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EMBEDDING ENERGY SAVING POLICIES IN THE DUTCH NON-PROFIT HOUSING SECTOR

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Abstract
Many studies on policy implementation have emphasized the difficulties of putting policies into practice. The paper presents several ways in which Dutch non-profit housing providers incorporate their energy saving policies in their 'regular' housing management regarding the existing stock, such as planned preventive maintenance, renovations and other physical improvements. Several housing associations were selected that have formulated an energy saving policy and that have at least some experience in implementing these policies. Interviews were held with managers of asset and maintenance management and with policy staff of housing associations. It is investigated to which extent the policy ambitions, both at the portfolio level and at the project level, are carried out, and in which way these ambitions are embedded in the organisations' regular working processes. In addition, the main stimuli and barriers for the implementation of the energy saving policies are identified. Special attention has been paid to the feasibility of combinations of energy saving measures with other physical improvements in the housing stock. Results show that the implementation of energy saving policies in annual improvement and maintenance plans is in most cases not problematic, and that the most significant problems arise during the preparation of individual investment projects.

Keywords: energy saving, implementation, social housing, the Netherlands

INTRODUCTION

As in many other countries, energy efficiency has gained priority on the agendas of governments, housing providers and the building sector in the Netherlands. This paper deals with the implementation of energy efficiency policies of non-profit housing providers (in the Netherlands almost always housing associations), in particular with the way in which these housing associations materialise their own energy policies in their housing management practices.

Dutch energy policy has three major goals: security of supply, environmental quality and economic efficiency. Over the longer term the government aims to achieve a sustainable energy system. Current energy and climate policy focuses on cost-effective measures to carbon-reductions, on energy conservation and sustainable electricity (Kern and Smith, 2008). The official Dutch goals set in reaction to global climate change are ambitious. The Dutch goal states that in 2020 CO_2 emission must be reduced by 30 per cent compared to 1990. In line with EU policy, the Dutch government also aims that 20 per cent of the energy used will be produced sustainably in 2020.
In line with these governmental ambitions, *Aedes*, the umbrella organisation of Dutch housing associations, declared in 2008 that the sector will reduce the natural gas consumption level with 20 per cent in ten years. It also agreed with the Ministry of Housing and *Woonbond*, the national body of tenant organisations, a reduction of energy consumption in new building with 25 per cent in 2011 and with 50 per cent in 2015.

There is a lot of literature on energy saving and other forms of energy efficiency in housing. Among them, many publications deal with energy saving measures and techniques and their application, in individual dwellings (e.g. the use of solar panels, types of insulation, high efficiency boilers), a building block (e.g. heat and cold storage) or at the neighbourhood level (e.g. district heating). A lot of attention is also paid to governmental energy regulations, including taxes and subsidies, subjects on which several internationally comparative studies have appeared (e.g. Beerepoot, 2007; Itard and Meijer, 2008; Sunikka, 2006; Horne, 2008; Engelund Thomsen, Wittchen *et al*., 2008; Schüle *et al.*, 2009; Hamilton *et al*., 2010). In addition, there is growing literature on tools for assessing the sustainability or, reversely, the environmental impact of buildings, for example Life Cycle Assessment (e.g. Fay, Treloar and Iyer-Raniga, 2000; Forsberg and Von Malmborg, 2004; Meijer, 2006). However, the embedding of energy efficiency in the management of individual housing organisations is not often explored, although this subject is important for two reasons.
First, numerous studies show that there can be a wide gap between the policy ambitions and the implementation of these objectives in concrete measures. Many planning studies show a poor implementation of policies due to conflicting interests, miscommunication, misinterpretation and lack of anticipation on possible side effects. In most cases, these implementation studies concern large governmental institutions or large companies, but recent research (Nieboer, 2009) has found similar outcomes for Dutch housing associations, which organisations are considerably smaller (think of a few hundreds of employees). In addition, his research dealt with policies trying to influence *internal* decisions, which are different from most government policies in the sense that these are usually directed towards *external* parties. In his research in the Dutch building sector, Hoppe (2009) found similar results.
Regarding energy efficiency more specifically, there are also many indications for wide gaps between policy ambitions and implementation (e.g. Jaffe and Stavins, 1994; Brown, 2001; Zilahy, 2004; Sorrell *et al.*, 2004; Hoppe, 2009). What is more, many studies regarding the implementation of energy efficiency programmes indicate that progress is often less than what could be expected on the basis of rational models, which assume a smooth translation of

policy into action. Already some decades ago, for instance De Man (1983) and Coltrane, Archer and Aronson (1986) pointed out the importance of social-psychological factors such as personal attitudes in adopting energy conservation programmes. As for housing portfolio management in non-profit housing sectors, recent studies (e.g. Gruis and Nieboer, 2004; Gruis, Tsenkova and Nieboer, 2009) indicate that housing portfolio management is in an early stage of development, despite initial expectations of rapid policy development as a consequence of neoliberal policies and, related to that, reduced government support. Although (particularly in the Netherlands, Australia and the United Kingdom), some studies have focused on transferring approaches from business planning to housing portfolio management (e.g. Van den Broeke, 1998; Larkin, 2000), these planning approaches are not often applied in practice (e.g. Gruis and Nieboer, 2004; Nieboer, 2009a and b).
Second, the implementation of energy efficiency policies at housing management organisations takes place in a political context that was, in the last two decades, dominated by policies that entailed a shift of responsibilities from government to market (Clarke and Newman, 1997; Peck and Tickell, 2002). This has led to a different relationship between government on the one hand and non-profit and other private institutions on the other hand, with government taking a more enabling and a less providing role. This development was particularly visible in the non-profit housing sector (see e.g. Whitehead and Scanlon, 2007; Boelhouwer, 1997 and 1999; Priemus, Dieleman and Clapham, 1999; Priemus and Dieleman, 2002), where government influence is, almost by definition, larger than in the commercial housing sector. The shift away from government control and towards market forces was often coupled with reduced levels of government support, a growth of the owner-occupied sector, and greater independence of housing associations from the government. The shift from government to market has entailed a more dominant role and responsibility for non-profit housing providers to achieve social objectives, for instance in the field of energy saving.
In this paper we focus on the non-profit or social housing sector. The focus on the non-profit sector is particularly important in this context, as evidence from advance performers indicate that it is this that is taking the lead in terms of implementation of energy efficiency policies, not just in individual buildings where the types of measures are selective, but also on a neighbourhood basis.

As has been stated earlier, literature is generally rather sceptic about what to expect as regards the reflection of policies in individual actions. In this light, it is plausible to expect a gap between energy efficiency policies of Dutch housing associations and the realisation of these policies. It is, however, not well known, how wide this gap is and, if there is such a gap, where in the implementation process the main problems occur. As for this process, we distinguish two stages. The first stage is about the embedding of these policies in general steering mechanisms such as the annual investment planning and budgeting. Also the embedding in related policies, such as maintenance policies and rent policies, are addressed. The main focus here is on corporate wide working procedures and related policies. The second stage is about the materialisation of these corporate wide forms of steering in concrete investment projects. The main focus in this stage is at the project level.

The research questions are as follows.

- In which way do Dutch housing associations materialize their policies in their measures regarding maintenance and other investments in their existing housing stock?
- To which extent are planned energy saving measures in investment projects of Dutch housing associations carried out?
- Which stimuli and which barriers do Dutch housing associations encounter when embedding their energy saving policies in maintenance and other investment activities?

The following section goes into the approach of the research. Then, the findings are presented. On the basis of these findings, we draw conclusions and present some recommendations.

RESEARCH APPROACH

The research has been done in two stages. The first stage is about the embedding of the energy saving policies in general steering mechanisms such as the annual investment planning and budgeting. Also the embedding in related policies, such as maintenance policies and rent policies is addressed. The main focus here is on corporate wide working procedures and related policies. The second stage is about the materialization of these corporate wide forms of steering in concrete investment projects.

First stage: energy saving policies

For the first stage, nine housing associations were selected that have formulated an energy saving policy and that have at least some experience in implementing these policies.
The housing associations presented in this paper are anonymously addressed as A, B and so on. Except one housing association with around 4,000 dwellings, all selected housing associations are, to Dutch standards, large organisations. Most of them have approximately 20,000 homes; some of them have more than 50,000 homes.

Interviews were held with managers of asset and maintenance management and with members of the policy staff. In principle interviews were held with people responsible for:

- the asset management and the energy saving policy;
- the maintenance planning and budgeting;
- maintenance projects;
- renovation projects.

Depending on the division of tasks per housing association and knowledge about the subjects, the interviews were held with 2 to 4 persons per housing association. For the interviews a structured checklist was set up. This checklist was tested beforehand by one of the selected housing associations.

Second stage: energy saving projects

The second stage is about the materialisation of these corporate wide forms of steering in concrete investment projects. The main focus in this stage is at the project level. For this research a distinction has been made between 4 types of investment projects:

- void repairs;
- planned preventive maintenance;
- minor improvements;
- major improvements.

For this research void repairs and planned preventive maintenance are considered investment projects. Energy saving measures can be realized simultaneously with void repairs and planned preventive maintenance interventions. Table 1 shows the main characteristics of the investment projects.

	Void repairs	Planned preventive maintenance	Minor improvements	Major improvements
Occasion	Change of tenant	Maintenance planning	Need for quality	Need for quality
Cyclical process	No	Yes	No	No
Realisation per dwelling or housing estate	Dwelling	Housing estate	Housing estate (or dwelling)	Housing estate
Realisation occupied or unoccupied	Unoccupied	Occupied	Occupied	Unoccupied
Service Life extension housing estate	No	No	Possible	Yes

Table 1: *Characteristics of investment projects*

From the nine selected housing associations of the first stage of the research, four were selected for this second stage. The outcome of the interviews at one of the four housing associations gave too little solid information to be included in this paper, so we have included the findings of three housing associations, presented here by the letters A, B, and C. Per housing association projects were selected representing each type of the investment projects. Selection criteria for the projects were:

- significant energy saving measures have been realised that result from the energy saving policy
- the project is typical for the housing association
- the project is (nearly) completed

If possible, per housing association projects were selected with single and multi-family dwellings. Unfortunately, projects representing void repairs were not found at any of the selected housing associations. An additional study is carried out to 'repair' this omission, but the results of this study are not available yet.
The research was done through a document survey and interviews with people of the housing association involved with the projects. For the interviews a structured checklist was used comprising questions about the project management, the results and the process.

FINDINGS

The findings, based on interviews and document study, are divided into the two stages mentioned in the previous section: first the findings about the embedding of the energy saving policies in general steering mechanisms such as the annual investment planning and budgeting are presented. Secondly, the materialization of these corporate wide forms of steering in concrete investment projects is presented.

Policies and goals for energy saving

To make energy saving policies more concrete, ambitions or goals are established. Examples are an ambition for decreasing energy use in terms of percentage, to be reached in a particular year, the number of energy label steps per year, or the removal of the worst energy labels (E, F, or G) within a set period of time.
Mostly, there is a relationship between policies of individual housing associations and the national, local or umbrella organization covenants these individual housing associations follow. A lot of the interviewed housing associations follow the covenant of the Dutch umbrella

organization for social housing associations, which aims to save 2% per year on natural gas, starting in 2008 until 2018.
Table 2 gives an overview of some of the goals per housing association.

Housing association	Goals		
	Total CO_2 reduction	Other	
A	20% in 2018	-	-
B	20% in 2018	Improving/optimizing all dwellings under label D	Striving for label B in renovations
C	20% in 2015	-	-
D	20% in 2018	-	At least a B label when exploitation period exceeds 15 years
E	25% in 2018	-	-
F	2% per year	-	-
G	30% in 2014	No more E/F/G labels in 2014	All renovated homes have at least a B label
H	Unknown	Two label steps if measures are repaid within 20 years	At least a B label when exploitation period exceeds 15 years
I	3% per year	1000 label steps per year	17.000 E/F/G labels improved to B label

Table 2: *Overview of goals per housing association*

Next, the links between energy saving policies and general steering mechanisms such as the annual investment planning, budgeting and the forms maintenance and investments are presented.

Link with budget for maintenance and investments
There are three ways housing associations deal with the embedding of energy saving policies in their (regular) budget. First, there is no special budget for energy saving measures; costs are part of the regular maintenance budget. Secondly, there is a special budget, but this is not necessarily meant for energy saving measures, but can be used for sustainability or environmental measures. Thirdly, a special budget is available only for energy saving measures. Each housing association that was researched is presented in one of these three categories. A special budget meant only for energy saving measures seems to be an advantage but the size of the budget, whether or not earmarked, is much more important.
Some housing association also mentioned another hindrance to incorporate energy saving measures in the regular long-ranged investments plans, because the capacity to invest is under pressure and the future is uncertain. Alterations in tax regulations and the decrease in house sales increase the financial uncertainty. Furthermore, some housing associations did not provide all their stock with an energy label, making it difficult to assess the need for energy saving measures and therefore estimate a budget. Other housing associations are depending partially on the willingness of tenants to agree on an increase in the rent for the financing of energy saving measures.

Link with planned preventive maintenance
For many housing associations in the research, planned preventive maintenance is the most important moment to carry out the energy saving measures, mainly because of scale advantages. In general, a large group of dwellings is grasped and a cluster of measures can be placed per dwelling. Six out of the nine housing associations have standard energy saving measures in its planned preventive maintenance, mostly double glazing and improving or adding insulation of façades, roofs and floors.

The use of the word ‘standard’ suggests that these six housing associations are executing these measures in all circumstances but some exceptions on this are made. If the particular dwellings have a short life span, measures will not be carried out and investments are restrained. Furthermore, there is some freedom for the department or project managers directly involved in the projects. Sometimes this means parts of the list of requirements are not always followed.
An important condition in general is that the benefits (costs savings and energy saving capacity) are greater than the general costs. Some housing associations use tools such as Gross Initial Return for energy investments or Internal Rate of Return for calculating the return. The table below gives an overview of the standard energy saving measures of the nine housing associations.

Housing association	Standard energy saving measures				Special budget? **
	Double glazing	Façade insulation	Roof insulation	Floor insulation	
A	X	-	-	-	yes
B	X	-	-	-	yes
C	X	X	X	X	yes
D	-	-	-	-	no
E	-	-	-	-	yes
F	X	-	X*	X	no
G	X	-	X	-	nee
H	X	X	X*	-	yes
I	X	X	X	X	yes

*When the roof needs replacement **including special budgets for sustainability or environmental measures
Table 3: *Overview of goals and standard energy saving measures*

Link with void repairs
The housing associations interviewed for this research rarely perform energy saving measures during void repairs. The costs are higher, because of the lack of scale advantages. Sometimes a tenant objects to the planned preventive maintenance or renovations but when this unwilling tenant has moved, void repairs are used to make the dwelling in accordance with the dwellings renovated earlier.
Investments during void repairs can also happen if waiting for planned preventive maintenance is considered irresponsible. An example is the replacement of single glazing by double glazing, when the window frame is ready to be replaced.

Link with renovations and improvements
Most of the researched housing associations have the same requirements on energy saving and use the same conditions for renovations as they use for planned preventive maintenance. This means in general that the same energy saving measures are considered for renovation as for planned preventive maintenance. Higher requirements for renovations do occur, but only if they are required by the Building Code.

As already stated, for the second stage of this research staff members of three housing associations were interviewed. These three housing associations have at least some recent experience in implementing its energy saving policies in maintenance and renovation projects. Below, summaries are presented of the interviews with the staff members of the three housing associations. Subjects covered by the questions were energy saving ambitions, project organisation, project features, the energy saving measures and cooperation of tenants.

Housing association A

To give a practical result to the ambition housing association A has formulated four spearheads: energy saving and CO_2 reduction, health and liveability, sustainable solutions for maintenance and new developments and finally internal environmental care. The energy saving ambition is 20% reduction in 2018 compared to 2008.

A list of requirements housing association A uses has four ambition levels for planned preventive maintenance and renovations. Every ambition level corresponds with the new exploitation period and the strategic label. Once the exploitation period and strategic label for a particular project have been established, a list of energy saving measures is more or less automatically generated. This procedure ensures unambiguous further development by architects and other consultants. The design of projects can also be assessed this way. In its Environmental Policy Plan, housing association A states that they will guarantee tenants that the energy bill will decrease (based on the project as a whole) more than the increase of monthly rent after the renovation.

Three projects of A were selected for this research. The first project was a four storey doorway apartment building, built in 1974. This project can be considered a planned preventive maintenance project. Tendering for this project was done by a private contract, based on a so called 'building team' contract. This means the contractor was already involved from the initial phase of the project. Energy saving measures for this project are replacement of window frames with hard wood window frames with the FSC quality mark, the fitting of highly efficient double glazing, adding of insulation of façades, led-lights in central stairways, removal of geysers, placement of collective hot water supply with heat recovery and adding mechanical ventilation. With these measures, the energy label went from G to B. The placing of solar panels would have made label A possible, but proved to be too expensive.

The second project consisted of four buildings, each with 12 storeys, built in 1960. In total 288 galleried dwellings were refurbished. This project can be considered a planned preventive maintenance project. Energy saving measures carried out in this project were highly efficient double glazing in all window frames, roof insulation, new ventilation registers and closing of cracks, placement of mechanical ventilation, placement of new closed geysers, improvement of collective heating system, placement of thermostatic radiator valves and individual cost indicators, placement of wind turbines on the roof. This last measure was eventually rejected by the municipality, because of objections by dwellers in the neighbourhood. The energy label went from G to B.

The third project, a minor improvement project, consisted of a three-storied doorway housing estate, with a total amount of 226 dwellings, built in 1928. The project was a pilot for 'performance based collaboration', which means the housing association describes the approach through quality and performance requirements. From the design phase, the contractor is involved to consider the measures that ensure technical and financial efficiency on the short and long term. Measures in this project included the placement of highly efficient double glazing, roof insulation, the removal of geysers, the placement of highly efficient boilers and the fitting of mechanical ventilation. Some measures were considered, but not executed. Heat recovery proofed to be technically complicated and not cost-effective and the replacement of inside insulation meant the tenants needed to be temporarily moved from their homes. Furthermore, floor insulation also proofed to be too costly and sound insulation of the floors was not necessary, because the placement of fire resistant ceiling solved this issue. Because of the measures installed, the energy label improved from G/F to C/D.

It seems tenant cooperation was not an issue in executing the measures in the mentioned three projects. The housing association chose not to increase the rents after completion of the projects, only voluntarily when a tenant asked for a specific improvement of their home. A side

effect of not increasing the rent is that tenants could be less aware of energy use and costs, because it is not visible in their living costs.

Housing association B

In September 2009, housing association B specified their Environmental Policy Plan, in which they state to aim for 20 % CO_2 reduction compared to 2008, to be reached in 2018. All dwellings with an EPC lower than D will be optimized, starting with the ones that have the worst performance. Maintenance activities that are part of the planned preventive maintenance program are taken into consideration and adopted for these specific projects. At far-reaching refurbishments, it is policy that at least energy label B is reached. Some measures are considered standard in the Environmental Plan, i.e. placing of double glazing simultaneously with painting of the windows, which is combined with the adding of mechanical ventilation when the tenant alters. Old boilers are always replaced with new highly efficient boilers. Collective boilers are always replaced by environment friendly collective systems, if the system has the capability to individually bill the tenants. This housing association strives to cover 75% of the costs by raising the rent.

Only one project of B was selected for this research, because this was the only recent renovation project that has the Environmental Policy Plan as a framework. The project is a six storied gallery flat, built in 1963, and can be regarded as a minor improvement project. The exploitation period of the building is extended by 25 years.

The project acted as a pilot for 'performance based collaboration'. The contractor involved came up with recommendations for the set of energy saving technologies including installations. The standard set included the fitting of high efficiency double glazing, insulated panels in the façades, placing of mechanical ventilation and the replacement of kitchen geyser for electrical boilers. Additional and more expensive measures the contractor suggested were floor insulation, hollow wall insulation, roof insulation, heat recovery trough mechanical ventilation and solar panels. In the end, the following energy saving measures were considered economically feasible: high efficiency double glazing, insulated façade panels, mechanical ventilation, hollow wall insulation of the brick facades, floor insulation under the first floor, the replacement of geysers by a collective heating and hot water system and finally roof insulation. The increase in rent after the work is finished is calculated based on the expected decrease of the energy bill at the level of the individual home. This will not be guaranteed to tenants, but it might be considered in the future.

The project is going to be evaluated with special attention to investigating if the right measures were applied to the building. The housing association guaranteeing occupants a decreased energy bill is also studied, because this helps to get 70% of tenants to agree on the renovation, which is a legal impediment. Generally, the implementations of far-reaching energy saving measurements are studied per individual project. In this specific project, more energy saving measures were implemented than could be expected from the policies in the Environmental Policy Plan. In conclusion, the success factors in this project are that the building apparently was technically suited for quite a number of measures, and the willingness of tenants to agree with the increase of the rent.

Housing association C

Housing association C laid down its ambitions regarding energy savings for its stock in the document 'Energy project 2009-2015'. The 20% CO_2 emission reduction was to be reached in six years, a period based on the painting cycle. In this period the whole stock was to be updated for a budget of € 90 million. Half of this budget had to be earned back by rent increase. The policy is that every dwelling needs to be equipped with high efficient double glazing, façade insulation and roof insulation, unless the dwelling was already sufficiently equipped.

Ground floor insulation would only be considered if economically feasible. The Energy Project started with a pilot phase, in which homes ready for planned preventive maintenance, were fitted with energy saving measures. The pilot was executed by a project group consisting of a project manager, a communications manager, an engineering project coordinator and a financial consultant.
The initial plan was to start the pilot with six projects, dispersed by type and building year. Four projects were finally included: 40 single family homes built in 1920, a flat built in 1973, 15 dwellings for the elderly built in 1960, and 10 small apartments in a villa, built in 1920 and renovated in 1982. Following the principles of the Energy Project, all homes would be fitted with double glazing, façade insulation, roof insulation (even if the roof doesn't need replacement) and sometimes floor insulation. The actual pilot projects of the Energy Project, however, showed a greater variety in energy saving measures than the policy plan prescribed. This can be explained by technical issues or by the fact that some of the measures had already been taken.
The 40 single family homes built in 1920 were to be fitted with floor insulation, insulated glazing, façade insulation and roof insulation in the extension. Roof insulation in the rest of the dwellings was placed in the 1990s and is still functional. The fitting of double glazing sometimes means replacing the moving parts of the window frame. Tenants only pay for the glazing, not the replacement of the moving parts. Furthermore, the dormers are replaced and these are equipped with double glazing, but tenants don't have to pay an increase in the rent.
The flat built in 1973 is to be fitted with floor insulation for the bottom apartments, insulated glazing in new window frames and the insulation of facades. More specifically, the end wall is insulated on the outside, resulting in a higher insulating value than insulating the hollow walls on the long facades. The roof was already insulated in the 1990s.
The 15 dwellings for seniors, built in 1960 are fitted with floor insulation, roof insulation, the replacement and adding of double glazing and facade insulation of three dwellings. The replacement of the roof was part of planned preventive maintenance for this year. For this reason, the costs of the replacement and insulation are not recalculated in the rent.
The 10 apartments in a villa, built in 1920 and renovated in 1982 are to be fitted with ground floor insulation, insulation of the flat part of the roof and double glazing. 'Wrapping' the building with façade insulation is complicated, due to municipal regulations on altering the appearance of a building. Ground floor insulation is limited to the parts directly under a dwelling, because of the vaulting of the floor. As with the aforementioned project, the replacement of the roof was part of the planned preventive maintenance for this year. For this reason, the costs of the replacement and insulation are not recalculated in the rent. The increased insulation has consequences for the ventilation, but the proposed solution is not popular with tenants.
In the light of the ambitions of the Energy Project, the results of the pilot were rather disappointing. First, the combination with planned preventive maintenance, did not work out well. The preparation of the projects took more time than is actually desired for these type of projects. So, the principle of combining energy investments with planned preventive maintenance projects has been abandoned. Second, the principle to get a 50% payback in the rent for the measures was difficult to realise, for which reason housing association C has abandoned this principle. The most important bottleneck in the progress of the Energy Project was the willingness of tenants to contribute financially to the measures. Further, there were frequent internal discussions about which activities or materials had to be charged in the rent and which not. Ultimately, in most projects of the Energy Project, the costs were not recalculated in the rents. As a consequence, housing association C decided to carry out the energy saving measures with half of the initial budget, which means that it must be much more selective in its selection of investment projects.

An example of a project outside the scope of the Energy Project was a project consisting of 147 particularly small single family dwellings. These dwellings were improved significantly by altering the plans, adding a dormer window and combining 20 small dwellings to make 10 big new dwellings. The roof and floor were insulated and double glazing was put into place. In general, it can be stated that the role of energy saving in the project was limited. First the decision was made to replace parts of the dwellings, then it was decided how to do this as sustainable as possible. Energy saving measures were joined in with other ambitions and options. Because the costs of these measures were only a small part of the total expenses, they were a problem for neither the tenants nor the housing association itself.

DISCUSSION AND CONCLUSION

The interviews from the first stage of implementation (from policy to general steering) seems to suggest that the embedding of energy policies in regular investment activities can take place fairly easy, simply by including energy saving measures into planned preventive maintenance and/or renovations. An important condition is that budget is available for the extra costs of these specific measures, that the financing is independent from third parties and that tenants are willing to accept the resulting rent increase. Especially the financing of energy saving measures is a problem, for several reasons. First, the liquid assets of housing associations have worsened recently, due to decreased sale of dwellings, an increased tax burden and also tight national rent regulations. Second, uncertainty about the future rent regulations and energy prices, which influence payback possibilities, increase the financial risks involved. The embedding of energy policies into the regular work processes seems to be hampered especially by financial constraints and not, as expected beforehand, by internal and organizational factors, such as the lack of coordination between departments.
However, the results about the second stage of implementation (from general steering to projects) give reason to doubt these conclusions. Some interviewees indicated that the official project requirements are not always followed in the preparation of a project, and that energy saving measures agreed upon in the preparation phase of a project is actually not carried out in the execution phase. This research, however, does not give evidence about how often this takes place. Some interviewees have indicated that for those who lead investment projects time and budget are more important than energy saving. In line with Hoppe (2009), interviewees have also stated that the implementation of measures in this area is partly dependent on the motivation of these project leaders.
Another factor in the implementation of energy saving measures is related to the type of investment projects. There is merit in the argument that energy investments must be combined with other investments, because this combination of efforts reduces capital loss and saves money on the long term. The study indicates that energy saving measures can be relatively easily included in renovation projects, because renovation as such entails a range of physical measures and a relatively long preparation period. If combined with planned preventive maintenance projects, however, the story is different. There is a risk that these projects 'explode' in both time and budget, especially if considerable energy measures have to be carried out and if extra communication with the tenants is needed, for instance about a rent increase. This would suggest that improvement projects such as renovations are more suitable moments to carry out energy saving measures, but the problem with these projects is that they do not frequently occur: if we would wait for all such project to be carried out, the energy policy ambitions (as given, for instance, in Table 2) would not be met. So, both planned preventive maintenance projects and (larger) improvement projects are not entirely appropriate to include energy saving measures. A solution to this problem could be a combination with a

long-term investment program to increase the physical quality of the housing stock, a kind of investment scheme that many Dutch housing associations have developed and mostly has duration of 10 to 15 years. Further, it is conceivable to make use of several types of investment projects, for instance to carry out relatively simple measures (e.g. double glazing) in planned preventive maintenance projects and to carry out more complex measures in renovation projects.

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