

Energy efficiency in housing management – conclusions from an international study

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Abstract

Energy efficiency has gained a lot of prominence in recent debates on urban sustainability and housing policy due to its potential consequences for climate change. At the local, national and also international level, there are numerous initiatives to promote energy savings and the use of renewable energy to reduce the environmental burden. There is a lot of literature on energy saving and other forms of energy efficiency in housing. However, how to bring this forward in the management of individual housing organisations is not often internationally explored. An international research project has been carried out to find the answers on management questions of housing organisations regarding energy efficiency. Eleven countries have been included in this study: Germany, the United Kingdom (more specifically: England), France, Sweden, Denmark, the Netherlands, Switzerland, Slovenia, the Czech Republic, Austria and Canada. The state of the art of energy efficiency in the housing management of non-profit housing organisations and the embedding of energy efficiency to improve the quality and performance of housing in management practices have been investigated, with a focus on how policy ambitions about energy efficiency are brought forward in investment decisions at the estate level. This paper presents the conclusions of the research.



Introduction

Energy efficiency has gained a lot of prominence in recent debates on urban sustainability and housing policy due to its potential consequences for climate change. There are numerous local, national and also international initiatives to promote energy savings and the use of renewable energy to reduce the environmental burden. The residential built environment is a significant factor in the use of fossil energy sources and, therefore, has a substantial potential in the reduction of this energy use. Because of this, it is not surprising that there is a lot of literature on energy saving and other forms of energy efficiency in housing. However, how to bring this forward in the management of individual housing organisations is seldom internationally explored, although there are strong indications that implementation and management are equally important, if not more important than the technique that it requires. An international research project has been carried out to find the answers on management questions of housing organisations regarding energy efficiency. Eleven countries have been included in this study: Germany, the United Kingdom (more specifically: England), France, Sweden, Denmark, the Netherlands, Switzerland, Austria, Slovenia, the Czech Republic and Canada. The state of the art of energy efficiency in the housing management of non-profit housing organisations and the embedding of energy efficiency to improve the quality and performance of housing in management practices have been investigated, with a focus on how policy ambitions about energy efficiency are brought forward in investment decisions at the estate level. This paper presents the conclusions of the research, in which we will address the main research questions:

- What are the energy efficiency policies of social housing organisations?
- In which way are these policies implemented in the housing management of these organisations?
- Which are the main stimuli and impediments for this implementation?

In this paper we deal with these questions by cross-national comparisons and, based on this comparison, analyses of the possibilities and impossibilities of executing energy efficiency policies. These comparisons and analyses are presented around three themes: the national context, the actual implementation of energy efficiency in housing management, and the stimuli and barriers for this implementation. The following section deals with the national and to a minor extent also local contexts. The stage of policy development and policy implementation at the national and the local level will be addressed, as well as the autonomy and the financial possibilities for non-profit landlords to develop and to follow own portfolio and asset management policies. The third section concentrates on the actual implementation of energy efficiency policies by non-profit landlords. Central issues in this section are the policy ambitions that these landlords upon themselves, the embedding of energy efficiency policies in investment decisions and management practices to carry out a range of measures and/or packages to improve the energy efficiency performance of the existing stock. The fourth section deals with the stimuli and impediments for non-profit landlords to carry out energy efficiency policies. The main findings concerning these stimuli and barriers are compared with those mentioned in existing literature. The section also addresses the extent to which the stimuli and barriers are similar across the countries studied. Finally, the fifth section will go into prospects for the near future and policy recommendations.

National context

It is complicated to compare the national contexts, if only because some countries are highly dependent on non-renewable energy sources from other countries (e.g. Switzerland), while other countries have their own energy sources. The ambitions differ too, possibly influenced by these national contexts. The CO₂ reduction goals for 2020 for example differ from the EU standard of 20% reduction in 2020 compared to the national situation in 1990 to a reduction of 40% in Germany and Sweden for the same period. The ambitions regarding renewable energy use differ from a level below

the European standard (14 % in 2020 in the Netherlands for example) to more than double (50% in 2020 by Sweden and Switzerland for example). There are several ambitious goals set in the diverse countries. Denmark want to become totally independent from fossil fuels in 2050, the UK strives for a reduction of the CO₂-emissions with 80% in 2050, some local authorities in Switzerland have embraced the ambition of a standard use of 2000 W per person in 2050 and France wants to have renovated 800,000 dwellings to a consumption level lower than 150 kWh/m²/year in 2020.

All countries have national programmes regarding energy. More and more programmes are focussed on the existing building stock, like the Green Investment Programme in Slovenia for owners of residential buildings, the More with Less programme in the Netherlands for existing buildings in general, the low carbon transition plan of the UK (including the Warm Homes and Greener Homes programme) and the CO₂ building regulation programme of Germany. In some countries the task of reducing the energy performance of houses is combined with other goals, for example in Sweden, where 'greening the people's homes' is combined with creating new markets and jobs. The tax reduction policy regarding the improvement of the existing housing stock in Sweden is also developed to fight black work. In Canada energy efficient retrofitting in social housing is combined with green jobs creation.

Almost all country descriptions mention the combination of national, regional and municipality activities. The Swiss cantons, German federal states, Slovenian regions and Canadian provinces do all have their own policy. In France and Denmark the local governments play an important role. There are also various regional and local subsidies funded by the national government. In Canada there is a Green Municipal Fund. In Austria there are regional refurbishment subsidies out of a federal budget. In several countries government subsidies are limited due to the economic crisis. However, there are still many subsidies available. In the Netherlands for example, where budget savings have top priority and the topic of energy efficiency much less, there is still subsidy available to create an energy reduction of 20 to 30% in 28,000 homes and to write tailor-made energy saving advices for 55,000 homes. In the Czech Republic there are state subsidies for renewable sources, mainly solar power and the passive house standard is supported. In England there are carbon budgets and in Canada loans, subsidies and performance contracts. In Denmark the government cooperates with energy companies, which invest in the subsidies. Quite often energy related subsidies are combined with general retrofitting subsidies. In the Czech Republic for example a combination of several energy efficient measures in apartment building and family houses leads to a bonus on a state subsidy. In Germany dwellings are categorized based on their energy consumption. Changing dwellings into energy efficient houses leads to bonuses. Switzerland has financial incentives for research and development and for information projects. France has white certifications for landlords and Canada a green mortgage project. In several countries financial incentives for pilot projects are available, like the pilots of a passive house standard in refurbishment projects in Austria.

Almost all countries influence the energy improvement of the existing housing stock by indirect regulation. In Switzerland, France and the Netherlands for example tenant protection legislation is modified to encourage energy efficient renovation. The owner of dwelling can recoup costs for investments in energy efficient measures via rent increases.

In many countries existing regulation have been tightened recently. The latest change of the German building law for example included a tightening on energy performance regulation of 30%. Also the obligation to use renewable sources has been included in the German law. There is also an obligation in Germany of an independent control system of energy performance certificates. In France the general building law has been severely tightened after a big multi party debate (*Grenelle de l'Environnement*). Austria has integrated ambitious energy performance goals in laws for new and existing building. Slovenia has new laws too and in Denmark the energy requirements have been tightened, also for minor renovations and replacements. In England the Warm House & Energy Conservation Act was implemented in 2004.

Tax incentives are mentioned by several countries. In Switzerland for example tax on CO₂ emission forms the financial basis for the Building Programme (one third must be invested in this Programme). France has property tax rebates for social housing companies and in the Netherlands the tax on work has been reduced for energy efficient retrofitting. In Germany, France, the Czech Republic and the Netherlands low interest loans are available to finance thermal renovation.

To conclude this array of government incentives, two initiatives can be mentioned because of their affordability and effectiveness. In Slovenia fragmented ownership and lack of financial sources were serious obstacles to implement an energy efficiency policy. In France a multi-party debate (*Grenelle de l'Environnement*) resulted in several laws and had a strong impact on the property and construction industry. In both cases, the strong point is in the mobilisation of stakeholders, whether or not in the form of public-private partnerships.

Implementation of energy efficiency in housing management

Housing management, as interpreted in this paper, refers to the activities that housing organisations undertake to adapt themselves, their services and in particular their housing stock to changing societal demands. It is clear that in all of the countries included in this study, increasing the energy efficiency of the housing stock is recognized as an important societal challenge. In general, social housing providers are seen as key-organisations in meeting this challenge. Nevertheless, there are clear differences in the level of attention within social housing sector policies. In this section, we will summarize the findings of our study of:

- the ambitions of social and public landlords concerning the energy efficiency of their housing stock,
- the way in which energy efficiency is incorporated in their asset management, and
- the nature of the activities undertaken by social landlords to improve the energy efficiency of their housing stock.

We will conclude this section with some reflections on the opportunities to further stimulate social landlords to increase the energy efficiency of their stock.

Ambitions

Although increasing the energy efficiency of the housing stock seems to be a prominent issue within national policies as well as many social landlords in all of the countries studied in this book, the actual application within the housing management of social landlords shows a very diverse picture of practice between countries and also between social landlords within each of the countries. This has to do with the variety of institutional, social and economic contexts in which the social landlords operate as well as with differences between organisational cultures of social housing providers.

In some countries, ambitions to increase the energy efficiency of the housing stock already seem to have become a key ambition among social landlords. For example, in Switzerland, many non-profit housing providers have an objective to improve other sustainability areas, which is often explicitly described in the statutes of cooperatives or in laws, ordinances and regulations pertaining to construction and renovation of public buildings. Consequently, many leading and innovative examples of the application of energy saving technologies and management strategies are found in the non-profit housing sector. In fact, they can be considered an innovative force in this area compared to housing built by institutional investors such as banks and insurance companies. Also in Sweden, recent studies show that energy efficiency in different ways is today cost-efficiently integrated in housing management, and on a large scale, among public housing and among private housing owners (SABO, 2009). In the case of England, the attention for energy efficiency among social landlords has been stimulated among others by the introduction of the Decent Homes Standard, and a survey among 18 social landlords showed that ahead of the Decent Homes Standard being produced, all of those

interviewed already had energy strategies in place. Furthermore, despite the relatively modest standards specified under the Decent Homes Thermal Comfort criterion, all organisations were striving to improve the energy performance of their stock as much as possible given practical and budget limitations and where a home did fail the standard, the vast majority of organisations were doing work well in excess of the minimum required to pass. In Austria, energy efficiency has been stated to have a high significance in everyday practice. Housing maintenance by social landlords is better funded than all other sectors of the Austrian housing stock. Neither the private rental nor the owner-occupied sector has similar financial and legal tools to enforce energy efficiency measures. Additionally, the non-profit housing sector has a specific relation to the regional governments as their ultimate controlling authority and because of their dependency on housing subsidies, which are strong incentives to implement housing policy goals quite immediately. Furthermore, Austria has a relatively long tradition in developing energy efficient housing.

Social landlords in other countries seem to be in relative 'transitional phase' and are in the middle of adopting ambitions for increasing the energy efficiency of their housing stock. In the Netherlands, the interest among housing associations in the first years of the century to invest in energy reduction was limited because of low demand from residents and expected high costs of energy saving measures. Since fairly recently, many housing associations are now willing to invest in energy efficient measures in their housing stock, among others due to attention in national and sector housing policies and the introduction of the energy label. Also in France, social landlords have adopted energy efficiency of the housing stock fairly recently. This has been partly related to the fact that the energy performance of the social housing stock is much better than the rest of the French housing stock. But, since recently landlords have become progressively aware of global warming, increasing CO₂ emissions and high resource prices. Moreover, reducing energy consumption is one way to reduce the level of unpaid rent and to improve the value of the assets. Finally the government took several decisions to stimulate energy efficient investments and made the regulation more stringent to force building owners to integrate the energy issue in their financial models. For example the regulation asks any landlord to provide energy performance certificates to tenants looking for a dwelling. Thus they were forced to collect data about the energy consumption of their housing stock.

In a third group of countries, ambitions among social landlords seem to be relatively low. In the case of Slovenia, interest among the existing non-profit housing organisations for renovations and energy efficient refurbishment is low. The poor financial situation of social landlords, the inappropriate rent policy to stimulate energy efficient refurbishment, the absence of a well-defined housing strategy and relevant legislation, coupled with the lack of a clear commitment to energy efficient refurbishment result in the fact that energy efficient refurbishment only plays a minor role in management of the non-profit housing sector. In Denmark, although the need for comprehensive energy renovations in social housing is often emphasised, associations also have (access to) knowledge of available technologies to improve energy efficiency and register energy consumption patterns at estate level, renovation proposals are hard to implement because they can be and are vetoed by tenants, and projects typically have to document clear profitability or be financed by additional means to avoid this veto. Both tenants and housing professionals are reluctant to invest in energy-saving measures because they doubt the actual profitability of these energy investments. In Canada, notwithstanding the importance of investing in energy efficiency retrofits of existing social housing, particularly in the context of less funding for new construction, the policy intervention has been rather limited. This is especially due to the recent devolution and decentralization of responsibilities to lower levels of government coupled with curtailment of federal funding for social housing and a number of social housing providers view energy efficiency upgrades as costly and in some cases not feasible. In the Czech Republic, energy efficiency measures are closely linked to the refurbishment task of panel buildings, which hold the largest potential in energy savings by way of restorations, repairs and modernizations which are stimulated through targeted subsidies.

Energy efficiency in portfolio management

In relatively few countries, energy efficiency is a standard part of overall portfolio management policies. Furthermore, there are substantial differences between social landlords within countries as well. Studies in Germany demonstrate that energy efficiency modernisation is embedded in a general strategy on further developing residential areas and building stock. In doing so, the housing companies have to deal with different objectives. Even if they name obligatory contribution to municipal climate protection strategies as an incentive, the company's strategy has to comply with the development goals for their housing portfolio. On one hand, necessary investments in building stock are supposed to secure long-term return, and on the other hand, stabilise the vacancy situation. As a result, housing industry investments are always assessed in the light of possible market developments and whether or not tenants will be able to afford the rent in the long term. In Sweden the majority of the public housing companies have environmental policies and they work actively with energy efficiency and economic drivers and municipal objectives are said to be major motivations for energy savings. In France, when the government urged social housing organisation in 2002 to implement strategic asset management, environmental issues were not taken into account. French housing companies had just discovered the concept of sustainable building and their environmental policy was still in their infancy. Most of the investments aimed at improving energy efficiency and water savings were conducted in order to reduce service charges and maintenance costs paid by the tenants. In the field of waste management, air conditioning, energy and water consumption, housing companies followed the legislation enacted by French public authorities. The introduction of an energy performance certificate in 2007, however, forced landlords to gather data about the energy efficiency of their estates in order to inform their future tenants. This also allowed many of them to add some indicators such about energy efficiency in their strategic asset analyses and to carry out major renovations according to the energy consumptions of the dwellings. Also the cases of Vivare in the Netherlands and GESOBAU in Germany illustrate the way in which energy efficiency has recently become a part of strategic planning by some social landlords. Nevertheless, the evidence from our studies suggests that in many cases, energy efficiency is not a standard part of portfolio management yet.

Measures

When studying the case studies included in the various country analyses, the measures to improve energy efficiency of the housing stock can generally be classified as relatively straightforward. Energy savings are mainly obtained through measures such as building envelope insulation, heating and ventilation measures, and influencing behaviour of tenants. Some cases from Sweden show more ambitious improvements and indicate that energy efficient retrofitting projects are possible through commitment, and strong and clear leadership, financial support from external sources, a long-term perspective on investments and co-operation and support from the local authorities. Also in Austria low energy and even nearly zero energy standard is emerging even in rehabilitation, although the improvements can be substantial and therefore costly, especially in the old stock which lags behind not only in thermal standards, but also regarding accessibility for disabled, sound insulation and planning typology.

Stimuli and impediments

From the study several stimuli and impediments for the implementation of energy efficiency policies by non-profit landlords can be identified. We first present an overview (see Table 1) and then address the most important stimuli and impediments separately.

Table 1. Overview of stimuli and impediments per country

Country	Stimuli	Impediments	Related remarks
Sweden	combination of energy efficient actions with other standard raising (renovation) works; information campaigns; lower energy/water costs for the tenants; national technology purchase; investment in R&D and demonstration programmes	Little possibilities to pass on investment costs to tenants; uncertainty about (future) energy prices; short-term perspective in investment calculations reinforced by a new law on more commercial property management among 'non-profit' housing; owners of multi-residential buildings are not eligible for national grants for renovation; the unfortunate location and technical and socio-economic condition of many areas	Strong and clear leadership are more important than technology and knowledge diffusion
Denmark		Too much power to the tenants; split incentive	Measures to motivate tenants are necessary
Germany	National and local government policies: pressure with quality norms combined with financial support; Energy Performance Certificate as marketing instrument; combination with other (renovation) works; value increase and improvement of market position	Split incentive; the higher the all-over standard of a building, the less it is economical interesting to owners invest in energetic renewal; little pay back in terms of home value increase in areas of low demand; unmotivated tenants	Perpetuation of governmental incentives would help to foster energetic renewal
The Netherlands	Value increase and improvement of market position	Little possibilities to pass on investment costs to tenants; unmotivated tenants; investments do not combine well with planned preventive maintenance	Many technical possibilities, also in properties with monumental status and therefore protected façades
England	Integration of energy efficiency in general policies; government pressure via quality norms (e.g. Decent Homes Standard); fuel poverty eradication (i.e. identified social need)	Cost of measures to tenants; mixed tenure blocks causing conflicts; guidance for hard-to-treat properties (e.g. solid wall/off gas); planning requirements	Commitment of involved parties is important; landlords seen to exceed (basic) minimum standards when they provide benefit to tenants

Country	Stimuli	Impediments	Related remarks
France	Stringent regulation and subsidies; presence of leading parties	Low energy price (compared with other European countries); very high refurbishment costs; technical complexity of refurbishments (architectural constraints); market for energy performance guarantee is not developed yet; landlords with limited financial resources usually located in areas of low demand, where no pay back in terms of home value increase	Energy policy of social landlords is in most cases in its infancy; market value is uncertain
Switzerland	Strong intrinsic motivation in the sector		Attitude of individual landlords may be more important than political measures; motivation of tenants is also important
Austria	Strict supervision on the sector, abundant financing, good payback possibilities	Shrinking investment capacity, due to e.g. increasing building costs	
Czech Republic	State subsidy; combination with complete renovation; increasing energy prices	Stressful process for applying; need for agreement of all tenants; insufficient budget of housing cooperatives and municipalities; age structure of tenants	Generally higher awareness of inhabitants about energy efficiency; positive effects on social environment and diversity of tenants
Slovenia	Favourable loans for energy-efficient refurbishment	Split incentive; unforeseen behaviour of tenants and housing managers; intensive communication to get commitment	Collective action of individual tenants is crucial; governance rather than technique is the problem
Canada	National, provincial and local government policies	Limited funding grants, complex and stressful process for applying (drains management time), limited time-frame for completing work.	Positive effects on liveability and employment

Although increasing the energy efficiency of the housing stock seems to be a prominent issue within national policies as well as many social landlords in all of the countries studied in this book, the actual application within the housing management of social landlords shows a very diverse picture of practice between countries, but also between social landlords within countries. This has to do with the variety of institutional, social and economic contexts in which the social landlords operate as well as with differences between organisational cultures of social housing providers. Looking at the results

within this book it is hard to find extremely successful management strategies in a sense of practices that have led to comprehensive and feasible approaches towards increasing the energy efficiency of social landlords' portfolio's. Nevertheless, some success factors can be found, which, in combination with each other, may result in a wider application of energy efficiency policies within housing management of individual housing organisations and estates.

The study confirms the initial expectation that energy efficiency is not a taken-for-granted topic in the non-profit housing sector. Although energy efficiency is embedded in the portfolio policies of many German, Swiss and Austrian non-profit housing providers, strong internal and external incentives have been and are necessary to bring the subject forward. Two main stimuli can be mentioned.

The first stimulus, and a not surprising one, is the intrinsic motivation of parties in the sector. It was expected beforehand that efforts to improve the energy efficiency of the housing stock is regarded as a part of the non-profit character of the sector, and the study confirms this expectation. It must be stated, however, that attitudes towards the subject can vary considerably, not only within each of the national sectors as a whole, but also within each of the parties in the sector. The organisational culture within housing organisations seems to be a key-factor. For example, contributors from Switzerland suggested that the extent to which the providers of non-profit housing try to implement energy efficiency measures in their stocks seems to depend more on who the providers are and the visions and policies that guide their intentions than on energy improvement incentive programmes. Contributors from the Netherlands have stated that housing associations embrace energy efficiency from their role as social entrepreneurs. Similar indications can be found in other countries as well.

Second, the study indicates that some form of government support is necessary for the execution of energy efficiency measures by non-profit landlords. This may sound traditional in this period of economic crisis, budget savings and government retreat, but the study shows that in those countries where the non-profit housing sector is able to deliver successful energy efficiency projects, government support is crucial if not a *sine qua non*. The type of government support can range from hard instruments such as standards, directives and subsidies, but also softer instruments such as encouraging and facilitating partnerships. Subsidies are important, but there are also examples of other influential policy instruments, such as mandatory standards (e.g. passivhaus standards in Austria, energy certificates in France, the thermal comfort criterion in the Decent Homes Standard in England, and other, more general building prescriptions in several countries) and rent regulation with possibilities for cost recovery. Regarding the subsidies, a stable availability of these incentives is important, because this diminishes uncertainty in the market among the parties that are potentially eligible for these subsidies. Further, for instance in Austria and Sweden, we have found that government supervision has a strong influence on policy priorities of the non-profit housing providers in these countries.

Although the research primarily focuses on national policies, it also shows the importance of regional and local policy measures and instruments in promoting energy efficiency. The role of regional and local governments is especially important in countries with a federal administrative structure (Canada, Germany, Austria, Switzerland), but is also relevant in other countries in the research, for instance via municipal influence on the portfolio and asset management of landlords (e.g. Sweden) and via local energy initiatives (e.g. the Netherlands).

To conclude the list of stimuli, a third one could be the financial appreciation and long-term profitability of the housing stock, but, with the possible exception of Germany, these are (still?) a weak incentive for most of the landlords in the countries studied.

As for the impediments, the study confirms the split incentive problem that is mentioned frequently in literature. It also confirms other economic barriers to energy efficiency, such as uncertainty about future energy prices and the estimated payback time (which constitutes a financial risk), and access to capital. Several of the projects dealt with in the case studies could benefit from a range of external funding opportunities, which is not possible everywhere and thus limits the transferability of these projects to other cases. There is some pay back conceivable in the form of an increase of the property

value, but there is little evidence at this point. In addition, there are signs (at least in Germany and France) that value increase does not occur in areas of low demand.

The split incentive problem is aggravated because there are little possibilities for landlords to charge specific energy investments to the tenants. Obviously, landlords have investment budgets, but these cannot easily be increased for additional investments in the area of energy efficiency. In addition, if there are legal possibilities to increase the rent for energy efficiency purposes, these possibilities can find their limits in the willingness (and the power) of tenants to comply with the plans. This consent is decisive in Denmark, where tenant self-governance is very strong, but the case studies in for example Switzerland, the Netherlands and Sweden show that tenant agreement is also crucial in other countries and also that tenants' consent is mostly difficult to obtain. This has not only to do with the limited financial means of the tenants, but also with the uncertainty or even a mistrust regarding the calculated savings on the energy bill.

Another impediment is in the fact that policy intentions and investment measures have unforeseen side-effects, which partly dash the expected gains of the policy or measure involved. Several case studies show that implementation problems mentioned in literature (notably on planning, business administration and public administration) with respect to various policy areas also occur where the execution of energy efficiency policies is at stake. For example, the Slovenian case study point out that individual behaviour after the improvements can turn out to be countereffective. Communication with involved actors might help to cope with this phenomenon. The Dutch case of Vivare indicates that it is important to combine the energy improvement works with the right type of investment. Regarding the successful case studies in other countries, the study slightly suggests that a combination with renovation or refurbishment facilitates the execution of energy efficiency measures, especially when radical improvements are to be carried out. This also suggests that big energy performance measures must be embedded in more integral quality improvement schemes.

Prospects and recommendations

The comparative research profiles a diversity of practical policy measures supporting comprehensive energy retrofits in the social housing sector. The empirical research results point to two particular policy trends:

- a more supportive policy framework for energy efficient transformation of social housing yields better results, and
- non-profit housing providers due to their institutional culture, market share, commitment to sustainability and ability to innovate are in a better position to implement innovative strategies for energy efficiency retrofits in their portfolio compared to private sector landlords.

Furthermore, research highlights the increasing diversity in the investment and management strategies related to energy efficiency retrofits across countries and social housing organizations. The responses in practice are dependent on the nature and the role of the social housing sector and the economic, social, and political factors defining the institutional legacy of its operation.

The research draws on network theory and its application to comparative analysis of the operation of social housing actors. The emphasis is on mutually dependent actors —governments, social housing providers, resident associations, housing industry institutions— with none of them being dominant in the process of policy formulation and implementation (Kickert, Klijn and Koppenjan, 1997). The framework applied to this research views investment strategies of social housing providers as contextually dependent on the policy environment within which they operate. The policy environment is deconstructed through analysis of a range of policy instruments (regulatory, fiscal and financial) to determine the main factors affecting the types of retrofits implemented and investment priorities.

Further, the investment strategies are defined by the nature of social housing organisations operating between state, market and civil society. Research indicates that state-led housing organisations, such as municipal providers (Sweden, Canada, the Czech Republic) might be relatively easy to influence by governments to invest in the energy efficiency of their housing stock through bureaucratic mechanisms. Market-led, non-profit housing organisations (the Netherlands, Austria, Germany) are sensitive to the return on investment and could be reluctant to invest in the energy efficiency of their stock if it cannot be recovered by an increase of rental income. In addition to the position in the state-market-society triangle, other factors may influence the willingness and ability to invest in energy efficiency such as the size, knowledge and skills within the organisation, the available financial resources and the market position of its housing stock (Engelund and Wittchen, 2008).

The analytical model employed in the comparative research centres on the links between policy objectives, policy instruments—regulatory, fiscal and financial—and implementation choices by social housing providers. At the project level, case studies in the eleven countries feature results in the implementation of energy efficiency retrofits such as: quality, technical and financial aspects, technology (types of energy efficiency measures), financial risks and cost recovery (see Fuller, 2009; Mlecnik, Visscher and van Hal, 2010). Notwithstanding the results of government programmes targeting energy efficiency retrofits, particularly in countries with long-standing and strategic framework for policy action (Austria, Denmark, Sweden), the comparative research points out a few critical issues:

- projects are focused on a fairly narrow range of opportunities, defined by current technology and often fail to factor in behaviour changes,
- the real cost-reduction effectiveness of energy efficiency policies might be lower than their proponents claim due to difficulties in accurate monitoring of energy savings, and
- measures implemented are rarely part of strategic approaches to asset management of social housing, but present an opportunistic response to a variety of government programmes and policy measures.

A number of social housing providers view comprehensive energy efficiency upgrades as costly and in some cases not feasible (e.g. the Netherlands, Denmark, Canada, France). The difficulty to cover upfront costs for advanced technologies such as electric thermal storage, or the difficulty of implementing geothermal heating in existing social housing stock exemplify the challenges (e.g. Slovenia). Moreover, aspiring to achieve high energy efficient standards typically increases capital costs by at least 5-10%, making it even more difficult to recover costs through rents (e.g. the Netherlands, Denmark, Switzerland). In addition to grants, providers need to access new capital through loan underwriting, renegotiation of loan insurance or its replacement by another form of rated guarantee. This is a significant challenge for the small non-profit and co-op organizations (e.g. Canada). Other measures—organisational and fiscal—need to be implemented to generate a more robust response, remove barriers and target providers and projects most in need of financial help.

Better integration of energy efficiency in social housing management is needed in order to control / lower costs of energy efficiency retrofits in the social housing sector, particularly in the older estates where large-scale renovations and retrofits are needed (e.g. in the Czech Republic, Slovenia, France). Research consistently points out to the need of systematic support through well integrated regulatory, fiscal and financial measures to effectively and economically address the housing stock conditions and to improve quality standards. Some progress on the regulatory side has been achieved through changes in standards and building code requirements. Certification helps landlords and tenants become more aware of the impact of their building's energy performance on operating costs (see Austria, Denmark, Sweden). However, it is increasingly apparent that grants and long-term funding to defray the capital intensive nature of these improvements rather than a rating is what mobilizes social landlords towards achieving reductions in energy consumption of their stock. Enhancing the energy performance of a building is definitely welcomed by social landlords especially with availability of necessary funding.

Having a well-performing building will facilitate management and monitoring of the stock as well as enhance tenants' well-being. In the majority of cases, social landlords may not see, or realize, the benefits of making their housing stock energy efficient due to split incentives and lack of clear market signals (e.g. the Netherlands, England), or simply due to tenant opposition (e.g. Denmark, Switzerland). Direct incentives should be felt by social landlords in order for them to totally 'buy into' energy retrofits. Moreover, there is a need to facilitate monitoring of the energy performance of social housing units as well as a need to improve access to information for social landlords about available housing programs and community-based support for social tenants.

The research documents challenges in the implementation process as well as profiles innovative responses that tend to be efficient in economic and environmental terms. Different approaches have been used in the ten countries featured in this book to pilot test the mix of regulatory, fiscal and financial measures designed to promote energy efficiency implementation (Mlecnik, Visscher and Van Hal, 2010). Such policy reforms recognise the growing importance of energy efficiency retrofits in environmental terms, but also the economic and social benefits of green job creation, lower housing costs, improved housing quality, health and community wellbeing (Schüle, 2009). While the emphasis in this review is on the social housing sector, this first systematic comparative assessment has the potential to offer important insights into policy responses that might benefit the residential sector as a whole. As the number of successful projects grows, green and affordable housing could be seen as a proven, cost-effective approach to creating healthy, vibrant communities. These significant advances in implementation, due in large part to public and non-profit sector leadership, could signal an emerging transformation in housing and energy policy. Together, these trends signal an emerging transformation in affordable housing policy through national and regional commitment. The engagement of government agencies and social housing institutions is critical for the continued success in the implementation process.

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References

- Engelund Thomsen, K. and K.B. Wittchen (2008), *European national strategies to move towards very low energy buildings*, Hørsholm: Aalborg University, Danish Building Research Institute, <http://vbn.aau.dk/fbspretrieve/14019804/sbi-2008-07.pdf>.
- Fuller, M. (2009), *Enabling Investments in Energy Efficiency; a study of energy efficiency programs that reduce first-cost barriers in the residential sector*, Berkeley: University of California, California Institute for Energy and Environment / Burlington (Vermont, US): Vermont Energy Investment Corporation.
- Kickert, W.J.M., E.H. Klijn and J.F.M. Koppenjan (eds.) (1997), *Managing Complex Networks; Strategies for the Public Sector*, London: Sage Publications.
- Mlecnik, E., H. Visscher and A. van Hal (2010), Barriers and opportunities for labels for highly energy-efficient houses, *Energy Policy* **38** (8), 4592-4603.
- SABO (2009), *Hem för miljoner. Förutsättningar för upprustning av miljonprogrammet – rekordårens bostäder* [Housing for millions: prerequisites for renovation of housing], Stockholm: Sveriges Allmännyttiga Bostadsföretag [Swedish Association of Public Housing Companies].
- Schüle, R. et al. (2009), *Energy Efficiency Watch; Final Report on the Evaluation of National Energy Efficiency Action Plans*, Wuppertal/Berlin: Wuppertal Institute, Cologne/Berlin: Ecofys Germany, http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/Results/EEW_-_Final_Report_July_2009.pdf