



**LOW-CARBON
LARGE-SCALE
RENOVATIONS
OF HOUSING
STOCK**

**WHAT IT
TAKES TO
INTEREST
DUTCH
INVESTORS**

BY MARTIN VEJRAZKA

Master's Thesis for the Spatial Planning programme

Nijmegen School of Management

Radboud University

2018

TITLE PAGE

Author

Martin Vejrazka
vejrazkamartin@gmail.com
Master Spatial Planning
Planning, Land and Real Estate
Radboud University Nijmegen

Internship Supervision

TNO – Strategic Analysis & Policy
Expertise Group: Strategy and Policy

Barend van Engelenburg
Senior Researcher

Jeroen Brouwer
Project Manager & Research Scientist

Nienke Maas
Senior Advisor

Supervisor & First Reader

Keyang Li
Radboud University Nijmegen

Second Reader

Erwin van der Krabben
Radboud University; University of Ulster

Date and place

August 15th 2018
Nijmegen



Radboud Universiteit Nijmegen

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MOTIVATION & ACKNOWLEDGEMENT

Initially, I would like to use the given space to outline my thinking process, experiences and acknowledge the people who supported me along my journey from the very broad area of interest to this, rather focused research, endeavour.

I believe that cities, and even more the way in which the cities and their elements are managed, have an enormous impact on how humans behave and the amount of pollution they emit. Thus, I am convinced that the potential to reverse the climate change and to secure a sustainable future lies in the way we approach our cities.

Firstly, there was an idea to address the old and inefficient buildings through renewal and sustainability measures, though the idea was rather vague. Furthermore, the academic advisors of Radboud University helped me to focus my interest on internship opportunities. Thus, I managed to get an internship at one of the largest research organisations in the Netherlands – TNO.

Secondly, I became part of a ValueFit project within TNO that aimed at developing a validated business model for a value creation approach connected to deep retrofitting. So, it allowed me to follow my interest and I could learn a great deal about the barriers that hamper renovations, about energy efficiency measures and initiatives across Europe. Eventually, I could contribute to the project and I engaged in the preparation of the main deliverable. More importantly, the first three months allowed me to explore deep renovations and define my research aim. Subsequent three months ultimately shaped my research as I could exploit academic resources and contact experts through TNO network which eventually became even more exciting period.

Even though it took a part of my writing time, I also gained valuable skills through my second internship, working at Ernst and Young Innovation Hub. Engaging in the creation of new innovative projects across industries in a fast-paced working environment pushed my creativity and decision making a bit further. Thus, it definitely enriched my studies and helped to deliver this thesis.

Moreover, there are many people that deserve acknowledgement. As it was not easy with me, I firstly owe many thanks to my supervisor Keyang Li who provided me with a great deal of encouragement to carry on and many suggestions that stimulated my thinking process. Further, I would like to thank whole Strategy and Policy team at TNO, especially Nienke Maas that allowed me to join TNO but also to Barend van Engelenburg and Jeroen Brouwer for their support, mentoring and countless inspirational conversations.

Last but not least, I must appreciate the support of my family and my girlfriend who cheered me up and pushed me to complete my writing. In summary, those two internships, all the experiences along the journey; support from my mentors, colleagues, friends and family shaped the course of my master's studies and led me to finalise this thesis.

STRUCTURED ABSTRACT

Purpose: The intention of this thesis is to shed a new light on deep renovations of Dutch housing stock. The study looks at the view of one of the largest investor group – Dutch pension funds – on the investments in deep renovations. The ultimate aim is to explore the conditions that would enable pension funds to invest in this field.

Design/methodology/approach: The foundation of the research design is built on the model of the new practice creation. As the thesis look at conditions enabling the change in the practice of investors, so the first part of exploration is focused on pension funds and the pressures that influence them. Secondly, the legislation affecting the energy efficiency of housing and the state of housing stock itself is explored. Both of those initial parts are based on secondary research of academic and grey literature. However, the third part explores the factors enabling the change though researching the annual reports of the 10 largest pension funds and interviewing experts. Through the snowball sampling method, nine experts were chosen and eventually interviewed. The individual interviews were based on findings from reviews of literature and annual reports, and were conducted in a semi-structured manner. Eventually, the findings stem from a thematic analysis of the interview transcripts.

Findings: The research design enabled to identify several conditions under which Dutch pension fund investors would change their practice and invest in deep renovations of Dutch housing. There are conditions related to the investable size, the pension funds are able to invest only in larger projects so there is a need for bundling of individual renovations. Furthermore, investors need transparency and credibility from the parties performing the renovations, so they can calculate their risks and returns. The conditions related to monetary, legal and valuation mechanism were raised too.

Practical implications: The findings provide a brief overview of what behaviour can be expected from one of the largest investors, hence researches can explore the topic further, policymakers can modify regulation in order to support the involvement of pension fund while organisations along the deep renovation chain can learn about expectations of potential investors and incorporate it into their business planning.

Value: Even though the conditions do not represent an exhaustive list of conditions, the value of this study lies in the approached viewpoint and its originality, as it aims to bridge a gap in a knowledge of stakeholders in the deep renovation chain and prepares the foundation for further research.

KEYWORDS

Housing, Energy efficiency, Deep renovations, Pension fund investors, Non-financial factors

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LIST OF ABBREVIATIONS, FIGURES AND KEY TERMS

LIST OF ABBREVIATIONS

GHG – Greenhouse gas
nZEB – nearly Zero Energy Building
(S)RI – (Socially) responsible investing
E&S - Environmental & Social
ESG – Environmental, social and governance criteria
GDP – Gross Domestic Product
EPBD - Energy Performance of Buildings Directive
EU – European Union
EC – European Commission
PV – Photovoltaic

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KEY TERMS

As the terms *deep renovation* and *stakeholders* repeatedly mentioned in this study, it is worthwhile to explain them in the beginning.

Due to the EU promotion and pushing towards the nZEB (nearly zero-energy) building standard, the nZEB/low-carbon concept is dealt with. The low-carbon renovation is the key concept of this study and is used interchangeably (although there might be minor differences) with terms deep renovation, (deep) energy retrofit, energy-efficient renovations because they all represent a radical modification of a building into a highly energy efficient one. Generally, major renovations are done periodically due to the age of the building, the estimated cycle for those renovations is 30 to 50 years. In addition to the renewal of façade, windows and upgrade of mechanical equipment, deep renovation focuses more of energy efficiency equipment and structures concerning the upgrade of space and water heating, energy regulation systems, ventilation, lighting, PV panels, heat pumps etc.

Concerning the stakeholders in deep renovations, the chain incorporates variety of stakeholder including all governmental level; distributors and providers of energy; societal side including NGOs, think tanks etc.; construction and building industry incorporating builders, developers, architects, contractors; financiers and investors; property managers, residents and owners (Becqué et al., 2016). In case of this study, the attention is paid to the large organisations of the financial sector.

1. Introduction

The complex issue of addressing the global climatic changes and reducing greenhouse gas (GHG) emissions is definitely one of the top issues we, as humanity, face in this century (United Nations, 2007). At the same time, one of the observable triggers is abundant and cheap energy that has enabled globalisation and has raised expectations for higher living standards across the world. In recent decades, there is a correlation between the year-to-year increase of 3% on global gross product and 2% rise in energy consumption in the world, hence the outcome is exploitation of massive amounts of fossil fuels as the primary source of energy supporting the global economy. Although there is a radical year-to-year growth of 30% or more in generating green - solar, geothermal, water or wind – energy, it will take a number of years to equals fossil fuels with the green sources of energy. It is estimated and outlooks show that the demand for energy will not decline but rather other otherwise, though the same applies to the fossil fuels (Incropera, 2015).

Moreover, the urbanised environment globally use roughly three-quarters of primary energy and emit between 50 and 60 per cent of the world's total GHG (UN Habitat, 2015). The buildings themselves emit around 18.5% GHG (IPCC, 2014). The similar findings are also revealed by Building Performance Institute Europe which points out the energy use in the European buildings (residential as well as tertiary) which is roughly 40% of the primary energy use and it is leading a significant amount of GHG emission. (Economidou et. al., 2011).

Daly (1996) claim that the outdated approach of pushing for the constant growth in all spheres, especially the economical one, should be replaced by future-looking development so the quality replacing the quantity. In a similar vein, it could be also understood as the sustainable development, the sort of development that focuses on quality of live, efficient resource utilisation, environmental protection and preservation. Rotmans (2006) claims that the evolution to the sustainable future is incompatible with the outdated because this approach brings a high level of uncertainty and complexity, although this evolution and speeding it up can be influenced by a number of diverse types of steering and guiding measures. In addition to these authors, Giddens (2011) recognised the opportunity for addressing the climate change through behavioural systems but at the same time the author sees the biggest issue in shifting individual and organisational cultural norms. In effect, mitigation measures demand lifestyle and behaviour-related changes but people are not willing to embrace any measures.

Furthermore, Roaf, Crichton, & Nicol (2009) pointed out that the climate change should be affected through spatial planning and the construction design to reduce its negative impacts. Similarly, the built environment (new as well as standing buildings) is perceived as a part of economy offering a large potential for improvement in terms of efficiency and GHG emission reduction (Wilkinson et. al., 2007). However, it is important to bear in mind the fact the there is no guideline for retrofitting, it is the very complex environment with inherent cultural and technical structures to deal with (WBCSD, 2010).

In summary, the climate change is of the most pronounced issues in the world and this thesis does not even try to find a solution to such a complex issue, even though the climate change

remains the behind-the-scenes driver of this thesis. So, the endeavour that this thesis represents is to bring its piece of the puzzle through addressing the built environment as the large energy consumer and GHG emission producer. The contribution and the way to achieve it is further specified below.

1.1. Context

Since the buildings consume quite a significant portion of energy in Europe (Economidou et al., 2011), the EU suggests multiple ways to strive for better sustainability due to its considerably high sustainability consciousness; one of the pathways for enhancement within the union is energy efficiency. The Sustainable European Cities suggests that the consequences, as well as causes of climatic changes, should be tackled particularly in cities (EU, 2007). Exactly for such reasons were set up initiatives with commitment transform Europe into an efficient low carbon economy, pledging to cut GHG emissions by at least 20% by 2020 in comparison with the 1990 levels (Wilkinson et al., 2007). Additionally, if we look at energy efficiency in the built environment, we must realise the composition of the built environment where residential buildings form three-fourths of the building stock and 80% out of these buildings were built more than quarter of century ago (Economidou et al., 2011).

Moreover, the strategy for an improvement of national energy efficiency in a building stock should prioritise renovations of standing buildings (Wilkinson et al., 2007), hence the European Commission (2010) set a goal focusing only on the new buildings that all of them must be built in the nearly zero energy standard by 2020. Although this step is vital, in itself, it will not have an impact on the efficiency of building stock in general because there are 1% (or even less) of new buildings built every year (Thomsen & van der Flier, 2002). However, the same authors also pointed out that there is increasing attention for reusing and improving existing housing stock. Extensive renovation of the existing building stock offers the largest potential of savings, at the same time affecting the new buildings is equally important because the new built will shape the emissions for upcoming decades (Robert & Kummert, 2012). In addition, Van Hal & Femenias (2009) alerted that we can miss the opportunity for renovating the largest segment of Dutch housing the major renovation usually comes in 30 to 40 year. Furthermore, the current pace of renovations is not much higher than the pace of new builds, as it was identified by the project ZEBRA2020. The rate of major renovations in 17 European countries was between a number slightly above zero and considerably below 2.5% (Toleikyte et al., 2016). Such pace of renovations means that even countries with the highest pace of renovations would take up to 50 years to renovate whole stock, and even more in other countries.

In addition to the above goals and targets, the EU's Research and Innovation funding programmes have also been paying attention to that issues through these programmes, such as Horizon2020, EP7 etc., and its thematic calls for proposal and eventual funding of projects (European Commission, 2015a). Despite the proved impact of renovations on efficiency (Pollitt & Shaorshadze, 2011; Kiss, 2014; Taranu & Verbeeck, 2016); the presence of European, national and other programmes, the housing renovation rate remains fairly low across Europe. There are various barriers that hinder the uptake of energy efficiency measures and deep retrofitting of the housing.

Taking such issue from a broader perspective, Rittel & Webber (1973) defined a wicked problem as an issue where an array of stakeholders is incorporated and any endeavour talking the issue is not complete and perfect so it will somehow affect other parties. Thus, we can perceive the endeavour to make the European built environment more energy efficient as one of the wicked problems. Similarly, there are also many stakeholders — tenants, landlords, utility providers and distributors, financiers, and more — engage, though with their unique set of each with their own set of ambitions and goals. There is also the high complexity of the issue as the scale and size of properties vary so while one solution works well for one it does not for the other. Another aspect that must be considered is rapid changes which can be harmful like badly set policy but also beneficial like innovative commercial schemes that boost embracing the energy-efficient renovations that start to pop up (Incropera, 2015).

Since there is a need for larger the pace or change in terms of renovations and reduction of GHG emission, the academia sees the potential for faster improvement in large-scale societal structures that are created by the physical as well as behavioural aspects; these changes address neighbourhoods level and other levels focusing on segments of a city (Eames et. al., 2013). There is a need for technological, contractual and process innovations in order to access the untapped market, existing policies and industry initiatives does not prove their ability to stimulate the rate and depth of renovation to rise (De Groote, Lefever, & Reinaud, 2016).

For that reason, scholars, practitioners as well as the EC, through Horizon2020, strives to identify barriers that hamper the uptake of deep renovations in order to make easier to overcome them. Among the vast collection of barriers that these authors have recognised, their reports frequently distinguish a significant group of barriers which, in general, can be categorised to: Technical, Financial, Social, Intuitional & Administrative group of barriers (Pitt et al., 2009); (Economidou et al., 2011); (Karlsson et al., 2013); (Jones et. al., 2013); (Vandewiele, Larsen, & Cuyppers, 2015); (Toleikyte et al., 2016); (European Comission, 2016).

As it was pointed out, there are many studies focused on identification of barriers and drivers to the deep renovation, though for the exploration of the given context in Europe, this study is rather interested in the practice. Jain, Hoppe, & Bressers (2017) stated that one of the key actors in introducing, stimulating and spreading new sustainable approaches are governmental bodies. However, it would be nearly impossible for the governmental organisations to reach set goals without collaboration with the private sector (Schot & Geels, 2008). In addition to that Guez & Zaouati (2017) in their book raise a question: *“How can we finance energy-efficient residential renovation on a large scale – especially when occupants lack the resources to invest in onerous building work? How do we ensure that future energy savings cover the cost of investments made today?”* Conventional financial models do not have the tools to tackle these issues. According to Guez & Zaouati (2017), the important factor is a risk which can easily dissuade an actor from engagement but if spread across all stakeholder then it becomes bearable for an individual. Thus, the examples of engagement public, private or both sectors can be drawn upon the European countries that are highly committed to change the described situation in the way to support the set targets.

One of these examples can be found in the largest European economy: Germany. The government there has set the goal to increase the rate of energy efficient renovations from

1% to 2% (Wolff & Weber, 2017). Due to a governmental bank-led stimulation program that helps owners with energy efficiency upgrade through financial motivation, it has become one of the most distinct role models in terms of policy instruments. The financial support is provided as either grants or loans for complete renovations or to reach a particular energy performance label (IPEEC, 2017). So, Germans use rather a traditional way to finance energy efficiency using innovative contracting models with respect to energy savings. However, it has some disadvantages: higher transaction costs and uncertainties (Ziehm, 2016). Despite some negatives, the renovation programme has resulted in 240,000 energy efficient renovation of dwellings and building 116,000 new energy efficient dwellings in 2012. (KfW, 2013)

The government of the United Kingdom also finds the issue of inefficient buildings quite important, hence the government ran a pilot trial of the so-called Green Deal scheme in 2011. Green Deal encouraged homeowners to renovate their buildings by installing energy-saving improvements at no upfront cost, repayments would be made through energy savings. Authors note that 400 households were involved in the trial in London but only 126 had an energy audit and eventually, 60 signed up for the scheme, even if the subsidy represented 40%. In summary Mott MacDonald (2017 – Appendix I) raised several interesting points. Firstly, a property had to be assessed beforehand and people had to pay even if no measures were applied. Secondly, the interest on the Green Deal loans was rather high – 6 to 7% in comparison with 2 to 3% for Energiesprong. Thus, she concludes that regulations only can create the movement needed to overcome the market failure in British deep retrofit of the housing.

In Denmark, the switch to the low-carbon economy through renewable sources of energy and energy efficiency is one of the national priorities. An estimate shows that slightly over 600 million Danish crowns are needed to cover the energy efficiency target of EU 2020 objectives. Energy strategy builds mainly on law enforcement, informative and awareness associated instruments (Kiss, 2014). The same author also analysed Dansk Energi model and have identified that pension funds have been recognized as key actors in energy-efficiency transition. Thus, as an example of purely private initiative could be described as the initiative of PKA pension fund in collaboration with an energy efficiency company. The fund manager at one of the 'greenest' pension funds in Denmark (PKA, 2017 – Annex I) explained: "that an energy renovation company approached them with a plan to close the financial gap in energy renovations of companies and social housing. He says that the important factor for collaboration are data provided by the company so they can assess the investments. Thus, PKA representative pointed out that pension fund investors *"need experts to do the actual savings, to do the actual installation, to do the day-to-day work. That is why we created a fund, a normal fund which is just operated by this described company. I would say that 99,9% of investors are not interested in energy efficiency. Despite it fits their DNA and their investment mandates, it is too complicated, we have a lack of understanding, there is lack of products out there - lack of 'Sustain solutions' all around Europe"*. He explains PKA considerations on launching the fund *"we only took that conversation because it really fits our strategy to be seen a role model in Denmark when it comes to green investments so [energy efficient] fits very well into that"*. Some of the behavioural reasons were mentioned: *"what*

we also saw when we launched SustainSolution fund when we actually had a discussion with other pension funds and we were the only investor which were comfortable with making this type of investment. I think, the reason for it that we have an experience with the alternative type of investments, so it would be a much stronger set up when we had three pensions funds. We see the same pattern in the Netherlands as well, where pension funds expressed their uncertainty regarding the risk.”.

Pointing out to the direction of the Netherlands, Dutch has set a number of targets related to distinct parts of the economy including buildings for which strict reductions in terms of consumed energy and emitted pollutants have been set to reach until 2020. The Netherlands also declared to become carbon neutral by 2050 in the Energy Agenda. This long-term strategy, the Energy Agreement (Energieakkoord) providing targets and agreements for energy saving in many spheres in the Netherlands was signed by a number of Dutch public and private organisations (Ministry of Economy & Ministry of Interior, 2017). In line with that, the Netherlands has got involved in some of the EU's Horizon 2020 projects such as COHERENO, E2Rebuild, EPISCOPE, GarantEE and many more. However, the Netherlands also has its own national initiative. One of the internationally sound initiatives - Stroomversnelling – focuses on housing associations to renovate 111,000 homes to net zero energy. However, it is estimated that 750 zero-energy renovations were performed in the rented housing sector, of which 700 were launched by Stroomversnelling (Ministry of Economy & Ministry of Interior, 2017) which is considerably below the renovation target.

In summary, this gives us a broader overview of barriers to larger market uptake of housing renovations and a few sound examples of public and private initiatives with the aim to support residential energy efficiency. Since the deep renovations require high costs at the beginning and long period to return the money and profit. It also puts a significant pressure on the investment scheme as the invested money is not paid back quickly and may take longer to an investor to establish the self-sustaining scheme. The financial sustainability is a hot topic of deep renovations so there is an urge for the merging of various financial instruments because of the total cost of a deep renovation (Kiss, 2014). As we also learnt, the typical financial schemes are not adjusted to efficiently tackle the current market failure allowing the spread of risks amongst the stakeholders. However, the international practice allowing to learn from the engagement of stakeholders it does lead to an uptake as it was exemplified on public organisation engagement in German as well as the private one in Denmark, though the Netherlands is lagging behind. Even though a brief look at drivers and barriers was provided, there is a need for understanding what actually do drive the stakeholders and what factors having an influence on their decisions.

1.2. Problem definition

What have we so far learnt about the deep renovations' situation? There are targets set on the European level but, in addition to them, each member state has adjusted specifications over their own targets. Even though that targets have been set, the pace in which are the renovations performed are insufficient to fulfil the targets. Such a situation is caused by many factors which could be summarised into a Technical, Social, Intuitional & Administrative, and Financial group of barriers. Trillions of euros must be invested in energy efficiency in order to

succeed in reaching 2050 low carbon targets which mean to reduce buildings' carbon emission by roughly 90% in comparison with 1990 (Hudson, Schopp, & Neuhoff, 2013). Nevertheless, public and private-led initiatives throughout Europe aim to increase the pace and make the financing easier and accessible for the renovations.

In the study concerning large-scale retrofitting in the Netherlands, Veenstra et. al. (2017) see five conditions that building sector in the way to accelerate the renovation pace: *“a new legislation frame, start local energy plans, industrial technical innovation, chain collaboration in the sector and new financial arrangements”*. Furthermore, Filippidou, Nieboer, & Visscher (2017) identified that the deep renovations in the existing residential building in the Netherlands are carried out in a very low pace so the pace is too low to achieve Dutch efficiency goals. In addition to the current situation, the authors state that the circumstances for implementing energy efficient measures in social housing is difficult so the implementation in private or rental sector is even more complex. Authors particularly pointed out that issues and potentials at the same time lie in access to financing and other finance-related issues; implementation of the market measures; awareness of renovations and understanding the concepts of energy efficiency (Filippidou, Nieboer, & Visscher, 2017), although the renovations improving energy efficiency represent number of benefits for the European economy (Saheb et. al., 2015).

Some researchers have focused on investment in energy efficiency from an occupant-investor point of view, Pollitt & Shaorshadze (2011) pointed out that it presents a big hurdle due to the high investment in the beginning and small and slow payback as a result of energy cost saving. Despite that efficiency improvements could result in meaningful long-term energy and financial savings, the resistance prevails and energy efficiency gap continues. Taranu & Verbeeck (2016) focused on motivation, feelings and habit in order to explain what influence decisions of private owners in energy renovations. Although there are proven cost-efficient measures, these studies offer an evidence that the rational energy efficiency solutions are adopted inconsistently, rather rarely.

On the other hand, Brouwer et al. (2017) researched value creation in the renovation of housing stock in the Netherlands and concluded that there is an incompatibility between stakeholders that resulted in a market failure. They also pointed out that most of the actors and stakeholders in the deep renovation chain currently have their own values incompatible with others which contribute to the presence of the market failure. In their view, deep renovations require a more holistic and innovative approach embracing economical, technical, social and governmental elements. Such an approach would improve the connection of values and bring more suitable environment in overcoming the market failure. Authors also pointed out that developers and investors in the built environment should be included the whole process of co-creating the environment and mechanisms. Brouwer et al., (2017) claim that when we can convince investors (e.g. pension funds) that this new concept of deep renovations actually fits their needs more than the current practice, then, they assume, part of the market failure could be solved.

Nevertheless, the best economically efficient are those deep renovations which are applied on the larger geographical segment throughout the long period of time (Kiss, 2014). Since the

perspective of occupant and owner-investor is fairly explored while the institutional investors and pension funds have been recognized as key actors towards the transition of the low carbon economy, the shift of attention should be made. As Adair et. al. (2007) already focused on understanding the needs of investing institutions and to identify a model suitable for encouraging institutional investment in the UK. Also, we could see the example of the Danish institutional investor (pension fund) above allocating assets to energy efficiency. To our knowledge, there has been no research exploring institutional investors' perspective on deep renovation investment and particularly not in the Netherlands. Only, Brouwer et al. (2017) raised the question: *what do the investors want?*, seeing the potential answer as the part of the solution to the deep renovation market failure.

In addition to the investors perspective, McCarthy, Sorsa, & van der Zwan (2016) focused on investment preferences in pension funds and have identified much more research is needed in order to identify those preferences that are not made public and cause the ability of some actors to achieve their goals. They also see the space in research for the identification of other factors that shape investment preferences which require to research the circumstance under which the shift in approach and assets is made. Authors also mentioned that the financial crisis actually supported some of these shifts. One of these shifts can be represented by the push of government and businesses in the Netherlands that have requested pension funds to invest more in Dutch projects which in our view includes buildings and infrastructure. This can be also supported by Brouwer et al. (2017) who noted that despite the current situation of market failure, the Netherlands one of the most suitable countries for a market trial due to the fairly significant drive in large-scale renovations there than countries such as the United Kingdom or Sweden.

Therefore, we can conclude that there is a knowledge gap in understanding of the preferences or values of investors in the Netherlands, particularly unknown is the change of their preferences in relation to the deep renovation type of investment.

1.3. Research objective and its scope

Even though we are aware of the complexity, in terms of stakeholders and their interests, that is in our cities, we are still aiming for collaborative cities where stakeholder are connected and empower each other on their way to a joint goal rather than locking themselves in silos. (Elsinga et. al. 2016). So this study comes to the realisation that in addition to the main role of each sector e.g. construction industry: to build, the financial sector: to manage money; they are not solitary but rather part of the larger ecosystem which ultimately serves to the people. Thus, it is vital to find out values, preferences, hurdles as well as needs of those actors to the synergy resulting in the outcomes we desire.

Since the institutional investors are recognised as potentially importation actor in energy efficient renovations, there are two main reasons why pension funds have got the attention in relation to energy efficiency investments. Firstly, pension funds' horizons (i.e. focus on long-term revenue) and pay-back period requirements are longer than other capital providers such as banks, venture capital providers etc. Basically, long payback times match the strategy of pension funds as long as the return of investments is closely linked to the related risks.

Secondly, examples across the globe present that pension funds are inclined to list sustainable investments higher in their portfolio (Kiss, 2014). The Dutch households have a very high share of savings in comparison with the rest of the world. However, these savings are not accessible to bank mortgages, there are kept by pension funds (Elsinga et al., 2016; McCarthy et al., 2016). Even though Dutch pension funds are urged to invest in the Netherlands and its economy, we cannot see a massive uptake in deep renovations invested by pension funds. Additionally, there is the potential fit with the pension fund strategy while a large volume of savings that could be used for the purpose of renovations.

The financial barrier to the energy-efficient renovations is pronounced in relation to many specifications including the access to funding. As opposed to the studies focusing on preferences and barriers from the builder, owner or policy perspective, this thesis aims to shed new light on the other side of the spectrum: institutional investors. **The thesis aims to find out values and preferences of pension funds. In particular, whether they have any motivation to invest in deep renovation and what are the obstacles they are facing.** Financial organisations, as well as the experts researching the same issue, might help us to specify what is necessary in order to unlock the potential.

Nevertheless, to address all institutions in the EU and experts is not feasible. It is imperative to set a clear boundary of the research in order to keep that within scope, especially in the researching of such a broad issue with implications in a myriad of industries. The scope of the thesis can be summarised and delineated in the following 5 points:

- Even with the EU making the boundaries for this study from the geographical perspective, the Netherlands is in the centre of attention. Only one country is covered in detail as each member state has its own specifications in terms of the building stock, national policy and the financial system.
- With regard to building stock, this study concerns only existing building as there is the most significant potential for improvement and reduction of GHG emissions, while the study deals with residential buildings as they cover a substantial part of the EU land.
- The thesis, in relation to the buildings, strives for the highest possible impact in terms of efficiency and reduction of the environmental footprint. Thus, large-scale deep (low-carbon) renovations currently appear to be the most efficient combination
- A large financial institution that is able to invest in big renovation projects with the long-term investment horizon; institutional investors, specifically, pension funds give the impression of being a suitable investor.
- Besides the rational evaluation of the financial aspect - return on investment in terms of financial gain must be positive - this study aims to explore a number of non-financial factors affecting investors decisions, preferences, values which could lead to different resource allocation, referring explicitly to non-financial factors linked to investors' strategies and duties that could lead to allocation of resources into projects addressing other values e.g. environmental and social.

The combination of all these points gives the paper a certain boundary which will be further justified depending on the further literature research captured in upcoming chapters.

1.4. Research question

There is a number of potential questions that arise with the definition of the aim of the thesis and the research scope. Yet, the most suitable question, to find out more about the pension funds preferences while having the intention of making the existing housing stock more sustainable, is:

- ▶ **What are the pension funds' conditions on investment in the large-scale deep renovations of housing stock?**

For the reason of reinforcing an answer to the main research question, there are more questions to ask. Hence, three sub-questions are established to gradually achieve the objectives and consequently answer the main question.

The first part of exploration is to learn more about the rationale behind pension funds: the way they behave as an organisation, internal and external motives for their strategies, decision-making and investments.

- ▶ **What is the rationale behind the pension fund field?**

Secondly, in order to explore the environment in which the pension fund investors are desired to invest in, it must deepen the knowledge in relation to the deep renovations in terms of the regulatory base and housing stock.

- ▶ **What is the state of the deep renovations of housing stock in the Netherlands and the legislation affecting deep renovations on both Dutch and the EU level?**

Lastly, as the means to support the answer to the main question, the practice of pension fund investments assessment needs to be explored. Since the returnability of investment is taken as a must, the light is shed on non-financial factors concerning institutional logics, practice, collective identity: organisational field.

- ▶ **What are the non-financial factors in the energy efficiency investment decision-making of pension funds?**

1.5. Societal and scientific relevance

As we are learning more about the large-scale type of investor, the people and organisations along the deep renovation chain can learn what such investors need in order to change itself in the way to allocate their resources into the renovations. Though, the impact of this thesis may be much broader than its narrow aim focusing on the factors in investments. Essentially, the reason for the deep/energy-efficient renovations is mainly paid less on energy bill which is connected to consuming less energy. Furthermore, as we learnt in the introduction, there is rising energy consumption predominantly in cities, hence it has an impact on growing GHG emissions which eventually influence the climate and generally the environment around us. Therefore, learning about investors might eventually enable to unlock capital for deep renovations which ultimately have an impact on occupants' comfort and significant reduction

of a utility bill. However, in the broader sense, a decrease in energy consumption would have an impact on GHG emission reduction.

Furthermore, researchers and experts focusing on the upscaling and uptake of deep renovations mainly aim for finding out more from the place of potential implementation (house owners and housing associations) and implementers (builders, engineering companies, utility companies etc). The contribution of the thesis lies in its complementary view of the research of the deep renovations that have not paid much attention to the financial sector. Thus, the thesis intends to fill the gap in understanding stakeholders in the deep renovation of housing stock.

1.6. Thesis structure

Since the first chapter provides insight into the subject of the research, here we provide an overview of the steps in the thesis and their connection within the paper. Thus, the below-displayed diagram shows the way that the study proceeds while it can be simultaneously used as a reading guide.

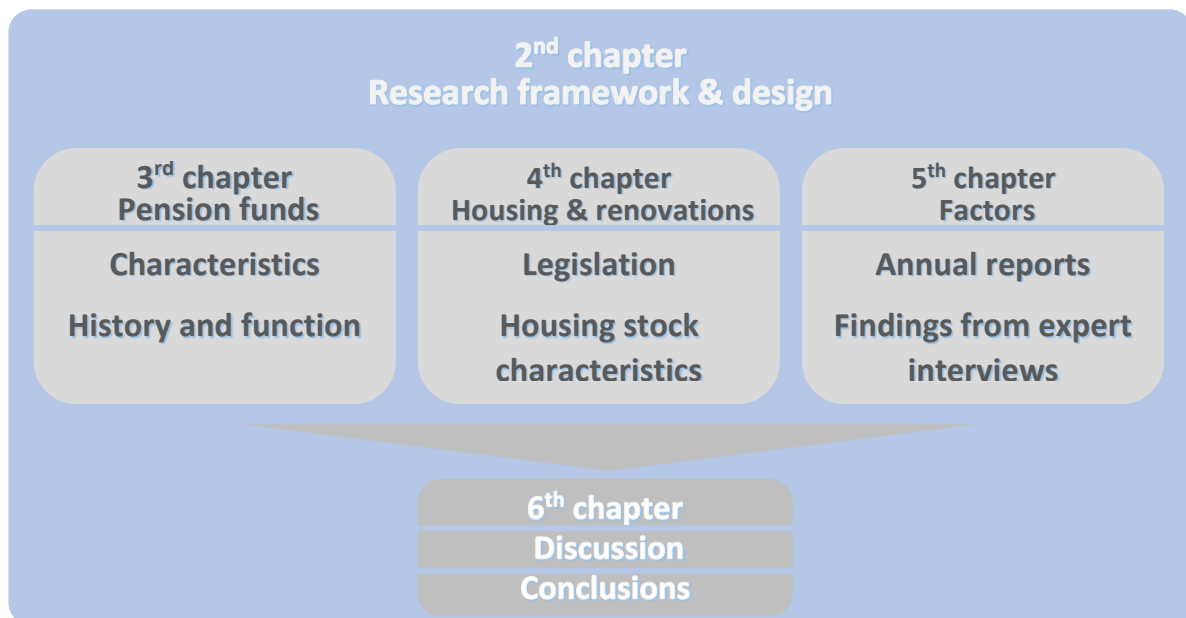


Figure 1:Thesis structure

In summary, the first chapter gives the study the aim, the second one provides us with the means – theories – and the structure of how the theories are employed. The third one briefly presents the function and historical development of pension funds and explores pressures that have an influence on pension fund investors. The fourth chapter concerns the state of deep renovation in the Netherlands by looking at the legislation affecting housing and its efficiency, and exploring the characteristics of Dutch housing. The fifth chapter examines the factors enabling the change of pension funds investing more closely through exploration of their attitude expressed in annual reports and subsequently interviewing experts. Finally, all parts are discussed, and conclusions are made in the last chapter.

2. Theoretical framework and Research design

2.1. Theoretical Framework

As this study ultimately intends to explore the factors that could initiate, and hold back, the change in the practice of pension funds (the shift of some investments towards the deep renovation of housing stock), it must be led by an overarching concept in order to delineate a way for achieving the set goal. Since the issue is rather complex, this study aims to find a guidance for navigation within the research problem in academic theory. The academic theory provides a vehicle steering the reasoning of a research and questions its arise along the way of grasping a particular subject (Torraco, 1997). Thus, this chapter concerns the components of such a concept - the theoretical framework.

The theoretical framework is more than a formal or substantive theory, it includes many specific formal and substantive theories that may share basic assumption and general concept in common. Our research framework incorporates the organisational and institutional theories as a means to look at the views, and practice of actors behind the potential remedy, to explore the factors in the large-scale renovations of housing stock. The chosen theories aim to explore what drives the pension fund investors, understand their practice and pressures that affect them (section 2.1.1). As we understand the subject (Dutch pension funds), we need to understand the object - Dutch housing stock and legislation shape it (section 2.1.2). The third part explores the factors that prevent or/and could cause a change of practice in relation to investing in the housing renovations (section 2.1.3). Eventually, the combination of all three parts creates the theoretical framework of this study the modified *Model of a new practice creation* (section 2.1.4).

2.1.1. Pension funds' field

As Brouwer et al. (2017) pointed out the stakeholders in the large-scale deep renovations (residents, investors, owners, contractors, suppliers...) have entirely different values and expectations, hence they also highlighted that a certain harmony on the values could be the key factor to tackle the market failure in the renovations. Porras (2016) see the market failure as a situation where being better off and selfishly focus on own individual interest produce consequences that are not efficient from the general societal point of view. Theory associates the failures with a number of factors having an influence on it such as the time factor that stakeholders' preferences could be the same but in a different point in time; then the awareness - stakeholders do not have the same information base; the markets of interest are not liquid and does not provide competitive prices and other influential factors. Further, Brouwer's report supports that the market failure in the large-scale deep renovation is associated with stakeholders (on demand as well as on supply side) focusing on their own interests and following the values that are not in line with each other's. Since pension funds have been acknowledged as significant players in pushing the change in the economy towards more GHG efficient practices (Kiss, 2014), we need to explore and understand their values in relation to the deep renovations. As long as pension funds' needs are understood, they could

specifically be a part of the solution to the deep renovation market failure as they can amass the side of demand (De Groote, Lefever, & Reinaud, 2016; Brouwer et al., 2017).

To outline the starting point, we review what is currently known to the study and what is aimed to find out. Currently, we cannot see pension funds investing in any deep renovations in the Netherlands. From the actual point of view, we do not know what drives pension funds to invest or not. So, the academic theory should provide the study with a theoretical framework to analyse current state and shifts in the investment structure of specialised business services which are, in our case, Dutch pension funds. Academia poses a number of ways we can approach theories, though the theories, we aim to employ, should allow us to look at the environment that shapes the arena in which pension funds operate and factors that would enable them to include deep renovations into their operational scope.

- **Values**

Initially, questions arose in relation to the theoretical perspective, specifically, how the term 'pension fund' and 'investor value'/'investor need' can be addressed from a theoretical viewpoint. A pension fund is an organisation that manages people's savings for their retirement so for that reason this group of organisations manage a huge amount of money that creates a large portion of global investments (Bikker, 2017). The investor values can be identified, in our view, as the way these organisations function, in their practice and strategies.

The pension funds as one group of organisations (that can eventually be engaged in the deep renovation chain) are incorporated into the public spheres through common standards, deals, agreements and authorities, which is also how Parsons (1956) highlighted the way the institutions function to integrate organisations with other organisation in society. In another words, institutions make standards and boundaries for business and stakeholders (Jackall, 1988) that makes a solid reason for learning from institutional theory. Furthermore, organisations and individuals are based on Friedland & Alford (1991) description are steered, structured and organised in space-time. Therefore, we can say that the institutional theory (institutionalism) focuses on the origin and spreading of organisational action. Thus, if we want to understand how the organisations such as pension funds take actions, we should incorporate institutional theories in the theoretical framework.

Taking look on the large-scale societal phenomena in institutional theory, Thornton, Ocasio, & Lounsbury (2012) revised Friedland & Alford (1991) institutional orders in the inter-institutional scheme and beside the "*key orders: the Capitalist market, bureaucratic state, democracy, nuclear family, Christianity*", they added community. In the perspective of this study, the institution forms such as family and religion are irrelevant and will be left aside, although the state, the market and the profession play an important role.

The development of institutional theory brought organisational theorists working within institutional theory to established a new sub-theory which described the contrasting practices and beliefs representation for the intuitions of contemporary cultures (Alford & Friedland, 1985). The institutional logic allows us to look closer at driving forces within

organisations as the logic offers a channel amongst large-scale institutional perspective and fundamental small-scale activities (Thornton & Ocasio, 2008). The behaviour of individuals and organisations engaged or incorporated in one abovementioned institutions is shaped by distinct institutional logic linked to the particular institution (Thornton et. al. 2012). With the purpose to understand any level of institutional logic, the knowledge of its composition is vital. Institutions comprising of legal, moral and behavioural components with associated actions and resources deliver the balance and meaning to social life (Scott, 2013). The variety of rather abstract but recognisably different institutions are ideal for researching relationship of diverse logics that may be conflicting, in harmony or create new combinations in different geographical or societal (Greenwood et. al., 2017). In addition to the research approach, grasping the history of the institutional environment, institutional characteristics, as well as the development of academic understanding, are the key steps in studying institutional logics (Friedland & Alford, 1991; Thornton & Ocasio, 2008).

Since there is a group of organisations – Dutch pension funds - that we aim to understand their values, the institutional logic seems to fit for this search for theoretical framing of the pension funds' values. Institutional logic enables more specific exploration of what the pension funds' needs are through describing their practices and belief characteristics. From the analytical perspective is fundamental to explore the history of pension funds and institutional influence on them in the Netherlands, as well as in general, in order to understand their current specificity.

One of the academic streams was presented by Meyer & Rowan (1977) who focused on the large-scale viewpoint, we can also talk about the new way of approaching institutional theory through three central concepts: institutional rules, legitimacy and similarity described as isomorphism. The institutional similarity was further restructured by DiMaggio & Powell (1983), who built on the concept from the societal level of the organisational field and distinguished different sources of isomorphism: coercive, normative and mimetic. Many scholars criticised the similarity (isomorphism) concept though it provided a good starting point for the development of institutional logic research (DiMaggio, 1997; Thornton, 2004). Thus, the DiMaggio & Powell's (1983) perception supported the incorporation of organisation and institutional theory into sociology which resulted in crossover institutional approach.

Moreover, the approaches to institutional logic theory vary based on their view on emergence, form and spread of stakeholders' actions as opposed to the concept of isomorphism (similarity) which appears to be insufficient to explain organisational structure and behaviour. In contrast, the structure and behaviour of organisations are studied through arrangements and circumstances shaping the institutional environment, that is the way the concept of institutional logic is approached. (Baer, 2012; Friedland & Alford, 1991). Thornton & Ocasio (2008) see the evolvement of the theory in the way of embracing the effects of distinct institutional logics on individuals and organizations. This is also the approach we adopt as the study look at the effects of multiple institutional logics on pension fund organisations.

Moreover, the phenomenon of multiple institutional logic in the organisation have already been described by a number of authors and it is present within organizations is common across a wide variety of fields including corporate and financial sectors (Sjöström & Welford, 2009), professional services (Smets, Morris, & Greenwood, 2012). Based on studies of Besharov & Smith (2014) and Sjöström & Welford (2009) we can point out that part of academia sees the relationships within multiple logics varying from coexistence to conflict. Some organisation are performing badly while some outperform the others or become more sustainable or innovative, it just depends on the composition and effect of multiple logics. However, the research has not yet proved what has an influence on paralysing or outperformance in terms of multiple logics (Besharov & Smith, 2014).

Despite the fact that the multiplicity of logics can result in diverse outcomes, means to differentiate among particular logics is needed. According to Thornton et al. (2012), Scott's conceptualisation of institutional pillars is useful for classification of institutional approaches, hence the integration of institutional pillars concept seems particularly useful for their differentiation. Scott (2013) exploited DiMaggio & Powell's (1983) theories and incorporated in his three institutional pillars (figure 2). Scott's regulative pillar, in our view, refers to supervision and legally binding features; monitoring connected with rules and sanctions in case of breaching the rules. According to Thornton, Ocasio, & Lounsbury (2012), the normative pillar refers to features of social life that are non-legally binding, these moral and evaluative perspective is provided by values and norms. Whereas, the cognitive pillar refers to a more nuanced perspective focused on reality, categories and frames allowing the interpretation of identity and meaning. Looking at figure 2, the indicators appear to be valuable for the purpose of this study as it may allow better characterisation logics and identification of drivers behind logics.

	Regulative	Normative	Cultural-Cognitive
Basis of compliance	Expedience	Social obligation	Taken-for-grantedness Shared understanding
Basics of order	Regulative rules	Binding expectations	Constructive schema
Mechanism	Coercive	Normative	Mimetic
Indicators	Rules Laws & Sanctions	Certifications Accreditations	Common believes Shared logic of action
Affect	Fear,Guilt/ Innocence	Shame/Honor	Certainty/Confusion
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensible Recognisable Culturally supported

Figure 2: Institutional pillars (Scott, 2013)

- **Field**

The main research question leads us to the potentially suitable condition for the change of pension fund organisations, though we must understand what actually shape the current organisations. Above, we introduced institutional influence that shape organisation and stem from institutional and organisational theory. Since we do not aim to focus on one particular organisation but rather on the group of organisations with a similar purpose and geographical location - Dutch pension funds.

In connection to the previous part, we must emphasise that institutional logic theory is applicable on the variety of levels, though for the purpose of the logic concept should be specified in order to address the scope of this study. Scholars have incorporated the institutional logic concept on all three distinct analytical levels micro (personal, household etc.), meso (community, organisation...) and macro (nation, society etc.)(Thornton & Ocasio, 2008). Since our study focuses on pension fund field which falls to the meso-level analysis, the field-level focus appears to be the most suitable. To support the argument for the field-level focus, there can be drawn some similarities to the study researching competing logics in the finance field, in particular, in a different mutual funds environments steered by opposing logics (Lounsbury, 2007).

In regard to the organisational similarities, institutional theory recognises a concept of how individuals and eventually organisation resemble each other. The concept of collective identity was introduced and explained by Melucci (1989) as a collaborative, shared delineation of collective actions taken by a number of individuals that agreed on the process of taking the particular action which is also based on relationships of groups and individuals. So, these resembling groups – organisations - are connected through shared moral and behavioural qualities (Thornton et al., 2012). Moreover, the collective identities are organised stakeholders who are deliberately formed around a shared purpose and desired result (Cornelissen, Haslam, & Balmer, 2007). Van Stekelenburg (2013) adds that collective identity is not a given feature but rather a practical product of a process. Thus, the collective identity concept can enable us to recognise the similarities in organisational groups that are a product of continual developments.

Nevertheless, the recognition and bundling of organisations based on their shared purpose and similarities have a fairly important value for this study. A concept that stem from the institutional and organisational theory seems to be suitable for focusing on the field-level and fundamental for bundling such organisations under one concept called Organisational field. The field itself was defined by Greenwood et. al. (2017) as environment generating more abstract societal as well as physical features and items. In relation to the organisational field, DiMaggio & Powell (1983) see such environment made up by the supply side, demand side which also incorporate key suppliers, resource and product consumers, competitors etc.; all these stakeholders shape and influence the organisational field. Thus, in the case of our study, we can call it pension funds' organisational field. Scott & Meyer (1994) supplemented DiMaggio & Powell's theory by considering organisational fields as joint groups of organisations that share the same

values and beliefs while they are addressed by the same regulatory environment. In summary, that is also the way we want to analyse this meso-level, Dutch pension funds, in this study in order to identify their values aka drivers.

To research the current way the pension fund organisations work and based on what values, we will shed light on the field. The field is a vital element of exploration within institutional theory defining groups of actors interacting with one another (Suddaby et. al. 2007). Based on the scholar’s (Lounsbury & Crumley, 2007; Thornton et al., 2012) conceptualisation in Figure 3, we can outline that organisational field comprises of the two abovementioned concepts: Institutional logics and collective identities & practices. Such organisational practice field eventually creates two types of outcomes: one which is very much typical for the organisations incorporated in the field while the anomalous is rather unusual. Anomalous actions can lead to a number of different scenarios while it could be a contributing factor in the change of the organisational field.

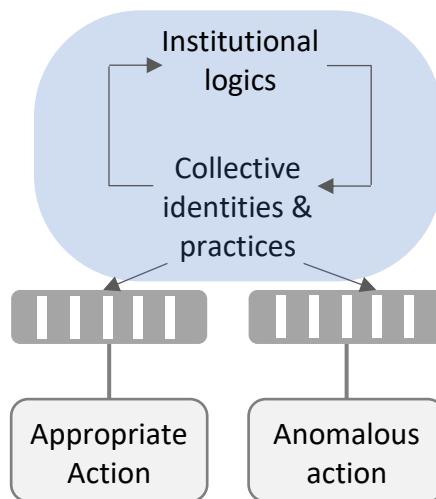


Figure 3: Organisational field
(Lounsbury & Crumley, 2007; Thornton et al., 2012)

In summary, the concept of the organisational field will provide the study with the tool to answer the research sub-question “What is the rationale behind the pension fund field?”. Indicators will allow to identify the influence of particular institutional pillar and to eventually find out the institutional logics shaping the field. In addition to the logics, we will identify collective actions shared and shaping the practice in the pension funds’ field. Ultimately these components should be sufficient theoretical foundation to answer the first research sub-questions.

2.1.2. Market to invest in - Dutch housing stock

In addition to the two types of actions the pension funds practice field make, the focus here is on (at this time still) an anomalous action – investment in energy efficiency of Dutch housing. Thus, the light is shed on the desired investment environment which is in our case the Dutch housing stock. In this study, Dutch housing stock does not create boundaries only for the investment but also it delineates the regulatory boundaries. So, in addition to the

general housing market specifications, the regulations affecting housing energy efficiency must be described. The description of the environment for operating the anomalous action eventually lead to an overview of potential investment opportunities on the market for deep renovations.

The Dutch housing units that have been already built will also create the main part of the housing stock in ongoing several decades so there is the highest potential to decrease consumed energy and resources in general. Therefore, the built housing has the key role in achieving the environmental targets in the Netherlands (Filippidou et al., 2017). It leads us to transform the question raised by Guez & Zaouati (2017): what is the environment (and its characteristics) where investors can finance energy-efficient residential renovation on a large scale? Thus, the description of the Dutch housing stock is necessary in order to recognise the investment potential there.

The environment can be from the theoretical perspective understand as the physical part of the built environment, which is necessary to incorporate, but there are other underlying perspectives that must be taken into account in order define the potential for the deep renovations. As sociological thinkers, Giddens (1984) and Sewell (1992) emphasised that any exploration of social environment should include physical and personal resources as a way to incorporate limitations in their ability to take or cause action to be made. Authors also explain that efficiency of rules and norm must be supported with sanctions, while to be feasible within the cultural belief. The housing stock can also be seen as one of the conceptions of social structure, hence it is under a number of influences.

Furthermore, Scott (2013) pointed out that institutions do not only steer and restrict behaviour through imposing legal, moral, and cultural boundaries that define either good or bad performance but they also support and give the freedom to activities and actors. Such empowerment is enabled through recommendations, guidelines and resources for proceeding with actions as well as limitations and preventions of operations. Those characteristics are by Scott (2013) defined as schemes that structure the vital element of institutions: "*regulative systems, normative systems, cultural-cognitive systems*"; which ultimately create the three pillars of institutions (see above Figure 1: Institutional pillars).

In the case of our study, we perceive these institutional pillars as certain sources of influence that shape the built environment. The imperative for this part of the study lies in indicators presented in Scott's exhaustive explanation in figure 2. The indicators represent the analytical means to define regulative, normative and cultural-cognitive characteristics of the Dutch housing stock. In particular, we will look at the policies and laws to cover regulative pillar, certifications connected to higher energy efficiency and also cover some patterns of the shared logic of action related to the renovations; all parts related to either deep renovations or improvement of energy efficiency in housing. Thus, it enables us to understand the specification of Dutch housing stock especially in relation to the market potential and pressures in energy efficiency and renovations and eventually to answer research sub-question: "What is the situation of deep renovations of housing stock in the Netherlands and what is affecting it?".

2.1.3. Change of practice – factors involved in the change

Thirdly, once the general organisational field of Dutch pension funds is established and characteristics of the investable environment are described, it is vital to explore pressures and indications deriving from the variety of institutional logics that prevent the change of the organisational field - practice and logics - that would lead to it. In this part the identification of specific consideration that pension funds have in relation to such anomalous actions e.g. the energy efficiency and building market, in particular, what hold them back and what would initiate the organisational change in relation to the large-scale deep renovations. This, in the end, lead to an answer to the last research sub-question: “What are the non-financial factors of the investment decision-making of pension funds?”.

Scholars see the highest energy savings of the deep way of renovating building mainly if applied to the larger number of units or houses while considered in the long time frame (Kiss, 2014). Although the good balance between costs and efficiency is achievable, rational energy efficiency solutions are applied rarely (Taranu & Verbeeck, 2016). Current stream of research pointing to the direction of finance-related challenges such as access to funding and lacking adoption and investments in energy renovations (Filippidou et al., 2017). Thus, large investors (e.g. pension funds, mutual funds, venture funds...) in the built environment need to be included in the development of efficient deep renovation mechanism (Brouwer et al., 2017). For those reasons, the pension fund investors in the Netherlands are appealed to invest in Dutch projects (McCarthy, Sorsa, & van der Zwan, 2016). However, to convince investors to take part in a solution to the market failure, we need to understand their needs (Brouwer et al., 2017). So even though we do not know the needs of pension fund investors, they are called on to invest. Researchers and practitioners emphasised that much more research is needed in order to identify preferences in pension funds’ investment decision making that are not made public but at the same time it would be valuable to identify why some actors are able to achieve their goals (McCarthy, Sorsa, & van der Zwan (2016) (PKA 2017 – Annex I). McCarthy, Sorsa, & van der Zwan (2016) identified a gap in the research for identifying factors that, in addition to the typical financial factors, shape investment preferences. However, authors see the potential in a closer look at the circumstances under which investors would change their preferences about investment and carry out modifications within a variety of asset classes. At this moment, it is not certain what the other factors are. However, as we could see from the examples (see the context section) we assume that the fundamental financial analysis does not provide a complete view on an investment. So, it must be complemented by other factors which we call *non-financial*, those factors can eventually have an influence on the change of the organisational practice field. An example of such factors could be, for instance, CSR, environmental and social expectations (Sjöström & Welford, 2009), though this study tries to keep the term *non-financial factor* to some extent broad to avoid a limiting the viewpoint of the research.

In connection to the first part, where institutional logics which have an influence on pension fund organisations are elaborated on, in this part, we are particularly interested in logics and practices that are connected to the change of the organisational field. In our case, the chance that is related to investing in the energy efficiency and energy efficient buildings. Thornton et

al. (2012) argue that changes of practice and organisational identities often go hand in hand, and more complete understanding of the effects and tendency to change of institutional logics requires the attention of both. Additionally, Greenwood et. al. (2010) argue that researchers should focus more on the situation when actors are influenced by a number of institutional logics called institutional complexity. Actors are affected by pressures and indications deriving from the variety of institutional logics.

In addition to the DiMaggio & Powell (1983), Greenwood et. al. (2017) pointed out that a reasonable number of studies on the logics has focused on the significance of dominant logics, shifts of logics and eventual practice field change (e.g. Lounsbury, 2007). Greenwood et. al. (2017) also made a recommendation for further research to use the organizational field perspective as a tool of analysis for meeting societal challenges of this century. As it has been mentioned, we find one of this challenges in financing large-scale deep renovations, hence the conditions for a potential change of practice field will be defined.

Basically, the third part of the study focuses on the non-financial factors that influence the change in an organisational field. If we take a look at Figure 3, we can claim that the anomalous action - investment in the deep renovations – is socially recognised problem, though the decision-making behind the change of the organisational is an unknown process. Thus, this part focus on influences and effects that supposedly affecting this process in the way to create a new organisational practice field.

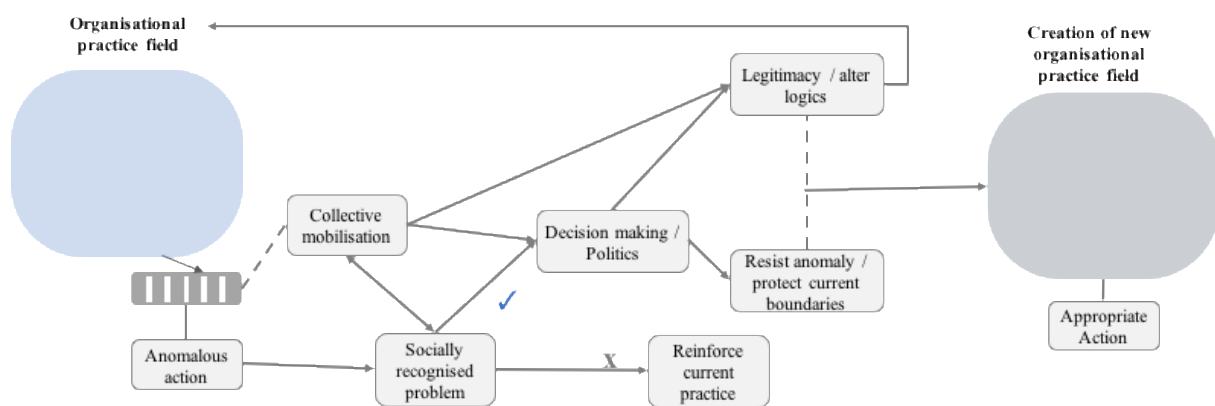


Figure 4: Simplified creation of a new practice field (Lounsbury, 2007).

2.1.4. Conditions for the change

Firstly, the exploration allows learning more about the rationale behind pension funds: the way they behave as organisations, internal and external motives for their strategies, decision-making and investments. For this purpose, institutional and organisational theories are employed, in particular, the institutional logic theory enables to comprehend the influence of distinct instructions. In connection with the logics, institutional pillars conception provide means to recognise particular sources of influence of institutions. Collective identities concept allows the study to get familiar with the shared definition of pension funds through

an exploration of their common interests, experiences, and solidarities, while practice look at their actual actions. Eventually, the combination of these features makes up the pension funds' practice field which enables the answer to the first sub-research question:

What is the rationale behind pension fund field?

Secondly, an exploration of the Dutch housing stock is imperative to perform in order to look at the environment in which the pension fund investors are desired to invest in. The institutional pillars concept set the theoretical boundaries of the exploration of the Dutch housing, in particular factors that shape its regulative, normative and cultural-cognitive characteristics in relation to energy efficiency and eventually deep renovations. Basically, the combination of physical and institutional characteristics of the housing stock partially reveal the market potential but mainly provide the study with means answer the second sub-research question:

What is the situation of deep renovations of housing stock in the Netherlands and what is affecting it?

Thirdly, as the means to support the answer to the main question we explore the decision-making process in the change of organisational practice field which is in our case the practice of pension fund investments assessment. Since the returnability of investment is taken as a must, the light is shed on non-financial factors concerned in this process.

What are the non-financial factors of the investment decision-making of pension funds?

Above all, the theories described above are eventually employed in the New practice model (Figure 4) where we ultimately define the conditions that currently hold back the change but could initiate the creation of a shift in the practice of pension funds. The practice that would, by any means, allow investing in deep renovations of housing stock in the Netherlands. It, in summary, allow answering the main research question:

What are the pension funds' conditions on investment in the large-scale deep renovations of housing stock?

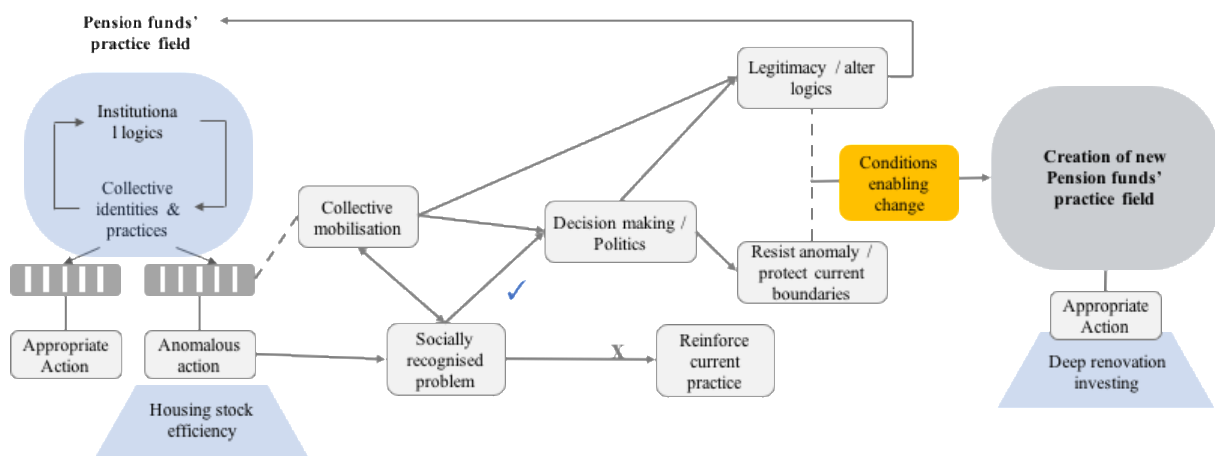


Figure 5: Model of the New practice creation
Adapted from Lounsbury & Crumley (2007); Thornton et al. (2012)

2.2. Research design

Since the theoretical framework can be perceived as the lens enabling the study to have a focus and keep it in a certain boundary, the research design provides the study with a logic and tools for researching the topic within the set boundaries. Thus, this subchapter introduces the logic behind this thesis by providing a research approach and methodology. Within the methodology, description argues choices for methodological paradigm and the methods that stem from such paradigm. The consideration of methods used: in defining data sources, the collection of data and eventually in analysing it; reasoned in the following segment. Finally, there is drawn a connection between the research design and the theoretical framework.

2.2.1. The context and the purpose of the research

The first consideration of the research is for whom and for what reason is the research conducted and how it will influence the design of the study. As the basic research, also known as academic research, represent one end while applied research is at the other end of the scale (du Toit, 2015; Neuman, 2014). Applied research is focused on practical aim and is done to bring practical solutions to a particular issue. On the other hand, extending the theory and knowledge base is the purpose of pure or academic research. Our study does not have clear boundaries as it focuses on the practical issue but building a knowledge for future solutions. The decision on the relationship between a study and empirical reality must be considered in any research and it is connected to its purpose, these decisions can be categorised into explanatory, descriptive and exploratory research approaches.

Descriptive research approach aims for a precise description of the reality - specific population or of interest (Dulock, 1993) which raise 'why' questions so it creates the foundation for an explanatory research approach (De Vaus, 2001). The explanatory approach offers underlying explanations for events or occurrences which is done through, either creating a new theory or testing hypotheses (De Vaus, 2001; du Toit, 2015).

However, the exploratory research tackles new problems on which little or no previous research has been done, this type of research does not intend to offer a final and conclusive solution to the existing problems (Brown, 2006). As this thesis aims to focus on the relatively unknown or little-understood perspective of the housing renovations, the exploratory research approach appears to be the most suitable approach. Neuman (2014) adds that the process of exploratory research, since the subject is little researched, the purpose is to become familiar with the basic facts, circumstances and issues; picture the general condition; frame questions and areas to focus on in further research.

2.2.2. Methodological paradigm and approach

There exists a strong connection of methodological paradigms and methodologic approach, methodological approach basically stems from the paradigm. Neuman (2014) refers to the paradigm as a framework for theory and research that includes basic assumptions, key issues and methods for pursuing answers. Social sciences recognise several main paradigms, though

in planning research are the most influential: positivist, pragmatism, interpretive and critical social science. (du Toit, 2015; Neuman, 2014).

In relation to the paradigm adopted in this thesis, the social reality is embedded, so it implements subjectivist rather than objectivist ontology. The pragmatism emphasises the relevance through employing the combination of designs in order to deal with real-world problems. As we do not address the empowerment of people in societal change while the reality is seen as constantly changing and socially constructed, the Positivist and critical social science paradigms are not relevant to the study. Thus, the pragmatism is the chosen paradigm.

An approach is connected to the paradigm, positivist to the quantitative design, while interpretive and critical social science paradigms to qualitative – textual and visual – types of data. Yet, pragmatism is rather flexible and employ a combination of methods (du Toit, 2015; Neuman, 2014). Rather than numerical, the textual data appears to be more relevant to the study as it allows to examine the views of actors more closely as opposed to the objectivist numerical view of reality. As Silverman (2015) pointed out that qualitative research also catches the smallest distinctions and features of urban and public life, and activities within this structure; that is something that other research methods are not able to. Thus, this research follows rather qualitative methodological approach, in addition to the previous interconnected choices of exploratory research and its usual connection qualitative methods creating an opportunity for follow-up research employing quantitative and hypothesis testing methods (du Toit, 2015).

2.2.3. Data – source, collection and analysis

Since we adopt an exploratory approach towards the research, the source for our exploration of the field does not come only from previous works but mainly from experts in the field. So, this study combines the use of both secondary and primary data. In addition to the source of data, this section further elaborates on techniques for data collection and analysis.

The sources for posteriori knowledge originate from secondary data which, in the case of this study, are traditional academic as well as commercial publications, grey literature including project reports, working papers and government documents. The academic journals in this study combine all accessible articles and books. Project reports and working paper allow the study to look at the practice of the renovations, while the commercial reports enable the view on the investor and market side of the explored field. Government document finalises the exploration of secondary data by looking at the view of European and national government and legislative they imposed on the build environment and investors there. To sum up, the intention of this knowledge acquisition is not to perform an extensive literature review but rather to develop an argument about the current state and to gain a broader view from a variety of sources.

As opposed to the secondary – already collected and presented – data make a limitation for reusing, the primary – newly collected – data address specific research questions, once the raw format is analysed (du Toit, 2015). Employing qualitative methods in the collection of

primary data must be done by interviewing experts. In our view, only experts in the field of renovations and investments could allow the exploration; further in the study are defined the actual professionals. Farthing (2015) refers to such identification as sampling which is commonly classified into the probabilistic and non-probabilistic methods. The non-probabilistic is often used in qualitative research. Due to the unfeasibility in terms of time and costs, the deliberate choice of experts is more convenient for but it pays its price in form of representativeness and generalisation of findings. As we expect difficulty in engaging experts, the gradual involvement of experts appears to be particularly suitable. This type of sampling – snowball sampling method - in nutshell works like a chain where interviewed expert refers to the other who would fit into our scope (Farthing, 2015; Silverman, 2015). This sampling method enables the study to extend its data base through the network of stakeholders.

§As we know what subjects we want to interview, the question is to what sort of interviewing method be best to adopt. According to Farthing (2015), the qualitative data collection varies and so their trade-offs. Due to the nature of this research, we prefer an individual interview, where the attention can be paid to an expert. In addition, the interview will be led in a fairly informal tone in order to establish a good connection for referral chain reinforcement as well as for depth we can go throughout the interview. In terms of the structuring of interviews, Silverman (2015) points out that the purpose of semi-structured interviewing is used to gain an in-depth understanding of how key stakeholders perceive an issue which is exactly the way this thesis proposes to form the interviewing. Farthing (2015) adds that less structured interviewing is particularly suitable if there has been little research on a topic. The interviewing involves a thematic question, so the interview is guided by these pre-set questions, but the interviews will be driven by responses of an interviewee. The list of questions is presented in Appendix 2. The result of an interview is a recording which is the main material for a transcription (Silverman, 2015).

Once the primary data are collected, Silverman (2015) and Nygaard (2017) emphasised that analysing and presenting qualitative data does not have one defined and clear way. However, it is rather about employing common sense and keeping within the boundaries of what derives from data, so its statements and findings can be justified on the basis of what was found. Throughout this approach, the data examined and re-examined which enable the research to be exploratory and flexible to possibilities that may emerge throughout the process.

The core activity is to analyse the qualitative data by getting a large amount of data into manageable chunks. Data are coded, then arranged coded into distinct categories - that is called thematic analysis. Giving codes to distinct passages in the data is called open coding, while the second one compares open codes, integrate information and construct broad, overarching categories with interconnected data which are eventually presented in the section 5.3.

2.2.4. The research framework overview

In summary, the research design should enable the incorporation and use of the theoretical framework in order to answer the research questions.

Due to the fact that we focus on a perspective that has been researched a little so far, the exploratory approach guides this study to create a general picture of conditions that consist of basic facts and settings. A priori knowledge is gained through an academic and grey literature review that lead to the understanding of current pension funds' field, institutional logics, collective identities and practices that shape its current way of working.

This type of literature also enables the study to learn about, something that is unusual to invest in for the Dutch pension funds, the energy efficiency of the Dutch housing stock and the housing setting in this potential investable environment. These first two segments allow identifying suitable organisations and people to talk to learn more.

Thirdly, we want to understand the factors involved in the change. To describe the factors in this social action and to understand social reality we need to collect qualitative data from actors involved in this real-world problem. Snowball method of sampling enables the study to gradually identify the experts from the realm of pension funds and energy efficiency investments with every single semi-structured interview. Then, transcripts of interviews are coded and factors can be identified. Ultimately, based on these three parts, conclusions can be made, and the main research question answered.

3. Pension funds

As we could learn from the first chapter, we should look at the pension funds as they are seeming to be a suitable type of investor. However, we actually still do not know why the choice of pension funds fit the large-scale deep renovation type of investment. Thus, the first task of this chapter is to explore and eventually justify the choice. The 3 of the exploration briefly look at the variety of investors and justify the choice of pension funds, the extensive 3.2 explores the historical development of pension funds, their role and function but importantly it provides an insight in the pension funds' field by looking at the three influences and pressures that in our view affecting the field. The last section (3.3) puts the knowledge gained throughout the chapter together in order to define the rationale behind pension fund investors which at the same time represent the answer to the first research sub-question.

3.1. Investors' characteristic

Initially, before we look at the investors, we have to define certain characteristics that an investor should have in connection with the deep renovations of housing stock. Deep renovation of a house or an apartment building usually incorporates several tasks such as wall and floor insulation improvements, double- or more glazed windows and some technological improvement which could also include photovoltaic panels. For that reason, these types of renovations have typically long payback period, the length of the period is usually between 15 and 20 years. For that reason, the potentially suitable type of investor should be inclined to a long-term investment strategy. In addition to the strategy, undertaking this type of renovation reduce energy consumption by 60 to 80%. The energy efficiency goes hand in hand with lowering energy bill and greenhouse gas emission reduction. This adds up the renovations the positive environmental and social aspects.

In the investment universe, there is a variety of financial institutions. They often work as an intermediary to make investments indirectly. Institutions including banks, insurance companies and pension funds; they pool the savings of governments, businesses and individuals and channel them into loans, other types of assets and other large-scale investments (Gitman et al., 2008). In addition to this group of so-called institutional investors, there are types of investors, for instance, venture capitalists which provide money in the very beginning of an idea or a company without expecting any money (interest) during the adoption of an idea or development of a company. However, a venture capitalist type of investor expects a massive increase in price/value so the investor can eventually sell his share and make a one-off profit (Cumming, 2012). To sum up the investor types, Çelik & Isaksson, (2014) identified three rather simplified and incomplete groups, though the differentiation is sufficient for this brief exploration. There are at least three groups of institutional investors identified by Çelik & Isaksson (2014). First, they use the term traditional institutional investors that incorporates pension funds, insurance companies. The second category is referring to alternative institutional investors for hedge funds, private equity firms, exchange-traded funds and sovereign wealth funds. As a third, they acknowledged asset managers because

this is a rapidly growing group due to outsourcing they invest directly in their clients' name and based on their clients' investment policy.

The time horizon, for which investors allocate their assets, is particularly important. Dyck et. al., (2017) recognised investment time-frame aspects in their paper, where reflected on differences in investors' investment horizons. Short-term investment vehicles are exclusively invested in by managed or money funds invest. Similarly, hedge funds pool money from a variety of investors and invest such pool in securities which represents stocks, bonds etc. (Gitman et al., 2008). According to Dyck et. al., (2017) hedge funds are, in general, oriented on rather quick investments with high profit and incentive, hence a short-term underperformance of their investments make them highly vulnerable and put a great deal of pressure on fund managers. Hedge fund investments are typically related to acquiring insignificant parts of publicly traded businesses that do not allow them to affect any changes within the businesses (Achleitner et. al., 2013). On the other hand, private equity and mutual funds, considered as self-regulating institutional investors, typically associated with sizable allocation with longer time-frame while focused on businesses that are not publicly traded (Achleitner et. al., 2013). From the description of abovementioned investors, we can say that the venture capitalists do not fit by principle this type of investment as they expect to withdraw their investment at once with a large profit while independent institutional investors are afraid to experience a loss in a short-term (Cumming, 2012; Dyck et al., 2017).

Moreover, another institutional investor has an important significance – pension fund investors are not simply focusing on short-term profit making but they are generally associated with investments in longer time-frame which make them more resistant to a short-term market oscillation (Çelik & Isaksson, 2014). As a long-term oriented investor, investment managers of pension funds have reportedly postponed their incentives if some of invested businesses or assets experienced loss in a short time-frame (Dyck et. al., 2017). Pension funds stem from the search as probably the most suitable as they are sort of investor that is able to tolerate – indeed, it is expected – if it helps achieve greeted long-term value creation. The role of investment managers is to secure time horizon and risk objectives of the investment portfolio, hence (Barton & Wiseman, 2014) claim that it would require more investments in less liquid assets such as property and infrastructures. Thus, we can state that, in addition to the initial assumption, the role of pension funds in the remedy of the deep renovation market failure appears to be more significant.

3.2. Pension fund – history, the way they function and the pressures affecting them

The exploration of the history and the way of operating enable a better understanding of the pension fund organisations. The exploration looks at the historical and geographical development of the pension systems and the form in which they have developed in.

According to Bachher, Dixon, & Monk (2016) and Bachher et al. (2016), the last century was influenced by so-called pension fund capitalism that causes massive amass of money that was historically located in the first world countries such as Anglo-Saxon countries. In countries like

Japan, the UK but also in the Netherlands, there is defined benefit by law which makes a significant part of the retirement pension system. Logically, the largest volume of pension assets in countries of western Europe and North America (OECD, 2016).

Moreover, to get a better notion of how is the pension system created across the world, a recent characteristic of OECD (2016) shows that while in some countries is most money in pension funds, insurance companies are leading in others. Furthermore, the pension fund systems are generally divided into two distinct groups: occupational and personal; the occupational pension system is commonly connected to the employer or industry (e.g. hospitality, public servants etc.) while those systems without connection to labour are perceived as personal (OECD, 2016). There is a variety of schemes across Europe including different combinations of private and public fund that can be sponsored by an employer or not (Clark, 2004; OECD, 2016). This brief elaboration on the types of pension schemes is sufficient as the aim of this study is not the retirement pension providers but pension fund investors.

To sum up the function of pension funds, pension funds are significant investors while being organisations supporting national social security benefits through gathering money from people throughout their lives, putting money together and investing them in all kinds of assets (loans, bonds, stocks, government investments etc.) and market, this enable securing people's pensions with some additional profit from investments which is eventually paid back in form of a pension during their retirement period (Clark, 2004; Davis, 2000).

3.2.1. Fiduciary pressures

As we could learn, pension funds are managing huge amounts of money which are in fact people's future pensions, hence that is the reason for governing and regulating such funds while pushing them to follow so-called fiduciary duty.

Moreover, this duty ensuring that a pension fund invest (and generally acts) responsibly with a diligent management and without exposing people's ('initial investors') money too much risk. The word *Fiduciary* itself is originated as a Latin verb meaning 'to trust', so 'fiduciary duties' is a usual term for the duties a pension fund has towards their current and future retirement pensioners. Fiduciary duties are not a uniform legally-binding guideline but rather it is a variety of definitions, essential features and degree of enforcement that are imposed on the financial organisation of all kinds across Europe (Clark, 2004; J. Sandberg, 2011; Sievänen, Rita, & Scholtens, 2017).

In summary, fiduciary duty applied in Dutch pension fund makes up a particular set of unique features to be followed in order to act in line with the interest of current and future retirement pension beneficiaries.

3.2.2. Market pressures

According to OECD (2016), the number of pension funds have been shrinking while the volume of money they are managing is rising, that is also the case of the Netherlands. In addition to the size of the pension funds and their essential function in securing a regular

income for retirees, pension funds are one of the major group of investors in the market (financial, capital, stock exchange markets etc.) (Clark, 2004). Further, as the typical short-term investor buying while the markets are rising and selling while they are plummeting, the pension funds' long-term investment strategy having a stabilising function on the market as it is not dependent on the short-term up and downs (Boersch, 2010). High diversification in terms of an extensive number of businesses and assets is typical for pension fund investors (Çelik & Isaksson, 2014).

McCarthy et al. (2016) pointed out that pension funds' long-term, in their with *patient*, investment can be related four distinct areas of interest: investing to loans and bonds as a way to support businesses and long-term activities; investment generating return over a long period of time; then there are two opposing way of investing in businesses and corporations, own passively a stake without interfering the management of a company while the other is based on actively managed engagement supporting long-term plans and approaches. On the other hand, there is an evidence that pension funds have been deviating from the long-term strategies, due to institutional influences such as business and political interest, to the more short/impatient way of investing that offers higher revenues (McCarthy et al., 2016). Thus, it points out a direction towards rather market-oriented institutional pressures having an influence on the pension funds' investments.

Moreover, such market pressures can be also seen in the historical development of the Dutch occupational pension funds. In the years after the Second World War, investments of Dutch pension funds were mainly focused on assets with given rate of revenue in the long period of time which are loans and bonds for households and businesses. However, the 80's brought Modern portfolio theory with the promising potential of significant returns on investment, which also affected the abovementioned assets with stable revenue, and it had taken over (Van Gerwen, 2000). The second half of the 90's brought a transformation of investors as they slowly adopted a new role as an active investor; the engagement of investors in financed businesses have an effect on improving their revenues and the ways of working while protecting them from aggressive corporate takeovers (Frijns, Mensonides, & Schreurs, 1995). Even though there had been a push towards the inclusion of social and environmental factors by the end of the 1990s, there was a consensus among the organisations and employers that the returns on investments should not be threatened under any conditions or situations (FNV, 2000). Thus, pension funds' way of investing led to an agreement amongst unions and employers to support pension assets for long-term (patient) as well as short-term (impatient) allocation (McCarthy et al., 2016). Verstappen, Herder, & Van Gelder (2015) showed that pension funds instead of more active ownership, Dutch pension funds chose for the more passive shareholder role but also, the authors pointed out that marginal part of investors allocated money to more socially or environmentally performing assets (if they do prefer to invest in bonds with environmental or social impact or corporate equities).

Nevertheless, the financial crisis to some extent shifted preferences of pension funds and other parties. Additionally, the Dutch government and employers to demanded pension funds to allocate more money in the Dutch projects which include real estate and infrastructure. Even though many funds are suffering from worse financial revenues, "profit orientation

remains dominant” (McCarthy et al., 2016)

3.2.3. Environmental and social pressures

Moreover, as we mentioned the social and environmental practices, we must point out that such practices are there for a number of years but kept in the background. Hence, the previous three decades have been globally important for development and spreading the practice of socially responsible investments which also known as sustainable or ethical investment; we can count institutional investors as significant stakeholders enabling such a massive spread of responsible investments from the 80s (Renneboog, Ter Horst, & Zhang, 2008; Scholtens & Sievänen, 2013). As it can be from the current viewpoint supported, Boersch (2010) correctly predicted that the financial crisis is likely to lead to an increased focus on risk management of pension fund investments and he expected that holistic investment strategies would become more popular.

Furthermore, the latest financial crisis has hit nearly all people and investors across the globe and led them to focus on the markets, responsibilities and conditions under which markets work. At that time, the demand for responsibility and transparency arise simultaneously with boundaries of responsible investment (Scholtens & Sievänen, 2013). As the current generation is very much critical towards any misuse of investments or unethical behaviour, investors are starting to expect social and ethical responsibility in a variety of day-to-day management of financed businesses and assets. Hence, there is a rising consensus among fund managers that Environment, Social and Governance (“ESG”) factors have a significant impact of return on investment (KPMG, 2015). The United Nations-sponsored Principles for Responsible Investment (PRI) supporting the creation of boundaries for responsible investment. By the end of 2016, the initiative exceeded 1600 engaged organisations which in total manage more than €60 trillion in assets. The PRI document that—at least in theory—encourages and supports the shift towards more responsible investing, and it obligates the organisations which signed (including pension funds) to take corporate ESG performance into consideration when they allocate capital into a variety of assets. (Gond & Piani, 2013)

The responsible investment was defined by Scholtens & Sievänen (2013) as *“ethical investments, responsible investments, sustainable investments, and any other investment process that combines investors’ financial objectives with their concerns about environmental, social and governance (ESG) issue”*. In contrast to the traditional investments, the responsible way of investing includes checking procedure into its consideration; these so-called screens highlight investments to either avoid or to prefer. These screens are based upon ecological, social, corporate governance or ethical principles, and often aim to engage in the local communities and in shareholder activism to further corporate strategies towards the above aims (Renneboog et al., 2008). All the mentioned practices have been strengthened and rise since the financial crises hit the markets globally (Shiller, 2013). There is an evidence that all kinds of responsible investing are swiftly rising and this trend is fuelled by investors’ enthusiasm about making the most of their investments in long-term through exploitation and incorporation of ESG criteria in the decision-making process (Rahdari & Anvary Rostamy, 2015; Sievänen et al., 2017).

Furthermore, studies show that a significant portion of institutional investors are not dealing with managers that do not provide assets supporting responsible investment strategies which strengthen the fact the pension funds appraise to a great extent all three parts of ESG criteria in their investment decision-making (KPMG, 2015; Sievänen et al., 2017). Taking the numbers and volume of closed responsible investment deals from the geographical perspective, we can see that most of these investments have been taken in Europe where the demand for environmental and social value of an investment is the greatest (Barber, Morse, & Yasuda, 2016). Strict policies, related to a wide array of fields including energy efficiency and climate change in general, makes the European continent leading in attracting responsible investment as it takes all top positions environmental and social rankings in the world (Dyck et al., 2017). The numbers from the continent show that mostly institutional investors push businesses to better ESG performance so the market and volume of funds focused on responsible investing has nearly doubled to 476 billion Euro in the period between 2010 and 2016, especially the countries like the UK and the Netherlands have been in the forefront of this market (A. Dyck, 2016; KPMG, 2016; Renneboog et al., 2008).

Making long-term investment decision is difficult without well-calibrated metrics allowing to identify healthy assets performing over a long period of time, specific measures may vary by industry and sector. Pension funds have been adapting their traditional investment strategies while their investment decision process has progressively included more and more non-financial factors (Eurosif, 2016). Responsible investment strategy with the longer time frames incorporates ESG factors in all stages of investment decision-making: the initial exploration and research, appraisal and actual cherry-picking and incorporating in a portfolio (Eurosif, 2016). Such process combines the basic financial analysis and incorporation of ESG factors in order to better capture long-term returns for investors and to benefit society by influencing the behaviour of companies. Responsible investment can be found on both sides of financial markets in investing as well as lending so it addresses loans, bonds, stocks, commodities, and all kind of monetary instruments (Sievänen, Rita, & Scholtens, 2013).

In summary, pension funds are surely pushing businesses to better environmental and societal performance as the funds are not under influence of making short-term revenues (Dyck, 2016). North European funds are more inclined to get involved in responsible investment strategies while larger funds are most likely to adopt responsible type investments rather than the smaller ones. (Sievänen et al., 2013). Furthermore, the responsible investment is especially strong where strict norms related to the natural and social environment are; they can even force out market forces if they are strong enough.

3.3. Pension funds – the rationale

In summary, we have the Dutch pension funds that manage considerably over one trillion euros out of approximately 26 trillion in pensions assets globally, that makes a huge porting of global pension savings and potential investments. As we know from the theoretical part institutions make standards and boundaries for business and stakeholders (Jackall, 1988) and it could be explored that pension funds are under influence of at least three competing institutional logic.

Firstly, the academic and grey literature on the historical development of pension funds, in particular, the Dutch ones, reveals that market logic dominates in the realm of pension funds. Basically, market logics hone profit maximisation and pension holder value.

Secondly, the fiduciary logic that is built on the notion of trust. There are only a few steering forces and fiduciary duty is one essential one, steering behaviour of institutional investors including pension funds. Fiduciary duty has both functions restrictive as well as supportive, especially on the way to achieve non-financial. However, fiduciary duty mainly enables consideration of financial returns, as the pension holders should be provided with the best pension possible and take into consideration its own pension-holders.

Last but not the least, what it can be understood from the pension environment is that there is a gradually strengthening logic that is based on the notion that financial system is inseparable from human rights and the environment, values, common interest, shared responsibility towards future generations. The institutional logic that is based on protection of the natural environment and safeguarding unfairness within social sphere (Sjöström & Welford, 2009) cause that pension funds do not take financial analysis into account as the only piece in investment decision-making but include other non-financial factors such as environmental, social and good governance (ESG) factors. In addition to the ESG inclusion, we can state that the crisis initiated the collective action together with a steep trend of investors adopting a responsible way of investing. In connection to the collective action, Gond & Piani (2013) offered their perception of three spheres of defending the logic of responsible investing such as the ethical sphere humane (for instance working conditions), practical sphere and specific cost-cutting (e.g., better energy performance), and absence of understanding these aspects by businesses which is typically the ultimate reason rationalising the need for incorporation these aspects.

In summary, this chapter offers a fairly general overview of the organisational field of the pension funds' which provides rather an extensive answer, described above, to the first research sub-question: "What is the rationale behind pension fund field?". The knowledge gained throughout this chapter is further exploited in the fourth chapter that specifically focuses on the environment of Dutch pension funds.

4. Dutch housing stock and deep renovations

As far as it is known, energy efficiency measures could globally reduce GHG emissions by roughly 80 per cent while saving nearly 6 billion tons of carbon to be emitted to the atmosphere from the building sector by 2050 (Incropera, 2015). Thus, the enhancement of energy efficiency in the building stock is one of the quickest and most economically efficient solutions for decreasing GHG emissions while improving environmental conditions (Becqué et al., 2016).

However, to even think about any changes, the environment of implementation must be understood in the first place. Furthermore, the aim of the chapter is to explore the field of residential buildings in terms of the state in which the buildings currently are, the pace of the transformation of the industry, and the issues that are presented there. So, to explore the environment in which the pension fund investors are potentially desired to invest in, it must deepen the knowledge in relation to the deep renovations in terms of the regulatory base and housing stock. Although this study focuses predominantly on the situation in the Netherlands, the country is still a component of a larger body. Thus, the study firstly takes a brief look at the bigger picture, the situation in the EU as it represents the given context where the Netherlands is placed.

Firstly, the exploration of housing stock starts with the understanding of the current situation and the trends that have an influence on the speed of these changes. Thus, a review of the key legislative documents is the core of this part allowing to draw part of the picture (section 4.1).

The second part of the picture comes with the view of the quantitative data of the residential market in the EU and the NL. It supports the study through understanding the size of the market as well as the potential size for saving in terms of energy and for renovation industry (section 4.2).

Lastly, throughout the Scott's (2013) characteristics of institutional pillars, the exploration of Dutch housing enable the answering the second research sub-question (section 4.3): "What is the state of the deep renovations of housing stock in the Netherlands and the legislation affecting deep renovations on both Dutch and the EU level?"

4.1. Legislation related to the energy efficiency in housing

The Netherlands is a part of a larger organism called the EU-28. Although the member states differ in their physical, economic, social, community and cultural aspects of housing, they are all to some extent interconnected, regulated and steered by the EU and its organisations. This sub-chapter aims to explore the most significant legislative and regulatory influences that have an impact on the energy efficiency of residential buildings generally in European and specifically in the Netherlands. The reason for focusing on the EU level in the first place is that the regulations issued by the EC are often rather general and countries decide the degree and strictness how they impose them on themselves. So, in this part, we find out how is the building stock steered in terms of energy efficiency and what are the observable implications.

4.1.1. European Union

The reuse and enhancement of existing housing stock in European countries are increasingly becoming a primary concern of European housing policy and practice because the annual supply housing units are only about 1% (Thomsen & van der Flier, 2002). Over the last two decades, the EU has employed a fair amount of policies related to the buildings and their energy efficiency. The EU has issued specific Directives aiming to reduce the energy consumptions and CO₂ emissions of buildings and promote the development of the necessary policies and measures to comply with the Kyoto Protocol (Barbano et al., 2013). As the deep renovations offer an exclusive opportunity for reduction of energy consumption and GHG emissions, the EU see the renovation as one of the vital instruments for achieving the EU 2020 goals. i.e. reduce GHG by 20%, have 20% of energy from renewables and increase in energy efficiency by 20%. Moreover, since the renovations do not mean only better energy efficiency, it can be also connected to an increase labour opportunities, improvement in climate and environment-related implications, hence it represents multiple benefits for the European economy (Saheb et. al., 2015).

Policies adjust stakeholders' preferences along the energy efficiency chain. This chain incorporates a variety of stakeholder including all governmental level; distributors and providers of energy; societal side including NGOs, think tanks etc.; construction and building industry incorporating builders, developers, architects, contractors; financiers and investors; property managers, residents and owners (Becqué et al., 2016).

Furthermore, the main policy maker who can affect the abovementioned stakeholders on the European level is the European Commission. It is also the case of building stock where the consciousness of energy efficiency issues take place. In the view of the EC, the greatest energy saving potential lies in buildings as improvement of energy efficiency of all buildings while it is particularly important to focus on older building as they are more energy-demanding so they proposing to accelerate the refurbishment rate. Therefore, The European Commission has established 10 priorities for 2015-19. The Energy union and climate priority sets the aim to deliver inexpensive and responsibly produced energy which addresses the reduction of consumption but also its effects environment as well as supporting new labour opportunities and investments (European Commission, 2015b)

Throughout the years the policies have been shaped from Brussels. The European Parliament passed the Energy Performance of Buildings Directive (EPBD) in 2002. The EPBD focuses on the performance of all types of building, including the new builds as well as the already built ones. An update of this directive put ever stricter measures mainly on the newly built buildings, it requires to all new public buildings and all new buildings in general, to be built in nearly energy zero standards, from 2018 and 2020 respectively (BPIE, 2015). Thus, in regard to the buildings and energy efficiency, two main legislative instruments The Energy Performance of Buildings Directive from 2010 and the Energy Efficiency Directive from 2012 succeeded the previous. Both of the directives encourage the enhancement of energy efficiency of buildings while providing a secure investment environment. The most recent amendment to the EPBD was published in June 2018 and introduces objectives for fast-

tracking the economically sensible retrofit of existing buildings so EU countries must create solid long-term renovation schemes with the utilisation of financial resources on the way to the decarbonisation of all buildings by 2050 (European Commission, 2018)

In summary, the Energy Performance of Buildings Directive requires the member states to comply with the following:

- All new public buildings and new buildings in general, to be built in nearly energy zero standards, from 2018 and 2020 respectively (BPIE, 2015).
- Label showing energy performance must be presented in all legal and commercial activities related to building
- Create a check-up system for heating, cooling and ventilation systems
- Establish economically efficient requirements for buildings of all stages and age including technical equipment
- Formulation of national financial stimulation systems to enhance the energy efficiency of buildings (European Commission, 2018)

In addition to the latest amendment to the EPBD, the Member States have got 20 months to integrate their adjustment into state regulatory environment (namely by March 2020) (European Commission, 2018). However, the Barbano et al. (2013) identified that national integration of the previous EPBD (from 2010) seemed to be more difficult to incorporate than the previous directives for the Member States as the countries are facing different contextual difficulties related to the location, hence the actual implementation and effectiveness on a country level are often more problematic than expected.

4.1.2. Netherlands

National and regional administrations can shape the addressing energy consumption and other use of resources in buildings. The market for technical and mechanical equipment of the buildings can be regulated, hence having an influence on resource efficiency (Becqué et al., 2016).

Specifically, in the Netherlands, the building regulation can be traced back to the beginning of the 20th century when the Housing Act was introduced. An update of the same Act in 90's requested minimum performance of newly built buildings in terms of energy efficiency (Hoppe, Bellekom, & Lulofs, 2013). By introducing this energy performance coefficient, builders became responsible for the choice of measures and eventual performance, all choices in terms of technology became optional, a builder just have to comply with the performance requirements ((de Klijn-Chevalerias & Javed, 2017)

Dutch policymakers have set a number of targets related to distinct parts of the economy including buildings for which strict reductions in terms of consumed energy and emitted pollutants have been set to reach until 2020. The Netherlands also declared to become carbon neutral by 2050 in the Energy Agenda. This long-term strategy, the Energy Agreement (Energieakkoord) providing targets and agreements for energy saving in many spheres in the Netherlands was signed by a number of Dutch public and private organisations. In addition to that, the Agreement have targets to cut carbon emissions by 80-95% by 2050 and to generate 16% of energy from renewable sources by 2023. The global climate agreements

have led the Netherlands to undertake to reduce carbon emissions by 40% in 2030. In terms of all building The Energy Agreement aiming to achieve building energy label A in average for all buildings in 2030. Under the EPBD Directive force the builders to build all new buildings in nearly zero-energy standard or more efficient from 2020 onwards (Ministry of Economy & Ministry of Interior, 2017)

Thus, this section provided an overview of the legislation in place and planned. The next section will reveal the state of residential buildings which is the sector affected by the abovementioned legislation and regulation.

4.2. Housing stock in the Netherlands

Since the brief description of regulations and certification influencing the built environment of the EU and particularly the Netherlands has been done in the previous part, the attention in this subchapter is paid to the implication of these forces to the built environment.

Dutch housing stock accommodates more than 17 million residents of the Netherlands and is quite specific in some aspects. Before we start to examine issues of the Dutch housing stock and try to find solutions to related to efficiency and other attributes, we need to take a step back and look at the Dutch residential buildings as it is. We look at its characteristics also in comparison with the rest of the European Union. Thus, the explored characteristics of the Dutch built environment are its age, energy efficiency, type of housing and tenure in housing.

4.2.1. Age and energy efficiency

Initially, just to see the urgency for change in perspective, one of the most significant energy consumers is the building sectors where can be seen a rising trend in the last two decades. According to (Economidou et al., 2011), in our homes, we consume about two-thirds of the energy consumed by buildings in total. The Eurostat shows (see figure 7 below) this consumption in perspective of all energy consuming sectors in the EU.

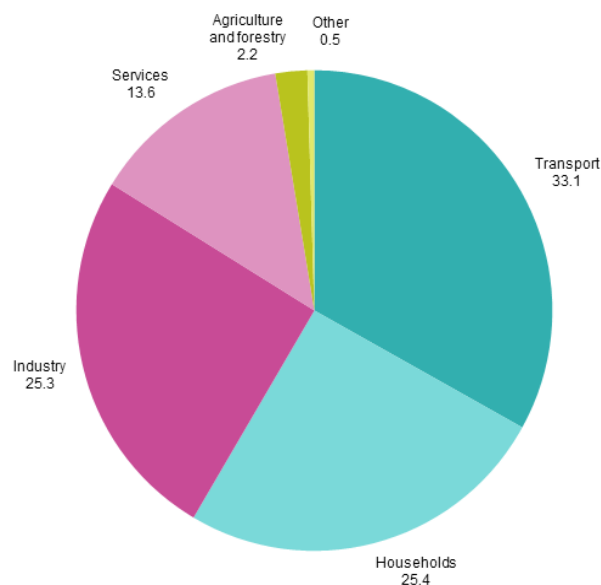


Figure 6: Final sectoral energy consumption EU-28, 2015 (Eurostat, 2017a)

In addition the proportion of households consumption, a number of scholars claim that the age is an important characteristic determining energy use as older households generally tend to consume more energy than younger households (Guerra Santin, Itard, & Visscher, 2009; Hal van & Femenias, 2009; Robert & Kummert, 2012; Wilkinson et al., 2007). Janssen(2004) adds that the biggest portion of energy buildings is used for “*space heating 57%, followed by 25% in the form of hot water, 11% for lighting and other electrical appliances, and 7% for cooking*”. Together with the lack of sufficient insulation layer creating an efficient envelope of older buildings (Economidou et al., 2011). Data on typical heating consumption levels of the existing stock by age shows that the largest energy savings potential is associated with the older building stock. Due to the fact that the building age and its efficiency often correlate, we first explore the age of the residential buildings and their energy use afterwards.

As we can see from the figure 6 a significant portion of the building stock in the EU is older than 50 years with many even older. In most EU countries, half of the residential stock was built before the first thermal regulations (built before 1970) (European Commission, 2018).

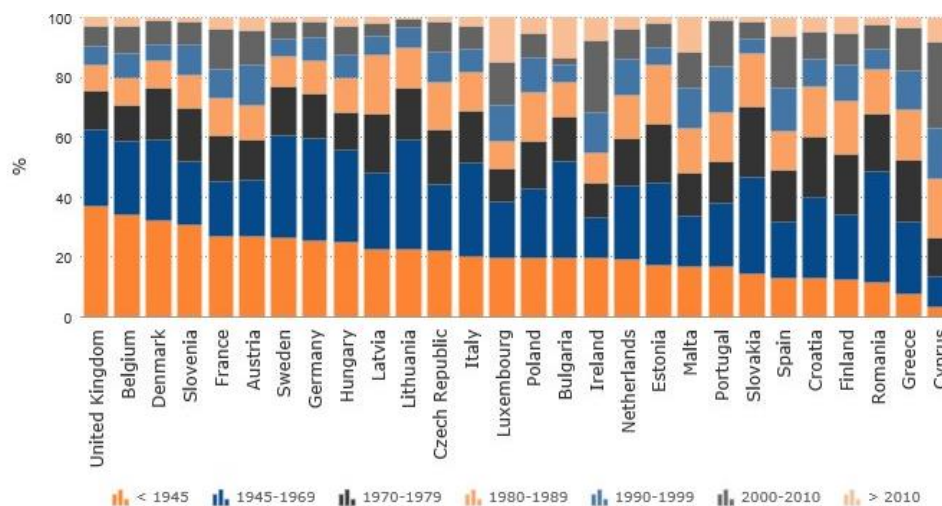


Figure 7: Breakdown of the residential buildings by construction year by 2014 (European Commission, 2017)

Only in the Netherlands, residential buildings are responsible for nearly one-tenth of carbon emissions (Schoots, Hekkenberg, & Hammingh, 2016). Koezjakov et. al. (2018) defined building archetypes that are most common in the Netherlands, the most typical were built in the period between 1965 and 1974 which together accounted for 20% of total Dutch dwellings by 2015. Noticeably there more than 3 quarters of dwellings are older than 25 years (see the figure 7). The age is also an important motive for major renovations. The currently standing ones need periodical improvement and upgrade in terms of equipment, structures, design and their efficiency and performance. Improvements to “*space heating, ventilation and air conditioning (HVAC), water heating, insulation, water fixtures, energy control systems, and lighting are common retrofit measures*” (Becqué et al., 2016). Sandberg et al. (2016) estimate that renovation activity resulting from the ageing process of the dwellings which is related to the deep renovation of facades is estimated to occur in 40 – 50-year cycles. However, so-called energy saving modernisation, for instance, changing the heating system

or installing a photovoltaic panel is generally performed in cycles of 30 years or even shorter. Thus, the majority of Dutch housing stock in terms of renovation cycle comes to the age when the deep renovation or modernisation is necessary.



Figure 8: Housing age distribution – Netherlands
(European Commission, 2017)

Furthermore, pointing out the age and the necessity of renovation, the newly build housing and major renovation have an impact on the energy efficiency of housing stock. So, it is quite important to look at the renovation rates and newbuild rate.

Zebra 2020 (Toleikyte et al., 2016) has developed an indicator for renovation for equivalent major renovation rate. Roughly the half of monitored EU countries shows the rate between 0.08 in Spain to 2.4% in Norway. Such pace of retrofits means that in the best performing country the whole building stock would be renovated no sooner than in 40 years' time. In other countries, this pace is much slower the renewal rate of the Swedish residential stock is only 0.6% which would take more than 150 years to be completely renovated.

Moreover, as we look into the ageing and inefficient residential building stock (Economidou et al., 2011) where, after its massive growth in the last century, the annual construction rate of housing currently dropped under the well below 1% in the Netherlands. At the same time construction of new housing units in Europe ranged from 0.45 to 1.15 % in 2014 (Toleikyte et al., 2016). It leads to a short calculation showing that an average of 1% new builds per year make approximately 70% of present dwellings will be in use by 2050.

The same applies for the Netherlands, since the buildings have a long life cycle, most of the currently standing buildings will be there in upcoming several decades; Dutch annual generation of buildings is 0.6% in comparison with the existing buildings (Filippidou, Nieboer, & Visscher, 2016). Taking the actual number of newly built homes, there were approximately 50,000 homes constructed with an increasing trend to 80 thousand in 2018 which is still a number slightly above one per cent. In addition to the newly built homes, according to the report, renovation and transformation activities will lead to another 7 thousand units (Capital Value, 2016).

Additionally, looking at the actual energy efficiency, at present, data from national Energy Performance Certificates also known as EPC is the only source on the energy performance of the building stock in the EU. If we look at the (BPIE, 2017) report from 16 EU countries including the Netherlands, we can see the 97% of buildings in these two-thirds of European building stock should be upgraded to reach higher energy efficiency.

Specifically, in the Netherlands, one third out of the roughly 7.5 million Dutch dwellings had EPC by the end of 2014 (van Eck, 2015). Thus, at that point in the time, we could see that

significant portion out of certified buildings had C label or worse, so it did have higher energy consumption.

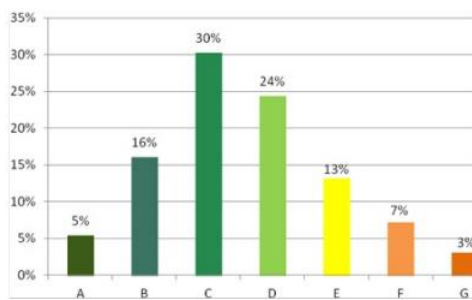


Figure 10: EPC for housing (van Eck, 2015)

	A(+)	B	C	D	E	F	G	Total
Apartment	3,745	7,644	8,968	5,601	3,315	1,819	899	31,991
'Gallery residence'	56,838	132,993	177,916	154,026	81,057	34,495	10,556	647,881
Maisonette	3,109	8,412	15,822	9,749	4,631	3,095	1,497	46,315
'Veranda residence'	24,030	91,990	174,491	141,573	85,129	53,703	24,736	595,652
Family house	29,827	97,914	226,865	189,468	87,398	41,842	13,122	686,436
Corner house	19,713	58,488	146,393	103,100	61,437	40,558	19,262	448,951
Villa	2,900	6,602	9,440	7,882	5,191	3,876	3,015	38,906
Building (care)	327	529	835	662	503	154	191	3,201
	140,489	404,572	760,730	612,061	328,661	179,542	73,278	2,499,336

Figure 9: EPC for housing by type (van Eck, 2015)

Later at the time, according to the large-scale study of Dutch social housing carried out by (Filippidou et al., 2016), the yearly portion of deep renovation in social housing is between 0.6 and 0.9% while the amount of energy labels (EPC) remains roughly the same as the numbers from 2014 which together with a yearly amount on new buildings is low. Even though this trend is positive, the rate of both major/deep renovations in social housing and housing supply is low. Authors claim that the trend of energy label improvement on social housing is observed similarly in the owner-occupied and private-rented sector. However, the non-profit housing sector is more active than the owner-occupied when it comes to energy renovations. The authors (Filippidou et al., 2016) state that the scattered ownership makes the deep renovation more complex for private and rental housing sectors in comparison with the social housing.

To sum the age and energy efficiency up, the age of building generally correlate with its efficiency. In the Netherlands, about three-quarters of the housing stock is older than 25 years which makes a large portion of the stock inefficient and reaching the age for a major renovation. However, the rate of major renovation remains low as well as the rate of new housing built.

4.2.2. Dwelling type

The information about the type of dwelling that people live in gives us an overview for potential renovation process in terms of the scale of the particular building type and replicability of solutions.

The residential buildings form about 75% of all buildings in Europe (Economidou et al., 2011). However, the picture of residential stock differs significantly across the EU. According to (Eurostat, 2017b) population and housing census conducted in 2011 found that there were 495.6 million people in the EU-28 living in a private household. The same source says that, in 2015, more than 4 out of every 10 persons lived in flats, close to one quarter in semi-detached houses and one third in detached houses. While Spain, Latvia and Estonia are countries with the highest proportion of people living in flats, the residents of Ireland, the Netherlands and the United Kingdom are the only member states which exceed 50% people living in semi-

detached houses (Eurostat, 2017b). Thus, in terms of residential dwelling type, the Netherlands belongs on the edge of scale with its high volume of semi-detached houses and people living in this type of houses.

Moreover, looking specifically at the housing stock in the Netherlands, there are considerably above 7.5 million dwellings there (Filippidou et al., 2017). While observing Dutch housing by naked eye one can tell that the most common type of dwelling is the terraced house (Rijtjeshuis): two or three storeys high, with a front and back garden, adjoined by two, three or more rather similar buildings. Apparently, the (Eurostat, 2017b) combined Terraced houses and semi-detached houses (Twee onder een kap) into one category which make up 4 million dwellings about 55% of Dutch housing. The detached houses (Vrijstaand) have a share of about 17%, flats (appartement) are roughly on 19% and other types of dwellings count by 4%; see figure 11 (Capital Value, 2016; RVO, 2011).

4.2.3. Tenure type

In addition to the information about dwelling type, tenure is the crucial element allowing us to see the ownership relations in residential property. This information is eventually important for the way in which the deep renovation is approached.

Tenure status generally consists of two major groups: owner-occupied and rental housing. In 2015, nearly 70 per cent people in the EU-28 lived in the units they own, while the rest, about 30%, lived in a rented their flats and houses. However, there is further differentiation within these two groups: approximately 20% of people were tenants living in units with market price rents while about one-tenth of tenants lived in reduced-rent or free accommodation. In the EU the owner-occupied dwellings in 2015 ranged from 51.8 % in Germany up to 96.5 % in Romania (Eurostat, 2017b).

Furthermore, the Netherlands follow the similar trend like the rest of the EU, nearly 60% are owner-occupied homes which accounts for 4.4 million dwellings while roughly 40% are rental dwellings. The rental sector is made up of 0.6 million privately owned rental homes (20%) and 2.3 million rental homes owned by social housing associations (80%) (Capital Value, 2016).

Moreover, the Dutch housing stock has one distinctive feature as approximately 2.3 million units are owned by large housing associations and about 1 million rental units are owned by private individuals. (Capital Value, 2016) in its report combined data from CBS, Aedes CiP 2015 and IVBN in order to create a comprehensive diagram for investors which at the same time is useful visualisation for us to see the potential scale for improvement more transparently.

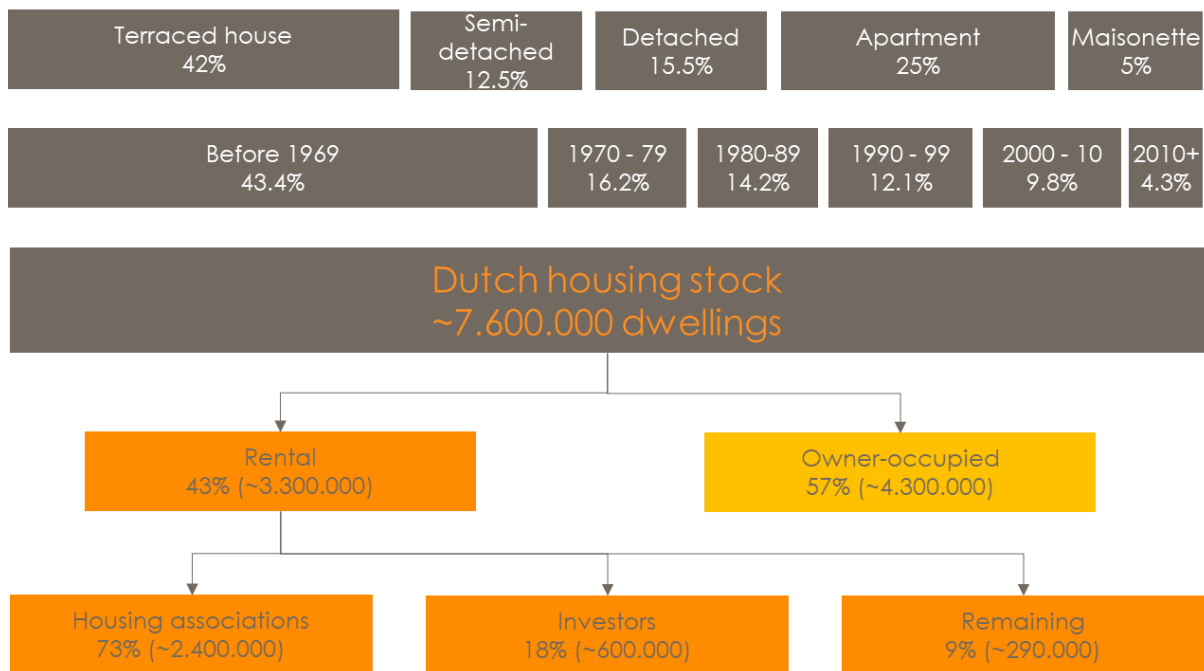


Figure 11: Dutch housing stock
(Capital Value, 2016; RVO (Netherlands Enterprise Agency), 2011)

In addition to tenure, there roughly 60 % of the population lives in their own dwellings but with an outstanding loan or mortgage (Eurostat, 2017b). Taking into account the housing stock environment, financing is particularly important. If we look at the last decade, the major institutional changes outside the housing market have impacted enormously on the Dutch housing finance system. In 2008, the Netherlands, like many countries, was hit by the financial crisis and the subsequent recession. As the owner-occupiers depend on mortgage financing there were hit the hardest by the crises, also due to the fact that a great deal of Dutch banks financed mortgages via the global financial markets. Also, consumer confidence in the housing market fell to an all-time low, causing many potential home buyers to postpone or rethink their purchase. The rental sector was much less affected. (Ministry of the Interior & Kingdom, 2014)

As a response, there has been implemented strict interventions. Reregulation of the Dutch mortgage market has been implemented due to the size of the household debts which has doubled in the last 20 years (the Netherlands the European front-runner) as it put individual households, banks and the government at too much risk. All Dutch banks were able to pass the international assessment predominantly due to that fact that they could balance it with a high volume of households savings which are held by the pension funds. So, there has been a response to this crisis but the government gave priority to supporting the recovery in financial markets while improving the government budget but no clear strategy for restructuring the housing market (Elsinga et al., 2016).

Thus, it all gives us an overview of how about the physical situation of housing as well as the relation of residents towards the housing and financing. The housing stock as it is now is mainly the consequence of normative, coercive and mimetic mechanisms that have been influencing and shaping to the current state.

4.3. Deep renovations in the Netherlands

The ultimate aim of this chapter is to answer the second sub-research question: 'What is the state of the deep renovations of housing stock in the Netherlands and the legislation affecting deep renovations on both Dutch and the EU level?'. Thus, significant characteristics of housing were explored throughout this chapter including legislation affecting its efficiency, physical state and the relation of people towards the dwellings.

As it was found out, the Netherlands, we have roughly 7.6 million dwellings. There are about 30% of apartment dwellings but mostly houses, predominantly terraced houses. That is convenient due to the potential for the renovation, a solution is easily scalable and replicable, which is also what, for instance, the Stroomversnelling project makes use of. The age is also a significant reason for a major renovation and as we can see there more than 3 quarters of dwellings are older than 25 years. Another interesting aspect is the ownership – nearly 60% of dwellings are owner-occupied while in the rental housing the big chunk is managed by housing associations. From the deep renovation perspective, these two big groups of ownership are also interesting to recognise because while one can be managed on large scale the other must be taken from the individual level.

Above all, from the institutional theory point of view, the forces of mimetic mechanisms (3rd pillar), that could be 'visible' through common beliefs or shared logic of action, are not there yet. However, we can say that the state (the EU and the Netherlands) using a number of coercive and normative forces that have the implication on the stakeholders in the housing market. There are rules and laws that push property owners to improve their buildings in terms of energy efficiency. At the same time, those owners and real estate brokers are pushed through a normative measure to assess the efficiency of a property through Energy Performance Certificate. Those who do not comply with those coercive and normative mechanisms are basically not able to operate with their properties, or if they do not improve efficiency it currently has implication on their sale but in the near future would be unsellable due to the upcoming regulations.

In summary, the Dutch regulation may presumably have an impact in mid/long-term as new buildings must be nearly zero-energy by 2020 and all buildings in average energy label A in 2030. But at this moment in time, even though there is a number of European and national initiatives and regulations to increase the market uptake of the deep renovations, there is not yet a reflection of all abovementioned as there is the still-stagnant number of the deep renovations and efficient new builds.

5. Factors enabling the change

The mission of this third part is to identify factors that are involved in the change of pension funds' practice. Throughout the study, we were, so far, able to sketch out the general organisational field of Dutch pension funds and provide some characteristics of the investable environment – Dutch housing. However, the third part moves from the rather descriptive to the practical exploratory approach, hence it aims to explore indications deriving from the variety of institutional logics that prevent the change of the organisational field (practice and logics) that would lead to a change. We are particularly interested in factors that hold pension funds back and would initiate the organisational change in relation to the large-scale deep renovations. So, it eventually allows answering the last research sub-question: “What are the non-financial factors of the investment decision-making of pension funds?”.

5.1. Annual reports

The second chapter taught us that pension funds are influenced by at least three significant logics: market logic, fiduciary logic and environmental protection & social injustice logic. Nonetheless, this chapter focuses on the implications of those logics in practice. Learning right from the practitioners is a quite straightforward approach. However, a better and deeper understanding and further inquiring require gaining a basis for questions. Throughout this subchapter, we aim to find out what has an influence on pension funds' decision-making process, especially what tools and metrics pension funds use to make decisions.

5.1.1. Data source

The source of such data must be searched for at the suitable organisation. Most of the larger financial organisations issue reports in which they describe the way their organisation is managed and what results they achieve. We can recognise different types of the report such as thematic reports focused on a single topic or/and an area, while companies also issue an overview or a retrospective report summarising company management and results from the previous year often with an outlook for upcoming years; that is called an annual report.

Presumably, a pension fund annual report may represent a valuable source of secondary data/information on functioning and the decision-making of a fund, hence it can create a basis for the primary research.

The Netherlands has dozens of pension funds of different sizes. Thus, the practical choice taken is to search for and review annual reports of the 10 largest funds in terms of managed volume of assets. We assume that the largest funds are also the most influential and guide the rest to a certain direction, hence look at those reports can provide an overview of Dutch pension fund market.

Since the reasons for carrying out this review are clear, the topics to look for at those reports need to be defined. Throughout the rather superficial analysis, we, firstly, find out if the pension funds mention responsible investment and consideration on ESG performance, and to what extent it is embedded in their investment strategy. Secondly, look at whether pension funds mention any, in our view, ‘sustainable’ investments such as investing in energy

efficiency, renewable sources of energy, low carbon buildings etc. Last but not least, we try to identify metrics, indicators and tools they use to choose the 'sustainable' investments or all investments in general.

5.1.2. Annual reports' review

The pension funds being behind the reviewed annual reports were chosen based on the ranking of the world's 300 largest pension funds in 2016 (Willis Towers Watson, 2017). This review was done in mid-2017, prior to the interviewing. Base on the rank we chose 10 largest Dutch pension funds.

- ABP
- PFZW
- Pensioenfonds Metaal en Techniek (PMT)
- Royal Dutch Shell
- BpfBOUW pensioenfond
- PME
- ING Pensioenfonds
- Rabobank
- ABN AMRO Pensioenfonds
- Vervoer

Based on such a shortlist of 10 largest pension funds in the Netherlands we could also find out that pension funds used exclusive and non-exclusive asset management companies to manage their investment activities. APG exclusively manages ABP's assets. PFZW pension fund uses PGGM as an exclusive partner for its investments. Large parts of PMT and PME's assets are managed by non-exclusive asset management company MN (ABN AMRO, 2016; APG, 2016; bpfBOUW, 2016; ING CDC Pensioenfonds, 2016; MN, 2015; Pensioenfonds Vervoer, 2016; PGGM, 2016; Rabobank Pensioenfonds, 2016; Shell Pensioenfonds, 2016). We assume that the rest out of the ten companies are managing their money by themselves.

As it was mentioned the review was performed in 2017 so it was done on annual reports describing asset management in 2016. Annual reports for all 10 largest was identified, though a limitation is that a few of them are in Dutch.

A brief review revealed several investment principles which appeared in most of the annual reports. The point from which the pension funds derive in their considerations is The Ten Principles of the UN Global Compact (UN & Deloitte, 2010). Furthermore, all annual reports mention compliance with the Principles for Responsible Investment established by the United Nations (United Nations, 2016). One of the most pronounced topics in relation to UN PRI is the integration of Environmental, Social and good Governance performance factors in the investment considerations which is emphasised in relation to making portfolio more future-proof and stable in value. A few funds use services of Sustainalitics (Sustainalitics, 2017) to evaluate compliance with a range of goals, including ESG in companies. ESG criteria mention in connection to their inclusion in most investment decisions incorporating also real estate. Moreover, to measure and improve the sustainability performance of a real estate fund or portfolio and to increase transparency in the real estate sector, all pension funds (except

Vervoer pension fund) use the GRESB - Global Real Estate Sustainability Benchmark (GRESB, 2017).

In addition to general responsible investment strategy, all pension funds mention exclusion policy to remove companies that do not comply with the set rules by the UN. The engagement strategy is to bring about improvement in companies through dialogue. Voting on management proposals, and the already known ESG integration. Most of the funds also focus on targeted investments that are in line with UN Sustainable Development Goals in some cases mentioning energy efficiency.

In summary, it can be concluded that all pension funds to some extent adopt responsible investment strategy and the United Nations Principles of Responsible Investment. In relation to UN PRI, all annual reports mention integration of ESG criteria in decision-making. However, there is no mention of what sort of metrics or indicators they use to measure, for example, ESG in their assets. Moreover, pension funds buy services from specialised research and rating agencies such as Sustainalytics and GRESB. Nevertheless, there was no mention that pension funds use specific metrics or indicators to choose direct investments like energy efficiency projects.

5.2. Sampling interviewees

In theory, the investment in deep renovation should be a profitable, pro-environment and pro-social investment. However, as we could learn above, the practice is very much different, pension funds do not invest in such projects. Thus, this chapter aims to explore the views and experiences from practitioners and experts in the fields related to the energy efficiency in buildings and investing in such market.

The practicality of choosing experts was based on a few principles. The first principle of such a process was that an expert has to fit one of the groups: 'Institutional investor & advisor' or 'Consultants in the financing of energy efficiency'. A potential interviewee in the 'Institutional investor & advisor' group had to work at a pension fund, an asset management company managing pension funds' money or a pension fund advisory company. On the other hand, a consultant had to be involved in advisory company or project related to energy efficiency of buildings, preferably residential. Secondly, the person should work at an organisation or be involved in a project associated with Dutch financial and energy-efficiency environment. Eventually, the longlist with all potential interviewees has about 50 names on it. The list had been developed gradually with the use of the snowball method which in practice means that the more people had been contacted the longer the list became. Due to the practical issues as the willingness and availability of contacted experts, there were 9 individuals willing to participate and interviewed.

Furthermore, the interviews were conducted as semi-structured, rather an informal questioning the experts in order to steer the interviewed in a preferred way but to allow the conversation to develop in a natural way. There are 6 experts from the financial side and 3 experts from energy efficiency, though it must be pointed out that the expertise can be practitioners can overlay both groups. For the group of 'Institutional investors and advisors':

- Chairman of the financial committee at TNO pension fund – a (smaller) company pension fund managing about 3.5 billion euros in pension assets
- Senior responsible investment advisor at PGGM – an exclusive asset manager to the PFZW, the second largest pension fund (over 190 billion euros) in the Netherlands
- Principal fund manager at MN – an asset management company for several Dutch pension funds including *pensioenfonds Metaal en Techniek* (PMT), *Pensioenfonds van de Metalektro* (PME) and *Bedrijfspensioenfonds voor de Koopvaardij* (Bpf Koopvaardij). The fund in total manages more than 110 billion euros in pensions.
- A senior manager at NLII – the Netherlands Investment Institution (NLII) is an organisation enabling institutional investors such as pension funds and insurers to invest directly in the Dutch economy.
- Senior researcher at Bouwfonds IM - the real asset investment management division of Rabo Real Estate Group focusing on residential and commercial real estate.
- An analyst at GRESB –Global Real Estate Sustainability Benchmarking assessing the sustainability performance of real asset sector portfolios and assets

The second group of interviewees are 'Consultants in the financing of energy efficiency':

- Project manager at Green BuildInvest Initiative - a platform creating a community where stakeholders share their challenges in the Dutch market.
- Consultant at PNO and project manager at BuildInterest – European project focusing on overcoming the financial gap in the built environment
- Senior advisor at TNO - Netherlands Organisation for Applied Scientific Research is an independent research organisation in the Netherlands that focuses on applied sciences

5.3. Findings

The findings are based on the transcriptions from nine semi-structured interviews with Dutch stakeholders. There has been a number of interesting points that experts made. In order to categorise these points, we made use of Atlas.ti – a qualitative data analysis & research software – and coded relevant findings.

Throughout the interviews, we wanted to find out a number of publicly undisclosed points related to the way pension funds invest and factors connected to it. Thus, we prepared a set of questions, though we must point out that due to the used research method and two rather different groups of interviewees, the formulation and use of questions eventually differed depending on the direction of an interview. In addition to the preparation, Prior to the actual interviews, the interviewees were informed about the topic and the point of interest in this study. The prepared set of questions can be found in Appendix 2.

- Risk aversion

Firstly, we wanted to explore whether there is any difference in risk perception associated with the size as it could make a difference in defining a more suitable entity in relation to the deep renovation investments. A chairman of a small fund says:

“If you realise how pension funds allocate their money, they are, in fact, constantly looking at the balance between how much risk is in a particular investment for what return.” (TNO Pension fund, 2017)

As an advisor of the second largest fund pointed out:

“as we are a pension investor we have to invest in market rate returns so we want to make a good positive societal impact, but we are not willing to give out a financial return or take additional risk.” (PGGM, 2017)

The chairman of rather small pension funds adds that:

“If you ask people, it is still the most important criteria. We do want to have a proper pension.” (TNO Pension fund, 2017)

Thus, we can say that in the world of pension funds that the risk aversion is not mattered of size. Small as well as large pension funds share more or less the same risk aversion. Pension funds have a responsibility towards their pension holders to provide them with a good pension so they cannot put them under a threat of losing it or reducing its size.

- Regulations and risk perception

In addition to the risk, the pension funds are also pushed by the Dutch National Bank to keep the risk profile low:

“You are not allowed to have a higher buffer if you are not able to repay the money on pensions. Therefore, there is a pressure to lower the risk.” (TNO Pension fund, 2017)

Which means that riskier the investments are the more money a pension fund must hold in order to be able to pay back pensions.

The initial research and subsequent annual reports’ review revealed that pension funds engage and integrate responsible investment strategies:

“[responsible investment strategy] is fully incorporated in our investment policy.” (PGGM, 2017)

“That is fully incorporated in our investment policy, in all asset classes, in the whole balance sheet or at least we are currently on about 80%. However, the goal is to implement it for the whole balance sheet.” (MN, 2017)

So, we can confirm that pension funds are engaged in the shift towards more responsible investments. It also means the inclusion of ESG criteria for their investments. However, Dutch National Bank at the time of interviews had no metrics for investments that have, for instance, high ESG performance so the highly performing investments can, from the viewpoint of DNB, have a higher risk profile, hence pension funds must have higher buffer levels.

“I did ask several times the Dutch National Bank to try to make a system where ESG criteria are in line with the risk criteria...The representatives of Dutch National Bank asked all Dutch pension funds what they do to invest in more ESG performing assets. So, I asked them ‘What do you do to change your rules to apply a lower standard deviation to those categories that have longer-lasting goals.’” (TNO Pension fund, 2017)

Based on the interviews, pension funds invest in more ESG performing type of investments, but they must be convinced that the investments will be financially well-performing assets as their risk buffer will eventually be increased.

- **Human and research resources – investment assessment**

Furthermore, pension funds do not have the capacity to research the whole universe of investments so this type of assurance is provided by external companies:

“we do not have the capacity to have a track record of all those thousands of companies you can put money into and we are not able to make a decision on those companies.” (TNO Pension fund, 2017)

“we do not have the capacity to have a track record of all those thousands of companies you can put money into and we are not able to make a decision on those companies... There we get an advice from Sustainalitics... We use GRESB (Global Real Estate Sustainability benchmark) database and by the way, we are one of the founders of GRESB..”(PGGM, 2017)

“larger pension funds usually invest more in private funds, rather illiquid market so they ask their investees to participate in GRESB and for them, it is a reporting and engagement tool. Usually, they have engaged after a pension fund invests in them.” (GRESB, 2017)

- **Housing - indirect investment**

However, a private property fund - a place where pension funds can indirectly invest in the residential and commercial property - do not use only one assessment to make a decision on an investment:

“The GRESB evaluation is not the only thing you should look at and that is very important... We just think that there are more things to look at if you would like to have long-term strong investment.” (Bouwfonds, 2017)

Focusing more on the investing in the housing in the Netherlands, the advisor to the largest pension funds describes drivers behind those decisions:

“It is two-fold, there is a commitment to do something with ESGs and social development goals developed by the UN where they committed themselves to mobilise and contribute to these goals. The first part result in doing something related to energy transition or more sustainable housing. The second part is more about Dutch social and politic pressure to invest in the real economy in the Netherlands.” (NLII,2017)

- **Housing – mortgage investment**

In addition to the indirect investing in the property funds, the pension funds invest in the Dutch real estate through a few more approaches:

“The way we do it, we do not finance the housing market. We do it via mortgages. We are not investing through funds or so.... The Dutch mortgage company is simply focused on housing mortgage. Funding funds issuing mortgages to the housing market.” (MN, 2017)

“we do have mortgage products that we invest in. We provide a small discount on making a house more sustainable so more energy efficient investments. That is the Dutch mortgage product we provide, and it is called Athens.” (PGGM, 2017)

- **Housing – direct investment**

Even though that pension funds and asset managers tend to invest indirectly, one of the interviewed asset management executive confirmed that his funds deviate from this trend. The fund has a housing portfolio that has been acquired and managed throughout years.

“we are one of the few pension funds that have its own housing portfolio...We have our own team that manages built houses in the Netherlands. We also renovate these houses to more sustainable levels. We upgrade all the houses with a small increase in rent while the other side of the coin is that the value of a house increasing more that costs of these climate-friendly improvements.” (MN, 2017)

In nutshell, the first part of the interviews, which was rather general and allowed us to find out about the willingness of pension funds and their asset managers to invest in more environmentally and socially performing asset classes. We can summarise that pension funds and their asset managers to some extent pushing towards the more sustainable way of investing through responsible investment strategies involving exclusions and ESG criteria integration. As the financiers do not have the capacity to assess potential investments on their own, they use independent specialised companies to provide them with assessments and benchmarking. However, we could also identify some factors limiting the way pension funds invest in more ESG performing asset. One of these factors is the policy of the Dutch National Bank perceiving it as a riskier type of investments, hence pension funds get worse risk profile and must increase their financial buffer.

- **(Non-)Financial barriers**

Moreover, the second part of the interviews was a focus on topics targeted more on the energy efficiency and investments in housing energy efficiency. Specifically, we aimed to reveal whether the access to finance represents a real barrier as it is referred to in a number of studies (Pitt et al., 2009); (Economidou et al., 2011); (Karlsson et al., 2013); (Jones et. al., 2013); (Vandewiele et al., 2015); (Toleikyte et al., 2016); (European Commission, 2016). Further, we aimed to find out what factors cause the current situation in which the largest financial institutions (that are at the same time pushing for investing in more sustainable assets) do not invest in making housing stock more energy efficient.

As we mentioned, there are several studies that claim that access to finance is the most significant hurdle in deep renovations of housing stock or buildings in general. Nevertheless, the findings from conducted interviews claim rather the opposite. The leader of the EC funded a project focused on financing energy efficiency in buildings said:

“I’m not sure whether there is the single main barrier, the common perception is that access to finance is the one but I’m not sure that’s the case. It’s always easy to say we need more money but it is not really concrete. It is typically a lot more complex... If you look at the rental sector of the housing market it is the opposition from the people that they live there. People do not want the house renovated, it is a nuisance. While the barriers in the office market the barriers will be completely different.”(PNO, 2017)

“I am not sure if there is a one [a barrier] I could point out; the true problem is there are so many of them.” (TNO, 2017)

“I would say the main area why it is not happening is the non-financial issues rather than financial...it is predominantly due to the fact that there are more operational limitations than

funding limitations....So, there are a lot of practical, political and operational barriers which at least limit the speed in housing companies are renovating.” (NLII,2017)

“I do not think that financing is the hurdle but more of an operational hassle.” (PGGM, 2017)

Therefore, we can say that financing is not the most significant barrier. It may not be a barrier at all as it represents an overarching term that is used to cover the non-financial hurdles.

- **Non-financial barriers – lack of projects**

In addition to the previous part where the non-financial factors were mentioned as the potential barrier to the investments in the energy efficiency in buildings or more specifically deep renovations of houses, this last part aims to identify those non-financial factors.

One of the initial responses that the financial sector has to the question ‘why don’t they invest’ is something that was mentioned during the interview with Danish pension fund manager:

“The financial sector says we have the money but we cannot find projects.” (PNO,2017)

The lacking number of projects is also related to the scope that pension funds have, they must look at a certain size of a project:

“larger institutional investors look for large investments...a limited number of resources as in people who do the investments...That means that amount of work determining the amount of work in invest in a project worth 10 million is about the same as in a project worth 100 or 200 million...As the result, they look only in projects starting at 100 million ticket size which makes it difficult for them to invest in the Netherlands because there is a limited number of large projects...” (NLII, 2017)

- **Non-financial barriers – lacking transparency**

Similarly like the Danish interviewee, the Dutch ones pointed out that what this a non-yet-existing market lacks is an organisation that can make investments transparent:

“During most of the meetings, I could experience it is all about lack of data which is perhaps the major issue from an investor perspective...The trust is related to lack of track record. Which is the major issue for investors because there is no database of projects available where they can assess the risk. Typically when they invest in something there is a risk profile – interest rate, risk of default, primary energy efficiency; it is just not there. It has not been around for long enough to make an adequate risk assessment by default the risk is as high which hamper a lot of these investments.” (PNO, 2017)

Our problem is, there is not a good tool for sustainability for residential because residential is completely different as opposed to the commercial real estate. (Bouwfonds,2017)

“What I personally think that there is not a trusted party (a private company) in the Netherlands which would lead coordination about all kinds of energy efficiency improvements in housing...There are several private companies that provide these type of services but I think it is very complex and people do not understand it and there is still a bit of reluctance to make a big investment.” (PGGM, 2017)

“I would point out is a hit-and-run approach, a building company gets an assignment to build a building with certain constraints or demand and they make a drawing and they say how the build will be built. That is a static contract and what I mean with hit-and-run is that they are ready, the building is done so the building is yours and good luck. The building company has no responsibilities anymore so when something needs to be repaired or maintained for instance

due to a certain way of using the building the energy losses are different in comparison with what was calculated by the building company, it is not a responsibility of a building company anymore. There is the building and I am not responsible anymore so that is the meaning of hit-and-run.” (TNO, 2017)

“So that is in my opinion problem in Holland – you need one party for solar panels, another for a boiler, next one for new windows, you need another one for insulation of floors and walls... People need one contract in the company they really trust in... The party going to install it, it is also a credible party and the technique is also sufficient enough next few years, does not go broke, the system not going to default, the quality is good.” (PGGM, 2017)

The quotations above show that there are at least two intertwined issues associated with transparency in investing in the deep renovation of housing. Pension funds, as any type of financial institution, need to calculate the return and risk for a particular investment but if data is lacking, it creates an aversion towards such investment. The data availability is very much related to the fact that there is no credible organisation or company that provide one-stop-shop and life-cycle services that would allow data collection and subsequent trustworthiness to invest in.

- **Data availability - Alternative investment**

In addition to the transparency and data availability, interviewees pointed out to the slightly different direction, they have invested in infrastructure projects as they are provided with more established and thus transparent type of investment:

“Our loan portfolio is not really targeted on financing energy efficiency in housing on the other hand if you look into our infrastructure portfolio we bought a big stake in SolarCity. We particularly invested in solar parks in desert and mountains where these panels are available for people who don't have enough space of their rooftops so these homeowners rent solar panels in these sunny and hilly areas which provide a very efficient way to get solar energy and, therefore, lower energy bills for homeowners. This sort of allocation is an infrastructure investment for us where we become the owner of a solar park which is rented by customers from residential sector and pay a monthly fee for that while they get a certain amount of energy for that.” (PGGM, 2017)

Infrastructure investment in a deep renovation or its technological part is currently not possible, though there may be a potential:

Now we are looking together with Dutch state in a way (following example from the UK and the US – on tax/on-bill charge) to link the mortgage to the property [or technology equipment] rather than the individual. That's something that we are currently discussing with the ministry of housing in the Netherlands to see how we can legally create such structure and if it is allowed by European law. If that would be successful then we can see a big opportunity to mobilise private house owners (NLII, 2017)

Such inability currently creates a barrier so investors rather invest in infrastructure projects.

- **Non-financial barriers – missing valuation standards**

Another non-financial factor that was already highlighted by the British expert during the initial interview and afterwards repeatedly appeared during the Dutch research is the fact that the price invested to the energy efficiency measures is not reflected in the price of the property itself. The Dutch experts pointed out:

“because deep retrofitting of a certain asset will cost you more than 5 to 10% of the total value of the asset and whether you will get it back in the proper sense in 10 years’ time, I am not sure. It could be but if you do not have a proper valuation for the deep retrofitting while your tenants taking off part of their energy bill, that does not happen.” (TNO, 2017)

“At the same time, we see that private housing owners because they are very hesitant to lend money to renovate their house because they already have a mortgage and refinancing of for example 20 thousand euros to undertake the renovation...Current analysis from housing valuator shows that your property valuation will not increase by 20 thousand.” (NLII,2017)

“Valuators do not know how to evaluate the energy efficiency measures. In the Netherland, one of our main projects will be to work with valuers and banks as such to create a common consensus on what aspects you should look at. A very easy way to demonstrate the problem is if you are a homeowner and you want a new kitchen worth 5 thousand, then if you take a mortgage your home will be more valuable. However, if you want a solar panel, you have to take a loan because the bank does not see it as an added value of your home.” (Green BuildInvest Initiative, 2017)

- **Non-financial barriers – missing incentives**

Additionally, potential stakeholders in the deep renovation chain, from the financial institutions to the builders, lack of incentives to push them closer to work on the renovations:

“The renovation part is even worse because we do not have any incentive for anyone in this field to make big steps in this aspect.” (TNO, 2017)

“If there is an incentive from the government that we pay lower taxes and so on. There basically should be somehow an incentive because at this moment there is no incentive for investor do make such investments.” (Bouwfonds, 2017)

Above all, the brief review of the annual reports and the subsequent interviews enable us to explore the general approach of the sample from Dutch pension investment environment and more specific attitudes towards deep renovations of housing stock. We can conclude that the institutions push towards more pro-social and pro-environmental type of investments but only to some extent as they try to keep their risk profile low. We found out that the major pension funds and asset management companies on their behalf consider a few factors as quite significant for the investment to the deep renovations. There are a number of reason why the investments do not take place: the pension fund investors lack projects and partners in this market; the availability of data related to the performance of renovations is lacking; any form of financial or non-financial incentives is also lacking; valuation method of the energy efficiency measures is not in place either. Thus, these are not directly financial barriers but rather non-financial barriers which do not make the financing possible.

6. Discussions and conclusion

6.1. Discussion

This discussion deal with the aim of this study, its findings and their practical value. Further, there are discussed similarities and differences between the studies concerning a similar topic or aspects. The next step covers all three research sub-questions. Lastly, the limitations of this study are briefly elaborated.

At the beginning of this study, we identified the knowledge gap in investors' preferences associated with deep renovation type of investment. Further, we narrowed down the scope of this study on the pro-environment and pro-social investor with a long-term investment horizon: pension funds. We delineated the aim paying the attention to the pension funds' motivations and obstacles for potential investment in deep renovations. Eventually, we were able to some extent identify what motivates pension funds to take the renovations into consideration but mostly the obstacles or factors that make the investment in the deep renovations complex were found.

Furthermore, these findings create an overview of conditions under which would Dutch pension funds invest in the large-scale deep renovation of Dutch housing stock. Since there is a Europe-wide momentum pushing all buildings to become energy efficient, these rather broad findings may be significant to academia but particularly to practitioners and experts beyond the financial sector. These finding might also be important in cross-sectoral understanding and collaboration. We can speculate how valuable the findings are, though there is obviously a momentum while actions to support that are lacking. The relevance of findings in practice can be valuable to policymakers and energy efficiency sector in their endeavours for intermediation between private finance and energy efficiency projects. Thus, the findings make up at least a few pieces of the puzzle that represent a working deep renovation mechanism.

There are many ways researchers look at the problem, McCarthy, Sorsa, & van der Zwan (2016) focused on how the preferences of pension funds (including Dutch) have changed over the decades. We can strengthen our findings by claiming that the authors similarly identified pension funds' preferences to be caused by institutional pressures related to financing needs and capacities, governance capacities, and regulative compliance. Furthermore, McCarthy, Sorsa, & van der Zwan's (2016) recommendations steered the research to the identification of other factors that shape investment preferences, particularly those that are not expressed in public. In contrast, Brouwer et al. (2017) researched large scale deep renovations of housing in particular, though they focused on potential business models. They identified a mismatch between stakeholders' values, hence they recognized the knowledge gap between investors preferences and values. Thus, this thesis can complement these studies.

Moreover, in terms of the research topic, there are at least two studies that the thesis can relate to. On one hand, there is a study from Masini & Menichetti (2013) identified the incomplete understanding of underfinanced Renewable energy technologies. Authors also build on institutional theory but included behavioural finance in their research on non-

financial factors affecting the decision to invest in renewables. However, the researchers made use of quantitative methods in their analysis based on a large sample of European investors of all kinds, while we aimed for qualitative exploration of pension fund investors only. The quantitative research brings more comparative view on the issue, so they could, for instance, identify that a priori beliefs on the technical adequacy of the investment opportunities play a much more important role in driving investments than the perceived effectiveness of existing policies. Even though the research approach of our study does not enable such comparison, our findings correspond with the study of several intuitive beliefs - the necessary condition for investors is that the solution must be proven and that the implementation of suitable policy instruments can correct market inefficiencies.

On the other hand, the second study, and also the latest study, from Bergman & Foxon (2018) focuses on the exactly the same topic – insufficient financing in the large-scale deep retrofit/renovation of housing. Even though there are clear similarities, the geographical boundaries of the study concern only the UK while aiming to identify implication on a new framing for energy efficiency policy. The authors see the potential for creating investable opportunities in framing energy efficiency as infrastructure, similarly, some investors in the Dutch environment also see the potential in energy efficiency infrastructure. The partial overlap between ours and Bergman & Foxon findings highlighting the need for a mechanism that aggregate individual projects into larger, investable opportunities while government acting to reduce investment risk.

Focusing back to this thesis, there are three research sub-questions supporting the main one. The first research sub-question asked about pension fund investors which led to a brief description but more importantly to an identification of three pressures influencing pension funds. This identification is based on literature review and surely does not represent a full list of influential forces affecting pension fund investors, though those three characteristics are significant for our understanding of pension fund investors.

Through the second sub-question a closer look, at Dutch housing and deep renovations within, was taken. The characteristics of housing and legislation affecting the housing were described. The characteristics of the EU and the Netherlands do not try to be compared but rather emphasised the differences and incomparability with other countries of the EU. Further, we could see that the physical and ownership attributes such as uniformity may support easier large-scale adoption of deep renovations. The main takeaway is that even though the housing stock is renewed with more efficient houses and deep renovations are done, the pace/volume is too low to fulfil any targets related to the energy efficiency of housing.

Thirdly, the actual organisation and experts are examined in order to identify non-financial factors that make energy efficiency/deep renovation investments complicated. As a result of annual report examination and expert interviews, a collection of factors - such as data availability, sizable investments, credible parties etc. - was identified. There might arise a question where the boundary between financial and non-financial factors actually is. As the factors like credible parties to cooperate with and the availability of data might be perceived as non-financial ones in our view, at the same time, others could be labelled as financial

factors. So, the boundary in between those two is rather blurred and may not be further differentiated, though this could be a question for a different research.

In addition to the value that this research can bring, we must also acknowledge its limitations. Some limitations were mentioned through the scope of this study. Further, it was already acknowledged that this study has its limitations in terms of geographical boundaries, it touches upon the EU but predominantly focuses on the Netherlands with its specificities in building stock, national policy and financial system. Notably, due to the practical limitations regarding the sample size and variety of interview organisations, the generalisation of the findings is not so solid, though the findings were strengthened through literature supporting most of them. Additionally, the findings are not supposed to be representative, but it is a rather broad overview of factors having an influence on investors, hence they partly filled the knowledge gap.

6.2. Conclusions

In summary, this study investigated deep renovation of housing stock from the perspective of probably the largest institutional investors – pension funds. It aimed to reveal pension funds' values, preferences, motivations and obstacles related to the investing in deep renovations.

First of all, based on our findings, the non-financial issues represent the main hurdle for any market uptake of the large-scale deep renovation of housing stock in the Netherlands.

Further, there is an issue in investability of projects. If some of the previous studies claim that available financing is an obstacle, we, on the other hand, identified a non-existing or insufficient number of investable projects from financiers' perspective. That is mainly due to the fact that pension funds invest in large projects (the minimal number differs from 20 to 100 million euros). Thus, the condition that stem from such findings is that individual deep renovation projects must be bundled or managed under a large bundle.

The following condition is related to the transparency and the way pension funds invest. As the funds are actually investing people's future pensions, pension funds have a high risk aversion (and are also regulated to be risk averse). Basically, the risk is lowered through data from which the funds are able to calculate the performance of a particular asset and their risk and returns on the investment. So, data availability is the necessity for pension funds.

In connection to the data availability, the source of data – organisation performing the deep renovations – is equally important. Pension funds need a reliable partner that has the know-how; hence it can install, operate, maintain and replicate the renovation solution. Therefore, such partner(s) can provide data as a result of proven track-record and robustness of the provided services.

In addition to the conditions directly associated with the renovation investments, there were raised another, at least three conditions, reflecting current systemic hurdles in investing. Firstly, the change of monetary policy, in particular, the re-evaluation of the risk potential of ESG factors by Dutch National Bank – the supervisory body of Dutch pension funds. Secondly, the legal approach to the energy efficiency elements in buildings must change to enable

financing of renovations (on-bill or on-tax financing). Thirdly, the significant condition is the adjustment of valuation for energy efficiency measures (e.g. photovoltaic panel) that, according to current valuation standards, do not affect or even decrease the price of a property.

Above all, these are the conditions that, based on our research model, can create a new practice field where deep renovation projects represent a usual investment class.

- **Suggestions for further research**

Since the conditions identified through our explorative research represent a non-exhaustive list. The first suggestion is to involve a larger sample and create an exhaustive list, though the real value could stem from ranking the importance of those conditions. Additionally, each of the identified conditions creates an opportunity for a potential follow-up study. As this study did the first phase – the exploration, following research could focus on larger more representative sample though applying a descriptive research method, subsequently, an explanatory research method to reveal the causal relations.

Furthermore, the qualitative interviews in this study painted a picture of the complex decision-making processes undertaken by financiers when they are making their investment decisions. Based on these findings, a next step would be to interview the opposing side - housing owners and learn more about their view. Additionally, in relation to the knowledge gaps, there is space to research the barrier to the renovations – technical, social, institutional as well as the financial - from a different point of view. Another interesting point worth of researching stemmed from the interview, the question raised during the discussion is how policymakers can incentivise financial institutions to move into the market of energy efficient housing. Eventually, the future research could focus on combining of information from the builders, owners and financiers in order to create well-tuned policies supporting the uptake of deep renovations.

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Appendix 1 – Context interviews

The intention for conducting both unstructured phone interviews was to broaden the basis of knowledge from the European perspective. The interviewees are experienced experts, the first one in the British construction environment while the second one is a financial expert from a Danish pension fund, so it represented a valuable opportunity to learn about the situation regarding the deep renovations in the UK and Denmark.

Date	Organisation	Role
01/09/2017	Mott MacDonald - UK	Technical principal
31/08/2017	PKA Pension Fund - DK	Head of responsible investment

Unstructured phone interview conducted on the 1st of September 2017.

Projects Director at Mott MacDonald

First of all, I tell you about the project I am involved in and we can take it from there as a discussion. Projects I work on, there are not programmes of retrofitting investments, they are either newbuilt projects that have energy efficiency as the big element to it. I am familiar with the technical aspect of keeping energy efficiency in big residential projects and actually energy efficiency in commercial projects as well so to understand the technical side of implementing improved energy efficiency on new buildings and have some experience from there on retrofitting energy efficiency as part of a project that was retrofitting a building anyway. I do not have much experience in retrofitting, one project, 15 years ago, retrofitting just for energy efficiency because they do not tend to need consultants. However, being in the energy efficiency UK anyway, I am familiar with the argument about generally retrofitting and the difficulties in persuading homeowners to spend money on the retrofit. Because they do not see the benefit, so it is difficult for them to understand this: why would I pay 20,000 pounds now to retrieve 100 pounds a year on my energy bill, this just does not make sense. I was part of a discussion on Energiesprong, the triangulation of Energiesprong. There was the very interesting thing that came out of that which is about rates of return and the interest rate from investors who invest in energy efficiency. They say we have got loads of money, we will make that money available for people who want to achieve energy efficiency and really expect a return on our money. There is a big difference on it but expectations of rates of return in the Netherlands compare to the UK because the rates of return in the UK are 6-7% and the rates of return I understood from Energiesprong 2-3%. That is the difference that killed it because those rates of return are really hard to achieve. Therefore, even though that investors have all their money available nobody wants it. Having followed those discussions in the UK where they were making funds available, setting up fund managers to manage those funds allocated for domestic and non-domestic retrofit, those investors were desperate for a project pipeline as they call it, are the people would want their money and would give them those rates of return but the pipeline see no reason to do that, it is not in my interest anyway. They have often better borrowing rates themselves, especially public buildings because, in the UK, they have a lender of last resort so you can lend for very low rates for public buildings.

I just remember one other thing, which is specific to the UK, on a domestic retrofit for the poorer parts of society for whom a saving of 30 pounds would be really valuable and crucial. In the UK they tend to live in council homes. Council homes being homes owned by the public sector.

- **Is it a sort of social housing?**

Yes, but it is not quite the same. Social housing is something different. There is a different grade of it, council houses are for the poorest while social housing is for those slightly more wealthy but it is different from their homeowners but private sales. For a council house, the accommodation for the poorest members of society, there is the thing called right to buy which means that those people, if they can, they can buy their home. Interestingly, if the council spend loads of money on energy retrofit, they have the risk that they never retrieve over time the benefit, because the tenant has the right to buy. These are the key reasons when we had these discussions about why it is really hard to make this work in the UK because the council run the risk of never retrieving their investment.

- **What is the situation on the broader scale not only in council housing but in rental housing?**

That is having its own problems because there is a landlord who has to spend money on renovation but the tenant recoups the benefit of lower energy bills. Then the UK introduced the thing Green Deal. The failure of that which all about that people do not spend money on energy retrofit because they do not have the spare ten thousand pound that they would need so they do not do it, even though it is a good investment over time. There was a thing where you can borrow money and pay it back against lower energy cost and that is what basically green deal was. The government was really surprised how few people were taking them up on it. The reasons for that were, in order to it you had to pay an assessor so you have to pay at least a hundred pounds or something to get your assessor to come and tell you what terms of deal would be and for lots of people was this thing what put them off, even that small pay. Then, there was an issue of the rates of return being too high. It all seemed to be like making money for investors rather than actually achieving the goals of the programme, luring taking them up on the loan.

- **Do you see any shift in investors focus towards non-financial or ESG improvement or considerations in their focus in particular projects?**

The driver for new in the UK is planning permission and it is our building regulations which are two separate regulatory principles. The planning permission is applied on a local authority basis and especially in the south-east and London. Within these policies they can say you do not get a planning permission unless you do this, for example, in London, they say you will not get a planning permission unless you achieve a lower carbon building. But there is no national definition of lower carbon building, the local authority has to come up with their own definition. In London they have applied sort of hierarchical thing where they say that a certain percentage has to be achieved on-site, in your building, and the rest of it, if you cannot achieve it on-site, you have to pay for residual carbon emissions which is sort of a carbon offset fund, a green fund that local authorities then administer themselves. That happens for the areas of the country, following economic growth and affluence so there are probably local authorities in the north of England where is no way that they would do that because they are desperate for a new economic vibrancy and they would not want to put off developers from developing anything. They do not really have the luxury of being able to impose these additional constraints on buildings whereas in the southeast of the UK everyone is desperate to create new buildings and get the value from being in London in less of a problem. There is one thing, however, there is also a national regulation called the building regulation and they are progressively applying tighter and tighter requirements on the energy efficiency of buildings anyway and these building regulations apply to major retrofits and also to new build. There is some driver for a retrofit that comes by the national level but the issue with those is that because they are national they almost have to accommodate the lowest common denominator. They have to be really careful, whatever government is in power, they have been more ambitious or less ambitious. When Labour were in power they were setting up a trajectory that was pretty ambitious which would probably cause problems in less affluent

parts of the UK because it would have been posed additional economic constraints that might be a problem. They have to tread the line very carefully which is why the local level and the planning permissions do not think that national policies going fast enough that is why they impose their additionally onerous local planning constraints.

- **Based on what you explained, does the south of the UK have stricter measures for major retrofit projects as well?**

In terms of comparison between new build and major retrofit, the new build is more onerous because you can achieve a more cost-effective target if you do it from scratch so they cannot apply that onerous targets for retrofits.

There was one other legislation issue I just remembered where the government has to declare that from 2018 in relation to energy performance certificate, the UK has an energy performance certificate and display energy certificate. Basically, buildings that going to be sold have a requirement to display and create energy efficiency certificate. From 2018 all buildings will not be able to be sold or rented with an energy performance certificate lower than band D. The last time I checked that it was still 2018 but I do not know about current changes, it might be delayed. That is an incentive for a landlord to do an energy retrofit because loads of them will be below that band. They have known for three years or so that they will be facing a problem where their property unless doing something about it, are not rentable. So that is another national legislation driver towards energy retrofit.

There are a couple more things in relation to these topics. When I say the UK, Scotland has its own, separate, set of national regulations and I think that Northern Ireland has that as well. Thing is that building regulation, the energy part of it, is due for an update in 2019. We, as building designers, know that in 2019 we will have more onerous targets to meet through building regulations but we also know, from past experience, we will not know what these targets are until, possibly, the day before, not literally but quite close to that time. There is also an allowance so they give you some time to adjust your design, I cannot remember the exact details, basically, there is a transition period.

- **Expect the regulatory ones, would you see any other drivers towards more sustainable and low carbon buildings?**

For owner-occupiers, there are drivers about lower energy costs so some sorts of clients understand investing to save in the future. They ask for the buildings to be designed that are more efficient than national regulation. Some developers who are building buildings to sell, they understand that they could get a premium for creating buildings that are more energy efficient. Some people would understand that sustainable development has increased value, or just believe that it is the right thing to do, so they are some developers who push the boundaries because they think that it is the right thing to do and they do really great things. The example of looking into what some developers do have a look at Queen Elisabeth Olympic park sustainability, that is a new development that is happening on the site of the London 2012 Olympics. There are also a couple of developers – British land and Land securities, both of these developers published their sustainability standards.

There is sort of clients interested, for example, university clients tend to be interested in it because there are fairly intelligent clients so they can understand that they are additional benefits. Generally some of the drivers are reputational so, for example, universities are attracting students. It is useful for them to have these sorts of stories about their university being sustainable accommodation, sustainable buildings.

- **Do you have any experience with a valuation of energy retrofits?**

Yes, there has been very little data in what the difference will be in energy bills so you can model it, you can predict it but because it all depends on how the people will use the building, for example, if it

is a school build whether they have evening classes and weekend use. There is not enough concrete data for investors to be that sure about their returns which is why their money is relatively expensive because the data is missing, the data giving investors reassurance that there will be a return at a certain level. Effectively there is very little precedence on the return from energy efficiency and you are right, that affect the ability to invest.

- **Do you have any experience in valuations buildings that have been retrofitted to an energy efficiency standard in comparison with the ones they have not?**

Because the people doing the valuation are state agents generally and they are not that technical and again, there is a very little precedent. They tend to see energy efficiency measures having complications, not benefits. I have heard stories where, just on a private residential house, he had two exactly same home but one had photovoltaic panels on it. A state agent would value the one with PV panels as lower than one without because it is a complication, it is an unknown which is crazy.

I am wondering what is going to change and I am following the whole carbon pricing story, the COP21, Paris accord thing. Because if the nations are brave enough to put pricing as a hard target that what might change the perception of energy efficiency from a difficult, complicated, horrible, wispy, unknown thing because the alternative is worse.

Another thing about energy retrofitting is the pure complication of it, as in, what is the right to do, is it the easy things stripping your windows, is it replacing your windows, is it replacing your boiler. The interaction between the building and energy HVAC (heating, ventilation, air-conditioning) systems is incredibly complex and so it is just not an easy thing to do. I am just thinking of a project we were looking at energy retrofit with a particular European district and if you have good a type of buildings that are consistent across your city then you can come up with a solution and then you can mass-retrofit because you have tried them out on a couple of building and they work pretty well. But if your city is made up of the massive different type of buildings that then means it is really hard to come up with a robust solution that would work all over the place.

There is another thing, in relation to new build as a solution, the UK has been looking in that for 10 years or so and as part of these planning requirements I was talking about, we used to advice developers on what the right answer was between heat pumps, biomass boilers, CHP (Combined heat and power), PVP (photovoltaic panels), improved fabrics, triple glazing and we have done a study looking at those things and trying to find the option and solution is. Over the 10 year period in new build residential, they have settled only on two things – improved fabric and photovoltaic panels. The reason for that is because these developers build brick-and-mortar and they want sit-and-forget solutions. They do not want a biomass boiler or CHP plant because it could go wrong in the future. Even if it cost a bit more, at an installation stage, to put photovoltaic panels in they are happy because it put less risk overall ongoing issues.

- **Do you see any direction in which this industry tend to move or is it unpredictable?**

Having tried to improved energy efficiency in building for the last 30 years, some people do it for altruistic reasons but ultimately that is not going to make the change that is needed, so I come to the conclusion that it is only regulation that can create the movement needed. That is in the UK, I cannot really speak for other countries. I think, the UK, in comparison with other countries seems to be very focused on the business cast. Which is good in some way because it means that they are very adapt looking to rate of return.

Unstructured phone interview conducted on the 31st of August 2017.

Head of Responsible Investment at PKA Pension fund

Basically, PKA is a Danish version of PGGM, we have healthcare and wealth-care in our base. These are nurses and so-called social workers. They are very interested in these topics, mainly due to the fact that 90% of our members are women. At our annual general meeting, we have different seminars discussing sustainability, everything from energy renovation, through tax to climate, many different topics and they are highly engaged. Our job is basically to figure out how can we, that the specific reference in our investment strategy, combine the best possible returns in line with our social, environment and climate agenda - how can we do that in the best possible way. Then I'm glad to invest in many different asset classes and many different investments ranging from offshore wind parks, direct infrastructure to investment in emerging markets, for example, the biggest African onshore wind park, to forestry, to green bonds, too many different types of investment. When it came to the energy efficiency, of course, we can see the return that can be made within these segments and that is also the reason why we are investing of course.

However within energy efficiency, what is the major problem? The major problem is not a lot of options for investors if they would like to invest in energy efficiency. Before we laughed SustainSolution fund, if we want to have an exposure to energy efficiency, sort of long-term aspect of energy renovating houses, the only thing we could do was invest in green bonds. That's it and that is what we did, where we have our own green bond and the framework assuring that proceeds only are used for energy efficiency and renewables. But still, from the Danish perspective, there are no products out there, there is no way for us to get that exposure.

It actually came out of nowhere because a Danish company doing energy renovations approached us and said exactly what you said – could we potentially close the financial gap with your capital, you would be able to make a substantial investment in energy efficiency and we could provide fully funded energy renovation mainly for companies and social housing sector and then PKA is repaid from the savings plus an interest. We find it interesting to pursue that, it is in the DNA of what we do. We do not mind the repay period of 10 years, it is a cash steady investment. Due to the fact that the company we collaborate with, they measure prior to any investment how much can be saved so we make the calculations, we make the assessment on how much we can save so we trust that. For that reason we invested 40 million into the SustainSolution, if it is successful, it seems like it giving the attention, we are speaking a lot of municipalities here in Denmark, they also need help. For example, the city of Copenhagen has the ambition to be CO neutral by 2025 so they need to make a lot of investments. There was also the reason why we laughed SustainSolution.

Going back to your question, what is the rationale behind moving into energy efficiency. The answer is None. There is no incentive for pension funds to do so. It is very complicated, it is not our expertise, so we would never be able to do it on our own. We need experts to do the actual savings, to do the actual installation, to do the day-to-day work. That is why we created a fund, a normal fund which is just operated by this described company. I would say that 99,9% of investors are not interested in energy efficiency. Despite it fits their DNA and their investment mandates, it is too complicated, we have a lack of understanding, there is lack of products out there is lack of 'Sustain solutions' all around Europe.

Things are progressing, in eastern Denmark, I had a discussion with some of the biggest energy efficiency companies to see whether we all can join forces and create a SustainSolution-type of fund but focusing on Europe. It could be with mature, well-capitalised companies from Denmark moving to Europe to provide such solution because simply it is not there. We also guarantee savings so that what differentiate us from other ESCO models.

Do you apply an ESCO model but it is much more reliable because everybody knows PKA in Denmark in the investment community. We have 40 billion euros under management. We do not guarantee the savings with our capital, that is not an option. However, the fund (SustainSolution) is in itself guaranteeing savings and it is much more flexible. What we're hoping to do is that being the SustainSolution a one-stop-shop so we have collaborations with solar companies, heat pumps, ventilation and the fund also created its own products, we can offer a number of different products.

If I were undertaking an energy renovation of my house, I am not an expert in energy efficiency when it comes to the specific products. I had to engage with 10 – 15 different contractors and it is too difficult, too time-consuming and I do not know what I am buying. If you are a social housing company in Denmark, and we can make an investment over 10 years and they do not need to pay anything and they actually get the savings once the money is repaid. It is a win-win situation.

What we also saw when we launched SustainSolution when we actually had a discussion with other pension funds and we were the only investor which were comfortable with making this type of investment. I think, the reason for it that we have an experience with the alternative type of investments so it would be a much stronger set up when we had three pension funds. Another two pension funds we talk to have decided that it is not for them.

We see the same pattern in the Netherlands as well, where pension funds expressed their uncertainty regarding the risk.

It is mainly due to the fact that they do not understand it. When the financial industry does not understand something then they choose to be conservative. However, what I think it is needed to be done is to figure out what is the actual risk of energy efficiency. Pension funds invest based on risk-adjusted return so how much risk are you actually allocating in particular investment. The thing is that energy efficiency adds 3% income per year during the period of 10 years, that might be more attractive than an average 5-7% on listed equities in the financial markets but only if you understand the risks. We have portfolio managers saying jumping up and down because they made an investment ensuring 1% per year in the next 3 years but to get that 1% they use close-to-zero risk and that is how we invest. We have a risk budget so how can we get the highest return but with the lowest risk. The problem is that if you are not able to quantify within these energy efficiency projects then you will never be able to convince pension funds also in the Netherlands why it is actually attractive to get even sometimes 2% over a period of 6 years. Because fixed 2% over that period with no correlation to the financial markets could be much more interesting.

- **What data use for assessment of such investment?**

We look at the past and portfolio of the company which approached us, also we look at what they are able to do and pipeline of the company so that is the sort of a data sheet we used. I know that the EU and other institutions are trying to create different databases where can aggregate the actual risks and potential of energy efficiency, or they are at least trying to do it. But we could see have not been able to execute, there is the lack of financing.

Sometimes we have to even charge 7% interest due to the fact that it might be smaller and it is much riskier to do that. On the other hand some of the most well-consolidated social housing companies in Denmark, massive companies, running close to zero debt. Having a long-term contract - over 10 years - with them represent risk almost zero because in partly private and partly owned by municipalities. Therefore 2-6% over 10 years with risk close to zero per cent is pretty interesting.

- **What sort of clients is your fund focus on?**

Actually, in the beginning, we were talking only to social housing companies in the beginning. In Denmark, it is a very conservative sector, it has been up and running for so many years and they have

their own way to do the business. We had some traction with the social housing sector and we had pilot projects and had closed some pretty interesting contracts. We could also see that it is relevant for a number of private companies so we even renovated two biggest ZOOs in Denmark because they use a lot of energy so we installed heat pumps, LED lighting, solar panels. We renovated even boarding schools so there is a very diverse mix of projects. We do not do single homes but we could do a cooperative of houses if having a substantial size. It all depends on whether we are able to assess the risk and the guys in the SustainSolution team are not able to go and use their time to assess specific risk for each homeowner which is in a cooperative of, let say, 20 houses or so. We need to go for a much bigger in order to reduce the risk also because of resources. We would invest 10 million rather than 1 million as the due diligence process tends to be the same.

- **As you mention a ten-year repay period, what repay period are you aiming for through your fund? Since some of the low carbon renovations have a period twice as long if they, for example, include photovoltaic panels.**

It is a good timing for our conversation. When we started out we did not have a solar in our mix of solutions and with heat pumps, ventilation and LED we could see the period 5 to 6 years. However, if you include solar the repay period gets longer. I think the longest period we have done so far is 12 years. I got an email from the fund, literally last week where they said that some of the periods for larger projects where you also renovate façades of homes and where you also look at insulation then you have the repay period of 20 years. What he also said is that these would be projects with different municipalities where they would like to renovate a lot of their buildings. And again, a project for municipality might be equally interesting as other projects despite having a period of 20 years because it is a municipality backed by the government. We are in the ongoing discussion whether we should adjust the term for the fund so we could do even longer repay periods. I think it is necessary to have these discussions and some of the Danish companies I have had a discussion with a variety of companies about insulation, heat pumps and different type of products that takes longer to repay. How do you overcome that if there are no banks, no financial institutions ready to make these allocations?

From the personal perspective, I would say if you have a portfolio of, let say, 100 million euros allocated in energy efficiency over the 20 years, that would be interesting. However, we are in the zero-percent market these days so I think that a lot of people are too afraid of being locked-in in the investment of 2% because in a few years you might get the German Bundes bond in 2 to 3 per cent or Danish sovereign bond on the same levels with again close-to-zero risk. That is also one of the discussions, we might see interest levels in 2,3,4% in upcoming years. How can you justify locking-in a project for 2-3%? How do we strike the right balance here and I think that a lot of investors are just waiting.

- **On the other hand, this sort of fund brings positive environmental and societal impacts. Are these non-financial factors also part of the consideration?**

Sure we have these considerations but we normally have these types of setups. When the company behind the SustainSolution, if they did not operate in energy efficiency we would not have would not even meet with them because it is not our expertise. We only took that conversation because it really fits our strategy to be seen as a role model in Denmark when it comes to green investments so it fits very well into that. On the flipside, you do not want to have a situation where the journalists, NGOs or most importantly members are saying that we do not want to use our pensions to try to save the world and then compromise on risk over returns. That should never be an option. That why we have a lot of consideration such as should we go for 20-year payback periods and so on. We might have a lot of support from the members and from the board but even if there is one member, and we have

300,000 members, saying that ‘I can see that you are not providing me with the best possible pension because you want to invest in energy efficiency or climate change projects’ that is not the way to go. Sure, we have a pretty impressive mandate, we have invested roughly 7% of our capital in green projects and hope to go to 10% by 2020 and we will do that pretty soon. We cannot do it only because of sustainable factors.

Something that is overlooked in the discussion is how policymakers incentivise pension funds and banks to move into that market. We have seen similar movements in the market, where, for instance, with new regulations and green banks but how can you do something similar not only on a national level. As I said, we have no incentives there days for investing in green projects. And even in the US, when you invest in a bond issued by a municipality then you are able to make substantial tax deductions with that investment. These proceeds go to schools, health facilities, one have you put on a sustainable agenda. Therefore, investors are from the pure financial perspective interested making those investments and you don’t have that in Denmark and I am sure that you don’t have in any other European country, where policymakers would say we want to steer the capital that would contribute in long-term aspects of our society. I think they should be looking towards that because I am sick and tired of these policymakers saying ‘you pension funds you have a special responsibility because you are a manager of all of our savings’. No, look at the current legislation, it says that you are not able to compromise on risk and return and you have to at any given time provide the best possible pensions, that is it.

We are one of the biggest pension funds in Denmark but let’s imagine you have a small pension fund (10 to 20 billion) where they have an investment team of 6 people. They would never be able to use their human resources to set up a fund as we did. Especially in the situation when they are not incentivised to allocate these resources to do so. If you don’t have any products in, for example, energy efficiency fund, these small funds are not able to invest in that sector. If they would have a fund where they could allocate millions of euros and the fund would do the day-to-day work. However, I am not even seeing that, I see real estate funds, climate funds which might have some focus on energy efficiency but I cannot see dedicated energy efficiency funds where the fund is taking the advantage of the market failure. It is a massive market failure.

- **What would drive you to replicate this product in other European countries?**

Germany would be probably the first country to approach and this is still sort of an infant phase. The discussions I had we major Danish companies within renovations sector from windows, insulations to pumps, the problem is that they all just want to sell their products, they are there just to sell their insulations, heat pumps whatever to different projects.

Let me compare it to the wind park company we work with – DONG energy from Denmark. They make ensure all permits, build the projects and operate the project so they operate the wind farms. Therefore, we just have to provide the capital because they do everything from A to Z. They are in charge of subcontractors which they assess, they build the wind farms and they operate the windfarms on long-term contracts. So, there you have a company that has a capital, expertise, the know-how to do so, it is a long-term contract and we just provide the funding.

Looking into energy efficiency and I think that where the market failure is, you don’t have any company like that in energy efficiency sector that would actually have the skin in the game. There could be in line with the SustainSolution approach, you don’t have a company that is making the installation, operating. We can see so many companies offering products from insulation to heat pumps and they just want to sell a product and once they sell the product they have no skin in the game afterwards. How can I invest in that, there is no way for a pension fund to helping those companies to sell their products unless we buy these companies, there is no upside for us to push their products. I said to

them that they need to join forces and launch a company in front of you that is sourcing your product and provides one-stop-shop in Germany, Holland, wherever and then PKA can come and close the financing gap with our capital but you have to have the company in front of you with that expertise knowing everything about insulation, heat pumps, LEDs and so on. All of them say the same things, they are running in circles and trying to sell their products in order to make a profit. If they all face the same market failure then we have to re-engineer the way we do things. That is why I encouraged these companies, we are facing the same problems, we have the same agenda – you want to sell your product, we all offering different solutions within energy efficiency so we are not even competitors. I think, we try to make something for homeowners in Denmark but not very successful. I think you need to start from the scale in the beginning. We would really need these companies to explain the market potential in Germany and explain the different market failure. Why do we have governments all around Europe with very impressive climate agendas but they are really lagging behind in real estate energy efficiency; Why is that?; How can we close the gap? That is what you need from those companies.

It would be a major advantage if the major companies would do something like that, not just a smaller place. The major company brings the brand, know-how and resources to invest and use the time to make this approach successful. If that would be an option, then you could basically just play a plug-and-play game from Germany to France, of course with different adjustments. That could be potentially an option. However, you need to go to scale, you need hundreds of millions to be invested in such a fund, in such a company and you need well-consolidated companies with a long track record of doing so and very flexible mandate.

When I talked to one of the biggest Danish insulation companies, they said the same what you said, how can we close the gap of 20% because nobody is interested in lock-in their capital for twenty years. However, we might be potentially interested. Then one of the problems is that you have some Danish companies which say that they do energy renovations in Bulgaria, Romania or Poland and they need some capital to make the project happen. I told them that we don't have the expertise to assess a project in Poland so that is never going to happen. You might have the expertise but we are never able to do it on our own but if we could make the allocation into a fund or in a company, when trust the guys so we can see their track record, we can see what they are doing then we could be comfortable enough to do so.

There was also an energy efficiency conference in Copenhagen organised by the European Commission. There were all these actors saying we need to educate pension funds, we need to educate the investors. I made a presentation and said you do not, we are not interested in being educated, it is not who you need to educate. We will never be those guys, making those calls, we will be the guys making hot calls to invest in energy efficiency fund or energy efficiency company but not whether we should do a project A or a project B.

The audience could not really understand the market failure because they have all the data, they can see it is not that risky but if you don't have the right framework around the market failure then nothing will happen.

To be frank, the investment industry is pretty lazy and we want to just multiply the capital. We are good at ensuring alignment in infrastructure, we are good at making sure that you have the right framework, the right set up but that's it.

There is a reason why we do not do direct infrastructure investments in emerging markets, we do that through a fund that does so for 50 years. The problem is that if you don't have these funds. If anybody comes to my door that they set up an energy renovation fund and we can overcome a massive market

failure and we can provide you at 5% across Europe with close-zero risk. That is pretty interesting for me but we are not seeing that because it is very technical and it takes a lot of time.

In our last wind park investment, we used roughly one year to make the allocation of 350 million euros but the energy efficiency fund takes a lot of time but it is only 40 million euros. To be honest I would rather do an investment of 350 million and use at the same time because it is very complicated, and a lot of things have to be discussed. However, we still use our time because it is on our green agenda and we find it important.

We even had the mayor for the environment in Copenhagen when we launched the fund, member of the parliament were there as well to support the idea and highlighting its necessity. Despite that, if it is new you need to educate the potential client about who we actually are and make it for them as easy as possible to buy our solution.

Appendix 2 – Interview guide

'Consultants in the financing of energy efficiency'

Role

- What type of project are you involved in?
- What sort of dialogue do you have with institutional investors?

Stakeholders

- What drives investors to allocate capital in energy efficiency in building stock?
- Which barriers hamper the accomplishment of these projects?
- What kind of barriers do you encounter connecting investors and projects?

Investment factors

- What are the main factors that investors incorporate in their risk/return assessment of an EE investment?
- What non-financial factors do investors look at?
- What sort of conditions do investors demand from the building sector?
- Do investors request any type of ESG compliance from the building sector?
- What is the response of the building sector?

'Institutional investors and advisors'

Role

- What sort of services do you provide (to institutional investors)?

Stakeholders

- What are the major barriers preventing pension funds from directly invest in projects?
- What drives investors to allocate capital in energy efficiency in building stock?
- Which barriers hamper the accomplishment of these projects?
- What kind of barriers do you encounter in connecting investors and projects?

Investment factors

- What are the main factors that investors incorporate in their risk/return assessment of an EE or low carbon investments?
- What non-financial factors do investors look at? (ESG compliance, energy efficiency, certification, CO2 emission)
- What sort of conditions do investors demand from the building sector?
- Do investors request any type of ESG compliance from the building sector?
- What is the response of the building sector?

Appendix 3 – Transcription of interviews with Dutch stakeholders

An overview of transcribed and recorded interviews:

Date	Organisation	Role
13/07/2017	TNO Pension Funds	Chairman of the financial committee
14/08/2017	PGGM	Senior responsible investment advisor
13/08/2017	MN	Principal fund manager
21/07/2017	NLII	Senior manager
28/08/2017	Bouwfonds IM	Senior researcher
26/07/2017	GRESB	Analyst
28/07/2017	Green BuildInvest Initiative	Project manager
19/07/2017	PNO, BuildInterest	Consultant and project manager
30/08/2017	TNO	Senior advisor

Interview no. 1

13/07/2017

Chairman of the finance committee at TNO Pension Fund

To explain my position, I am an employee of TNO. As you might know, TNO has its own pension fund and I am a member of the board of the pension fund. I am the chairman of the financial committee. We have a lot of money: 3.5 billion euros. So, I know a little bit about the financial structures and what causes the directions of the money allocation.

Today, I just told our colleague who is in our point of view interested in environmental issues. If I see how pension funds are managed, especially the small ones, we do not have direct allocations to specific projects. So we have a lot of money but we do not do direct investment in projects. However, the larger pension funds like PGGM and ABP, they have their own investors, so they directly invest in these funds. But these pension funds are so large that they only can and want to invest in really large projects so less than 10 or 20 million euros, they do not do it. That is one step for pension funds to invest. So it should be a huge project, otherwise, they do not invest.

What I can see, the large pension funds are driven by public opinion. They, especially PGGM and ABP, invest more and more in CO2 reduction but it is still a little part of their portfolio.

Just today I had an interesting discussion. If you realise how pension funds allocate their money, in fact, they are constantly looking at the balance between how much risk is in a particular investment for what return.

I am not from the financial world, so it was quite strange for me to experience it and see what the definition of risk is in the financial world. It is a standard deviation from the past. To give you a silly example, in 2014, we got all our investment statistics delivered by Blackrock. Blackrock is the party that gives us all the information. Then it came out that our risk profile dropped dramatically, and I was thinking what they did differently than the last year. Then I realise that 2014 was no more in 2008 crisis. So if the definition of risk is a standard deviation of the last five years. It is still the main driver. Should I put money in the government bonds or should I put the money in stocks, in stocks in Europe or in the far east or in the United States; it is all mainly driven by the standard deviation of the past. For the part, it is now driven by models that have a lot of economic scenarios for the future, so you can look at the standard deviation of those models in the future but still, this is the main parameter for the decision-making of pension funds. Especially the small ones, like the TNO Pension Fund, because we do not directly invest in projects.

- **Are your assets managed by another company?**

We invest large amounts of money in a fund of funds, so our money is managed by an asset manager. Not all money is managed by the asset manager but most of it. We have different categories. For all our stocks we have asset managers but a small part of our investment we have invested in private equity. For the private equity, we can put our own rules and we can ask for ESG criteria, not only carbon but broader. So that is one of the criteria for selection.

- **Do you apply this ESG strategy only for this small part of the assets or for the whole portfolio? Do you want asset managers to comply with any criteria?**

No, not for the larger part of the money. Many years ago, we asked Vanguard fund if they could start more ESG valid fund and if they decide to establish such fund we would put our money in such fund. That is a fund that excludes a lot of companies emitting large amounts of CO2. As you can imagine,

the money that we had in that fund had a very bad result last year because of the oil price. Then you directly see the dilemmas because our first goal is how do we make all the money for the future to pay for all the pensions. If you ask people, it is still the most important criteria. We do want to have a proper pension.

- **Is there a big driver to push towards sustainability?**

Not a big drive and one of the problems is that we do not know what the proper directions are. There is a shift going on. In my opinion that starts with the rule system, that is why I tried to explain that we, as a pension fund, are driven by the standard deviation of the past. I proposed to the Dutch National Bank that they should come up with a method that looked not only in the past but to the future. First, they did not quite understand. Then, I discussed that with PGGM and last year they came up with a proposal to the DNB. I discussed with them the idea that if you look at the companies that have more sustainable goals, not only CO2 but also the circular economy then it is rational to think that they have more positive future than those companies that do not focus on such goals. Because they have long-term goals rather than short-term goals. The research shows that those companies which have long-lasting goals are more stable, which means that they have lower standard deviation. Then the question is: "How can you define those companies?" from which you expect to have lower variation in the future compare to the others. If you can distinguish those sectors or companies then the DNB will set new rules saying that if invest in this sector, then you have to calculate with lower standard deviation and lower river risk so then it is more reasonable for pension funds to invest in those low-risk categories.

- **Where do you think is hidden the driver for a change?**

In my opinion, it has to start with the system. The representatives of Dutch National Bank asked all Dutch pension funds what they do to invest in more ESG performing assets. So, I asked them "What do you do to change your rules to apply lower standard deviation to those categories that have longer-lasting goals." They have never thought about it. Now I can see that PGGM started it and that is going to work a little bit now. I think that can change the whole system a lot. I am not sure if you know how much money is involved in Dutch pension system, it is huge money. Once Great Britain is out of the EU and 27 countries left, then 60% are Dutch money. So, the Dutch National Bank can have a system where they choose sectors for which they apply lower standard deviation or lower risk profile. Then, the pension fund would say "OK, we will shift our money in that direction".

Since a lot of funds, like ourselves, do not invest directly in the project. So, if the fund of fund come and say "we have a lower risk profile because we commit to follow these criteria" then money from all pension funds shift in such direction.

- **Do you think the initiatives - such as NLII that aggregates small projects and make it investable for pension funds – is the way forward?**

This kind of models can be even more efficient if the Dutch National Bank select companies that comply with the rules we talked about. We allow this investment to lower the risk profile, then it is more attractive to invest in these funds. For the small funds like us, we can decide to invest part of our money but currently, we do not have any certainty that it is better than a fund in, for example, in the United Kingdom.

- **To understand you correctly, you need a metrics which you do not have so far, right?**

We are constantly looking at that decision as I mention, the investment in private equity. So we select funds then we look at ESG criteria but not only for the private equity but also for other equity. Last

year, we put a lot of money in so-called smart beta funds which is a fund that mirrors the benchmark funds on the stock market. For example, you can replicate the Dutch stock market. The smart beta funds are based on several factors that change the market. There are a lot of studies that go 100 years back to identify those factors that have better results than the average and one of these factors is that a small company perform better than the large ones. In this factor investment, you can also have more ESG performing funds, so we invested in one of the smart beta funds that have the overlay of ESG criteria and they see it like an additional factor for better performance.

But then when we say that we do not want to take higher risk, it is better to put your money in a tracker fund because Dutch Central Bank says that it is our main criterion and everything that deviates from the main is an additional risk. We ourselves decided to go to the smart beta fund that selects their stocks by following certain criteria, not only large funds and low standard deviation. However, we still have a high-risk profile, even though we believe it is lower. By taking money from the tracker fund and putting them into the smart beta fund, we, on paper, increased the risk profile of our fund. If you think about it, we chose the fund that select smaller companies, more stable companies, it should be a lower risk. So that is one of the barriers if we want to reduce the risk we need to invest in a tracker fund. If you think about it, it must have a higher risk than smaller and more stable companies, but it is not how the system works. Thus, it is on each pension fund to say that we allow having higher risk profile as we believe it is, in fact, lower risk.

What I want to make clear is that for pension funds and most of the financial institutions is all about risk and expected return, and the way how it is measured creates a barrier for us.

- **How important are the ESG criteria?**

It is an important topic for pension funds but, on the other hand, it is really hard to decide what is a better ESG criterion. If you want to have a better ESG profile but also to take care of your risk profile, which is your primal steering factor, then it can lead to the very different decision. I did ask several times the Dutch National Bank to try to make a system where ESG criteria are in line with the risk criteria.

- **Do you see the solution in the monetary system?**

Yes, for a part. Of course, the boards of pension funds have their own responsibility, but it is a silly thing to think that they can make a significant change. It is why I gave the example that you put money in a fund which you believe has a better ESG performance while your risk will increase. As the consequence, other parts of your portfolio have to reduce the risk.

The risk is important for the size of the buffer you have to have. If you invest completely risk-free, the Dutch rules say that 105% is enough. If you have 105% you can repay all the future pensions but the more risk, you have the larger the buffer has to be and more money you have to have. For all pension funds, it is about 18% but if you decide to change and put your money away from index funds and you put them to the smart beta funds from 118% would become 120%. You are not allowed to have a higher buffer if you are not able to repay the money on pensions. Therefore, there is a pressure to lower the risk.

- **Do you have the main asset manager?**

No, we do not have the main one. Blackrock is our advisor and we also have part of our money in the Blackrock funds. They have two roles for us but they are independent of us.

Speaking of Blackrock, if you ask them about ESG several years ago, they would tell you “What are you talking about! It is about money, not ESG”. However, now, they started to realise that it is important, not only because Dutch pension funds started to ask them to do it because they started themselves to believe that they should look to the future to those criteria. Last year, the annual letter from Blackrock stated that they will look at more in the companies that they have more long-lasting goals. They want to adopt a more long-term approach to invest in a company and engage with the company management.

ESG basically becoming more and more important and not only because Dutch pension funds ask them to do but because they believe in it themselves.

I give you an example of some mechanism. For the part of the money that we can decide where to put our money or not. There we get an advice from Sustainalitics. It is a really strong mechanism they work on. As we do not have the capacity to have a track record of all those thousands of companies you can put money into and we are not able to make a decision on those companies. We, as well as a lot of Dutch funds, ask Sustainalitics for a list of companies that they put on the blacklist, we get the list and withdraw money from those companies. Sustainalitics monitor international companies and if a company does not comply with their set of rules, they reach out the company management, inform they in which points they do not comply and ask them for comments on these matters. In case that the company does not take any measures, it can end up on the blacklist. Then all pension funds will automatically take money out of this company so it has a large influence.

A nice example is the Diesel gate scandal of Volkswagen, Sustainalitics put them on the blacklist and immediately a lot of money got out from Volkswagen on the same day. Another example is from the chairman of PFZW (PGGM is their asset manager) who told me that they do not only apply to the rules of Sustainalitics but also the United Nations Global Compact rules. So they do not invest in those companies that do not comply with UN Global Compact rules. This has a big impact on investment. However, as I said before, we do not have direct investments, PGGM does. You can also see that the pension funds need strict rules and they cannot define that by themselves, there is a place for Sustainalitics and UN Global compact, then you can have a real impact.

Interview no. 2

14/08/2017

Senior Responsible Investment Advisor at PGGM

- **To what extent is socially responsible investment incorporated in our investment policy?**

It is fully incorporated in our investment policy. We have three pillars we build on. First of all, we are excluding the topic we and our clients do not want to invest, which is also related to social issues such as child labour, environmental issues, weapons. For that reasons, we use United Nations Global Compact so violators of this compact are excluded. We and our clients do not want to invest in these assets also due to reputation reasons which touch upon fundamentals of clients' pension funds. Some pension for example in health industry they do not want to invest in these

The second pillar, as we are owners or partly own companies and project, we also want to make it better from ESG perspective so that is why we work on that via voting, shareholder meetings and engagement with the board of these companies.

Then, there is the third one which we set up a few years ago as we started with a question how can we allocate more money to specific themes which can have a positive contribution to global challenges we all face too. Together with our clients, we chose for: climate, water, health care and food security. These are topics where our clients want to allocate more money. In 2013, we first did an analysis to do a positive allocation to these for things that were about 5 billion. While now our clients want to invest more so we quadrupled our plan to about 20 billion in 2020. It is also important to note as we are a pension investor we have to invest in market rate returns so we want to make a good positive societal impact but we are not willing to give out a financial return or take additional risk. However, we also think that it is not necessary, you can find a good investment where is good return/risk profile while you can have a positive contribution.

- **Do you believe that ESG has a significant impact on financial performance and why?**

Yes, I do think that they have a positive impact attribution or a contribution to better financial return and there are more and more studies, also academic studies that show that lower ESG brings additional investment risks. That is my belief and that is also more and more proved by academic studies that come to the same conclusion.

- **Is there a pressure for Dutch pension funds to invest in the Netherlands? In what sectors?**

There is always a pressure and to some extent, pension fund does want to invest in the Netherlands but of course, we always look for a right project with the right risk-return profile. There is a willingness to invest in it. As these investments are closer to home it is easier to analyse them since you can be in direct contact with the business or people who run the project. On the other hand, I must say that Dutch economy is not more than 1% of global GDP while pension funds invest between 5 and 10% of their assets in the Netherlands so there is the relatively big contribution of Dutch pension funds to the Dutch economy.

- **As one of your reports says, you focus on CO2-intensive sectors in engagement as so on. Do you perceive real estate as one of them?**

Real estate is a very CO2 intensive sector that is correct and via our investment, we have a strategy to invest in real sustainable buildings or in building that we can make more sustainable because we also

believe that it will increase the value of real estate – indirect revenue through fees and valuation but also directly through higher lease rates.

- **In relation to real estate, I could read in one of your older reports that you're focused on indirect investment in real estate. Is that remain true?**

Yes, we invest in real estate through investment funds so PGGM is not the direct owner of a building but we see ourselves as an investor. Where we invest in buildings or we partly own a building via a structured investment fund so we have all kind of organisations which take care of the buildings. That is more of a way we structure certain transactions. So you can see that we have an investment in private equity funds but not directly in buildings in our balance sheet.

- **What drives you to invest indirectly and why do not invest directly in real estate?**

We are a long-term investor we prefer to finance a building but we are not the party who has the skill and operations to run the building. Now we, for example, have a situation when 2 people analyse portfolio worth 100 million while you would need a team of 20 people to run a building. Currently, we are the investor who allocates the money and you have an entity who is the owner of the building as run the building. Therefore, we prefer to have the role of an investor and not too much to be involved in the day-to-day operational business of running the building and analyse the operational part and select the right operation parties who do it for us.

- **What tools do you use to measure performance or ESG compliance your real estate assets?**

We use GRESB (Global Real Estate Sustainability benchmark) database and by the way, we are one of the founders of GRESB. We also use GeoPhy – sort of a start-up company specialised in analysing of buildings' energy efficiency. We use their data in investment decision process but also for monitoring. The energy efficiency of a building but also the potential for better energy efficiency output of a company.

- **Do you somehow focus on energy efficiency in housing? (bonds, loans or investment in companies)**

To be honest, not so much at this moment. I think that this an area that will become more important in the future especially now when we got all these energy labels for residential building and houses in the Netherlands.

There is an investment strategy in the commercial real estate to focus on more energy efficient property. However, in the residential housing, we have some in the portfolio but it is not so much a strategy to look for the most sustainable residential property. Although I must say I expect that I expect that to become more important in near future.

Our loan portfolio is not really targeted at financing energy efficiency in housing on the other hand if you look into our infrastructure portfolio we bought a big stake in SolarCity. We particularly invested in solar parks in desert and mountains where these panels are available for people who don't have enough space of their rooftops so these homeowners rent solar panels in these sunny and hilly areas which provide a very efficient way to get solar energy and, therefore, lower energy bills for homeowners. This sort of allocation is an infrastructure investment for us where we become the owner of a solar park which is rented by customers from residential sector and pay a monthly fee for that while they get a certain amount of energy for that.

If we look at the financing of the residential housing via mortgages, we do have mortgage products that we invest in. We provide a small discount on making a house more sustainable so more energy efficient investments. That is the Dutch mortgage product we provide and it is called Athens.

- **In relation to that topic, how do you work with the national or European government on formulation or improvement of policy in for instance housing, energy efficiency and so?**

We are not too much involved in policy setting. We have our two colleagues who are specialised in involvement with the Dutch government and political parties which is our public affairs department so they are in contact with the Dutch government and European commission or members of the European commission around all kind of policy issues which includes energy. But I must say that the main topics are regarding pension fund contracts and some special topic about capital requirements for pension funds so not so much directly focused on for example energy efficiency.

- **Have you considered to set up some of the similar funds as PKA's SustainSolution through which they finance energy renovations?**

No, we do not. I don't know the exact specifics of the Danish fund but we do not invest in these type of funds. But it could be an initiative. But as I have already said we do invest in stimulating more energy efficient housing giving an interest rate reduction in our mortgage product. I know that in Holland financing for improvement energy efficiency of housing is still a relatively small market and it does not really gained ground here as well as like in other countries.

What I personally think that there is not a trusted party (a private company) in the Netherlands which would lead coordination about all kinds of energy efficiency improvements in housing. There are several private companies that provide these type of services but I think it is very complex and people do not understand it and there is still a bit of reluctance to make a big investment. While it is not a transparent market. Maybe they think that party which have to do all the work makes a big profit on their investments.

To summarise my personal opinion, there are no trusted parties in the Netherlands that you would say that I truly trust this party and they come up with a good proposal that really works. The party going to install it, it is also a credible party and the technique is also sufficient enough next few years, does not go broke, the system not going to default, the quality is good.

There was also an initiative a few years ago in the UK, the government set up a fund of about 100 million to leant money with low interest for an increase of energy efficiency in houses but never took off so money's still there. There is no party that people would trust which could make these investments in installation and maintenance.

So that is in my opinion problem in Holland – you need one party for solar panels, another for a boiler, next one for new windows, you need another one for insulation of floors and walls. People need one contract in the company they really trust in.

I do not think that financing is the hurdle but more of an operational hassle.

Interview no. 3

11/08/2017

Principal fund manager at MN

- **To what extent is socially responsible investment incorporated in our investment policy?**

That is fully incorporated in our investment policy, in all asset classes, in the whole balance sheet or at least we are currently on about 80%. However, the goal is to implement it for the whole balance sheet.

- **What is the way in which your company tries to contribute to achieving the climate objectives?**

There are several ways. One client is still considering the ways how to do it, the other one is implementing 10% in SGI portfolio till 2021, I believe but it probably easily reaches so, in the end, it will be more. So both big clients are making small portfolios for impact investing and there are a few topics covered such as access to finance, climate change of energy transition and waste. The other client has affordable housing as a topic.

Currently, we going through our portfolio and we are checking how sensitive we are to the climate change so we are doing a lot in that area. So we are in the forefront, together with PGGM and APG so we put more or less the same effort into that. Although policies might change for us.

- **What sort of changes are you talking about?**

The way you account for sustainable investments, whether you look back or you looking for new investments to comply with all new rules

- **Do you invest in real estate?**

Yes, we are one of the few pension funds that have its own housing portfolio. The way we do it, we do not finance the housing market. We do it via mortgages. We are not investing through funds or so. We have our own team that manages built houses in the Netherlands. We also renovate these houses to more sustainable levels. We upgrade all the houses with a small increase of rent while the other side of the coin is that the value of a house increasing more that costs of these climate-friendly improvements.

That statement to some extent contradicts my current findings that valuation is one of the barriers since it is not adjusted to these solutions so the value after a renovation remains the same.

We are improving the quality of the house and it will be more valuable because it is easier. Let say we have two buildings: house A with high energy bill and house B with high energy efficiency so you will probably choose the house B. Therefore we are more sure about renting such house, that is the idea behind. We are more cash-flow certain and I think that if you have lower energy bill to comparable house, then the value should be higher as well.

- **Is that the Dutch mortgage company?**

No, that is simply our own portfolio of houses that we have all around the country. We also build a complex around The Eye in Amsterdam, next to the former Shell building. That is our own business, we rent them our ourselves.

The Dutch mortgage company is simply focused on housing mortgage. Funding funds issuing mortgages to the housing market.

- **How big is your portfolio of housing?**

Mortgages are probably around 5% of asset allocation and our own housing portfolio is 1-2% but we also have offices and so on. We have around 2,5 thousand houses which are not that high number in comparison with the total number of houses in the Netherlands.

- **What drives you to allocate the capital in this sort of assets?**

We have this portfolio as long as we exist so that is something we grew up with. Simply it is the portfolio we have, manage and incorporate in our balance sheet.

- **What drives you to allocate the capital to the mentioned energy efficiency of your housing portfolio?**

That is simply investing in our houses and sometimes you have to renovate because people ask for it but we are already ahead of curve for about 3-4 years. A lot of houses are pretty old and it is time to renovate so that is the reason why we take solar panels on roofs and so on. We basically do it in the way that it should go forward as we, as the owner, take the responsibility to renovate the houses to contribute to the more sustainable environment.

Interview no.4

21/07/2017

Senior manager at Nederlandse Investeringsinstelling (NLI)

- **What sort of services do you provide to institutional investors?**

We form more of an intermediary role, which means that our institutional investors or shareholders (10 largest in the Netherlands) they wish to invest more in the real economy in the Netherlands but they are unable to do so on their own. The reason for that, the larger institutional investors look for large investments because they have a limited number of resources as in people who do the investments and therefore they can allocate their time very limitedly. That means that amount of work determining the amount of work in invest in a project worth 10 million is about the same as in project worth 100 or 200 million. As the result, they look only in projects starting at 100 million ticket size which makes it difficult for them to invest in the Netherlands because there is a limited number of large projects. As a result, they established our company which in fact tries to bundle the smaller projects into larger funds where our institutional investors can put a ticket of 100 million and then we can invest the money in smaller tickets for example 10 or 15 million.

We have been successful in set up three funds which are focused on SME financing and healthcare real estate. Currently, we are starting a fund that will focus on energy transition, predominantly renewable energy and energy savings companies that have technologies in these two areas.

In regards to housing, we have been talking to a lot of parties, because our institutional investors wish to invest or at least to contribute making Dutch housing more sustainable but it is very difficult to find a way to do that. Different areas of the housing have different issues, in some areas, there are non-financial issues as the reason why the renovations are not happening. I would say the main area why it is not happening is the non-financial issues rather than financial

- **What is the major barrier preventing pension fund from direct investment in these projects?**

There are at least 3 categories of the word projects – individual owners, corporate housing owners and social housing corporations. Focusing on the large ones, housing stock includes 7 million residential units in the Netherlands while 2 million is designated to social housing, around 4 million is private housing and 1 million is large private housing companies. That's about the distribution in the Netherlands. In the NL we have a system called WSW. It allows social housing corporation to get a loan guaranteed by WSW which in fact means state guarantee. As the result, social housing corporation can get a lot of cheap money so they are not looking for funding sources in addition to what they have because they can get enough and even cheaper than what institutional investors want to lend that. Therefore, money is not the issue for housing corporations, it is more matter of politics, operational aspects. For example, if they want to renovate a housing complex with different apartments, they need to get all the lessees on board which takes a long time. At the same time, you don't have enough people to do the renovation in your project. That the reason why we have about 2% rate social housing renovation, which is the very slow rate. But it is predominantly due to the fact that there are more operational limitations than funding limitations. At the same time they look into energy neutral renovation this is going very slowly. We have done research, our conclusions from these meeting were that current technology which you lock-in for a period of 30 years and people are very hesitant to do a commitment to a certain technology which in 5 years time will be completely outdated and you would have wished to do the renovation at that time. So there are a lot of practical, political and operational barriers which at least limit the speed in housing companies are renovating.

- **Do you see the same barriers in the private rental sector?**

No, I see fewer barriers. Mainly due to the new regulation that says that in the future have this housing have a certain energy performance label. At the same time you can see very large movements in the Dutch banking sector AMB, Rabo and ING, they are focusing on this type of clients (large real estate owners) in helping the owners to make their properties more sustainable. These owners are able to get better conditions for funding if they reach better energy label.

- **How can institutional investors compete with this campaign?**

They cannot compete with that because there is no channel to which they can fund these clients. In the Netherlands, if you are a private commercial real estate owner and you have for example 100 apartments and you have ABN AMBRO loan which funds 60% of the portfolio and you decide to renovate this complex where you need another 20 million. Your current relationship limits you to get money from other parties.

Institutional investors can play a role in that market in either to set up a new fund which completely funds these clients or they can fund the banks which can finance these commercial real estate parties.

- **Where is your role in this chain?**

In regard to the renovation of social or commercial housing, we don't see a role for ourselves. There are no funding means for social housing and commercial owners have funding from banks so we have to replace the banks or finance the banks by setting up a new fund.

- **Do you still explore ways to somehow finance these renovations?**

There is no role for us in these two sectors. However, there might be a role for of in the sector of private ownership if we can bundle that in a large portfolio and that is something that we are currently investigating.

PGGM is actively looking to make Dutch housing more sustainable and we experience too little projects to invest in which is really the bottleneck so that's why we are looking into how we can help private housing owner. Then you need to set up some kind of programme which facilitates that. At the same time, we see that private housing owners because they are very hesitant to lend money to renovate their house because they already have a mortgage and refinancing of for example 20 thousand euros to undertake the renovation. Current analysis from housing valuator shows that your property valuation will not increase by 20 thousand. People say why should I put myself into further debt if I don't get the value back.

For renovation worth of 20 thousand you need 15 to 20 years period to redeem your additional loan for that and if you move in the period of 20 years then you will not your money back.

Now we are looking together with Dutch state in a way (following example from the UK and the US – on-tax/on-bill charge) to link the mortgage to the property rather than the individual. That's something that we are currently discussing with the ministry of housing in the Netherlands to see how we can legally create such structure and if it is allowed by European law. If that would be successful then we can see a big opportunity to mobilise private house owners.

- **What drives pension funds to invest in Dutch housing sector?**

It is two-fold, there is a commitment to do something with ESGs and social development goals developed by UN where they committed themselves to mobilise and contribute to these goals. The

first part result in doing something related to energy transition or more sustainable housing. The second part is more about Dutch social and politic pressure to invest in the real economy in the Netherlands. The second point assures that Dutch pension funds will not focus on sustainable housing but Dutch sustainable housing.

- **Do pension fund have any conditions for building sector?**

They don't have any conditions for now because they are not really investing in that at this moment. It needs to become market practice. It needs to be in line with Dutch building regulations for new properties which are already very sustainable.

In my opinion, the condition same as the current criteria for new buildings would be sufficient but it is a matter of discussion on a certain project.

Interview no.5

28/08/2017

Senior Research - Bouwfonds Investment Management

- **Could you summarise for me the work of Bouwfonds in relation to residential property?**

Bouwfonds Investment Management, we are the management company of Rabo Real Estate Group, I am working for the business unit: Residential. We are investing in European residential market, not only normal residential property but also student housing complexes on whole pan-European scale. At this moment we have more than one billion in assets in the Netherlands, Germany, France, Spain, Denmark, Poland. So we always look into new opportunities in residential and student housing in Europe and we have a long term strategy which is also important think to take into account. We are the owner but also the landlord for a lot of people so we have quite a lot of tenants.

- **To what extent is responsible investment strategy incorporated in our investment policy?**

Well, of course, in the Netherlands, for example, we always take the energy label into account but I think that is it at this moment. That is more or less the same what we do in the other countries as well. Due to long-term investment strategy, we invest in around 10 years, usually 7 to 10 years, that is the long-term strategy which is not from the corporate social responsibility perspective but more the investment perspective. Because most of the fund have a life-cycle from 7 to 10 years.

- **Do you believe that ESG (environment, society and governance criteria) have a significant impact on financial performance and why?**

For us, it is more than looking into carbon et cetera so what we think, we are using LOG model location, object and user (locatie, object, gebruiker in Dutch). We just think that there are more things to look at if you would like to have long-term strong investment. The location should be sustainable in the future so that it the one aspect. You can have a really nice residential building in the middle of nowhere with really low emission, energy neutral and so on but nobody wants to live there because there is no public transportation in surroundings, no schools or supermarkets so it is not enough to look only in energy aspect. Therefore we look in location object but also the user. That is, it think, the major problem with investment in energy neutral building and that is why we did not do it in the past because it is quite a lot of money for us but the advantage is for the user because they have a lower energy bill, therefore it is not our added value.

- **What tools do you use to measure performance or ESG compliance your real estate assets?**

We take something it accounts but it is no go, it is nice to have but that's it. The GRESB evaluation is not the only thing you should look at and that is very important. Our problem is, there is not a good tool for sustainability for residential because residential is completely different as opposed to the commercial real estate. We also work on the pan-European level.

To be honest, we do what is needed, for example, in the Netherlands it is needed to look at energy labels but it is not our strategy to invest in energy neutral residential units but we are also not buying very old stuff.

- **You mentioned institutional clients on your website. Do you have any Dutch or European pension funds amongst them?**

For residential ones, the majority is German pension funds and I think that questions over there are much lower in comparison what is happening over here in the Netherlands.

- **Do pension fund clients have any particular criteria for their investments?**

It should have a good energy label but that's it. Besides that we use our LOG model, our investors know that with every acquisition, we are filling in the LOG model and there are a lot of questions around the particular building, technical aspects but I do not know anything about that because I look only into the market.

- **As you mention that we hold your properties for period 7 to 10 years on average. Do you also invest improvement in these properties?**

We, of course, always improve our buildings if it is necessary and also to sell it for a better price. Because we have our long-term investment strategy the energy neutral is a question mark for us. The reason why we are thinking about it that in 7 or 10 years these might be the only buildings you can sell, that might be the market in 7 to 10 years so that is the question we currently looking at. If the answer is Yes, then more and more investors will invest in this kind of buildings because it is the future and you need to do it. Otherwise, in 7 to 10 years, you will not be able to sell your property anymore or for a low price because a new owner then must invest quite a lot of money to get to the market levels at that point.

- **What would drive you to allocate some capital in energy efficiency in residential property?**

The fair answer is that the market would have to ask for it. Especially that the advantage of energy efficient housing goes to our tenants and not to us. Therefore, the barriers are the split-incentive dilemma.

The problem is, of course, you can always raise your rents based on your investment, but the affordability is the key issues we are looking at so a building should be affordable. If the apartment is normally 700 euros so we can change our tenants 800 or 900 euros but it should still remain affordable for our tenants. Their energy bill will be lower but then you should have a really nice business model where you can really convince tenants that it really worth and it worth to our investment and also increase the rent. The, what is it in for us? It could be an answer from our tenants, our rents are 100 euros higher while my energy bill is 10 euros instead of €70. That is always the competition field we work in.

If there is an incentive from the government that we pay lower taxes and so on. There basically should be somehow an incentive because at this moment there is no incentive for investor do make such investments. The only possibility is that it will be easier to sell your properties to another investor in near future. So, for now, we would have to have a real market driver to start investing in these properties.

- **Is there any pressure on your funds to invest in the Netherlands?**

There is not really a pressure but investors would like to have houses of a good quality with good energy labels. For instance, in the Netherlands we are mostly buying new building so it is always A or B, and if we are looking into older building then energy standard should be at least C but it is not only A. It can be also C but then we know that we have to invest more in the near future because it is needed for the building.

Also the higher the energy label the higher rent we can ask, that is also the case in the Netherlands, because of the Point system for the maximum range you can ask. That is the sort of incentive for higher energy label for the landlord. For instance between energy label A and B, it is around 4 points, that is around 20 euros on extra rent monthly or for B++ it can be 12 points which are 60 euros and that is kind out an incentive in the market.

Interview no.6

26/07/2017

Real Estate Advisor at GRESB

- **What sort of services do you provide to pension funds?**

We have a number of assessments in which we evaluate ESG performance of different investment vehicles. Our main investment assessment is real estate assessment in which we evaluate ESG performance of equity type of funds and listed property companies. We are voluntary assessment, an investor asks investees to participate in our assessment. They log in into our portal, fill in the questionnaire and provide a lot of consumption data and we benchmark according to data. That's what we do in summary.

- **What drives investors to focus on energy efficiency or, generally, sustainability in buildings?**

The main goal is to protect and enhance shareholder value by evaluating ESG performance so we truly believe that if organisation is more sustainable that will have a financial benefit and one the significant financial benefits is decrease of costs utilities such as energies or waste services but at the same time we believe that sustainable organisations have a better risk/return profile.

- **Do companies use GRESB benchmark to incorporate it into risk management or do they fully a complete risk management tool?**

There are different use-cases for different players. You have end-investors (pension funds) which they have funds we benchmark. They invest in GP, asset managers, listed property companies. A fund manager of organisation we evaluate it is more or less a business intelligence tool, they see what their competitors are doing. They are provided by a roadmap of what sustainability policies to implement.

On the other hand, you have a different type of investors, larger pension funds usually invest more in private funds, rather illiquid market so they ask their investees to participate in GRESB and for them, it is a reporting and engagement tool. Usually, they are engaged after a pension fund invest in them.

Further, we benchmark a number of listed property companies. The structure there is different because information about listed companies is publicly available. The investments are much more liquid and investors really use GRESB data for investment decisions so investors either base their decision on that or is more of an asset management approach.

There is also a small fragment of direct investment of end-investors into non-listed real estate but it is usually done through fund manager or through a separate account.

- **Are investors interested more in developer or project assessment?**

I believe that most pension funds or our participants focus on standing investments, a lot of Dutch pension funds like to invest in funds that do not have a lot of risks, usually a new construction or major renovation projects involve more risks so investors don't invest real estate for that reason, sometimes they do though. We do have some developer participants or funds that are more opportunistic but in general, the most of our investors are focused on standing investments, a few on major renovations and new constructions

The core focus of GRESB is managing of real estate so through GRESB you can see how your portfolio is performing in terms of ESG, it includes consumption and shown improvement but ultimately, an improvement is a part of the mentioned real estate management.

As far as I know the problems in many markets in residential projects, it is very hard to get data for the residential building as energy consumption and other utilities are confidential data that are not able to acquire. Even though you own the building, you are not allowed to ask tenants for consumption data. However, there are a few innovative solutions through that pension funds are can still acquire data, it is often difficult. One of the partners that have solutions in this field is INNAX. For us, it is a true challenge to get the real consumption data. We are a global benchmark so there are different regulation from different sectors and different countries.

We start by getting data and then we can see where the energy improvements are most needed and for a lot of funds data are confidential so we provide an assessment on a portfolio level and you can provide the portfolio level data, in our assessment, through asset level data but you don't need an asset-level data to report portfolio level data so it is voluntary to report on asset-level data. The issue basically is data security issues and that makes it hard to really get accuracy where the biggest improvement opportunities lie.

- **Do you have a firm list of indicators that you use for assessment?**

We have a list of publicly available indicators - 42 main indicators and additional 14 indicators for major renovations and new developments. So entities involved in major renovations and new developments fill in all those 62 indicators.

We provide all indicators publicly on our website while the collected data are published in aggregate.

Interview no.7

28/07/2017

Consultant at Duurzaam Gebouwd and project leader of Green BuildingInvest Initiative

Note: The interview was conducted as a recorded phone call. Unfortunately, the recording was corrupted and only part of it was preserved. Thus, the interview was partly restored based on the incomplete recording and the introduction sent by interviewee prior to the interview.

What type of project are you involved in and what is the role of the project?

Green BuildInvest is the Dutch work package of the H2020 BUILDINTEREST consortium. The consortium consists of three national/regional platforms. BUILDLab in the Emilia Romagna region (supported by ASTER), Euroquity in France (supported by BPI France) and Green BuildInvest Initiative in the Netherlands (supported by Duurzaam Gebouwd). Additional consortium partners include PNO Consultants (coordinator), ECN (impact analysis) and Europe Unlimited (platform/networking support). The project started in April 2016 and will continue until April 2018. The Dutch platform, Green BuildInvest Initiative (GBI), is supported by Duurzaam Gebouwd. Duurzaam Gebouwd (DG) is a platform that supports the sharing of knowledge and connects knowledge (people and projects) to boost sustainability in the built environment. The platform has 200+ supporting companies and organizations (partners) and reaches almost 15.000 via newsletter subscription every day.

BUILDINTEREST is a response to an EU H2020 call on the lack of investments in energy efficient (EE) buildings in relation to the trend of investment in real estate as a whole. The main objectives of the consortium are:

1. To identify barriers in regard to investing in / the financing of EE buildings
2. To showcase and support solutions to take away barriers and boost the investment in / financing of EE buildings
3. To support a platform for stakeholders to create an ongoing dialogue on the barriers and solutions and to boost investments.

But most of the DG stakeholders are on the supply side of real estate and construction. With the start of the BUILDINTEREST project was decided to create a new platform, GBI, to establish an open dialogue between financial and policy stakeholders without the possibility of a direct acquisition. On specific topics, the platform will definitely meet, but on certain topics, it's better to keep the groups separated. Our main stakeholders include banks, investors, pension funds, municipalities, national government, consultants, real estate developers, developing construction companies and others. It could be described as the demand side, but also includes local and national policy.

What barriers hamper the accomplishment of energy efficient projects?

In the first year of GBI, we focused on the inventory of barriers and solutions in energy efficiency in the real estate and creating stakeholder engagement. The European commission saw that investments in energy efficient buildings lack well behind with the growth of investments in real estate itself. The investments keep on going but there is more and more allocation of money to energy efficient buildings

In the second year, we are focusing on showcasing the worth of the platform in creating dialogues and facilitate innovation on specific topics and to support new initiatives. During the inventory phase we found that the main barriers lie in three issues:

1. Valuation of real estate with EE measures (in relation to risk perception)
2. Standardisation of processes

3. Showcasing existing knowledge in a way it can be used for new projects

What kind of real estate are you focused on in your project?

The European Commission does not divide between commercial or residential properties. From the European perspective, there are no categories. So, I decided, in my research, to do not distinguish between them either. It helps, because if you are looking at institutional investors or pension funds, they invest a lot straight in housing, in mortgages. It is, of course, a big aspect of energy efficiency and how you evaluate energy efficiency in residential buildings. So, I decided to take both commercial and residential property. I talked to about 80 to 90 stakeholders, I talked to all of them personally, ask them about the barriers, why they invest, why they do not invest, what is their perspective on sustainability. There were a lot of parties who just said: "well, I think, it is really interesting, but it will evolve on its own and we do not take additional steps to boost investments because after a while all real estate will be sustainable. There is no need for us now to allocate some of our investment directly to energy efficiency, it will get there on its own."

I found three main barriers, the most important barrier which is in line with your question is the valuation of energy efficiency in buildings and with perception evolved. So if they look at the energy efficiency they really know if the additional cost of energy efficiency measures will show up in building performance. Therefore, they do not know how to evaluate the building performance.

Valuators do not know how to evaluate the energy efficiency measures. In the Netherland, one of our main projects will be to work with valuers and banks as such to create a common consensus on what aspects you should look at. A very easy way to demonstrate the problem is if you are a homeowner and you want a new kitchen worth 5 thousand, then if you take a mortgage your home will be more valuable. However, if you want a solar panel, you have to take a loan because the bank does not see it as an added value of your home.

In commercial buildings, we now have a discussion about the C label. Bank see a risk if a building in a portfolio is a C-label because they cannot be rent or sell. So, they are now willing to invest or to finance energy efficiency measures. But they still do not know how to value existing measures so if a builder wants to add the measures to an existing office building, a bank does not know where to start and he is not thinking about a real estate mortgage but more a finance through another loan.

So we trying to build a workshop. We will organise several workshops to create consensus on the way buildings are evaluated (within the IVS and EVS) and we aim to create a position paper to support EU policy on risk perception together with RICS, TEGOVE – an organisation for European valuation standards, EEFIG, SEIF and UNEP-FI. On the 12th of September, we will have our first panel discussion about the different perspectives on the valuation of EE measures in buildings.

For the standardisation, we have been asked to support two projects (gas-free districts and zero energy schools) to establish the dialogue, support the project and help develop standard templates/processes to be able to replicate projects and 'invent the wheel once'.

We have also taken the initiative to support the GBCI in creating a Dutch platform for certification in the Build Environment. This includes sharing knowledge about certifications schemes and processes, but also to act as a spokesperson for the Dutch market in the international discussion groups on this topic. (Both technical and organisational)

Besides these specific topics, we are also part of several advisory boards and other discussion platforms to stay on top of the market.

Everything we do will be showcased online and in topic-specific events. The online website is being built to be a magazine for the showcasing of information, but also to act as a community to connect people on specific topics.

The main goal is to establish an ongoing platform that will support this kind of projects and showcase the knowledge, but without the necessity for payment. Our operational cost (after April 2018) should be covered by income from possible supporting partners and content on the website.

Interview no.8

19/07/2017

Green BuildInvest project leader and consultant at PNO

Co-interviewer: Project manager at TNO

- **What type of projects are you involved in? What sort of dialogue do you have with institutional investors?**

We recognised that [the gap between financial and building sector] the main issue. We observed that on one hand, the financial sector says they have plenty of money while the building sector says we have brilliant projects but we cannot find money. The financial sector says we have the money but we cannot find projects. So it seems that there should be a possible match. That was the starting point for our project [Green BuildInvest project]. We established financing platform in the Netherlands, France and Italy. There we trying to establish a stakeholder base both financial stakeholders as well as building sector. We asked them the similar questions What are the main barriers in your country and how should we tackle them. Currently, we are halfway through the project so that means that we've been through the process of asking 'what should we focus on and what do you want to work together with us' And we are currently starting to work on building workshops and working on the themes that we selected. These themes are quite different per country, we try to find matches between the countries but the platforms are quite independent. For example in the Netherlands we work on a theme Valuation of energy efficiency in buildings, the value of energy efficiency investments. We are working on methodology together with valuers to get it properly reflected. That is one of the ways we try to make the market more investable.

- **What domain are you focusing on in this domain?**

Currently, mainly office buildings. However, we could easily expand to domestic [residential] market. The focus on office market is driven by policies, especially in the Netherlands, where office buildings which have worse performance label than C are not allowed to be abandoned after 2023.

- **What drives investors to allocate capital in energy efficiency in building stock?**

As the project manager of the BuildInterest, I am not directly in contact with institutional investors. I hear what the other partners come back with and my impression is that some of the large institutional investors, for instance, pension funds, they have a specific target they discuss with stakeholders and they have to invest at least let say 5% in energy efficiency projects. I don't think it is primarily driven by returns. I don't think that investment in energy efficient buildings is so profitable, it is a driver in itself.

- **Why would they like to invest in energy type of energy efficiency projects?**

For those investors [investors with a high level of CSR awareness] yes. Some of the real estate investors, for instance, from Germany, they already say that they are not going to invest in any building that does not have at least A-label. That's what large real estate agent told me recently.

- **What are the barriers that hamper the financing of energy efficiency projects?**

Of course, there are so many barriers. I think that differs in dependence on the sector. If, for example, look into office market and then the utility market is a lot different and housing market is different from them.

If you look at the rental sector of housing market it is the opposition from the people that they live there. People do not want the house renovated, it is a nuisance. While the barriers in the office market the barriers will be completely different.

I'm not sure whether there is the single main barrier, the common perception is that access to finance is the one but I'm not sure that's the case. It's always easy to say we need more money but it is not really concrete. It is typically a lot more complex.

I don't think that return on investment itself is interesting enough to invest, it is usually the order of CSR or it is a driver of regulation like the label C demand and this type of drivers.

- **Do you think that decisions, for example, German investors are driven by supranational agreements (e.g. Paris agreement), national regulation or sector is driven agreements?**

I don't know what was the driver behind the German decision to invest in anything less than A-label building.

- **What kind of barriers do you encounter connecting investors and projects?**

You have the financial sector on one side and the construction sector on the other, and these worlds are completely different. Totally different people, talking 'different' languages with different background and they don't find each other. This was the reason for us to start the project and get them around the table and that is also the feedback we got from these people. It is interesting for them because they had never spoken to each other. Financial sector discusses it internally what the issues, problems and key points are. Building sector discusses that internally and vice versa.

- **Are there worlds willing to communicate and come closer to each other?**

Roel: There is plenty of enthusiasm. The timing is favourable because a few years ago would be that initiative just out of idealism but there are a lot of external drivers these days that higher the reasons to pick this up.

- **Do you also hear that from France and Italy?**

Less so. For instance in Italy, they have a different starting point as opposed to the Netherlands where is quite a lot of knowledge and engagement and people understood what the issue was, we have been talking for ages and let's started. While in Italy they had to start with communication campaign to start with awareness levels. France somewhere in between. The difference between Italy and the Netherlands was quite striking.

- **What are the main factors that investors incorporate in their risk/return assessment of an EE investment?**

That would be hard for me to answer.

- **Do you find that, for example, the trust in the building sector as they deal with the bad reputation in the sense of reliability what they deliver?**

Yes, that is definitely an issue. The trust is related to lack of track record. Which is the major issue for investors because there is no database of projects available where they can assess the risk. Typically when they invest in something there is a risk profile – interest rate, risk of default, primary energy efficiency; it is just not there. It has not been around for long enough to make adequate risk assessment by default the risk is as high which hamper a lot of these investments.

- **What non-financial factors do investors look at?**

During most of the meetings, I could experience it is all about lack of data which is perhaps the major issue from an investor perspective.

Interview no.9

30/08/2017

Senior advisor at TNO

Can you summarise what is the ValueFit project and its aim?

The ValueFit project is meant to be a way or a method to connect the supply side and the demand side for deep retrofitting. There are a lot of barriers to deep retrofitting and most of them are related to the demand side but also some are related to supply side. The main thing that there is the missing connection between the demand and the supply side. We wanted to discover or analyse whether the connector between demand and supply could be in the form of company. A company with a certain business model. We developed 4 kinds of business model.

What do you think about the current situation of low carbon renovations of housing stock in the Netherlands?

Not very good. At the current state, the new build housing buildings are pretty good on climate neutral sense but the incentive to do a little bit more is not there yet for a new build. Just the other week I was visiting a new part of The Hague that has been building. They still build houses with individual boilers on natural gas, it is pity. These housings are still not running on temperature heat so that is also pity. There are a lot of houses that are not fit for climate neutral future.

The renovation part is even worse because we do not have any incentive for anyone in this field to make big steps in this aspect. The only things we could develop are Second skin and the Energiesprong but these do not work because there is not a big demand, an individual owner does not do it and an investor does not do it, housing associations do not do it.

What important barriers to deep retrofitting have you found?

I am not sure if there is a one I could point out, the true problem is there are so many of them. The building sector is one of the most conservative sectors I have ever seen and, what I see happening, they are very not eager to be proactive. There is one builder or building company, in Friesland, in the northern Netherland. The owner of the company has a column in Cobouw, that is the building sector journal of the Netherlands, and he is the most progressive and proactive guy in the Netherlands but he is a very small builder. He has to struggle, at least what he told to the public, against all the conservative element in his own field, if you have counted all the barriers he talked about in his columns you would be surprised that anything is happening in the building sector at all. The building sector is conservative and is not going to move. The industry says that commissioners, the people who give them a commission to build new things like project developers, housing associations, they do not give them a task that goes beyond current practice so the innovation will not happen there. Whether they call Rabobank or housing associations, they are rather conservative in their commissioning and municipalities are not still able in they are not able to state certain demands for climate neutrality or sustainability in their policy while they sell a piece of land, they do not use tools to regulate that.

If you look at private house owners, you cannot expect that they, as a group, would be the most proactive group because they have timespan 6 to max 10 years and they do not have the information and incentive to do it on the long term. The banks where they have their mortgages mostly do not give them any credits for doing something sometimes they do reduce the interest of 0.1% if they have label raise from C to A, they are not able to connect that to their investment, if you have to pay 20 thousand more and you get point one percent decrease than in the end content value could be about the same as the investment but that is not the way how individual will calculate. It does not make sense. The whole system is more or less not stimulating deep retrofitting at all.

How important are the issues of financing and affordability of the low carbon solutions?

For a certain part of individuals, the affordability is not a problem because they do not calculate in affordability, they think about what is the value for my house itself, is what I invest in this house. They are willing to pay 20,000 extra for better bathroom or kitchen and they will not get a half of that back when they sell the house. There are willing to for that but also willing to pay for added value in terms of energy efficiency improvement if they see and recognise it, for example, that the comfort of the house will be improved or smart environment or it is better connected to their age-development or family development. There is nobody in the world who would tell the whole story – banks, mortgage advisors, builders, municipalities will not do it and there are no intermediates that can give you any advice on value creation for renovating your house, for the individual homeowners there is nothing there at this moment.

There is another housing owner such as housing associations who could have a different framework but they still do not have the tools to analyse the value for them. A different example is if your time span of buying and selling is 10 years, then you have a real issue at this moment whether you create value with that deep retrofitting or not. Because deep retrofitting of a certain asset will cost you more than 5 to 10% of the total value of the asset and whether you will get it back in the proper sense in 10 years' time, I am not sure, it could be but if you do not have a proper valuation for the deep retrofitting with your tenants that they take off part of their energy bill, that does not happen.

For a housing, the company is the same but now they have the EPV – Energieprestatievergoeding. A housing association can get back part of their investment by the EPV because they cannot increase the rent of their housing that much, they get a little bit back from the state. They can balance it a bit so it seems to be a little more attractive, on the other hand, social housing, are not allowed to increase the rent that much so their renovation model was already a bit corrupt. If they only do a renovation from energy label G to D, they cannot get funds back for such renovation from tenants.

So I think that private real estate owners are not stimulated at all at this moment. But there is one elephant in the room as the natural gas will be switched off between 2030 and 2050 in the Netherlands for all residential areas. Nobody talks about really talks about how the elephant looks like but it already has an effect so that can be a drive but the way it is going to functions is pretty vague.

The deep retrofitting situation for the Netherlands, if you think about it together with Paris agreement it should be necessary for 2050 and if you look what is happening so the goal is not within reach, beyond imagining. I think the pace 0.2 % per year and what you need is 2 so we need to be 10 to 20 times faster more than it is happening and that is not going to happen in another decade.

What have you learnt about investors needs for (and viewpoint on) deep renovations?

I have not talked personally to investors so I do not really know what makes them tick but in the whole area where you look at the parties that could influence the deep retrofitting pace, there are municipalities, national government and investors, those are the only ones who could have a long-term strategy that will last more than 5 years. I think that the investors, at least what I have learnt from discussions with people who talked to investors, they have a range of 40 - 60 years on what they want to achieve. This is the case of institutional investors, I not talking about private equity funds, I am not sure what is their range but the institutional investors, because they want to have a stable income for their pensions and for their long-term investments. They want to bring stable incentive for this kind of innovation and development. The context should be positive on that side but it is not there yet. In their framework, they do not have a framework or tools to assess the long-term value of their assets and trying to get used to. On the other hand, they do not want to have a building, for instance, if the climate change is not going to be mitigated, they should have calculations of a value for their

assets. One example could be recent floods in Houston if floods would be every year instead of every 5 years that makes a difference in the appraisal of their assets and investment in them. They can bring that to the table and I am not saying they you should focus on mitigation but I am also talking about how do you do your investments in those areas which are often flooded. You can also influence the effect of flooding on your investment because you, for instance, make dams around those assets. It is pretty expensive to rebuild every 2 years. The costs of electricity and gas in those areas will go sky high because you cannot produce electricity with coal power plants in the area because they will flood as well so you have to adapt energy systems for these areas as well.

Investors have to think about it and those models how to deal with climate change as an effect and mitigation that should be incorporated and if you now looking at their financial assessments, I am not sure if they do it in the proper way at this moment. I think, they going to be afraid of risks in value losses they will have. Especially institutional investors are the ones who have the most of money there so they must build valuation tools that can fit for that purpose. I am not convinced that the tools they use now are fit for that.

What do you think that would drive the market uptake particularly the Netherlands? What could measures or steps alleviate the market failure?

The simplest option would be regulation force that all new build must be climate neutral and all renovation should be also climate neutral, every time a person sells a house or buys a house there should be a renovation step that you improve energy label by 2 or 3 bands, there should be heat grids in every district where there are houses which are older than 1950. These are some of the examples so regulations are the easy way out.

I think the building sector can deliver anything you want, not as cheap as you would want it at this moment but they will deliver it. This is not going to happen because that is a political problem, we have a political system in which a regulation by government is not a favourite subject.

You mostly have three types of regulations or policy-making – by regulation, by stimulation(not financially organised but subsidies can be part of it while support of necessary innovation is the main part), by financial incentives. The financial instruments that could be for example increase in natural gas or increase in houses with low energy efficiency so they are other possibilities. What you see in national government in the Netherlands they do only the stimulation and supporting side. The national government also throw the issue over the fence to local provinces and municipalities without giving them proper support – no money, no tools and no people. They now have transition pathway for low-temperature heat and a municipality is the director of that transition and they get the responsibility to organise it there, each municipality will do it on its own without knowledge sharing, tools or help. Every city or municipality is going to invent the wheel and they will see and experience in next five years the same barriers in deep retrofitting as I described but then they will see it in practice because of they have the director role. Municipalities eventually throw it back saying that it is too expensive, energy prices are too low and all the parties have too many interests and so on. I call it throwback in history, we go from the national to the local level, we locally experience what we already know and in 5 or 10 years time we have the same experience but a little bit more local, then we have year about 2025 we are a little bit more experienced but not on track.

I do not think that currently developed support scheme will deliver something without any support of the legal or financial scheme. One of my hopes is that financial institutions will bring something at the table but if the financial sector will realise that this is going to be hopeless in time and they will have a tool that makes them make a better decision, that would make a real difference. I do not see that this change is going to happen.

What have you learnt from your European partners about their situation concerning deep renovations? Do they deal with the same issues?

I think that the issues in rest of continental Europe are more or less the same. The balance between responsibilities is different depending on countries, some countries do not have social housing associations, in some a local authority has larger responsibility but the triggers to do it are more or less absent everywhere. There are visions to do it but I do not see it really happening and there are no triggers to speed up the deep retrofitting. There are better projects in certain locations and I am convinced that there will be a specific project that will go ahead but that is not enough to scale up the market which is needed because the market is so small. The pains for not doing it are absent so why do it.

That is on the continent, in the Anglo-Saxon world, the barriers are even worse because they have much stricter legislation on the property and that makes it so difficult to have some change in that area, I think that is really disastrous. On the other hand, it can be also an advantage but I am not aware how you could do it. There are a couple of people in the UK who think that they have a lever for the issue but I think, from our continental point of view, that is pretty difficult to do it and we already think that is really difficult here. I am very negative about it but all the signs in the area are not pointing in the good direction so there is a need for a political action to get the signs in the proper direction. The one thing I learned from ValueFit is that if you do something with deep retrofitting you do not need to call it deep retrofitting but something else. Because deep retrofitting does not resonate with owners, residents or landlords of houses. Landlords want to earn some money or at least not lose any money, they want to have a positive balance sheet. The residents want to have comfort, have a nice house and do not want to pay excessive money and most of those parties they have a concept of value in their minds that should be explored better and should get a better analysis so you can get value (expressed in euros) where deep retrofitting does not fit at this moment.

We have done our current proposition of business models but what I could see during our conversations, people who are working in this field also do not have that broad definition of valuation. The building associations, the building sector, municipalities do not have it, investors might have it but they do not have proper tools. Nobody has the mindset.

The last thing I would point out is a hit-and-run approach (done or intended for quickness of effect rather than for permanency), a building company gets an assignment to build a building with certain constraints or demand and they make a drawing and they say how the build will be built. That is a static contract and what I mean with hit-and-run is that they are ready, the building is done so the building is yours and good luck. The building company has no responsibilities anymore so when something needs to be repaired or maintained for instance due to a certain way of using the building the energy losses are different in comparison with what was calculated by the building company, it is not a responsibility of a building company anymore. There is the building and I am not responsible anymore so that is the meaning of hit-and-run.

On the other hand, the ESCO kind of contract is that I will make a building, maintain, deliver the service of heating and electricity and secure what is promised for a certain period of time. Nobody is used to this kind of service in the whole building sector. I talked to a company which make the energy part of the buildings and they also offer insight and different context that they will maintain the energy part of the building, not the envelope and so on. That could be also a part of an ESCO, the whole maintenance but they are not used to work like that.

A building service company, they could offer a building plus all the maintenance and then the only thing that they do not want anything with owners or tenants of the house. They only want to be the

technical part of a building, then a housing association should do the rent and that is kind of a model. If a building company would provide the service, then the incentive will be that whatever will happen in the particular period of time will be on their table not only on the table of a housing association. That is the service contracting and the building sector contracting there is a large difference, they do not do it at this moment because they are very hesitant to even thinking about a financial risk. What do I need to build a house in a proper way that I minimise my risk for the next 40 years? That's the questing that I do not think that any building company ask itself, maybe the people intervolved in Energiesprong and the Friesland guy they do. If we can make that leap from building hit-and-run to a building service company kind of contracting in the next 5 years and if investors can push that leap, they do not need to invent the leap through the way they invest, that can make a real solid market.