



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



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## 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.

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## 1. Introduction

There is clear evidence that the climate is changing globally [1,2]. Rising temperatures [3,4] higher levels of precipitation, and increasing river run-off are expected to worsen [5] 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 [6–8], and in design recommendations for the urban environment [9]. Since 2010, research on climate change in the Netherlands has been bundled in the Knowledge for Climate research programme [10], this issue]. 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 [11]. 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 [12], 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

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temporarily during bouts of heavy rainfall, thus taking the pressure off the sewage system and lowering the risk of inundation [12].

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 (389) [13]. 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 [14]. 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 [15]. 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 [16]. 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 [17]. 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. [18] 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 [19].

That said, climate change is fraught with uncertainties [20] – 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 [21], policy-making 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” ([22] p.1 and p.19). In the case of mitigation, the intensive research efforts have resulted in many governance strategies, which, if not equally successful ([www.climateactiontracker.org](http://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’ [23] 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 [24] 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 [25]. This date is also the cut-off point for the Dutch national strategy [26].

In the interests of clarity it should be noted that climate change adaptation strategies have already been developed for designated vulnerable areas throughout Europe [21,27–29], 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 [30]. 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 [31]. The same goes for green roofs installed by housing associations, which were not specifically designated as climate change adaptation measures either [32]. 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 [33]. 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 [34]. The housing associations, labouring under financial difficulties [35], 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 enhance the uptake 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 [24,36]. 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’ [37] 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.

## 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

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