8 Assessment of the likelihood of implementation strategies for climate change adaptation measures in Dutch social housing

Chapter 8 concludes the empirical section of this thesis. It follows up on the results of the SWOT analysis in Chapter 7 by testing the five implementation strategies that were developed.
The paper has been published as: Roders, M.J., & Straub, A. (2015). Assessment of the likelihood of implementation strategies for climate change adaptation measures in *Dutch social housing. Building and Environment 83*, 168-176.

Abstract

Housing providers have to keep adapting their building stock to keep pace with the dynamic changes in the urban environment. One of the main drivers of adaptation is climate change, caused primarily by man-made greenhouse gases. Climate change is impacting on urban areas largely through drought, flooding from extreme precipitation, and heat stress. Climate change not only threatens the building stock, but also the quality of life of people living and working in urban environments. In the Netherlands, housing associations have strong interests in and responsibilities for managing the social housing stock and maintaining quality of life, but they seem scarcely aware of the challenge that lies ahead in terms of adapting their stock to the impacts of climate change. This paper focuses on physical adaptations to the housing stock and discusses the likelihood of the adoption of five implementation strategies for climate adaptation measures as assessed by decision-makers in Dutch housing associations in an online survey. The strategies combine conceptual approaches in policymaking, involvement of external players, and the execution of construction projects in a partnering approach, with the addition of one extra strategy that assigns a central position to the tenants. There was no strategy that stood out clearly as the one most likely to guide the implementation of measures. Many housing associations do, however, see opportunities in this area and might be persuaded to take action if they were provided with a wide palette of implementation strategies from which they could select the most suitable combination.

Keywords: Adaptation; Climate change; Governance partnering; Policy development; Social housing

§ 8.1 Introduction

There is clear evidence that the climate is changing globally (Füssel, 2009; Smith *et al.,* 2009). Rising temperatures (Salcedo Rahola *et al.,* 2009; Kleerekoper *et al.,* 2012) higher levels of precipitation, and increasing river run-off are expected to worsen (Bessembinder, 2008) and will pose a mounting threat to the quality of life in cities. The ongoing accumulation and development of knowledge about the impacts of climate change have led to behavioural and physical adaptations, resulting respectively in citizen guidelines on what to do, for example, during heat waves (MinHWS, 2007; Oakman *et al.,* 2007; Department of Health, 2012), and in design recommendations for the urban environment (GLA, 2005). Since 2010, research on climate change in the Netherlands has been bundled in the Knowledge for Climate research programme (Albers *et al.,* 2015). The 'Delta Programme New Urban Developments and Restructuring', which focuses on the development or redevelopment of urban areas and on making them climate-resilient has been running concurrently (MinIandE, 2011). Our study is part of the Knowledge for Climate programme, but it focuses on the 155 adaptation measures for the built environment in the 'Measure Matrix' of the Delta Programme (MWH, 2012), all of which are designed to make dwellings less vulnerable to the adverse effects of climate change and relate, for example, to the prevention of overheating by applying shading, or by using materials with high solar reflection capacities. Other measures that can prevent overheating are based on making better use of natural ventilation by installing windows that can be opened, or air vents. Meshed screens could also be fitted on windows to allow natural ventilation to take place without infiltration by insects. Another category relates to the prevention of damage by water ingress. Damage can be directly prevented by measures based on the 'dry-proofing' method, which stops water from entering a dwelling by placing watertight barriers in front of windows and doors; and indirectly prevented by the 'wet-proofing' method, which allows water to enter, but uses materials that are not affected by it, such as interior brick walls and floor tiles. Damage can also be prevented indirectly by infiltration crates, water tanks or green roofs, which store water temporarily during bouts of heavy rainfall, thus taking the pressure off the sewage system and lowering the risk of inundation (MWH, 2012).

In the Netherlands, housing associations can play an important role in implementing these measures in the housing stock. Approximately one third (2.4 million) of the total housing stock in the Netherlands is owned and maintained by a relatively small number of organizations (381) (www.cfv.nl). It goes without saying, therefore, that if these organizations adapt their dwellings, a large part of the Dutch stock will be climate-resilient. There are several reasons why a sharper awareness of the possibilities of purposefully implementing climate change adaptation measures could be important to housing associations. First, it would contribute to their social remit. Housing associations are regarded as societal entrepreneurs and are expected

to use their resources and commercial profits to achieve societal aims closely linked to the common interest (Van Overmeeren, 2014). Hence, it would be reasonable to expect them to commit themselves to making timely adaptations in order to prevent changing climatic conditions from threatening the quality of their dwellings. Secondly, the application of climate change adaptation measures could be interpreted as a legal obligation, since housing associations are required under the Social Rented Sector Management Order to provide their tenants with quality housing now and in the future (MinIKR, 2005). Thirdly, if they do not apply adaptation measures, they may be jeopardizing the future value of their dwellings, as the price of property in flood-risk areas is statistically lower than in non-flood-risk areas (Bosker *et al.,* 2013). Thus, adaptation measures can increase the value of their housing stock in flood-risk areas besides improving the quality of life of their tenants. Fourth, on a more economic level, the impacts of climate change are expected to become a serious threat to a country's creditworthiness (Kraemer and Negrila, 2014). And last but not least, housing associations own and maintain many dwellings that were built in the past when no-one gave a second thought to the impacts of climate change. As Jones et al. (2013) point out, the design standards to make new dwellings more resilient may not be feasible for the existing housing stock, so the impacts of climate change not only threaten the quality of the indoor environment with damp and mould, they can also accelerate the degradation of the finishes and push up the maintenance costs for many years to come (Hertin *et al.,* 2003).

That said, climate change is fraught with uncertainties (Lindley *et al.,* 2007) – which further complicates adaptation planning. Moreover, there are no government schemes as yet to incentivize adaptations. As climate change adaptation is still in an early stage of conceptual development compared to, for example, mitigation (Biesbroek *et al.,* 2010), policymaking is not yet in place.

The IPCC definitions for climate change mitigation and adaptation which are used in this paper are respectively: "A human intervention to reduce the sources or enhance the sinks of greenhouse gases" and "The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities" (IPCC, 2014). In the case of mitigation, the intensive research efforts have resulted in many governance strategies, which, if not equally successful (www.climateactiontracker.org), have proven able to raise broad awareness of climate change mitigation among policymakers and stakeholders at all levels. The Kyoto Protocol is a prime example of a governance strategy on a worldwide scale, the European 'Energy Performance of Buildings Directive' (EP, 2002) is an example at supranational level, and the 'Energy Performance Coefficient', which is part of the building code in the Netherlands, is an example at national level.

When it comes to climate change adaptation, however, the situation is different. Both the research field and the governance framework are still evolving. In 2009, in a White Paper on adaptation to climate change, the European Union proposed the establishment of a European Adaptation Strategy (CEC, 2009) and gave Member States until 2013 to prepare themselves. Although many of the 2009 recommendations have been implemented and several national adaptation strategies have been developed, hardly any of these contain concrete implementation plans or monitoring and evaluation programmes. The Member States have now been given until 2017 to prepare their National Adaptation Strategies (EC, 2013). This date is also the cut-off point for the Dutch national strategy (CCPC, 2013).

In the interests of clarity it should be noted that climate change adaptation strategies have already been developed for designated vulnerable areas throughout Europe (Biesbroek *et al.,* 2010; Bulkeley, 2010; MIT, 2014; Carter, 2011), but under the auspices of local programmes, which are driven mainly by internal interests in local aspects and are not guided or supported by an overall framework (Anguelovski and Carmin, 2011). Also, despite the absence of adaptation policy on a large scale, adaptation measures in the urban environment such as more public green space and more open water have been introduced in the Netherlands, Germany, the UK and elsewhere (Runhaar *et al.,* 2012). The same goes for green roofs installed by housing associations, which were not specifically designated as climate change adaptation measures either (Chapter 3 of this thesis). So, although the application of measures appears feasible, examples are largely incidental. For the large-scale application of adaptation measures a policy framework is necessary (Enserink *et al.,* 2010). Accordingly, since there is no policy, it is unlikely that climate change adaptation measures will be purposefully applied in either the urban environment or dwellings. In addition, many climate change adaptation measures may require extra investment by the property owners – which includes housing associations – especially in existing situations (Chapter 4 of this thesis). The housing associations, labouring under financial difficulties (Nieboer and Gruis, 2014), have been cutting their budgets and delivering projects to the minimum required standards for some time now. As climate change adaptation measures are not included in these standards, they are all too easily neglected.

It might be fruitful to combine certain instruments in the search for policy strategies that can increase the implementation of climate change adaptation measures. After all, it has already been noted that there is no single 'perfect' strategy that will solve all the problems at once (CEC, 2009; Murphy *et al.,* 2012). This paper evaluates five theoretical implementation strategies for climate change adaptation measures in the social rented housing stock. The research question is: Which strategies do housing association employees regard as most likely to lead to the implementation of climate change adaptation measures? As government schemes to inform, stimulate or force housing associations to take action are still under development, the focus is on the maintenance

and improvement of the housing stock. It is within this context that decisions are taken to implement physical adaptations. Adaptation can be 'mainstreamed' (Klein *et al.*, 2005) by finding synergies between adaptation policy and, for example, the policy on mitigation. In the next section we describe the research methodology and report the results. The paper ends with concluding remarks and recommendations for further studies.

§ 8.2 Methodology

This study contributes to a broader aim: the implementation of climate change adaptation measures in urban environments. All data supporting this study were collected and analysed using qualitative methods.

In brief, this study elaborates on five strategies for the implementation of climate change adaptation measures in the social rented housing stock. These strategies are a combination of several policy strategies (for easier reading, referred to as "conceptual approaches" in the rest of this paper) that should themselves be capable of assuring the implementation of climate change adaptation measures. The conceptual approaches were derived from the outcomes and experiences of earlier studies (Chapters 3 and 4 of this thesis), conference visits, and workshops attended by the researchers, and were underpinned by literature, theoretically confirming their feasibility and respective conditions. Thereafter, the strengths, weaknesses, opportunities and threats (SWOTs) of the conceptual approaches were verified in face-to-face interviews with practitioners such as real estate directors of housing associations, strategy and policy advisors of water boards, and directors of construction companies. After investigating the SWOTs, it became clear that individual conceptual approaches would not lead to the implementation of climate change adaptation measures; what was needed were implementation strategies consisting of several conceptual approaches (Chapter 7 of this thesis). The immediate aim of this study was to assess whether these implementation strategies were likely to be effective. As the wider objective was to generate implementation strategies for housing associations in the Netherlands, it was important to maximize the sample. Thus, the study addressed the entire population of 389 housing associations, 379 of which were contacted. No contact details could be retrieved for the other ten, which were duly omitted from the sample. Data were collected with questionnaires, sent out by e-mail. One strong argument against the effectiveness of questionnaires, 'Problems of motivating respondents' (Gillham, 2000), was avoided by sending personal invitations to people who were considered capable of assessing the implementation strategies. In addition, the questionnaire was designed to be answered within ten minutes. This approach delivered 102 useful responses, equating to a rate of 27%.

The introduction to the questionnaire stated clearly that the questions dealt with adaptation measures aimed at preventing problems caused by heat and extreme precipitation. Therewith it was intended to avoid confusion between adaptation and mitigation, as previous interviewees had displayed a tendency to refer to energy-saving measures (Chapter 4 of this thesis), when they were actually being questioned on adaptation measures. Some examples were even provided: sunscreens for shading, green roofs for water retention, trees for evaporative cooling, and water-infiltration crates in the ground.

The questionnaire consisted of three sections. The first included general questions on the respondent's position, field of work, and the size of the housing association in question. In the second section, the respondents were asked to assess the likelihood that adaptation measures would be implemented if a certain strategy were applied. A total of five implementation strategies (numbered A to E) were assessed on a 5-point Likert scale, ranging from 'very unlikely' to 'very likely'. There was always a 'don't know'/'no opinion' option. Respondents could not proceed to the next question until they had selected one of the answer categories. After assessing the likelihood of a strategy, respondents had the opportunity to explain their answers in an open text box. This was not mandatory before proceeding with the rest of the questionnaire. Seventy-four respondents (73%) did explain their choices in one or more implementation strategies. These statements were post-coded to provide more generic explanations for the assessments. The last section provided an option for remarks and space for an e-mail address if the respondent wanted to be notified of the results at a later date.

The individuals contacted were involved in policymaking on technical measures, and their working field encompassed the building stock of the housing association. Most of them held positions as managers or team leaders, project managers or policy advisors (see Table 8.1). The vast majority (80%) dealt with technical issues on a daily basis (Table 8.2).

Given the size of the housing associations represented by the respondents, it is clear that the larger associations are slightly overrepresented compared to the distribution of the total population. Figure 8.1 shows that 84% of the total population of housing associations have no more than 10,000 dwellings, as opposed to 72% of the housing associations that responded to the surveys (Figure 8.2).

POSITION OF THE RESPONDENTS	
45%	Director
44%	Manager/team leader
24%	Project manager
23%	Policy advisor
6%	Other

TABLE 8.1 Position of the respondent

WORKING FIELD OF THE RESPONDENTS	
80%	Technical
25%	Financial/General
18%	Other

TABLE 8.2 Working field of the respondents

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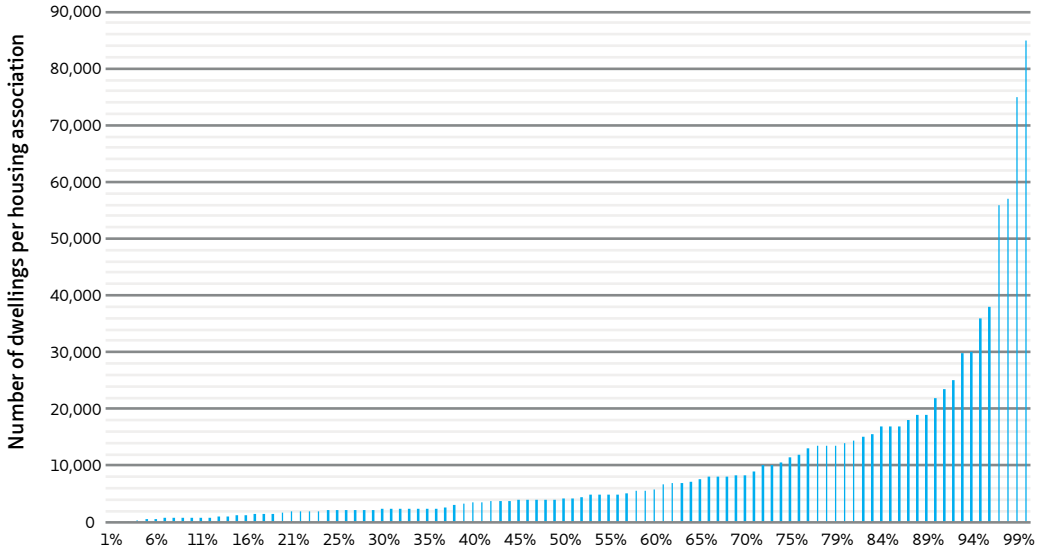

FIGURE 8.1 Distribution of total population of housing associations

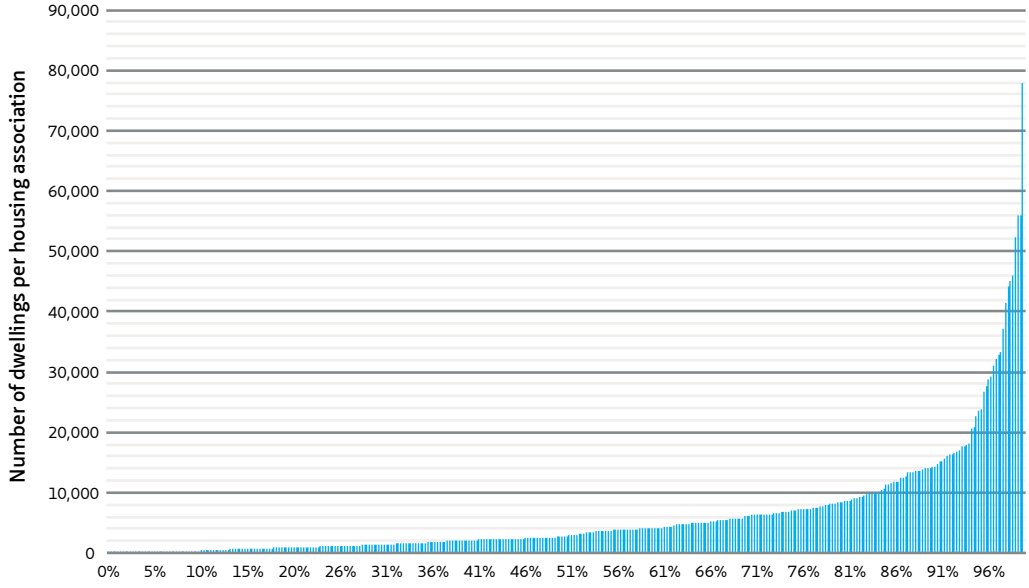

FIGURE 8.2 Distribution of responding housing associations

§ 8.3 Conceptual approaches

Previous studies concluded that climate change adaptation measures would not be implemented in the social housing stock because the housing associations lacked any policy guidelines. A second reason, directly stemming from the absence of policy guidelines, was that there were no resources to finance such measures (Chapter 4 of this thesis).

Three conceptual approaches were hypothesized to overcome the lack of policy guidelines and the financial barrier, and to facilitate implementation:

1 **Policy development:** simply stated, if there are no policy guidelines for the implementation of climate change adaptation measures, housing associations should start developing some.

2 **Involve external players:** see climate change adaptation as an opportunity. There are many players that stand to benefit financially and otherwise from adaptations to dwellings. For instance, water-resilient dwellings are less exposed to the risk of flood damage and place less of a strain on insurance companies. The housing association could use the money saved by insurance companies to negotiate lower insurance premiums.

3 **Carry out projects in a partnering approach:** take advantage of the current trend towards greater collaboration in construction processes in order to improve efficiency and then invest the savings in climate change adaptation measures. Involving the construction sector will also remove the complexity barrier, as this sector has the capacity to find technical solutions for complexity issues.

The SWOT analyses of the conceptual approaches assessed by practitioners (Chapter 7 of this thesis) showed that, for various reasons, these approaches were not feasible for the implementation of climate change adaptation measures in social housing. For example, even if the housing associations did manage to develop policy guidelines for implementing climate change adaptation measures, they would still lack the financial means to do the job alone. On the other hand, if they were working efficiently in partnership with a construction firm, policy guidelines on climate change adaptation measures would be needed to guide the implementation. It was argued that combining the conceptual approaches would considerably enhance feasibility (Chapter 7 of this thesis).

The combination of conceptual approaches led to four implementation strategies. The relationship between them is shown in Table 8.3. In the SWOT interviews with practitioners from the housing associations, one argument was raised that did not really match any of the approaches. Some interviewees pointed out that tenants are the most important stakeholders and that it is the societal task of the housing association to fulfil their needs in the best possible way. Accordingly, housing associations are sensitive to tenants' requests; in other words, if a tenant asks for action, the housing association is more likely to explore the available options. Moreover, if tenants are really

in need of adaptation measures, they will be more willing to contribute financially. A fifth implementation strategy was therefore developed, assigning a central position to the occupants of the dwelling.

		IMPLEMENTATION STRATEGY				
		A	B	C	D	E
Conceptual approach	1: Policy development	X	X		X	
	2: Involvement of external players	X		X	X	
	3: Partnering approach		X	X	X	

TABLE 8.3 Relationship between conceptual approaches and implementation strategies

The implementation strategies were described as follows:

Implementation strategy A: The housing association incorporates the implementation of adaptation measures in its policy, allocates funds for realizing them, and looks for collaboration with an external player (e.g., municipality/water board/insurance company) to co-develop and realize the project on the basis of unified goals. This Implementation Strategy is crucially dependent on an awareness on the part of the housing association that adaptation to climate change is necessary. Moreover, adaptation needs to be incorporated in the policy documents, since these form the basis for investment decisions. If the housing association decides to initiate a refurbishment project, and plans adaptation measures such as the placement of infiltration crates and rainwater tanks (see section 8.1), it can request a discount on sewage taxes, because the municipality –which is responsible for the sewage system – has less water to drain.

Implementation strategy B: The housing association incorporates the implementation of adaptation measures in its policy, allocates funds for realizing them, and sets up a partnership with one or more construction supply chains for all the renovation work in its housing stock. The delivery of climate-resilient dwellings is set as a performance indicator. The supply chains will have to develop knowledge about adaptation measures and apply it in the design of the project.

As in Implementation Strategy A, an awareness of the need for climate change adaptation and the recognition of the topic in policy documents are essential for investment decisions and approval of the design presented by the supply chain. In this Strategy, the housing association relies on the development of knowledge and the learning capacity of the construction supply chain with regard to the adaptation of dwellings to climate change. In a refurbishment project the housing association sets the performance requirements that the dwelling needs to fulfil after an intervention in the form of dry-proofing, for example (see Section 8.1). It is then down to the construction supply chain to come up with solutions to make the dwelling dry-proof.

Implementation strategy C: A construction company collaborates with an external player (e.g., municipality/water board/insurance company) and proactively

incorporates adaptation measures in a housing association project, without being requested to do so by the housing association. Together with supply chain partners and external players the construction company looks for solutions that fit into the project boundaries set by the housing association.
In Implementation Strategy C, if the housing association has not, for example, developed a policy on climate change, it will play a less proactive role. Although the likelihood of this situation arising has been pretty low to date, it is perfectly conceivable that a construction supply chain that is involved in a tender procedure would develop a design solution that involves, say, windows with shading devices, even though shading devices had not been specifically requested by the housing association. Suppose the construction company had received information from the municipality or other external players that shading devices increase the internal comfort of dwellings, and this were to become a unique selling point in the tender procedure, the construction company's chance of winning the tender would increase, especially if the design had been developed so efficiently that the shading devices did not add to the final costs.
Implementation strategy D: The housing association incorporates the implementation of adaptation measures in its policy, allocates funds for realizing them, and seeks opportunities for collaboration with external players (e.g., municipality/water board/ insurance company) to co-develop and realize the project on the basis of unified goals. The project is handed over to a consortium with which the housing association has a partnering agreement. The delivery of a climate-resilient dwelling is set as a performance indicator.
This Implementation Strategy aims to bring together as many stakeholders as possible with a view to enhancing the feasibility of the implementation of adaptation measures. The decision framework for the housing association is in place because it incorporates policy arrangements which give the representatives a firm basis for negotiating with other players; collaboration with external players will take place on the basis of shared benefits and the construction supply chain will be challenged to mobilize its expertise and come up with efficient solutions to make the dwellings climate-proof.
Implementation strategy E: The housing association and/or an external player (e.g., municipality/water board/insurance company) informs the tenants and makes them aware of the benefits (more comfort, less risk of nuisance) of an adapted dwelling. The tenants ask the housing association to take action. The housing association then formulates policy on the implementation of climate change adaptation measures.
Implementation Strategy E puts the tenant in a central position. In this strategy it is crucial for the tenant to be aware of climate change and the benefits of adaptation. This bottom-up approach can be initiated by informing tenants via local or national media, or brochures or meetings organized by their own housing association. The housing association has to be prepared to respond adequately to the tenant's requests to implement the measures.

§ 8.4 Results

The implementation strategies explained above are considered feasible for the effective implementation of climate change adaptation measures because they combine the conceptual approaches while mutually compensating for their weak points. Whereas the individual conceptual approaches were assessed by relatively few practitioners, this study sheds light on what a larger population of housing association decision-makers thinks of the implementation chances of the five strategies (see Table 8.4).

Likelihood of impremention strategies

ANSWER CATEGORY		IMPLEMENTATION STRATEGY				
		A	B	C	D	E
Very likely	5	8%	8%	7%	12%	8%
Likely	4	15%	20%	13%	16%	23%
Not likely, not unlikely	3	24%	21%	25%	20%	23%
Unlikely	2	29%	28%	26%	27%	25%
Very unlikely	1	19%	20%	23%	21%	17%
Do not know/blank	0	6%	4%	7%	5%	6%
Overall assessment		**2.6**	**2.7**	**2.5**	**2.7**	**2.8**

TABLE 8.4 Likelihood of the implementation strategies

Assessment of implementation strategy A (policy development + external players)

Overall, the strategy was assessed with a mean value between unlikely and neutral (2.6). The housing associations that assessed it as very unlikely or unlikely responded mainly to the issue of policy development. In many cases it was stated that policy for the implementation of climate change adaptation measures would not be developed, either because adaptation has no priority at all, as opposed to mitigation, or because there are no resources for applying adaptation measures in dwellings. Some of those who assessed the implementation strategy as likely or very likely did so under the condition that the measures could be financed. In that case they agreed that collaboration with an external player could offer a solution.

Assessment of implementation strategy B (policy development + partnering approach)

This strategy was assessed with a mean value between unlikely and neutral (2.7). The answers were slightly less pessimistic than for strategy A, given that a score of 3 (not likely, not unlikely) had positive connotations in some of the explanations, for example: "We are not yet actively working on the subject, but I think there is a chance that we will do more in the future" (Respondent 40). The arguments for a low assessment in this strategy were that housing associations are not willing to develop policy because of other priorities and lack of resources.

The reluctance to enter partnerships and the absence of planned rehabilitation projects were also put forward as reasons for assessing this strategy as unlikely or even very unlikely. However, housing associations that evaluated the strategy neutrally believed that the scenario is likely in the future. The respondents who awarded a positive score (likely and very likely) did take a positive view of the strategy in general: "It should be a general thought, for all housing associations" (Respondent 36), and because of the partnerships in particular: "The knowledge of the construction companies is used in this case. This can cut costs and stimulate innovation" (Respondent 57).

Assessment of implementation strategy C (external players + partnering approach)

This strategy was assessed the lowest of the five, but the mean value was still between unlikely and neutral (2.5). The housing associations that assessed the strategy negatively did so because they expected to lose control of the construction and renovation process. Those who assessed it positively did so on condition that it would not cost extra money.

Assessment of implementation strategy D (policy development + external players + partnering approach)

The respondents assessed this strategy as unlikely to neutral (2.7). The reasons varied, from lack of resources to the desire to maintain control of the maintenance and construction process. Some stated that they did not regard the strategy as likely in the current situation, but could still see opportunities in the future. The respondents who answered positively said several times that it was a good strategy in general, without offering further information: "This is how I see it" (Respondent 119). Remarkably, several respondents stated that they could not imagine such a strategy. These arguments were put forward with both positive and negative assessments.

Assessment of implementation strategy E (tenant involvement)

Implementation strategy E was assessed as the most feasible of the five. However, in general terms, the assessment was still unlikely to neutral (2.8).

The housing associations felt that it was important to involve tenants, who – in their view – should take the initiative for any action. Two important arguments can hamper implementation. One is that climate change is not enough of an issue among tenants to prompt them to request measures. The other argument, which was cited many times, is that the measures would have to be paid for by a rent increase – which significantly reduces the chance that they will actually be applied. For example, one respondent clearly stated: "If tenants – or their support groups – stand behind it, I think the chance of implementing adaptation measures is high. But, because it will probably lead to higher rents, the chance of realization will be reduced to zero" (Respondent 34).

Elaboration of implementation strategies A, B and C

Several additional questions were asked in order to gain a better understanding of the opinions of the housing associations in relation to their assessments of the implementation strategies.

For strategy A, the respondents were asked if they regarded external players such as municipalities, water boards and insurance companies as partners who proactively looked for solutions, or as parties with a controlling or advisory role. The outcome was 3.4 on a scale of 5, indicating that the respondents generally saw external players more as controllers or advisors than as potential allies.

For strategy B the respondents were asked how they would award tenders for work that includes adaptation measures, given that the housing association had set performance indicators for adaptation instead of a detailed description. Would they award the work to a specific construction supply chain in a direct relationship, or would they invite tenders from several competing consortia? There was no clear preference for either strategy, since the answer was 2.9 on a scale of 1–5, in which 1 meant working only with specific supply chains and 5 meant working only with competing consortia.

For strategy C the respondents were asked to assess the probability of their housing association buying ready-made renovation concepts for their dwellings. Apparently they were undecided, since the answer was 3.0 on a scale of 1-5.

§ 8.5 Discussion

Mainstreaming adaptation

This paper addresses the issue of adapting to climate change in an isolated situation and takes no account of mitigation or other measures. This perspective enabled the current status of policymaking on the adaptation of the social housing stock to be highlighted. Working out the details of the five implementation strategies showed clearly that adaptation has a low priority as a separate policy field. The likelihoods for all strategies were assessed as being less than the neutral position, edging towards unlikely. The difficult financial situation housing associations find themselves in at the moment (Nieboer and Gruis, 2014) is an important explanatory factor for this result. In addition, climate change adaptation is a relatively new topic for policymakers, so they may be hesitant about believing that measures are likely to be implemented. Moreover, there are many other risks that may have higher priority, such as asbestos in dwellings, carbon monoxide from open heating systems, or the affordability of dwellings.

Nevertheless, maintaining climate change adaptation measures as a separate policy field enables housing associations to learn from the experience gained from the application of previous adaptations and to monitor them (Wilson and Termeer, 2011). It also allows them to keep track of new or unknown impacts and to consider the most effective strategies for adapting the housing stock to these new circumstances. A policy plan for adaptation legitimizes investments, sets project boundaries, and provides guidance about what has to be done (Chapter 7).

However, in contrast to the adaptation policy, the measures resulting from these policy guidelines could be easily mainstreamed as a result of the potential synergistic effects involved. For example, the use of thermal mass in the ground to heat dwellings in winter and cool them in summer is considered energy-efficient and can, therefore, be regarded as a mitigation measure. However, as cooling is also provided in the summer, it is an adaptation measure as well. Similarly, insulating the roof and façade of a dwelling is an energy-efficient way of keeping it warm in winter and, as such, is a good mitigation measure, but it can also prevent dwellings from heating up, which makes it an adaptation measure. The same reasoning holds for green roofs and façades, for keeping the environment cool, and storing water (adaptation), and for increasing air quality (health). From that perspective, climate change could be perceived as one of many issues that housing associations are already dealing with in their general maintenance and improvement programmes, rather than as a completely new challenge (Hertin *et al.,* 2003; Berkhout *et al.,* 2006). It is important to note though, that although mainstreaming can generate many benefits, combining measures with different purposes can lead to suboptimal results (Pinkse and Kolk, 2012).

It can even be argued that the framing and definition of the topics of mitigation and adaptation as two different themes are generating more misunderstandings and negative connotations than necessary. For example, a measure such as insulation which was framed as an adaptation measure would prove a cost-effective way of adapting a dwelling (LCCP, 2014), because it saves energy (mitigation) and thus money!

Policy development

In the survey, the respondents were free to identify what they felt to be the most suitable level of policymaking to develop. Policymaking in housing associations usually takes place at three levels: portfolio management, which deals with the size, composition and location of the housing stock; asset management, which deals with strategies for maintenance interventions (minor/major) and/or whether dwellings will be sold; and property management, which deals with preventive or corrective maintenance interventions, rent collection and tenant contact (Nieboer, 2009).

The most promising option is to embed adaptation policy at asset-management level. This is the level where decisions are made on whether to renovate existing dwellings and whether to keep dwellings or sell them (Nieboer, 2009).

Involvement of external players

Asset management guides decisions not only at building level but also at neighbourhood level (Nieboer, 2009). Housing associations are important players along with municipalities and water boards, amongst others (Termeer *et al.,* 2011), that can help to fill the gap in the development of policy for climate change adaptation measures at neighbourhood level (Wilson and Termeer, 2011; Williams *et al.,* 2012; Uittenborek *et al.,* 2013). This paper has shown that there is room for improvement when it comes to making use of the power at this governance level, since housing associations see these parties more as controllers or advisors than as partners. The interests of housing associations are very much in line with the interests of municipalities, particularly with regard to the quality of life in neighbourhoods.

Partnering approach

The partnering approach, ideally a long-term commitment (CII, 1991) between the construction company and the housing association, could prove promising, not only because of the financial benefits conferred by increased efficiency but also because of risk-sharing. In renovation projects, the design decisions are made at an early stage, but they have a strong influence on the future quality and vulnerability of the dwelling.

The players involved at an early stage in the supply chain, such as designers and construction firms, therefore exert a strong influence on the comfort and vulnerability of the players who are active later in the supply chain, the tenants and housing associations. The partnering approach makes the players at the beginning of the supply chain partly responsible for the comfort and vulnerability of the players at the end and may result in more resilient design decisions (Hertin *et al.,* 2003). Especially if the construction company is engaged to carry out the renovation and the maintenance for the rest of the service life of the dwellings, it can focus on design solutions aimed at resilient dwellings, even if the impacts of climate change increase.

Tenant involvement

Putting the tenant in a central position as suggested in implementation strategy E may seem promising, as this strategy emerged with the highest assessment score. However, housing associations that go down this route could be putting their long-term strategies at risk, since the current occupant decides on measures that may have an influence on the future quality, vulnerability and value of the dwelling. The measure may seem to have a lot going for it in the short term if the tenant contributes financially, but in the long term it may lead to financial losses if the tenant does not (or cannot) collaborate. Moreover, even if the tenant is willing to accept a rent increase, it is sometimes impossible to implement one, because the social rental housing system in the Netherlands sets maximum rents for household groups who are eligible for housing allowance. If a rent is already close to the maximum, it cannot be increased sufficiently to cover the expenses (Hoppe, 2012). Nevertheless, the housing associations can apply measures rejected by the current tenant at a later stage if, for example, the tenancy changes hands. If there are no rent limitations, the costs of the adaptation measures can be easily absorbed in the rent for the new tenant. Lastly, if a tenant specifically requests an adaptation, the housing association would be in a win–win situation, given the prospect of a financial contribution and lower vulnerability in the future. Policy should be in place that allows housing associations to recognize the value of these requests from tenants who are willing to contribute to the realization of a resilient dwelling.

§ 8.6 Conclusion

Five strategies to enhance the implementation of climate change adaptation measures in social housing were assessed via a survey among housing association policymakers. In general, the respondents assessed the feasibility of all strategies as unlikely to neutral. The reasons they gave for their assessments indicate that the uptake of measures in the near future is being obstructed by the current financial situation of housing associations and the low priority of adaptation on the policy agenda. There was no strategy that clearly stood out as most feasible, thus confirming that there is no silver bullet in policymaking that will enhance the uptake of climate change adaptation measures. However, a considerable number of housing associations assessed one or more implementation strategies positively and saw opportunities for implementation of measures. These associations are the ones to focus on in the next step towards making the social housing stock climate-proof. Moreover, the results encourage the development of a wide-ranging palette of policy strategies that recognize the importance of framing adaptation measures, since previous research has shown that the implementation of measures, as such, is feasible, albeit in a different frame, such as mitigation or increased comfort.

At the moment, policymakers at housing associations are not focussing on the projected impact of climate change, which is expected to increase in the coming decades. Of course, it is possible to wait for the right moment to think about implementing climate change adaptation measures. May be then, policymaking on adaptation alone will be able to generate the conditions for implementing adaptation measures, and housing associations will not need other partners. However, the proposed implementation strategies focus on efficiency, which will not only prove beneficial for climate change adaptation measures, but all kinds of other measures that housing associations may want to apply to their dwellings as well. A more efficient construction process would allow housing associations to do more with the same amount of money. Moreover, since the renovation cycles in which the majority of adaptations could be incorporated are expected to last 25–40 years (Chapter 4), the next opportunity to apply measures lies far in the future, meaning that tenants will have to live in vulnerable dwellings for a very long time.

To date, research in this field of knowledge has had to deal with the future expectations of policymakers rather than with their experience of past events. For this reason a qualitative approach was adopted. In future, it is recommended that the policies developed are tested and underpinned through research that makes use of more quantitative data analysis methods.

The study reported in this paper and the studies it builds on (Chapters 3 and 4) share several similarities with research conducted in the UK at sectorial or corporate levels of policymaking (Jones *et al.,* 2013; Hertin *et al.,* 2003; Berkhout, 2004), which relates to the knowledge of the consequences and threats of a changing climate among employees. These employees had a general idea about climate change (obtained from media coverage) but had no specific knowledge of the impacts of climate change or the opportunities to adapt to them in their daily work. Moreover, climate change mitigation had been more successful than adaptation in gaining their attention. The similarities in the state of awareness and state of knowledge among firms in the house building sector make the findings reported in this paper valuable not only for the Netherlands, but also for other countries in Europe or elsewhere in the world where there are large-scale property owners.

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