+Heemskerk-1-Add, which achieved the sixth and seventh place with around 69% each.

Figure 50: Overall quality of the PAs regarding the sustainability indicator.



The overall quality distribution of the PAs for the sustainability indicator is shown in Figure 50. As can be seen, a quarter (25%) of the documents achieve only a low score, while a further 38% fall into the "low-medium" category, reflecting a quality of up to 50% of the maximum possible score. About a third of the documents (33%) score between 50% and 75%, while only two documents, or 4%, reach the highest possible category of "High", reflecting an overall score between 75% and 100%. To reach 100%, all issues reflected in each indicator (see Figure 51 below) would have to be clearly mentioned.

Figure 51: Results of the sustainability indicator for each individual indicator category and PA.

Nr.	Category	Long term goals and ambitions			Reducing energy consumption			Deploying renewable energy			Implementing circular economy	Enabling climate adaptation	Overall Score (%)
	Weighting factor	0,05	0,1	0,02	0,1	0,1	0,1	0,07	0,07	0,05	0,1	0,1	
	Indicator	*Present sufficiently ambitious long-term goals for climate-proofing their housing stock by 2050*	*Present clear intermediate reduction targets*	*Introduction of a CO2-Monitoring system*	*Reducing energy consumption by improving insulation when renovating existing buildings*	*Reducing energy consumption by replacing inefficient appliances with more efficient ones (heating/ electricity)*	*Reducing energy consumption by promoting changes in tenant behaviour*	*Ambitions to deploy RES or reduce fossil fuel use for heating*	*Ambitions to deploy RES or reduce fossil fuel use for electricity*	*Ambitions to deploy RES or reduce fossil fuel use for cooking*	*Implementation of circular economy practices*	*Implementation of climate adaptation practices*	
	Performance Agreement												
1	Aalsmeer-1	2,5	0	0	10	0	10	7	7	0	5	5	54%
2	Almere-1	5	0	0	0	0	10	7	0	0	0	0	26%
3	Almere-2-MU	0	0	0	0	0	5	0	0	0	10	0	17%
4	Amstelveen-1	0	0	0	0	5	10	7	7	0	0	0	34%
5	Amstelveen-2	5	0	0	5	0	5	0	0	5	0	0	23%
6	Amstelveen-3	2,5	0	0	10	5	0	7	7	0	0	0	37%
7	Amstelveen-4	2,5	0	0	10	0	10	7	7	2,5	10	10	69%
8	Amsterdam-1	5	10	2	10	0	10	7	7	0	0	10	71%
9	Beemster-1	2,5	0	0	10	0	10	0	0	0	0	0	26%
10	Beemster-2	2,5	0	0	10	0	10	0	0	0	0	0	26%
11	Beverwijk-1+Heemskerk-1-Add	5	0	0	10	0	10	7	7	0	10	10	69%
12	Blaricum-1	2,5	0	0	10	0	0	3,5	0	0	0	0	19%
13	Bloemendaal-1	0	0	0	10	0	5	0	0	0	0	0	17%
14	Diemen-1	0	0	2	10	10	5	7	7	5	5	5	65%
15	Edam-Volendam-1-MU	5	10	0	10	0	10	7	7	5	10	10	86%
16	Gooise-Meren-1	0	0	0	10	0	0	0	0	0	0	0	12%
17	Gooise-Meren-2	5	0	1	0	0	5	7	0	0	0	0	21%
18	Haarlem-1	0	0	0	5	0	0	7	7	0	5	0	28%
19	Haarlem-2	5	0	0	5	0	10	0	7	5	0	0	37%
20	Haarlem-3-Add	5	10	0	10	0	5	7	7	0	5	10	69%
21	Haarlemmermeer-1	5	0	0	5	0	10	3,5	7	2,5	0	0	38%
22	Haarlemmermeer-2	5	0	0	5	0	5	3,5	0	0	0	0	22%
23	Haarlemmermeer-3	0	0	0	0	0	10	3,5	7	0	5	0	30%
24	Haarlemmermeer-4	0	0	1	10	10	10	3,5	0	0	5	5	52%

The sustainability indicator continues for PAs 25 - 48 on the next page.

Nr.	Category	Long term goals and ambitions			Reducing energy consumption			Deploying renewable energy			Implementing circular economy	Enabling climate adaptation	
	Weighting factor	0,05	0,1	0,02	0,1	0,1	0,1	0,07	0,07	0,05	0,1	0,1	
	Indicator	*Present sufficiently ambitious long-term goals for climate-proofing their housing stock by 2050*	*Present clear intermediate reduction targets*	*Introduction of a CO2-Monitoring system*	*Reducing energy consumption by improving insulation when renovating existing buildings*	*Reducing energy consumption by replacing inefficient appliances with more efficient ones (heating/ electricity)*	*Reducing energy consumption by promoting changes in tenant behaviour*	*Ambitions to deploy RES or reduce fossil fuel use for heating*	*Ambitions to deploy RES or reduce fossil fuel use for electricity*	*Ambitions to deploy RES or reduce fossil fuel use for cooking*	*Implementation of circular economy practices*	*Implementation of climate adaptation practices*	Overall Score (%)
	Performance Agreement												
25	Heemstede-1	5	5	0	5	0	10	7	7	0	5	10	63%
26	Hilversum-1	0	0	0	5	0	5	0	7	0	0	0	20%
27	Huizen-1	5	0	0	10	0	0	7	0	0	0	10	37%
28	Huizen-2	5	0	0	10	0	0	0	3,5	0	0	0	22%
29	Landsmeer-1	5	0	0	5	0	5	7	3,5	0	0	0	30%
30	Landsmeer-2	2,5	0	0	10	5	10	0	7	0	10	0	52%
31	Laren-1	2,5	0	0	10	0	0	7	0	0	0	10	34%
32	Lelystad-1	5	10	1	10	10	10	7	3,5	0	10	10	89%
33	Lelystad-2	0	0	0	5	0	5	7	3,5	0	5	0	30%
34	Lelystad-3	5	0	0	5	0	5	7	3,5	2,5	10	5	50%
35	Oostzaan-1	0	0	0	10	0	0	7	0	0	0	0	20%
36	Ouder-Amstel-1-MU	2,5	0	0	10	0	10	3,5	7	0	10	5	56%
37	Ouder-Amstel-2-MU	5	0	0	5	0	5	0	7	0	0	0	26%
38	Purmerend-1	0	0	1	5	0	10	7	3,5	0	5	10	48%
39	Uitgeest-1	0	0	0	5	0	10	3,5	7	2,5	0	10	44%
40	Uithoorn-1	5	0	0	10	0	10	3,5	7	0	10	0	53%
41	Velsen-1	5	5	0	10	0	10	7	7	0	10	10	74%
42	Waterland-1	5	0	0	5	0	5	7	7	5	0	10	51%
43	Weesp-1	5	0	2	5	0	5	7	7	0	10	0	48%
44	Wijdemeren-1	0	0	0	5	0	0	0	0	0	0	0	6%
45	Wijdemeren-2	2,5	0	0	0	0	0	7	0	0	0	10	23%
46	Wormerland-1	5	10	1	5	0	0	3,5	0	0	5	0	34%
47	Zaanstad-1	5	0	2	10	0	10	7	7	0	10	5	65%
48	Zandvoort-1-Add	5	0	0	10	0	10	7	7	5	10	10	74%
	Average Score (%)	60%	13%	14%	70%	9%	63%	66%	58%	17%	38%	38%	42%

Legend:

Indicator issue	Colour
Mentioned	
Not clear	
Not mentioned	

Overall quality of PA	Range	Colour
Low	0 - 25%	
Low-Medium	≥ 25 - 50%	
Medium-High	≥ 50 - 75%	
High	≥ 75 - 100%	

4.2.2 Energy Poverty Indicator

The results for the energy poverty indicator are shown in Figure 53. As illustrated, the two lowest scoring documents are Haarlem-1 and Wijdemeren-1, which do not mention any of the developed indicator categories, resulting in the lowest possible score of 0%. In contrast, the document with the highest score is Beverwijk-1+Heemskerk-1-Add, with an overall quality of 95%. While it clearly mentions all other indicator categories, it only vaguely discusses whether it has targeted measures to reduce energy poverty. The indicator category on whether the documents mention the implementation of an energy monitoring programme among their tenants was the lowest scoring indicator category, with an average score of 8% across all PAs. Only three documents clearly mentioned this issue (6%), while a further two were ambiguous (4%). In contrast, the highest scoring indicator category asked about the existence of programmes to help tenants with financial problems or debts. This indicator had an average score of 79% and was clearly mentioned in 83% of the PAs (40 documents) and less clearly in a further 6% of the PAs (3 documents). It was not mentioned in the remaining five documents. As with the sustainability indicator, the overall quality of all the PAs gave an average score of 42%.

The three documents that were supplemented by an addendum had the three highest scores of all the PAs. While the Beverwijk-1+Heemskerk-1-Add document scored 95%, Zandvoort-1-Add achieved the second highest score with 93%. Haarlem-3-Add followed with an overall score of 88%.

Figure 52: Overall quality of the PAs regarding the energy poverty indicator.

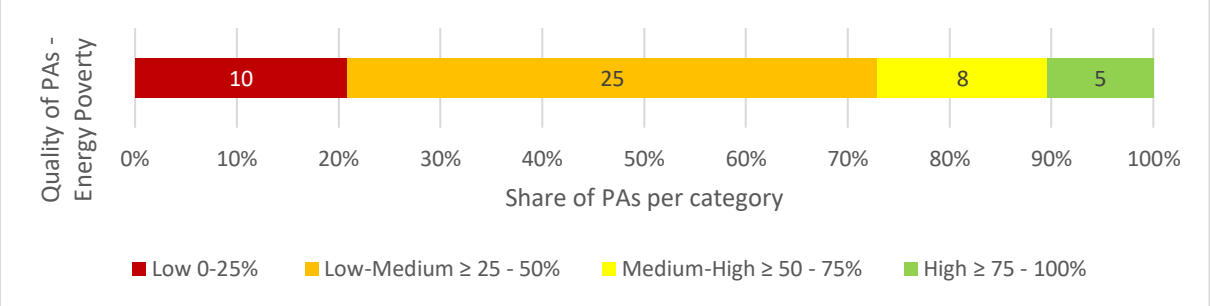


Figure 52 presents the overall quality of the PAs based on the four quality categories defined. As shown, around one fifth of the documents (21%) fall into the 'low' category, while the majority of documents with 25 PAs (52%) reach the 'low-medium' quality level. Eight of the remaining documents achieve a "medium-high" score (17%) and a total of five documents (10%) reach the highest quality level of a "high" score.

Figure 53: Results of the energy poverty indicator for each individual indicator category and PA.

Nr.	Category	Problem Awareness Energy Poverty			Support of low-income groups		Improving Energy Labels			Promoting Tenant Participation		Overall Score (%)
	Weighting factor	0,08	0,10	0,08	0,15	0,2	0,1	0,05	0,15	0,1	0,05	
	Indicator	*Awareness of SHAs of the concept of energy poverty through coverage in performance agreements*	*Targeted actions to reduce energy poverty in place*	*Implementing energy poverty monitoring programmes for their tenants*	*Programs for supporting tenants with financial problems / debts*	*Protecting tenants from increases in housing costs due to renovations or other sustainability measures*	*Monitoring the development of the energy labels in the housing stock*	*Energy label improvement goals are set with a target year*	*Phasing out buildings with low energy labels (E, F, G) prioritised*	*Tenants receive education programmes to reduce their energy consumption through behavioural change*	*Tenants play an active role in the energy transition*	
	Performance Agreement											
1	Aalsmeer-1	0	0	0	15	10	0	5	15	10	2,5	54%
2	Almere-1	8	5	0	7,5	10	0	0	0	10	0	38%
3	Almere-2-MU	0	0	0	7,5	0	0	0	0	0	0	7%
4	Amstelveen-1	0	0	0	0	10	0	2,5	0	10	0	21%
5	Amstelveen-2	0	0	0	7,5	20	0	5	0	5	0	35%
6	Amstelveen-3	8	5	4	7,5	20	0	5	15	0	0	61%
7	Amstelveen-4	8	5	0	15	20	10	2,5	15	10	5	85%
8	Amsterdam-1	0	0	0	15	20	0	2,5	0	10	2,5	47%
9	Beemster-1	0	0	0	7,5	10	10	5	0	10	0	40%
10	Beemster-2	0	0	0	15	0	10	5	0	10	0	38%
11	Beverwijk-1+Heemskerk-1-Add	8	5	8	15	20	10	5	15	10	5	95%
12	Blaricum-1	0	0	0	15	20	0	5	0	0	0	38%
13	Bloemendaal-1	0	0	0	15	10	0	5	0	5	5	38%
14	Diemen-1	0	0	0	15	10	10	0	0	5	5	42%
15	Edam-Volendam-1-MU	8	0	0	15	20	0	2,5	15	10	5	71%
16	Gooise-Meren-1	0	0	0	0	10	0	5	0	0	0	14%
17	Gooise-Meren-2	0	0	0	15	10	10	0	0	5	0	38%
18	Haarlem-1	0	0	0	0	0	0	0	0	0	0	0%
19	Haarlem-2	0	0	0	7,5	20	0	2,5	0	10	0	38%
20	Haarlem-3-Add	8	5	8	15	20	10	5	15	5	2,5	88%
21	Haarlemmermeer-1	0	0	0	15	0	0	0	0	10	0	24%
22	Haarlemmermeer-2	0	0	0	15	20	0	0	0	5	0	38%
23	Haarlemmermeer-3	0	0	0	15	20	0	0	0	10	2,5	45%
24	Haarlemmermeer-4	0	0	0	15	20	0	5	0	10	0	47%

The energy poverty indicator continues for PAs 25 - 48 on the next page.

Nr.	Category	Problem Awareness Energy Poverty			Support of low-income groups		Improving Energy Labels			Promoting Tenant Participation		Overall Score (%)
	Weighting factor	0,08	0,10	0,08	0,15	0,2	0,1	0,05	0,15	0,1	0,05	
	Indicator	*Awareness of SHAs of the concept of energy poverty through coverage in performance agreements*	*Targeted actions to reduce energy poverty in place*	*Implementing energy poverty monitoring programmes for their tenants*	*Programs for supporting tenants with financial problems / debts*	*Protecting tenants from increases in housing costs due to renovations or other sustainability measures*	*Monitoring the development of the energy labels in the housing stock*	*Energy label improvement goals are set with a target year*	*Phasing out buildings with low energy labels (E, F, G) prioritised*	*Tenants receive education programmes to reduce their energy consumption through behavioural change*	*Tenants play an active role in the energy transition*	
	Performance Agreement											
25	Heemstede-1	0	0	0	15	20	0	0	0	10	0	42%
26	Hilversum-1	0	0	0	15	20	10	5	0	5	5	57%
27	Huizen-1	0	0	0	7,5	20	0	0	0	0	0	26%
28	Huizen-2	0	0	0	15	10	0	5	0	0	0	28%
29	Landsmeer-1	0	0	0	15	0	0	0	0	5	0	19%
30	Landsmeer-2	0	0	0	15	10	10	5	15	10	0	61%
31	Laren-1	0	0	0	7,5	0	0	2,5	0	0	0	9%
32	Lelystad-1	8	10	4	15	10	0	5	0	10	0	58%
33	Lelystad-2	0	0	0	15	0	0	0	15	5	0	33%
34	Lelystad-3	8	10	0	7,5	20	0	0	0	5	0	48%
35	Oostzaan-1	0	0	0	15	0	0	5	15	0	0	33%
36	Ouder-Amstel-1-MU	8	5	0	15	10	10	0	15	10	2,5	71%
37	Ouder-Amstel-2-MU	0	0	0	0	20	0	5	0	5	0	28%
38	Purmerend-1	0	0	0	15	20	0	0	0	10	0	42%
39	Uitgeest-1	0	0	0	15	10	0	0	0	10	0	33%
40	Uithoorn-1	0	0	0	7,5	10	10	5	0	10	2,5	42%
41	Velsen-1	8	10	0	15	20	0	5	15	10	0	78%
42	Waterland-1	0	0	0	15	0	0	2,5	0	5	2,5	24%
43	Weesp-1	0	0	0	15	10	10	0	0	5	2,5	40%
44	Wijdemeren-1	0	0	0	0	0	0	0	0	0	0	0%
45	Wijdemeren-2	0	0	0	15	10	0	0	0	0	0	24%
46	Wormerland-1	0	0	0	15	20	0	5	0	0	0	38%
47	Zaanstad-1	0	0	0	15	20	10	5	0	10	2,5	59%
48	Zandvoort-1-Add	8	5	8	15	20	10	5	15	10	2,5	93%
	Average Score (%)	23%	14%	8%	79%	63%	29%	53%	25%	61%	23%	42%

Legend:

Indicator issue	Colour
Mentioned	
Not clear	
Not mentioned	

Overall quality of PA	Range	Colour
Low	0 - 25%	
Low-Medium	≥ 25 - 50%	
Medium-High	≥ 50 - 75%	
High	≥ 75 - 100%	

5 Discussion

In the following chapter 5.1, the contribution of the findings to the existing literature is presented and the results are discussed. The limitations of this research due to the chosen research design are discussed in Chapter 5.2, while finally Chapter 5.3 provides a number of recommendations for future research.

5.1 Contribution

The findings of this research add in several ways to the limited research found on the policy steering function of PAs. Few academic sources examined the coverage of sustainability-related issues such as circularity (Eikelenboom et al., 2021) or climate adaptation in these documents (Snep et al., 2023), both of which found limited application of these themes. Furthermore, no scientific literature was found that focused on the emerging issue of energy poverty within the PAs. Through the application of content analysis and the development of two indicators, this research made a valuable contribution to the literature by examining the content and quality of these PAs in relation to achieving a sustainable built environment and alleviating energy poverty among their tenants.

First, in line with the first research question, the contribution of the content analysis to the ten sustainability issues and four energy poverty issues examined (see sections 4.1.1 and 4.1.2) is discussed. This is done by comparing the issues on the basis of whether they were 'clearly mentioned' in the PA. In a second step, patterns between the defined categories will be analysed, e.g. whether or not concrete actions, numbers and times were mentioned for the issues that were both 'clearly mentioned' and 'not clearly mentioned'. The sustainability themes are discussed first, followed by the energy poverty themes.

In terms of sustainability-related content, all the ten themes examined were mentioned in the PAs, but with significant differences. Furthermore, on average, sustainability issues were ‘clearly mentioned’ with a probability of 54%. The two most frequently ‘clearly mentioned’ topics were ‘renovation for reduced heat demand’ (88%), and ‘deploying renewable energy for heat’ (79%). This was in line with expectations, as the Dutch climate agreements set the central target for the social housing sector to achieve an average B energy label for its housing stock in 2021 (CE Delft, 2022). Furthermore, as municipalities are expected to develop the Transition Vision Heat by 2021, which will form the basis for the planning of SHAs, a high coverage of this issue was expected. As several authors point out, several potential shortcomings have been identified in the municipal heat plans, e.g. due to uncertain energy modelling approaches and data dependency (Henrich et al., 2021; Herreras Martínez et al., 2022). This may explain why most of these plans are still at a relatively early planning stage. The two issues that were least frequently ‘clearly mentioned’ were ‘deploying renewable energy for cooking’ and ‘efficiency’. For cooking, one explanation could be that as the share of cooking in total energy consumption is estimated to be in the low range of 1-2% compared to space heating and hot water, the impact on decarbonisation at this stage can be considered rather low compared to the associated costs (Van Beijnum & Van den Wijngaart, 2023). The low proportion of SHAs 'clearly mentioning' efficiency may be due to the dilemma described by Rainsford (2021), that efficiency improvements that do not lead to a more sustainable system - for example by replacing old boilers with more efficient ones - require significant investment without enabling the SHA to meet its longer term decarbonisation targets. The results also revealed that 'climate adaptation' and 'circular economy' were 'clearly mentioned' in 40% of the PAs, which exceeded expectations based on the literature gap.

In terms of content related to energy poverty, this study found that all four energy poverty issues examined were mentioned, but there were also significant differences between them. On average,

across all four themes, the likelihood of these issues being 'clearly mentioned' was 42%, which was lower than for sustainability issues. The issue of 'programmes for low-income tenants' was by far the most frequently mentioned (83%), compared to the second most frequently mentioned issue of ‘Effect of sustainability measures on the affordability’ (46%). The high awareness of the former may be explained by the fact that local authorities play a key role in supporting tenants in debt and receive funding from central government to develop targeted programmes to protect these residents (Ministerie van Sociale Zaken en Werkgelegenheid, 2019). The issue focusing on an 'active role of tenants in the heat transition' was the least 'clearly mentioned', with 17%. An unexpected result was the relatively high coverage of energy poverty in the PAs, as this issue has only recently come to the attention of policymakers and researchers in the Netherlands (Mulder, Dalla Longa, et al., 2023). Nevertheless, it was mentioned in almost one in four documents (23%).

Focusing on the documents that 'clearly' or 'not clearly' mentioned the individual themes, the research results show that on average 63% of the documents mentioned clear actions for the sustainability themes, while only 47% did so for the energy poverty themes. Concrete numbers were specified in 32% of the documents for the former and 20% for the latter. The sustainability themes were also more concrete when it came to setting clear timescales, with an average of 51% of PAs 'clearly mentioning' these, compared to 39% for the energy poverty themes. Particularly low scores were achieved for the specification of specific locations in both cases, with averages of 13% and 0% respectively. As the topics related to energy poverty are more likely to refer to programmes to be implemented, e.g. to help tenants with debts, a low score was to be expected. However, the low score for sustainability related issues was a surprising result. The only category that scored lower for sustainability issues than for energy poverty issues was the responsibility of municipalities, with 34% compared to 58%. Finally, this research revealed that the responsibilities of the TAs were only formulated in an average of 15% and 21% of the documents.

Secondly, in line with the second research question, the contribution of the two different indicators developed for achieving a sustainable built environment and for alleviating energy poverty are discussed. While a previous research project looked at the development of key performance indicators for climate adaptation agreements in PAs (Klostermann, 2021), no comprehensive analysis of the quality of the agreements in the PAs was found.

The quantitative results on the quality of the PAs, as reflected in the developed sustainability and energy poverty indicators, showed that while the individual indicators showed a wide range of quality, the overall level of quality of the documents was rated in the second lowest quality category out of four, resulting in a score of 'low-medium' for both issues. Unexpectedly, both indicators received an overall score of 42% of the maximum possible, despite the fact that sustainability has been the focus of policy attention for longer than energy poverty. A possible explanation for this result may be the strong performance of the indicators focusing on 'supporting tenants with financial problems or debts' (indicator average: 79%) and the indicator focusing on 'protecting tenants from increases in housing costs due to renovations or other sustainability measures' (indicator average: 63%). Due to the weighting applied, these two out of ten indicators contributed around 33% to the final score. In comparison, the weightings for the sustainability indicator showed less variation between the lowest and highest weighting assigned, resulting in less significant dominance of individual indicators. Additionally, as previously pointed out, the national awareness for this topic with the aim to develop programmes to protect these residents on the municipal level may explain why this single indicator had the highest average score of both the sustainability indicator and the energy poverty indicator.

Another interesting finding of the applied indicators was that the sustainability indicator had a higher proportion of PAs falling into the two best categories of 'medium-high' (33%) and 'high' (4%) with 37%, compared to the energy poverty indicator with 27%, of which 17% were 'medium-high' and 10% 'high'.

Nevertheless, both developed indicators achieved an overall score of 42% because the sustainability indicator had more PAs scoring 'low' (25% compared to 21%) and fewer scoring 'high' (4% compared to 10%). In addition, although the sustainability indicator had fewer PAs in the second lowest category 'low-medium' (38% compared to 52%), the average quality of these PAs tended to be lower compared to the energy poverty indicator, where the reverse was true.

Finally, for both the sustainability and energy poverty indicators, the three documents that were supplemented with an addendum were among the highest scoring PAs in both cases. This was particularly true for the energy poverty indicator, where these documents achieved the top three places with overall scores between 88% and 95%. Although the documents for the sustainability indicator were among the top seven documents, they scored much lower with 74% in third place and 69% in both sixth and seventh place. One explanation for the significant increase in SHAs' awareness of energy poverty could be the increased national and local ambition, as the national government has allocated significant financial resources to tackling energy poverty in 2022 and 2023, including the deployment of energy coaches by the municipality, which is reflected in the high level of municipal responsibility in chapter 4.1.2.1 (BZK, 2023a). For the sustainability indicator, a likely explanation is that the new regulations associated with the abolition of the Landlord's Levy have had a noticeable impact on increasing efforts to achieve a sustainable built environment, albeit at a lower level compared to the level of ambition for energy poverty.

5.2 Limitations

Due to the chosen research design, methods and theoretical framework underpinning this research, several limitations must be noted when interpreting the results of this research, which may limit the generalisability of the findings.

This study used a case study approach, focusing on the Amsterdam Metropolitan Area, which includes a total of 32 municipalities. A limitation is therefore the representativeness and generalisability of the results for the whole of the Netherlands, comprising 342 municipalities in 2023. Including the PAs of different regions or municipalities could therefore lead to different outcomes in terms of the content and quality of the analysed documents. Nevertheless, with a total of 388,904 dwellings provided by SHAs in all municipalities surveyed, this area represents almost 17% of the total building stock provided by SHAs in the Netherlands. In addition, with a share of 27.2% of buildings owned by SHAs, this case study is relatively representative compared to the national average of 28.6% (CBS, 2024). Furthermore, the 36 SHAs studied represent about 13% of the 279 active SHAs in the Dutch social housing sector. Due to the large data sample of 32 municipalities, the differences between these municipalities already reflect a higher diversity of e.g. highly urban and rural municipalities, which is reflected in the different population densities of 143 inhabitants per km^2 for Beemster and 5,277 inhabitants per km^2 for Amsterdam (see Appendix A). Nevertheless, the average population density of 1,574 per km^2 for the data sample differs significantly from the average population density for the Netherlands of 522 inhabitants per km^2, resulting in an under-representation of rural areas (CBS, 2024).

Publicly available data was used for data collection and all documents retrieved for the case study area were used, limiting potential bias. High data quality was also ensured by contacting key stakeholders, consisting of municipalities and SHAs, to validate and supplement the data. One limitation is that not all SHAs were contacted, as no clear communication channel could be found for 9 of the 36 SHAs. However, as all relevant municipalities, which have to agree with SHAs on PAs, were contacted, this limitation can be considered minor. Several of the stakeholders contacted indicated that they were in the process of drafting new PAs to be published by the end of December 2023. However, due to the limited time available for this research project, these latest documents could not be included in the analysis as the analysis of these documents was data and time intensive.

To analyse the content of the individual PAs, a directed content analysis method was used. As described in chapter 3.3.1, the directed content analysis builds on the underlying theoretical background as derived in chapters 2.2 and 2.3. Therefore, a limitation of this study is the selected literature that provided the framework within which the data were analysed. Furthermore, as the documents were coded by a single researcher, the consistency and validity of the coding may be a limitation (Campbell et al., 2013). However, by defining the coding categories used to assess the specificity of the agreements, as presented in chapter 3.3.1, and by explaining the coding choices with examples in the results section, this limitation was attempted to be minimised. In addition, the inclusion of the final codebook increased the transparency and reproducibility of this research.

Another limitation concerns the above-mentioned framework for assessing the specificity of agreements. A distinction was made between, for example, whether an issue, action etc. was 'clearly mentioned', 'not clearly mentioned' or 'not mentioned'. However, the quality of the actions themselves could not be assessed. Therefore, even if an action is clearly mentioned, there may be significant differences in its quality. For example, a clearly mentioned but not overly detailed action could receive the same score as a very detailed and sophisticated action. For this reason, the results should be treated conservatively.

As for the content analysis, the indicators developed were based on the theoretical implications derived from the literature on achieving a sustainable built environment and alleviating energy poverty, as outlined in chapters 2.2 and 2.3. These considerations therefore provided the framework within which the quality of the PAs was analysed. In addition, a total of ten experts provided feedback on the indicators. Although the feedback resulted in only limited changes to the originally developed indicators, underlining their relevance, the results regarding the quality of PAs could change significantly if other indicators were used. This would be e.g., particularly the case if these indicators were found to be relevant, but were not, or only to a limited extent, reflected in the content of the PAs. Due to the fact that the scientific literature on energy poverty in the Netherlands is still scarce and the uncertainties surrounding this issue, reflected for example in the lack of a clear definition at European level, the individual indicators used for the energy poverty indicator in particular must be treated with caution. Another limitation lies in the feedback process on the indicators developed. As mentioned above, ten experts gave their expert opinion on the topic. However, all the experts are affiliated with TNO and no experts from outside the organisation provided feedback on the indicators. The inclusion of other experts from a wider field, e.g. policy makers, municipalities and SHAs, could therefore lead to changes or more nuanced feedback on the developed indicators. In addition, experts were approached individually to refine the indicators and apply weightings, instead of hosting an expert panel in which the experts could discuss their perspective on the indicators and agree on the weighting together.

Finally, as discussed in chapter 3.3.3, an expert opinion based weighting using the budget allocation approach was applied to the developed indicators to take into account the relative importance of the indicators for achieving a sustainable built environment and alleviating energy poverty. As discussed by the European Commission (2020), the application of weights to indicators can have a significant impact on the value of the indicator and therefore on the overall score. This is particularly the case when a higher weight is given to an indicator. A skewed distribution of expert weights was found for several developed indicators. Due to the relatively small data set of five responses, more extreme value judgements or outliers had a greater impact on the results. Therefore, median values were used for the final weights. In particular, the results for the energy poverty indicator are significantly influenced by the weighting, with two out of ten indicators contributing around 33% to the final score. This indicator is therefore more vulnerable to the results of weighting, given the divergence of expert opinion. As weighting always involves a value judgement, the responses of the individual experts were

made transparent in the methods section, allowing them to be critically discussed. Nevertheless, a relatively normal distribution of most indicators suggests a broad consensus among the experts on the relevance of the respective indicators, which underlines the robustness of the results, taking into account the limitations mentioned above.

5.3 Further research

Based on the limitations of this research study, several recommendations can be made for future research projects building on this novel research project. One possible avenue of research is to expand the geographical scope of this study from a case study to an investigation of all signed PAs in the Netherlands, shedding light on the differences between different regions, provinces and a wider range of SHAs. By including rural areas, this limitation of this study could be overcome and a more nuanced understanding of the content and quality of PAs could be achieved. Due to the large amount of data and time required for analysis, it could also be decided to compare two case studies, one with an urban focus and one with a rural focus, in order to fill this research gap, while still keeping the research scope feasible. In addition, further research could extend the temporal scope of this study and repeat the analysis of the documents at a later point in time to assess whether the content and quality of the PAs has improved, providing valuable insights into the evolution of the level of ambition of these documents. As discussed above, several SHAs and municipalities have already indicated in personal communications that new PAs will be published by the end of December 2023. As the awareness of energy poverty in the PAs has increased rapidly in recent years and as this topic is still relatively underrepresented in current research in the Netherlands, further research could therefore provide valuable insights into this emerging topic. In addition, with the abolition of the landlord's levy and the resulting availability of new financial resources, as well as the new regulations on National Performance Agreements, further research could be conducted on how this affects the content and quality of future PAs.

Another possible avenue of research could be to focus on the underlying governance system in which PAs are embedded. As municipalities, SHAs and TAs work together to develop these documents, a potential focus of future research could be to explore the experiences, expectations, benefits and limitations that these stakeholders experience with this policy steering tool. Recommendations could be made on how this tool could be improved or modified to enhance the process and the specific agreements made. This could include further aims such as exploring opportunities for sharing knowledge of best practice and how to promote collaboration between different SHAs and municipalities. In addition, the results showed that although the responsibilities of municipalities and TAs were generally covered in the PAs, they were mostly at a low or very low level, with the exception of municipal responsibilities for energy poverty. Therefore, future research could analyse how these two groups could be more effectively involved in the PAs in order to strengthen the level of ambition of these documents.

Finally, this research can be used as a basis for future studies to further improve and refine the applied content analysis and indicator development. For example, the methodology for the specifications could be further substantiated by developing key performance indicators or further evaluation criteria to analyse and assess the content and quality of these PAs. The relatively recent issue of energy poverty could be a particular area of focus. For the development and weighting of the indicators, additional stakeholder groups could be involved, such as SHAs, municipalities and TAs or policy makers, and an expert meeting could be organised to allow participants to actively discuss the importance of each indicator and agree on a common weighting.

6 Conclusion

6.1 Answer to the research questions

By analysing the performance agreements between 32 Dutch municipalities and 36 social housing associations in the Amsterdam metropolitan area, this case study shed light on the research gap regarding the content and quality of these key policy documents between these two stakeholders. The focus was on identifying the specific agreements and their level of quality in relation to the two main issues of achieving a sustainable built environment and alleviating energy poverty in the Dutch social housing sector. Therefore, a mixed methods approach was used, combining a directed content analysis with the development of two indicators focusing on the above-mentioned issues.

The first research question asked: *What is the content of the current performance agreements until 2030 between Dutch social housing associations and their municipalities regarding the sustainable transformation of the built environment and the alleviation of energy poverty?*

The results of this study revealed that the sustainability-related themes of 'long-term goals and ambitions, reduction of energy consumption, deployment of renewable energy as well as climate adaptation and circularity' and their sub-themes were generally mentioned in the PAs. However, the average level of coverage varied considerably between topics, with 'renovation and deployment of renewable energy for heating' being the most frequently mentioned, while 'deployment of renewable energy for cooking' and measures to improve 'efficiency' were, on average, the least frequently mentioned. However, for most of these topics, the agreements do not clearly specify the actions, numbers, timeframes, locations and responsibilities of the municipalities and TAs.

The four energy poverty issues examined, focusing on 'awareness of energy poverty, programmes for low-income tenants, the effect of sustainability measures on affordability and the active role of tenants in the heat transition', were also found to be discussed in the PAs, but also with significant differences in the extent to which they were discussed. Programmes for low-income tenants' were the most covered, while the opposite was true for 'active role of tenants in the heat transition'. The specificity of the agreements in relation to the above categories was even lower than for sustainability issues, with the sole exception of the responsibilities of the municipalities.

The second research question was: *What is the quality of the current performance agreements until 2030 between Dutch social housing associations and their municipalities regarding the sustainable transformation of the built environment and the alleviation of energy poverty?*

The indicators developed provided a comprehensive insight into the quality of each PA. Both the sustainability indicator and the energy poverty indicator resulted in a score of 42% for all PAs covered. However, substantial differences were found between the individual PAs. The lowest score for the sustainability indicator was 6%, while the highest score was 89% of the maximum possible. For the energy poverty indicator the difference was even greater, with scores of 0% and 97% respectively. However, the documents which were supplemented with an addendum were among the best performing PAs, which was especially true for the energy poverty indicator.

The results therefore contributed significantly to the insight and understanding of the agreements in the PAs and their level of detail, as well as the quality of these agreements in achieving a sustainable built environment and alleviating energy poverty among social housing tenants. Most of the key themes were covered in the PAs, highlighting the recognition of this policy steering tool to promote sustainability and alleviate energy poverty. However, the significant variation in quality between PAs demonstrates the great potential for significant quality improvement in a large number of PAs.

6.2 Policy Implications

Based on the results presented in this study, several policy implications can be drawn, focusing on the policy steering tool of PAs for the issues of sustainability and energy poverty between SHAs, TAs and municipalities:

The results showed that while the key issues for achieving a sustainable built environment and alleviating energy poverty, as identified in the theory section, were mentioned in most of the PAs, this was not the case for all of them and there were significant differences between the different issues. In addition, the level of specification for the individual agreements showed a high degree of variation. One implication of this could be the need for stricter government regulations specifying the issues to be covered in PAs.

Another important implication is that while some PAs excel in terms of comprehensiveness and quality of topics covered, other PAs sometimes lag considerably behind. Due to the wide variation in content and quality between different SHAs and in different municipalities, a key action could therefore be to share best practice between different actors and enable learning. The development of these best practices would also provide guidance on how best to structure the performance agreements and what issues to include, as well as inspiration on what specific actions can be implemented. To maximise impact, existing structures and institutions could be used, such as the Association of Dutch Municipalities (VNG) or the Dutch umbrella organisation for social housing (AEDES).

In addition, the development of specific evaluation indicators or key performance indicators could enable the quality and ambitions of the PAs to be tracked more effectively, while at the same time providing a framework for the parties to draw up future PAs focusing on the relevant issues. The definition of criteria for harmonising and standardising PAs could therefore play a key role or, ideally, the establishment of a database to which PAs report their progress, allowing for an automated evaluation of progress and efforts.

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8 Appendix A

Table 5: Key characteristics of the municipalities including the number and share of social housing dwellings. Based on CBS (2024)

Municipality (2021)	Total number of dwellings within the municipality	Total number of dwellings provided by SHAs	Share dwellings (SHA/total) in %	Number of inhabitants	Population density (number of inhabitants per km²)
Aalsmeer	13.284	3.149	23,7	31.991	1.590
Almere	87.259	23.514	26,9	214.715	1.662
Amstelveen	42.251	12.633	29,9	90.829	2.208
Amsterdam	449.989	179.630	39,9	873.338	5.277
Beemster	4.051	745	18,4	10.110	143
Beverwijk	19.511	7.028	36,0	41.863	2.275
Blaricum	5.175	1.083	20,9	11.954	1.076
Bloemendaal	10.166	1.802	17,7	23.478	590
Diemen	15.467	3.760	24,3	31.334	2.612
Edam-Volendam	15.432	2.648	17,2	36.268	668
Gooise Meren	26.896	5.956	22,1	58.524	1.407
Haarlem	77.201	23.106	29,9	162.543	5.573
Haarlemmermeer	65.214	14.724	22,6	157.789	799
Heemskerk	17.607	5.661	32,2	39.191	1.434
Heemstede	12.817	2.731	21,3	27.545	3.001
Hilversum	42.979	12.826	29,8	91.235	2.000
Huizen	19.018	6.177	32,5	41.090	2.600
Landsmeer	4.897	1.288	26,3	11.565	513
Laren (NH.)	5.441	918	16,9	11.398	918
Lelystad	33.734	9.479	28,1	79.811	347
Oostzaan	4.100	1.128	27,5	9.689	841
Ouder-Amstel	6.301	1.989	31,6	14.125	587
Purmerend	37.124	12.701	34,2	81.683	3.528
Uitgeest	5.728	1.260	22,0	13.632	711
Uithoorn	13.264	4.111	31,0	30.206	1.665
Velsen	31.439	11.312	36,0	68.617	1.518
Waterland	7.411	1.866	25,2	17.312	332
Weesp	9.386	3.013	32,1	20.445	897
Wijdemeren	10.800	2.096	19,4	24.463	514
Wormerland	6.919	1.996	28,8	16.333	423
Zaanstad	69.114	25.660	37,1	156.901	2.124
Zandvoort	9.706	2.914	30,0	17.168	535
	1.179.681	**388.904**	**27,2** (Average)	**2.517.145**	**1.574** (Average)

9 Appendix B

Table 6: Description of the selected and analysed performance agreements in the AMA.

Municipality	Social housing association(s)	Document-ID	Name of the document	Timespan (including)	Nr. pages
Aalsmeer	Eigen Haard	Aalsmeer-1	Prestatieafspraken 2021-2026 Aalsmeer	2021 - 2026	33
Almere	GoedeStede, Ymere, De Alliantie	Almere-1	Preambule bij de Prestatieafspraken Almere 2020 - 2024	2020 - 2024	4
	Dudok Wonen	Almere-2	Prestatieafspraken Almere 2023/ 2024 Gemeente Almere – Stichting Dudok Wonen - Huurderbelangenvereniging Dudok Wonen	2023 - 2024	4
Amstelveen	DUWO	Amstelveen-1	Prestatieafspraken 2020 Gemeente Amstelveen DUWO Vereniging Bewoners Uilenstede (VBU)	2020	6
	Woonzorg Nederland	Amstelveen-2	Prestatieafspraken 2019 Gemeente Amstelveen Woonzorg Nederland	2019	5
	Omina Wonen	Amstelveen-3	OMNIA WONEN 2023-2027 Activiteitenoverzicht - Activiteiten van Omnia Wonen in de gemeente Amstelveen	2023 - 2027	32
	Eigen Haard	Amstelveen-4	Prestatieafspraken 2021-2024 Amstelveen Update 2023	2021 - 2024	30
Amsterdam	Habion, De Alliantie, Woonzorg Nederland, Eigen Haard, Vestia, Stadgenoot, De Key, DUWO, Ymere, Rochdale	Amsterdam-1	Samenwerkingsafspraken 2020-2023 Amsterdamse prestatieafspraken tussen de woningcorporaties, de huurderskoepels en de gemeente	2020 - 2023	42
Beemster[8]	Wooncompagnie, Woonzorg Nederland	Beemster-1	Prestatieafspraken Gemeente Beemster 2018 - 2021	2018 – 2021	16
	Wooncompagnie, Woonzorg Nederland	Beemster-2	Prestatieafspraken Beemster 2018-2021 Jaarschijf 2019	2018 – 2021	14
Beverwijk[9]	Pré Wonen, WOONopMAAT	Beverwijk-1+Heemsker-1	Prestatieafspraken Wonen Beverwijk en Heemskerk 2022 – 2025	2022 - 2025	22
	Pré Wonen, WOONopMAAT (Addendum)	Beverwijk-1+Heemskerk-1-Add	Addendum bij de prestatieafspraken 2022-2025 Beverwijk-Heemskerk	2022 - 2025	6
Blaricum	De Alliantie, Het Gooi en Omstreken	Blaricum-1	Prestatieafspraken Blaricum 2018 - 2022	2018 – 2022	29
Bloemendaal	Pré Wonen, Brederode Wonen	Bloemendaal-1	Prestatieafspraken 2017-2021 Gemeente Bloemendaal	2017-2021	16
Diemen	Rochdale, De Key, Stadgenoot	Diemen-1	Raamovereenkomst Prestatieafspraken Diemen 2020-2023	2020 - 2023	19
Edam-Volendam	De Vooruitgang, Wooncompagnie	Edam-Volendam-1	Prestatieafspraken 2022 – 2026 Gemeente Edam-Volendam Jaarschijf 2023	2022 - 2026	31
Gooise Meren	Dudok Wonen	Gooise-Meren-1	Productieafspraken Gooise Meren 2020 t/m 2024	2020 – 2024	26
	Dudok Wonen, De Alliantie, Woningstichting Naarden, Het Gooi en Omstreken, Ymere	Gooise-Meren-2	Kaderafspraken 2019-2025 Gooise Meren	2019 – 2025	15
Haarlem	Rosehaghe	Haarlem-1	Prestatieafspraken Woningbouwvereniging Rosehaghe, bewonersvereniging Rosehaghe en gemeente Haarlem 2019-2021	2019 – 2021	5

[8] The municipality of Beemster was merged with the municipality of Purmerend in 2022. However, it was selected for the analysis.
[9] Beverwijk and Heemskerk signed the PA's together, therefore, the PA's are equal.

	Woonzorg Nederland	Haarlem-2	Prestatieafspraken 2019 t/m 2023 Gemeente Haarlem, Woonzorg Nederland	2019 - 2023	21
	Ymere, Elan Wonen, Pré Wonen	Haarlem-3	Prestatieafspraken Haarlem 2022 tot en met 2025	2022 - 2025	31
	Ymere, Elan Wonen, Pré Wonen (Addendum)	Haarlem-3-Add	ADDENDUM Prestatieafspraken Haarlem 2022 tot en met 2025	2022 - 2025	7
Haarlemmermeer	DUWO	Haarlemmermeer-1	Prestatieafspraken 2021-2023 DUWO – Duwoners – gemeente Haarlemmermeer	2021 – 2023	5
	Woonzorg Nederland	Haarlemmermeer-2	Prestatieafspraken 2021 tot en met 2023 Woonzorg – gemeente Haarlemmermeer	2021 – 2023	11
	Eigen Haard	Haarlemmermeer-3	Prestatieafspraken 2021-2023 Haarlemmermeer	2021 – 2023	19
	Ymere	Haarlemmermeer-4	Prestatieafspraken Haarlemmermeer 2021 – 2023 Samen de schouders eronder!	2021 – 2023	9
Heemskerk[10]	Pré Wonen, WOONopMAAT	Heemskerk-1	Prestatieafspraken Wonen Beverwijk en Heemskerk 2022 – 2025	2022 - 2025	22
Heemstede	Elan Wonen, Pré Wonen	Heemstede-1	Prestatieafspraken 2018-2021 Volkshuisvesting Heemstede	2018 – 2021	21
Hilversum	Dudok Wonen, Het Gooi en Omstreken, Habion, De Alliantie, Woonzorg Nederland	Hilversum-1	Prestatieafspraken Hilversum 2017-2020 Waarin de mens centraal staat	2017 – 2020	23
Huizen	De Alliantie	Huizen-1	Prestatieafspraken gemeente Huizen 1 januari 2020 t/m 31 december 2023	2020 – 2023	6
	De Alliantie	Huizen-2	Prestatieafspraken 2017	2017 – 2019	20
Landsmeer	Rochdale	Landsmeer-1	Prestatieafspraken gemeente Landsmeer – Rochdale – bewonersafvaardiging Rochdale	2021 – 2024	7
	Eigen Haard	Landsmeer-2	Prestatieafspraken 2021-2024 Landsmeer	2021 – 2024	34
Laren	Het Gooi en Omstreken	Laren-1	Prestatieafspraken 2019-2022 Gemeente Laren, Huurdersorganisatie Het Gooi en Omstreken (HGO) en Woningcorporatie Het Gooi en Omstreken	2019 – 2022	6
Lelystad	Centrada	Lelystad-1	Prestatieafspraken 2023-2027 Prettig wonen in Lelystad: bereikbaar en aantrekkelijk	2023 – 2027	29
	Harmonisch Wonen	Lelystad-2	Prestatieafspraken 2023-2027 Gemeente Lelystad, Harmonisch Wonen en de Huurdersorganisatie Mediteren	2023 – 2027	9
	Woonzorg Nederland	Lelystad-3	Bieding 2023 en Prestatieafspraken 2023-2027 Woonzorg Nederland	2023 – 2027	13
Oostzaan	Woningbouwvereniging Oostzaanse Volkshuisvesting	Oostzaan-1	Prestatieafspraken 2023 Gemeente Oostzaan, WOV en HVO 12 december 2022	2023 – 2028	12
Ouder-Amstel	Eigen Haard	Ouder-Amstel-1	Prestatieafspraken 2021-2026 Ouder-Amstel	2021 – 2026	26
	Woonzorg Nederland	Ouder-Amstel-2	Prestatieafspraken 2018-2023 Gemeente Ouder-Amstel en Woonzorg Nederland	2018 – 2023	10
Purmerend	Rochdale, Wooncompagnie, Intermaris, Woonzorg Nederland	Purmerend-1	Prestatieafspraken 2021-2024	2021 – 2024	14
Uitgeest	Kennemer Wonen	Uitgeest-1	Jaarplan 2023 Prestatieafspraken Uitgeest 2021-2024	2021 – 2024	22
Uithoorn	Eigen Haard	Uithoorn-1	Prestatieafspraken Uithoorn 2019 -2022	2019 – 2022	28

[10] Beverwijk and Heemskerk signed the PA's together, therefore, the PA's are equal.

Velsen	Velison Wonen, Woningbedrijf Velsen, Brederode Wonen	Velsen-1	Prestatieafspraken Gemeente Velsen 2021-2024 Jaarschijf 2023	2021 – 2024	36
Waterland	Woonzorg Nederland, Wooncompagnie, Intermaris	Waterland-1	Hoofstuk 1 Samenwerking	2021 – 2025	17
Weesp[11]	Ymere	Weesp-1	Prestatieafspraken Weesp 2020 tot en met 2023	2020 – 2023	13
Wijdemeren	Habion	Wijdemeren-1	Prestatie-afspraken2021-2023 AIIe (kwetsbare) ouderen een veilig en gezellig thuis!	2021 – 2023	3
	Het Gooi en Omstreken, De Alliantie, Vecht en Omstreken	Wijdemeren-2	Prestatieafspraken Wijdemeren 2020 t/m 2023	2020 – 2023	14
Wormerland	Parteon, Wormerwonen	Wormerland-1	Prestatieafspraken volkshuisvesting Wormerland 2021-2023	2021 – 2023	15
Zaanstad	Wormerwonen, Rochdale, ZVH, Eigen Haard, Parteon, Woonzorg Nederland	Zaanstad-1	Zaanse samenwerkingsovereenkomst 2020-2024	2020 – 2024	18
Zandvoort	Pré Wonen	Zandvoort-1	Prestatieafspraken Zandvoort 2022 – 2025 2 juli 2022	2022 – 2025	13
	Pré Wonen (Addendum)	Zandvoort-1-Add	Addendum Prestatieafspraken Zandvoort 2022 – 2025 20 april 2023	2022 – 2025	4

[11] The municipality of Weesp was merged with the municipality of Amsterdam in 2022. However, it was selected for the analysis.