Sustainable Retrofit of Social Housing: The Role and Future of Multi-Year Programs and Strategic Partnerships

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Article

Sustainable Retrofit of Social Housing: The Role and Future of Multi-Year Programs and Strategic Partnerships

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Abstract: Dutch housing associations, being semi-pubic construction clients, have been assigned an important role to help to realise the national goal of a CO_2 neutral housing stock in 2050. Practice shows that to achieve this goal, a growing number of housing associations bundle sustainable retrofit projects in multi-year programs. Those programs are implemented by entering into strategic partnerships with retrofit contractors. Based on an explorative literature review and case-study research, this article zooms in on the rationale behind the development and its effects and future. The process of establishing the partnerships and the organizational consequences for the partners involved, are discussed. The findings show that housing associations that opt for strategic partnering, significantly change their tendering process and, above all, look for the right contractors. The novel approach increases the retrofit rates and the tenant satisfaction with the process. Trust is key in the collaboration between clients and contractors. Hindering factors are the needed cultural and organizational changes on both the supply and demand side.

Keywords: CO2 neutral housing; Program-based retrofit approach; Social housing; Strategic partnering; Sustainable retrofit management; Tenant satisfaction

1. Introduction

Worldwide, debates between countries how to battle climate change has led to various agreements of which the Kyoto Protocol of 1989 and the Paris Agreement of 2015 are viewed as important tipping points [1.2]. The latter presented a major challenge for national policy-makers, asking for a far-reaching decrease of global greenhouse gas emissions. Since the Paris Agreement, many countries have strengthened their climate policies and commitments. Despite all the efforts, experts argue that the current agreements and policy actions are not enough to prevent global warming and its possible devastating consequences [3].

Current European Union policies aim to achieve a decarbonised building stock by 2050 [4–6]. Within this international framework, Dutch government and civil society organizations concluded in 2013 the Energy Agreement for Sustainable Growth on energy conservation, sustainable energy and climate measures [7]. In 2019, the Climate Agreement became the successor to the Energy Agreement. The main goal is to achieve a CO_2 neutral housing stock in 2050. In 2022 the Dutch government presented the National Housing and Building Agenda. Six related programs were included in this Agenda, including the Sustainable Built Environment Program. The goal remained to further drastically reduce CO_2 emissions and gas consumption. The ambition however was sharpened to achieve and exceed a CO_2 reduction of at least 55% by 2030 [8,9]. To reduce gas consumption it was agreed that, by the end of 2021, local authorities should have formulated a heating transition vision indicating which districts would be made gas-free before 2030. Although almost all local authorities had completed their visions by early 2022, it proves to be difficult to heat large numbers of homes by other energy sources10.

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Housing associations, being semi-public construction clients, are expected to play an important role to reach the Dutch sustainability targets. Not only as pacesetters to get the energy transition on track, but also to create a flywheel effect for other real-estate owners. It is furthermore expected that housing associations can realise these goals through industrialisation of the retrofit activities at considerably lower costs [8–11]. Dutch housing associations own a little less than 29% of the Dutch housing stock. Almost three-quarters of these 2,4 million social dwellings was built before 1990 and thus is at least thirty years or older [12]. This means that retrofitting and refurbishing have been, and will remain, important tasks of housing associations. Moreover, as a considerable part of the social housing stock consists of large series of relatively homogeneous dwellings, in principle favourable conditions exist for programmatic and multi-project approaches, and cross-project learning. An important pre-requisite in is that Dutch tenants have a decisive voice in the decisions whether and how energy retrofit projects are implemented. A qualified majority of the tenants is needed for a retrofit project to go ahead. The Dutch Civil Code states that at least seventy percent of the tenants have to agree with the intended project. Besides that, retrofit activities must not lead to an insurmountable increase in housing costs (rent and energy costs).

As part of the Dutch Energy Agreement in 2013, a covenant was concluded for the rental housing stock [13]. The umbrella organisation of housing associations, Aedes, expressed the ambition to achieve an average energy label B by 2021 (or an Energy Index of 1.4 or lower). Despite the fact that housing associations started to invest substantially more in energy saving measures, the National Energy Outlook 2016 found that the target from the covenant based on the then current plans of housing associations would not be achieved [14]. Subsequently a mandatory measure was issued for housing associations. As a reaction Aedes introduced the Housing Agenda 2017-2021 that stated that every housing association should have an plan by the end of 2018 to achieve a CO_2-neutral housing stock by 2050. With the Climate Agreement 2019, sustainability ambitions were sharpened and new goals called for insulation and energy transition tasks. Aedes responded to this with their Roadmap CO_2-neutral 2050, in which housing associations were offered support in planning and executing their tasks [15]. Since 2017, the housing associations stepped up their game and at the end of 2021 an average Energy Index of 1.4 was almost achieved. At the end of 2021, nearly 81% of social rental homes had a high efficiency boiler and about 16% was equipped with solar panels. Between 2020 and 2022, the insulation values of roofs, facades, floors and windows in the sector improved between 9% and 13% [16].

Despite the great efforts and successes, the retrofitting process of housing associations remained slow. Real breakthroughs, both in pace as depth, was lacking. It was expected that an acceleration could be brought about by the development of affordable energy retrofit concepts. The last decade various programmes were introduced to stimulate such a development: the 'Energy Flow' program (2013) the 'Renovation Accelerator' (2020) and more recently 'Construction Flows' (2022). The precise goals and approaches of these programs differ. However, in essence, they were and are aimed at making homes more sustainable on a large scale, with innovative approaches and solutions at significantly lower costs. In theory seemingly sensible approaches, but in practice it proves to be difficult to achieve the goals [17,18].

Looking ahead to 2050, all housing associations have the same target: to realise a CO_2-neutral housing stock. However the route to follow this goal is unique for each housing association. This article elaborates on housing associations that have changed their traditional approaches and have set-up multi-year program based partnerships with retrofit contractors. They are convinced that by doing so, both the effectiveness and the efficiency of retrofit projects can be improved. As not much is known about the novel approaches and the results, this article aims to answer the following questions: (1) What is the rationale behind program-based approaches and strategic partnering and (2) What are the key elements of strategic partnerships and what are the initial results and future perspectives of this approach?

Section 2 explores developments regarding strategic partnering and program-based approaches. The case study methodology and case selection are explained in section 3. This is followed by the

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findings presented in section 4. The article ends with a discussion and conclusions in the sections 5 and 6.

2. Multi-Year Programs and Strategic Partnering

In practice, the terms multi-year programs, program-based approaches and program management, are often used separately to indicate different developments. In terms of content however, the concepts are connected and closely related. Partnerships between public and private actors are concluded in order to achieve a certain programmatic target. This can lead to various economies of scale, but also has consequences for the management set-up and style and internal organization of all stakeholders involved.

Strategic partnering is used for many different kinds of cooperation: between national governments, within nations, between governmental organisations, between construction companies at the supply side and/or at the demand side, between producers and consumers, etc. In general the background and ratio of these strategic partnerships do not differ much from each other. International or national public private partnerships are mostly aimed at the realisation and implementation of common goals and agenda's. At the end of the 1980's the Brundtland report already mentioned the importance of strategic partnerships between governments and societal partners to realize sustainable goals [19]. Since then, strategic partnerships have been incorporated all over the world in many common agendas, policies and goals related to sustainability [20].

The reasons for strategic partnering in the business community (between companies or between companies and customers) generally are related to reach common goals in the field of market and knowledge position. Partnering up in strategic alliances can positively affect the operational security and continuity of the partners and can even influence their entrance to other market segments [21]. Combining preparation and productivity processes can lead to cost reductions in the different stages of production and implementation processes [22]. Partners can gain access and insight in each other's knowledge and skills, as a result of which the knowledge position of them can change in a positive sense [23]. Advantages that can give a boost to more efficient and efficient business operations.

The choice to join activities of different partners in a multi-year strategic partnership is usually based on their program and project management. In the construction industry this is usually derived from the asset and portfolio management of the client. The common denominator in the many definitions of program management is the focus on coordinating and managing a group of related projects to achieve advantages that are not possible when projects are managed individually. In most cases program management is used in an 'individual setting', in which a business manages a range of projects. Aligning and coordinating a group of related projects can lead to benefits that are similar to those mentioned in relation with strategic partnerships: continuity and guarantee of quality and production, stable supply of workforce, cross-project learning, better knowledge management and cost reductions [24,25]. On a more overarching level, the concept is also related to policy programming. For instance to realise the goal of a CO_2 neutral housing stock in the Netherlands in 2030, a broad government led coalition of market parties, interest groups and NGOs launched programmatic approaches to accelerate the sustainability of the built environment [7,8].

International examples of strategic partnerships, whether or not related to new methods of programme management, in the field of sustainable retrofitting of social housing are scarce. In some European countries (e.g., in Scandinavia and the United Kingdom) partnerships were set up to increase the delivery of affordable new built housing [26]. With respect to existing housing, initiatives can be found in Denmark where innovative public procurement schemes are developed to support building retrofit projects. An important condition for the success of these schemes is the involvement of competent and reliable project partners [27,28].

The situation in the Netherlands is different. Since the early 2000's, Dutch housing associations have established partnerships with contractors. Initially these partnerships were focussed on planned maintenance activities of the building envelope. This has evolved to the current situation, where some

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housing associations entered into partnerships for new construction, renovation and maintenance of their properties [18]. These strategic partnerships have been stimulated by umbrella and sector organisations of housing associations and contractors. In 2014 a foundation was established to share knowledge and experiences between housing associations, contractors and suppliers, e.g., via publications, education, training and offering specific tools [29]. The most important drivers for encouraging cooperation were, and still are, that it would lead to (transaction) costs and time savings, guaranteed availability of sufficient and adequate labour, better end results and higher tenant satisfaction. Practice shows that these advantages are actually realized [29–32].

3. Methods

A best practice case study approach was applied, including document research and semi-structured interviews. The case selection consisted of three phases. First, all possible interesting cases were selected via purposive sampling based on public sources. In the second phase an initial case selection was made based on the criteria whether the program-based approaches already were worked out in framework agreements between the intended partners. This led to a selection of twenty housing associations, of which data was collected through desktop research from public sources and practical knowledge of the authors and closely involved experts and colleagues. In the third phase cases were selected that already implemented the partnerships (i.e., "Are there lessons to be learned?"). Also representativeness criteria played a role in this phase: Are the cases reasonably spread in terms of region and size? Subsequently seven housing associations were selected (see Table 1). Although effort was made to take into account their size and geographical location, the selected housing associations are not fully representative for the sector. Four out of the seven housing associations are concentrated in the south of the country and in general the seven housing associations are also relatively large. To collect further data about the experiences with the partnerships, semi-structured interviews were held. For every case, representatives of the housing association and one or more of their contractors were interviewed. The questions were arranged within a predetermined thematic framework that addressed the following topics: initiative and goals, selection of the partners. organizational consequences, involvement of tenants, retrofit approach and initial results. Given the number of interviewees and to safeguard the internal validation of the cases, two researchers were involved in each interview. On average the interviews took one hour and a half and they were recorded. A transcript of the interview was send back to the interviewees for approval. Based on the interviews, added with results of desktop research, reports were drawn up for each case. These reports were also send to the interviewees for comments and additions. In a summary, the insights, experiences, and learning lessons of all partnerships were listed. The housing associations and their retrofitting partners could take note of the results and experiences of each other. Ultimately, the overarching results were presented in a discussion meeting, where the experiences with program-based retrofitting partnerships were discussed. The insights and conclusions from the meeting were incorporated into the final research report.

Table 1 shows that the selected housing associations generally enter into partnerships with two or more contractors, concluded in framework agreements for four to five years. In practice a project agreement is signed per retrofit project, often including design tasks for the contractor (design and build). These are broadly the similarities between the cases.

Table 1. Main characteristics of selected housing associations and energy retrofit programs.

	Dwellings	Staff	Current program	Contractors	Focus
1	8,200	85	2019-2022	2	NZEB, Energy labels A ,B
2	12,000	120	2018-2022	6	Stepwise, CO_2 neutral 2050
3	14,500	130	2016-2026	2	Building shell

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4	26,000	250	2017-2021	3	Energy label B
5	27,000	350	2020-2024	4	Energy label A
6	27,000	350	2020-2025	2	Energy label A
7	50,000	585	2020-2024	12	Stepwise, CO_2 neutral 2050

4. Results

Program-based strategic partnerships can be designed in different ways. This section discusses the following key elements: initiative and goals (section 5.1), selection of retrofit partners (5.2), characteristics of retrofit partners (5.3), organizational consequences (5.4), tenant involvement (5.5) and sustainable retrofit approach and initial results (5.6).

4.1. Initiative and Goals

With regard to the initiative, nuanced differences between the cases can be identified. In some cases individuals within the executive organization of the housing association took the initiative. In other cases, the strategic policy choice was taken at the higher management level. In all cases, the initiative was widely supported within the organisation and was embedded in the portfolio policy and asset management of the housing associations. According to the interviewees, such a combination of individuals taking the lead supported by management and board of the housing association is crucial to develop this new approach. It is also a pivotal condition to make this development successful and allowing it to penetrate all layers of the organization.

The direct reasons of all investigated housing associations to choose for programmatic partnerships can be captured in a remark of one of the interviewees, who summarised the main goals in the following sentence: *"Streamlining and accelerating the energy retrofitting process, resulting in the realisation of a higher sustainable quality and comfort level at lower housing costs (rent plus energy costs)".*

The housing associations formulated their goals as Key Performance Indicators (KPI's). Two of them have set explicit goals to reduce investment costs. In general, they do not expect a decrease of direct investments. However, transaction costs are expected to be lower because the multi-year approach, less tendering costs and cross-project learning. In addition, in most cases housing associations expect lower personnel costs because tasks are transferred to the retrofit partners. Generally, few 'hard' goals with regard to operating costs, or Total Cost of Ownership (TCO), have been set. Two associations explicitly strive for a lower TCO. The others do not have explicit costs reduction goals, they however again expect future maintenance cycles can be extended, resulting in reduced operating costs. Realizing product innovations as a goal are mentioned in more general terms. Some housing associations have translated this in an 'innovation calendar' or a minimum number of 'product or material improvements and innovations'. The initial goal was to improve energy labels of the dwellings. In a few cases, requirements have also been imposed on the minimum insulation values of building elements. All cases involve 'no-regret' measures and the focus of the approach and cooperation shifts to pre-sorting to $C0_2$ neutral. All housing associations aim to improve the support and satisfaction of their tenants. This is going to be realized by involving them in the retrofit project earlier and offering tailor-made services by giving them choices, e.g., with regard to the use of colours and planning of the retrofit

4.2. Selection of Retrofit Partners

The housing associations involved were dissatisfied with the traditional way of working and tendering. They have chosen a new, intensive and careful partner selection process. A process that, in most cases, was worked out in detailed steps. In addition to technical knowledge and skills, retrofit partners were sought that were reliable, accessible and communicative, open to make organizational changes and willing to adapt a different way of working. Furthermore they should be daring to be vulnerable, willing to collaborate and share knowledge and willing to consult with the tenants during

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the process. These 'softer' criteria often weighed just as heavily as 'harder' criteria such as prices for standard work. In short the partners should "have the same mind-set" as the housing association. The selection process usually consisted of various phases. In the first phase interested retrofit contractors had to fill in a questionnaire, or to write a short vision paper. Sometimes they also had to calculate a retrofit plan. In the second phase pre-selected contractors had to give a substantive presentation about their approach. In a few cases, employees of the housing association also visited potential partners to see how they worked internally and to get a feel of their vision, culture and mission. In short, the housing associations did not rush into selecting their future partners. Or as one of the executives of a housing association put it: *"We looked for partners who had to have the same DNA as us. They had to be reliable and accessible and they had to be able to interact and communicate with the residents".*

4.3. Characteristics of Retrofit Partners

In most partnerships, a limited number of main contractors (usually two) are responsible for the sustainable retrofit projects. Some selected contractors are also responsible for planned and responsive maintenance, and void repairs. Two contractors concluded a partnership with more than one housing association selected in the research project. Moreover, all main contractors involved in this project, participate in other partnerships as well, with housing associations that are not involved in this research project. Selected contractors are relatively large and have a long history. From the start on, often as a one-man or small family painting or carpentry company, they have grown into larger firms that are generally active in several regions of the country. Some even operate internationally and are listed on the stock exchange. To give an idea: Of the fifteen companies most involved in sustainable retrofit projects, five were founded before 1900 and eight were established in the first half of the last century. The remaining three were founded in the early 1970's. Two companies have a workforce of around 150 people. The number of employees at nine contractors is between 200 and 450. The other two contractors employ several thousand employees.

The larger companies have independently operating regional branches or operating companies that enter into partnerships with the housing associations. In a few cases, individual (smaller) companies have entered into a separate partnership under a new name and operate in a partnership with a housing association under that name.

4.4. Organizational Consequences for Housing Associations and Contractors

Compared to a traditional tendering process and a traditional relation with retrofit contractors, strategic partnering imposes new requirements on the internal organization and the capacities of the employees at both the demand and supply side. Not only the competencies and skills, but also the mutual division of roles and the tasks and responsibilities have changed. This has often been a long-term issue and requires continued active work.

There are differences between housing associations in the way they adapted their organizations. Most housing associations had, in advance, extensively considered the organizational consequences. Both in terms of competencies as in terms of division of tasks and roles. Some have made significant organizational adjustments to manage the new approach. Others tried to keep the organizational consequences as limited as possible and involve a relatively small group of employees in the strategic partnership program. They predominantly implemented the organizational adaptions in a work-based manner. In all cases, new forms of consultation have been created for the preparation and implementation of energy retrofit and maintenance projects, both at the strategic ('steering group') and at the implementation level ('project team or project group'). In addition, other facilitating adjustments have often been made, such as adjustments in the area of asset management and prioritization of housing complexes, data management, budgeting, coordination with maintenance processes, coordination with 'rental departments', etc.

Numerous adjustments have also been made on the side of the **retrofit contractors**. It often started for them with following courses and the staff participating in joint learning processes to learn

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the principles of lean management. However, based on the most important underlying goal to realise a new cultural and behavioural 'mind- and 'work approach, greater internal organisational changes were needed. Some contractors had to learn to design and calculate scenarios for stepwise renovation projects achieving the sustainability goals in 2050. New teams with collaborating mind-sets were put together, and some contractors hired resident counsellors to intensify the contacts with tenants. With design and realization teams, retrofit projects have been carried out in repetition for a number of years. The knowledge acquired in the projects was directly applied in follow-up projects ('learning by doing'). During the retrofit process close collaboration with the housing associations were realised in inter-organisational project teams.

Strategic partnering relies heavily on principles such as trust, openness and transparency, continuity, learning from each other and sharing and increasing knowledge. These principles cannot be (and have not) introduced overnight. It is the result of a development process, a process that in practice does not always run smoothly. As one interviewee noted: *"For this type of collaboration, the organizations of all partners need cultural and behavioural changes. That is also a matter of patience and continuing to work actively on it." and "We have become much more aware of each other's interests and how they can be dealt with. Not an easy process, but essential to make the partnership successful".*

For every case studied, all interviewees point out that despite the progress and the results achieved, it remains essential to work actively on the continuation of the relationship.

4.5. Tenant Involvement

The interviewees agree that housing associations continue to have an important core task to communication with their tenants and how to involve them in the retrofit plans. During the start phase of most partnerships, housing associations were responsible to obtain approval from the tenants to agree to the proposed retrofit plans. However, as the partnerships matured, the role and responsibilities of the retrofit contractors grew. They became responsible for communication with tenants during the entire renovation process. The housing associations often taking the lead in the preparation phase.

During the process, retrofit contractors developed tools such as a personal interactive resident app or a residents' platform. Via these digital tools residents and their families can view the retrofit plan and the various steps that are going to be taken, make appointments, read information, calculate housing costs and ask questions. As stated before, they also employ resident counsellors for personal consultation during the retrofit and after the retrofit completion. In addition most contractors are also involved in discussion meetings with tenants. According to both housing associations and retrofit partners these personal approaches make a big difference in the preparation and implementation phase of the retrofit process. The tenants, their situation and wishes are known and can be responded to seamlessly during the process.

5.6. Retrofit Approach and Initial Results

Compared to a traditional working process, the preparation and implementation processes in the new situation give housing associations much more flexibility. From the start of a project, the best feasible retrofit scenario is chosen, based on the sustainability goals and other requirements. However this process does not always goes smoothly. In some cases, the retrofit partner still had to get used to their new role and was still stuck too much in his old contractor role (e.g., forgetting their new proactive and initiating role).

Some housing associations have already adapted their sustainability goals. Initially the retrofit programs were aimed at realising an average energy label B. In most cases this goal has been reached and the future focus is shifted to realising a CO_2-neutral housing stock in 2050. Housing associations generally strive to continue their current partnerships. Another similarity between them is that they want to realise their energy saving goals step-by-step, with a 'no regret' and a 'just-in-time' retrofit approach.

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During the data collection, most programs and underlying projects were still in progress and therefore robust results of the ongoing partnerships are partly missing. According to the interviewees the current projects show that the benefits of strategic partnering are significant and promising and that they are on track to achieve their Key Performance Indicators (KPIs). In some cases, the exact number of improved homes is not yet known. What is clear however is that, within a relatively short period of time, a large number of homes have been made more sustainable, making them much more energy efficient and comfortable. To give an indication: two housing associations have succeeded in improving the sustainable quality of almost a third of their total stock to energy label A or B in recent years. In one case this concerns about 4,500 dwellings and in the other case the number has reached almost the 10,000 mark. One housing association has realised an energy cost reduction of an average 30% to 40% after the retrofit. Although only a few housing associations formulated a KPI on this subject, some indicate that they have clear indications of a significant reduction in the direct investment costs (ranging from 10% to 15%, rising to almost a saving quarter of the estimated costs). This also applies to operating costs: because the cyclical maintenance of complexes can be postponed, this quickly results in savings of between 15% and 20%. The transaction costs for housing associations have become significantly lower. Much less manpower is required for the preparation and implementation of the projects. Positive assessments are achieved in resident support (rising to more than ninety percent of the projects). Besides that, tenants are satisfied. On average they give the retrofit process and its outcome an eight on a ten-points scale.

Other less concretely measurable results are that the predictability, transparency and reliability of the retrofit process has become much greater. Mutual communication between housing associations and contractors has also been optimized, which has resulted in far more attention to each other's interests.

In turn, the retrofit contractors also experience benefits from the strategic partnerships. It leads to continuity of their business operations, it improves the quality and production they deliver, it assures a stable supply of workforce and leads to a better knowledge management and cost reductions across the board.

5. Discussion

Dutch housing associations are taking major steps improving the energy-efficiency of their dwellings to meet the national goal set for 2050 to realise a CO_2-neutral housing stock [7–9]. Based on the specific characteristics of their dwellings and tenants, their housing and strategic management goals, their organizational set-up, their partnerships with other parties, housing associations choose their own route towards 2050. Their choice is based on the desire that the end result must remain profitable and affordable for both housing associations as tenants. To avoid disinvestments most housing associations invest in step-by-step retrofit strategies. In the short term this approach leads to lesser energy savings in individual projects, however the energy savings are realised on a far larger scale.

A significant recent development is that housing associations are moving more and more towards program-based multi-year strategic partnerships with retrofit partners. The rationale behind this approach is primarily about improving the retrofit process using the knowledge and skills of the partners as effectively and efficiently as possible. Both housing associations as their construction partners have the same long-term goals and associated responsibilities. With partnering up, the predictability and continuity of the process is increased. For all partners involved, certainty is established about investments, budgets, production quantities, required capacity, order book, etc. All in all housing associations expected that this new approach would speed up and streamline the retrofit and maintenance processes and would reduce the costs. The findings of this project show indeed that lead times are faster and renovation rates are higher than one normally would expect. As stated a step-by-step approach is followed: first the shell is insulated and at a later stage installations are tackled. Focus lies on taking 'no-regret solutions' and 'just-in-time' strategies. The current retrofit approaches mainly rely on products, materials and techniques that already have proven themselves

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in practice. It is difficult to get product innovations off the ground on a large scale. A reason could be that for the implementation of technological innovations the market power of the retrofit partners, combined with the scope of the partnerships, is too small. For the near future, It cannot be expected that integral prefabricated renovation solutions will be applied on a large scale by these partnerships. Nonetheless the research project shows that product innovations are receiving increasing attention. Various partnerships work with a special 'innovation money pot' into which all partners contribute to jointly finance innovative actions.

The research results closely align with the expectations of program management. Coordinating and managing series of similar projects in programmatic strategic partnerships achieve advantages that are not possible when projects are managed individually. The benefits are mainly manifested by improvements in the quality and production level, stability and operational continuity of the process, better knowledge management and cost reductions [24,25]. These findings are supported by the results of other Dutch research projects in this field [29–32]. International scientific literature tends to overlook possible advantages for customers of programmatic partnering. In this project there is no way to avoid customers: tenants are the 'core business' of housing associations. A classified majority must approve the retrofit plans. The wishes, options and level of involvement and satisfaction of tenants must be taken into account in the process. Involving them properly in all phases of the retrofit process was also an important goal when setting up and developing programmatic partnerships. International scientific research that focuses on the involvement of tenants regarding energy retrofit decisions is scarce. The few international sources available, argue that to facilitate the retrofit process, there is a need for systematic involvement of tenants each phase of the process [33–35]. This research shows that the question how this involvement best could be arranged, differs per project . No project is the same and a variety of methods is possible with various tasks and responsibilities for the partners. The overall picture is that the far-reaching procedures and measures taken by housing associations, and certainly also taken by their construction partners, are to the full satisfaction of the majority of tenants. The way in which they are involved in the phases of the retrofit process is rated highly. Again, a conclusion that corresponds with results of other Dutch research projects [29–32].

Engaging in partnerships, places new demands on the organisation and the strategic planning and programming of both housing associations and retrofit partners . It takes time and effort to realize and maintain these changes. This process of change obviously starts before agreements are signed and continues during the partnership period. Working within a partnership is a long term process and under the motto "learning by doing", the process of change continues. This has, obviously, consequences for the way in which retrofit contractors are selected and the requirements that are imposed on them. Compared with a traditional tender process a different selection process to choose partners is set up. Besides 'hard' criteria (e.g., technical knowledge, experience and costs), more focus is put on 'softer' criteria (e.g., reliability, flexibility, communication skills, willingness to share knowledge and business culture).

The partnerships have changed the balances and relationships between the housing associations and retrofit contractors. Not only regarding the way practical cooperation is organised, but also with respect to the division of tasks, responsibilities, knowledge sharing and pro-activeness. To prepare and implement energy retrofit and maintenance projects, new forms of consultation have been created. Both at the strategic and at the implementation level. In addition, housing associations made other facilitating adjustments, such as adjustments in the area of asset management and prioritization of complexes, data management, budgeting, coordination with maintenance processes, internal coordination, etc. The traditional tasks and roles of the partners are shifting. Within the partnerships housing associations concentrate more on their core tasks. They trust the knowledge and skills of the market partners and focus lies on the end results. Demands on knowledge and skill level of employees, planning and programming methods and tools are reshaped. Internationally acquired empirical knowledge, in which these developments can be embedded, is scarce. A connection can possibly be found with a research project analysing the programmatic approach of Dutch infrastructure policies. The results show that advantages of such approach strongly depend on the

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way in which program management is structured [36]. The key elements of a program during its life-cycle (from initiative up to closure) must be identified and managed accordingly. This places essential demands on both program and project organization not only regarding the working environment (e.g., collaboration, awareness and commitment), but also regarding the management procedure and the monitoring of progress and measuring of the results. A program management team, that prioritizes what needs to be coordinated on program level and what can be done at project level, is pivotal. The roles and responsibilities of the team members should clearly be defined to ensure that the program can rely on the various underlying teams. Creating learning structures to promote an integral way of working, knowledge sharing, thinking and commitment to the program goals on all levels, is imperative. These demands on program and organizational design bear strong similarities with the way housing associations organize their partnership with retrofit contractors. Insights that can be used as clear points of reference to fine-tune their own program management structure.

The research shows that current strategic partnerships are firmly based on process and organizational innovations. Individual behavioural attitudes such as trust, openness, transparency, the willingness to share and learn from each other, are decisive to make the partnerships successful .Behavioural changes cannot be introduced overnight. It is the result of a continuing, and not always smoothly running, process. As one interviewee pointed out: *"For this type of collaboration, the organizations of all partners need cultural and behavioural changes. That is also a matter of patience and continuing to work actively on it." and: "We have become much more aware of each other's interests and how they can be dealt with. Not an easy process, but essential to make the partnership successful"*.

For every case studied, all interviewees point out that despite the progress and the results achieved, it remains essential to work actively on 'the maintenance' of the partnership.

6. Conclusions

The overall national goal in the Netherlands is to realise a CO_2 neutral housing stock by 2050. Given the size and characteristics of their assets, Dutch housing associations have been assigned an important role in reaching this goal. To realise this target more and more housing associations bundle retrofit projects in multi-year programs and enter into strategic partnerships with contractors. These partnerships turn out to be successful. They improve and streamline the retrofit process and accelerate the energy saving and sustainability performance of the social housing stock. The retrofit approach takes place step by step, mainly using products and techniques that have already proven their usefulness in practice. In addition, innovative, bio based and circular techniques and processes are increasingly being applied. The findings of this research show that faster lead times and higher renovation rates are realised. In addition, the satisfaction of tenants with the retrofit process and end result is high. In most cases cost savings are limited to savings on transaction cost at the side of housing associations.

The new approach leads to smooth and continuous maintenance and retrofit flows with small and close-knit partner teams. New balances and relationships arise between the partners regarding tasks and responsibilities, knowledge sharing and pro-activeness. Housing associations maintain control of the process, focus on the end result and rely on the knowledge and skills of their partners. Within the partnerships, maintenance and retrofit programs, budgets and planning schedules are increasingly being interrelated and aligned. Having the same 'mind-set' and the will to achieve the same goal together are important conditions for success. Also needed is broad intern support for strategic partnering within the organization of all partners. Trust between the strategic partners is one of the key factors for a successful partnership. Important hindering factors are time to realize the necessary culture and organizational changes on both the supply and demand side. It is a matter of patience and continuing to work actively on these principles within the partnerships.

This research project has a practical approach, is fully focused on the Dutch situation and on a specific topic: the content and results of partnerships between housing associations and retrofit partners preparing and implementing retrofit programs. In this sense, the research report offers Dutch housing associations and their retrofit partners numerous ideas, tools and learning lessons. for

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the implementation of successful partnerships. The insights could also be used to better tailor government policies to the practical needs of housing associations and their partners. Nonetheless the research project also contributes to the scientific body of knowledge regarding programmatic partnering between public clients with market partners. Focusing on tackling the task of making the housing stock more sustainable. This research adds to existing knowledge about goals, structure, results and benefits of working in programmatic partnerships. In addition attention is paid to the customers of the partnerships: in this case tenants. How can they be involved in the process so that the benefits also reach them? The organizational structure of the partnerships also provides valuable insights. This mainly concerns the way in which collaboration between partners in teams can be structured and which conditions should be leading. Of course, the subject continues to raise questions. More research is needed to further develop knowledge about the organisation of effectiveness program based approaches and strategic partnering.

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