

Deliverable D6.3 Transferability plan

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Summary

The REFURB compelling offers for (deep) energy retrofits have been designed to target the private residential sector. Task 6.3 was to result in a transferability plan for the rental sector, i.e. how REFURB compelling offers could be adapted to fit the rental sector.

However, due to their characteristics, some REFURB countries (DE, NL) composed a compelling offer for or stemming from segments other than the private residential sector. In D6.3, their lessons and experiences in the rental sector have been used to compile a generic transferability plan. The generic transferability plan can be used by other EU regions and countries that want to target their rental sector with REFURB compelling offers.

Table 1 shows the generic transferability plan for the rental sector:

Table 1 Generic transferability plan for rental sector

Process steps	Required adaptations REFURB compelling offers	Necessary actions/ framework	Responsibles/ executors
Gather basis information social rental stock: Aspects could be: Typology buildings Age buildings Type of tenants Presence of district heating present y/n		Research	Housing association Private – public cooperation (as in the HAPPI project)
Policy on energy retrofits	Decide on and describe policy on energy retrofits - Ambition level - Goals/ milestones In case of private- public cooperations: - Set standard together - Government can make guarentees on investment later on	Policy framework	Housing association/ corporation Private – public cooperation (as is in the HAPPI project)
Determine where potential for deep energy renovation lies	Investigate deep energy renovation potential of the stock: - Maintance level - Current energy performance	Research	Housing association/ corporation Private – public cooperation (as is in the HAPPI project) Consultant/ external advisor (if necessary)
Portfolio decision – making:	Which part of the stock should be renovated now: Based on combination	Information framework Policy framework (ambition level)	Housing association(s)/ corporation(s) Private – public cooperation (as is in the HAPPI project)

	maintance & potential for deep energy renovation		
Derive optimal technical package for renovation project	<p>Technical package:</p> <p>Technical package, i.e. the combination of technical (energy) measures differs from project to project</p>	Technical framework	<p>Housing association(s)</p> <p>Building company</p> <p>Private – public cooperation (as is in the HAPPI project)</p>
Financial solutions	<p>Focus is on large scale renovations; requires large investments:</p> <ul style="list-style-type: none"> - Rent increase? - Green loans - Subsidies (if available) - Possibilities to apply economies of scale - External (additional) financing - Energy performance fee (ESCO financing structure) - Government to guarantee investment <p>Aim: To ensure a viable business case for the house association(s)/ corporation(s)</p>	<p>Financial framework</p> <p>Legal framework</p> <p>/</p>	<p>Housing association/ corporation</p> <p>Banks/ funds</p> <p>Revolving funds</p> <p>Private – public cooperation (as is in the HAPPI project)</p>
Research organisation form/ structure of deep energy retrofits	<p>Different types of organizing the renovation, large scale:</p> <ul style="list-style-type: none"> - As single organisation - Cooperation with other housing associations? - With a consortium in a European project? 	Organisational framework	<p>Housing association(s)/ corporation(s)</p> <p>Private – public cooperation (as is in the HAPPI project)</p> <p>Building company</p>
Tendering process	Preparing and entering tendering process, contacts with building company/ suppliers	<p>Information and marketing ne</p> <p>Organisational network</p>	<p>Housing association(s)/ corporation(s)</p> <p>Private – public cooperation (as is in the HAPPI project)</p> <p>Building company</p> <p>Suppliers</p>
Enrich renovation package; transform into compelling offer tenants	<p>Addressing the drivers tenants</p> <ul style="list-style-type: none"> - maintainance wishes - aesthetics 	Information and marketing framework	<p>Housing association/ corporation</p> <p>Private – public cooperation (HAPPI project)</p>

	<ul style="list-style-type: none"> - comfort - luxery - more space <p>Removing the barriers tenants:</p> <ul style="list-style-type: none"> - renovation non-intrusive - fast renovation process - transparant process: who, what, when, how - practical issues resolved 		<p>Building company Suppliers</p>
Inform and entice tenants to accept compelling offer	<p>Informing tenants on maintainance needs and non- financial benefits Offering a catalogue of good examples renovated rental dwellings</p> <p>Offering tenants a choice between two compelling offers, theirs to decide.</p>	Information and marketing framework	<p>Housing association/ corporation Private – public cooperation (HAPPI project)</p> <p>Building company Process facilitators/ intermediaries (Buurkracht alike)</p>
Before, during and after renovation	<p>Offer an energy coach:</p> <p>Before:personal approach During: unburdening, trouble-shooting After: Give smart energy advice</p>	Information framework Technical framework	<p>Building company Housing association/ corporation</p>
Quality assurance	<p>Offer an energy performance guarantee:</p> <ul style="list-style-type: none"> - Monitor with sensors to check energy performance - Energy coach is to investigate and solve any deviations 	Technical framework Information framework Legal framework	<p>Building company Housing association/ corporation</p>
Dissimination of good cases		Communication/ marketing framework	<p>Housing association Umbrella organisation housing associations Building company Umbrella organisation building companies</p>

In addition, other potential target segments for transfer were involved. Their touch points with REFURB were identified (Table 2).

Table 2 Non- residential segments and their REFURB touch points

Non- residential potential target segments for transfer	Touch points REFURB approach
Rented office spaces	Comfort is linked with increased productivity of workers
Corporate communities - CSR communities (CSR; Corporate Social Responsibility)	Clear focus on certain market segment: CSR communities Use of a Customer journey Use of social and behavioral drivers & barriers (among others: advice, unburdening and guidance, decision making and group action)
Associations of owners – tendering solar energy	Clear focus on certain market segment: Owners of multi apartment dwellings Use a customer journey approach Use of social and behavioral drivers & barriers (among others: advice, unburdening and guidance, decision making and group action) Use of context drivers and barriers (multi- stakeholder issues) Create a single point of contact (the solar coach)
Office hotels	Driver: expected financial benefits Barriers: nZEB initiator and financial beneficiary undetermined
Schools	Drivers: Adequate competences school management/ city officials Barriers: Financing of the complex deep energy renovations Soft drivers for investment: Welfare of children, quality of education, preservation of cultural heritage

Introduction

Deep renovations of the residential sectors buildings towards nearly Zero Energy Buildings (nZEB) are lagging behind the European political ambitions for energy renovation. The overall REFURB project focuses on bringing forward solutions to solve the complex interplay between the supply side and the demand side of an NZEB renovation and bring forward an” offer one cannot refuse” solutions targeting the residential sector.

In Work package 4 the REFURB approach and its country - specific compelling offers (D4.4) were developed. The compelling offers were designed to target promising segments of the private residential sector. Work package 6 is set up to test and improve, roll-out and stimulate the transfer of the REFURB approach and its compelling offers. WP6 consists of the following three tasks, where this report is the deliverable D6.3 corresponds with Task 6.3, on transferability:

- Task 6.1: Pilot test and improvements
- Task 6.2: Rollout plan – (keep) increasing the impact of the Refurb approach
- **Task 6.3: Analyse the transferability of the project’s results – transferability plan.**

The REFURB project’s focus was on privately owned dwellings. Task 6.3 was to result in a transferability plan for the rental sector, i.e. how REFURB compelling offers could be adapted to fit the rental sector.

However, due to their characteristics, some REFURB countries (DE, NL) composed compelling offers for or stemming from lessons learned within segments other than the private residential sector.

For Germany, the compelling offer (D4.4) was based on the segment ‘tenants of multi-apartment-dwellings’ from the beginning, meaning mainly housing companies, especially housing cooperatives. From this perspective, the company or cooperative is the *owner* of the building, while the tenants, depending on the form of organisation of their landlord, might have certain rights of determination, but are mainly bound to the decisions of the owner. Focussing on this segment was conclusive as REFURB partner Bauverein (BHL) is a housing cooperative with about 7.500 units and ISW is very active in the field of urban development with a focus on cooperative and municipal housing companies, the rental market and energy renovation. Moreover, their work on the compelling offer in WP4 (D4.4) was already preparatory for the work on a generic transferability plan in WP6.

Moreover, Dutch REFURB compelling offer #2 ‘Modular approach to NOM’ stems from the industrial approach developed within the Stroomversnelling (Energiesprong). A large regional building company already renovates social rental dwellings in Northern part of the Netherlands (mainly Leeuwarden/ Fryslân) with its own Stroomversnelling alike NZEB solution and now seeks to target the residential sector as well. Hence the Dutch REFURB compelling offer #2 ‘Modular approach to NOM’.

Lessons learned in Germany, Leeuwarden/ Fryslân and within the Stroomversnelling can be related to and are recognizable as such and might benefit transfer of compelling offers to other EU regions and countries with (large) social housing stock. Therefore, these lessons learned were used to compile a generic transferability plan for widespread uptake of the REFURB approach. At the same time, other segments besides from the residential sector will be involved also.

Potential target sectors for transfer will be discussed in Chapter 1. Chapter 2 describes current REFURB experiences in the non- residential sectors. The generic transferability plan and other identified potential transfer segments are discussed in Chapter 3.

1. Identification of segments for transferability

1.1 FREE MARKET RENTING

1.1.1. Germany

In Germany, compared to other EU-countries, the rental sector is quite large and accounts for 55% of the total housing stock. 51% of the total housing stock is on the free market and 4% are social housing receiving government funding.¹

About every second household in Germany rents their home. Although owner occupancy is generally desired by many, renting is generally accepted as a suitable alternative, probably since the tenancy law in Germany is protecting the tenants' rights effectively. Rental housing situations are generally considered as being secure.

The building typology in Germany is rather diverse and depends highly on the regional tradition and developments. More than half of the German dwellings are located in multi-family-houses. A third of the dwellings are located in single-family-houses, the rest in two-family-houses.² Every fourth building was built before 1948, so there are quite a lot of old buildings still around. Most of the dwellings were built between 1949 and 1978.³ The building types constructed in that era differ a lot between the former eastern and western parts of Germany.

The results of the Census 2011 show that 59% of the total housing stock is owned by private persons. An additional 22% are owned by Condominium Owner Associations (COA). This is an organisation consisting of the owners (private persons) of apartments in multi-apartment-buildings, which deals with the administrative needs connected to the building. The apartments can be either owner-occupied or rented out to a tenant. Another big share of the housing stock is owned at almost equal shares of 5-6% by three different types of private owners: housing cooperatives, municipal housing companies and private housing companies.⁴

¹ BBSR, p. 19

² BBSR, p. 20

³ BBSR, p. 20

⁴ The shares missing to 100% is owned by other private companies, federal institutions or not-for-profit organisations like the church.

Table 3 Residential buildings and dwellings in Germany (Census data per 9th May 2011)

	Dwellings	
Private individuals	23 728 707	58,5%
Condominium owners associations	8 956 434	22,1%
Housing cooperatives	2 086 456	5,1%
Municipal property	2 294 244	5,7%
Private housing companies	2 183 183	5,4%
Others	1 296 293	3,2%
Total	40 545 317	100%

1.1.2 Netherlands

Renting on the free market is also possible, mainly renting either via a landlord or via a (commercial) housing company. The owner wants to make a decent profit as a return on their investment. The monthly rent is higher than 710,68 Euros, above the maximum amount for being eligible for housing subsidies. Tenants can therefore not opt for housing subsidy. Rent increases are also not regulated and there is no maximum rent either. It is a true free market, ruled by demand and supply. The free market in the Netherlands is quite diverse in terms of typology and geographically scattered throughout the whole of the Netherlands.

1.1.3 Denmark

The private sector can only finance the retrofitting project through commercial funds and thereby have higher rates. Furthermore, like private homeowners there are areas in Denmark where it is impossible to get financing.

Approx. 85% of housing in the private sector is multi-storey buildings. The largest concentration of private apartments is in the cities Copenhagen, Aarhus, Aalborg, and Odense. Here is approx. every fourth a residential home. Approximately 1/3 of the private homes were built before 1950 and have not been through a deep renovation since. Thus, there is an enormous potential for energy improvements.



Figure 1 Helgolandsgade 5 from 1908

There is a significant difference between the composition of landlords in Denmark. In the larger cities, the properties are typically owned by larger financial institutions such as pension funds, while private landlords in the province are typically private individuals. In Sonderborg, the private landlords typically administer 2-7 buildings as a part-time job.

The private rental housing sector is governed by the most stringent provisions of the rental law (“Lejeloven”) and the housing regulation (“Bolig-reguleringsloven”)⁵.

This law applies to almost all buildings from before 1991 which is also the buildings with the highest energy saving-potential. The law is making it difficult for the landlord to get a reasonable business case out of a retrofitting project. Because Denmark is characterized by a very high level of legal protection in terms of tenancy, that is, a high level of security of tenure⁶.

This means that the possibilities for raising the rent to finance a retrofitting is a strict process and requires a high level of juristic knowledge and expertise. Furthermore, there is a significant risk that the rent will be so high that the apartments will become impossible to rent out. This applies the most in the suburb’s like Sonderborg.

1.1.4 Estonia

The rental sector is 7% of overall residential housing market in Estonia. However, there are no or very few residential rental houses as such. Rather the rented dwellings are dispersed among different houses. For example, if an average Estonian multifamily house consists of approximately 40 apartments then statistical probability is that 7% of these i.e. two or three of these are rented out by their owners and the rest of the apartments in the same house are owner occupied apartments.

In this typical situation the owners of the rental apartments are represented in the Home Owners Association of this house on the same basis as are the owners of owner occupied apartments and the decisions to renovate are made on the principles described in previous deliverables (see for instance D4.4).

1.2 SOCIAL HOUSING SEGMENT

1.2.1 Germany

In Germany, the social housing system is in private hands. It must be distinguished between subject- and object-funded units.

Object-based: Every landlord is entitled to apply for object-based social housing subsidies for the apartments he owns. In return, the landlord is committed to live by certain limitations, such as rent caps and occupancy control agreements.

Subject-based: Tenants may apply for rent allowance or in case of recipients of minimum social welfare for accommodation cost subsidy. About 12% of all households are recipients of housing assistance.⁷

In other words: People with low incomes can either try to find a subsidized flat or they can rent on the free market and apply for accommodation cost subsidy afterwards. In addition, the federal states are promoting owner occupation and rented social housing and the acquisition of residential property.⁸

⁵ BBSR-Online-Publication Nr. 14/2016

⁶ BBSR-Online-Publication Nr. 14/2016

⁷ European Federation for Living: Financing Affordable Housing in Europe, p. 26-27

⁸ BBSR, p. 20

Housing cooperatives as well as municipal housing companies are often obliged by their statutes to provide affordable housing. They are not only profit oriented but also pursuing other goals like providing affordable housing for low income tenants, offering additional social services or having positive impacts on the regional/urban development.

1.2.2 Netherlands

In the Netherlands, the rental sector consists mainly of either social housing or renting on the free market. The total housing consists of 7.641.32 dwellings.

The social housing segment in the Netherlands is relatively large as compared to other European countries, as it accounts for around 30% of the total housing stock. In addition, free market renting accounts for around 14% and owner-occupied for around 56%⁹. These numbers are (kept) rather stable each year.

Social housing is provided by social housing corporations, i.e. non-profit organisations, which by their statute are to provide affordable housing for lower income households. The monthly rent within social housing is most often below 710,68 Euros. Tenants can apply for a housing subsidy (in Dutch 'huurtoeslag') if the monthly rent is below 710,58 Euros and their annual income is below 22.200 euro. More and more, social housing in the Netherlands is meant for the 'most vulnerable tenants', meaning tenants with the lowest incomes and increasingly also for those with psycho- social issues.

Rents within social housing can only be increased once a year and within tight boundaries. During the economic crisis (roughly between 2010 – 2015), rent increases within social housing were kept at a minimum, mostly only correcting for inflation (around 1% at the time).

Core tasks of social housing corporations are laid down in a law, Woningwet 2015¹⁰. Based on this law, social housing corporations, municipalities and tenants' representatives together are to make agreements on local social housing challenges, which also includes agreements on energy performance of the local social housing stock. By law, housing corporations must renovate their social rental stock to energy label B by 2022. However, considering the ambition of the Netherlands to be energy neutral by 2050, many Dutch housing corporations decide on more ambitious goals for the energy performance of their housing stock. Also, the Dutch Stroomversnelling has been stimulating deep energy renovation within the social housing sector for years now.

1.2.3 Denmark

Social Housing in Denmark is equal to Housing associations. They function as a non- profit organization and is part of the Danish welfare and therefore the sector is legally defined as affordable and decent housing for all in need hereof. The municipality has the right to disposal of 25% of vacant apartments.

The housing associations have a National Building Fund (NBF) that they pay to through the rent. The task for the NBF is to support new departments and subsidy when departments experience building defects or bigger renovation. To receive funds from the NBF a strict set of rules is enforced.

There are six local housing associations in Sonderborg, offering affordable affordable to all that are in need hereof. In Sonderborg, housing associations already perform many shallow energy renovations, no deep energy renovations projects have been made within the last 3 years.

REFURB partner ProjectZero already has gained some knowledge regarding the compelling offer for the social rental sector.

⁹ https://vois.datawonen.nl/jive/report?id=cowh1_2

¹⁰ <https://www.rijksoverheid.nl/reqering/reqeerakkoord-vertrouwen-in-de-toekomst/2.-zekerheid-en-kansen-in-een-nieuwe-economie/2.3-wonen>

A typical dwelling from a housing association from Sonderborg is shown in the picture below (Figure 2). This building is from 1959.



Figure 2 Dwelling housing association in Sonderborg

An analysis conducted by Copenhagen Economics (2014) shows that there is great potentials for energy saving. Analysis shows that renovations can often reduce energy consumption by approx. 30% in the housing association¹¹.

Older buildings have a significantly higher heat consumption per square meters than newer buildings. On average, heat consumption for buildings that were built before 1945 is above 125% higher and for buildings built between 1945 and 1974 it is above 80% higher than for buildings built in the period 1975-2012.¹²

Housing built between 1945 and 1974 amounts to approx. 280,000 homes, of which 35% have a renovation requirement¹³. Based on the above estimates of energy consumption in this type of housing, it is therefore expected that deep renovations can be made for approx. 98,000 homes throughout Denmark.

The National Building Funds framework for renovation was 4.2 billion DKK. in both 2015 and 2016. This is a reduction from the level in 2011-2013, where the framework was increased to counteract the negative economic development. The frame is expected to fall again in 2017 to 2.6 billion. DKK thereby leaving less funds to support both energy renovations. Of the total frame, up to 350 million DKK. is reserved for the implementation of deep energy efficiency projects, which corresponds to just 8% annually in 2015 and 2016. This amount of money is used for development project aiming at displaying the potential in different approaches in the housing associations.

A housing association is democratically managed by the residents in its governing organs and committees, see Figure 3.

¹¹ Dansk Byggeri, energianalyse 2017: https://www.danskbyggeri.dk/media/24229/final_byggeriets-energianalyse_samlet_net_2017.pdf

¹² Dansk Byggeri, energianalyse 2017

¹³ Dansk Byggeri, energianalyse 2017

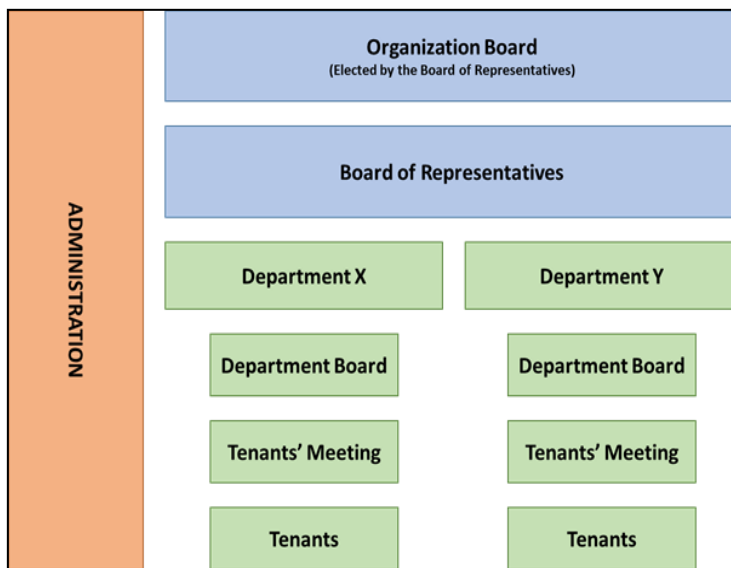


Figure 3 Structure of social housing in Denmark

When a social housing association inaugurates a plot of new buildings, a new department is formed, and the tenants elect a department board of about five persons (tenants always hold the majority in the department board). In that way, as years go by, social housing association organizations can grow to have a substantial number of departments with a varying number of housing units.

To launch any energy related measures in a department there is a political decision-making process that must be followed. At an annual resident´ meeting a department board is elected. This department board in collaboration with the association´s administration can propose sustainable energy measures to be undertaken in individual buildings or in a department. Once such a proposal is on the table, a resident´s meeting is called to inform about the plans and to discuss potential consequences. At the resident´s meeting, it is possible to ask questions and make other suggestions to the measures proposed by the department board.

Each department is a legal entity with its own financial accounts. The department pays a fee to the administration for all work conducted in the department.

1.2.4 Estonia

There are a few rental houses which are owned by municipalities either directly or through municipal management units.

These houses are eligible for KredEx renovation subsidies on the same basis as owner occupied multifamily houses represented by Home Owners Associations of respective buildings. With the difference that the main beneficiary is not an association but some municipal legal body. All technical, legal, procedural and quality control requirements apply for both cases.

1.3 OTHER POTENTIAL TRANSFER SEGMENTS

Other potential segments for transfer have been identified in the Netherlands, Denmark and Estonia. The identification was based on the existence of one or more touchpoints with the REFURB compelling offers. German partners BHL (housing company)/ ISW are active in the rental sector, therefore no other segments for transfer were identified for Germany.

1.3.1 Netherlands

Considering the energy transition, Buurkracht now seeks to broaden its scope by offering its services to other, i.e. non – residential segments. Two potential segments have been identified:

- Corporate Communities
- Building owners associations

There is potential for transfer considering the ‘community aspect’, the core business of Buurkracht. And the many touch points between Buurkracht and REFURB.

1.3.2 Denmark

There is potential for transfer to rented office buildings/space, as there are better possibilities to negotiate rent for rented office buildings and use green leasing contracts stating what comfort level the tenant is paying for.

This sector has potential because of the focus on indoor climate in relation to productivity. Therefore, businesses can see a transferability from better energy consumption to better indoor climate and furthered to more productive employees.

This method is already used in Copenhagen and the municipality of Copenhagen has developed green leasing contracts¹⁴. The potential of rented office spaces in Sonderborg is small but with the municipality as one of the biggest customers in the area there is potential for transfer.

In the private sector, higher comfort is often linked to lower sickness among workers and more productive workers. Therefore, the business case for a higher rent is better when these aspects are considered.

1.3.3 Estonia

Potential target sectors for transfer in Estonia/ Tartu are:

- Buildings of education sector especially buildings of primary and secondary schools.
- Office buildings, especially those housing small and medium sized businesses and enterprises and mainly on rental basis.

1.3.3.1 Buildings of education sector

There are 13 primary schools, 3 secondary schools and 5 united schools in Tartu. The buildings of these schools originate from different periods – the oldest are built in the middle of XIX century and have been rebuilt a few times. Most of the buildings originate from 1950 to 1990.

A goal was set for a fiscal period 2017 – 2020 to renovate all 13 primary schools. It was estimated to cost 81 million Euros. To spend this amount, it is needed to raise the credit limit of Tartu which makes the goal rather unattainable. Even more so considering that for a fiscal period 2013 – 2016 it was calculated to cost 110 million Euros to renovate all three types of school buildings but only 3.2 million was allocated and spent annually. Holding to this pace means that the renovation is going to be perpetual and some buildings will fall into total and irreparable disrepair.

TREA has a task to monitor energy consumption of Tartu schools. It means that TREA is to make suggestions about best renovation methods. TREA has had rather lengthy discussions with municipal

¹⁴ <http://www.viegandmaagoe.dk/wp-content/uploads/2015/09/VM-evalueringsrapport.pdf>

authorities on this matter for years. Renovation of schools does not pay back financially. Financially the best solution is:” Do Nothing!”. TREA commissioned a special study from Tallinn Technical University and the study confirmed our initial calculations. The culprit is the too low price for heating. In Tartu 1 MWh of district heat costs ~65 €. (all taxes included).

The other point to consider seriously is insufficient ventilation. The required air flows are high and equipment that can handle massive quantities of heat exchange of those air flows are expensive. Also building all the ventilation ducts is expensive and architecturally challenging.

Because of calculations – simple insulation worsens indoor air quality even further. Building ventilation into required specs without heat recovery leads to enormous financial burden in exploitation. Building ventilation with heat recovery system without renovating the envelope is just plain stupid. Therefore, the only reasonable outcome is complex renovation. This is what Tartu is doing in the limits of financial possibilities.

1.3.3.2 Office buildings

There are a few office buildings in Tartu, built between 1960 to 1990. They include buildings originally meant to be local government administrative buildings and are presently turned into office buildings and administrative buildings of former industrial establishments. Most of these buildings offer room for offices of small and medium size businesses. They are usually managed by holding or real estate management companies.

2. Current REFURB experiences non-privately owned residential segments

The original target sector of the REFURB compelling offers was the privately- owned residential sector. However, due to the specific market composition, the compelling offer for Germany and the Netherlands (also) target or stem from the (social) rental sector. Their experiences will be described in this section. These are the bases to compile the transferability plan in Chapter 3 of this report.

2.1 GERMANY – HALLE

The compelling offer developed by the German partner BHL and ISW was targeting the rental sector from the beginning and was already described in detail in D4.4.

Here the decision for or against a renovation is made in the housing company, based on the long - term portfolio strategy of the company. The steps leading to that decision will differ from company to company and depend also on the location and quality of the building stock, on vacancy rates, on the expected local population development, on the social status of the tenants and many other aspects. The renovation will be organized by the company itself, the tenants are informed prior to the beginning of the works on how they will be affected by the renovation and which rent increase is to be expected. Usually, the housing company would also include information on increased indoor climate and improved comfort, to avoid opposition by the tenants. The technical quality of the renovation works is generally ensured by the process.

The technical measures taken in a specific building, depend highly on the building typology and the specific circumstances, as well as on compliance with regulations and the possibilities of rent increase after finishing the renovation.

Recently, REFURB partner BHL has initiated a so- called district solution: The energetic-quarter-concept including the replacing of a more than twenty years old gas-heating-system for 877 dwellings through a cogeneration unit with district-heating support. With 385 kW electric power and 500 kW thermal power the yearly amount of electricity provides 1.000 households in the quarter.

Audited by an energetic-refurbishment-management program for now three years to ensure the step-wise-improvements.



Figure 4 Bauverein Halle & Leuna - Energetic-quarter-concept for the "Lutherviertel" neighbourhood

Specialised energy coaches are sent out in the neighbourhoods after comprehensive energetic refurbishments, as for example in the Lutherviertel neighbourhood. Here BHL, together with the consumer advice centre and the city of Halle has made a survey to see the results of the energetic refurbishment and to give some advice to save energy to the tenants (influencing user behaviour). Emphasising the additional benefits of energy renovations in the communication with tenants is useful for motivation and appreciation of the renovation, even if the actual savings are not quite as high as they might have wished for. Nevertheless, when it comes to saving energy and saving money on the energy bill, communication with and motivation of tenants is the most important factor. To avoid the rebound effect, information and training of the tenants could help and is at the same time of interest to the company. Additionally, it can strengthen the social cohesion in the neighbourhood.

2.2 NETHERLANDS – LEEUWARDEN/ FRYSLÂN

2.2.1 Experiences in deep energy retrofits in social housing

Social housing in the Netherlands has been targeted within the Stroomversnelling for years now. Dutch REFURB compelling offer #2 'Modular approach to NOM' (NOM= NZEB)' compiled and supported by a private – public consortium of Frisian stakeholders, stems from the industrial approach developed within the Stroomversnelling (see Figure 5). For more information on the content of the compelling offer, please refer to D4.4.

Housing corporation Elkien (active in Leeuwarden/ Fryslân) has decided to renovate its entire housing stock to NZEB before 2030. This is part of their policy on sustainability. In 2017, 55 social rental dwellings were renovated to NZEB with this Stroomversnelling alike industrial approach¹⁵. In 2018, another 50 social rental dwellings will have been renovated¹⁶. The energy performance of the dwellings is monitored afterwards, with the use of sensors. In return for the investment, the housing corporation asks its tenants to pay an energy performance fee. The amount of this energy performance fee always has to be equal and preferably less than the tenant's former energy bill.

The photo below (Figure 5) shows an NZEB dwelling, which was finished in 2017.



Figure 5 NOM (NZEB) social rental dwelling Leeuwarden (source: BGDD.nl)

The renovation of the social housing stock in Fryslân will also be tackled within a private – public cooperation: The Fryske Deal. This is an innovative plan to renovate 3000 social rental dwellings. Part of the Fryske Deal consortium are: 4 municipalities (incl. Leeuwarden), Province of Fryslân, three large Frisian building companies and several intermediaries, including Stroomversnelling. The long-term aim of the Fryske Deal is to design a transferable NZEB concept for the Netherlands.

¹⁵ <https://www.bgdd.nl/portfolio-fixed/woningverbetering-55-woningen-leeuwarden/2>

¹⁶ <https://www.bgdd.nl/portfolio/nieuwbouw-50-nom-woningen-wielenpolle/2>

Lessons learned and experiences within the Stroomversnelling, from the ongoing renovations in Leeuwarden and Dutch REFURB compelling offer #2 'Modular approach to NOM' are discussed below.

2.2.2 Lessons learned compelling offer social housing segment

Within the Stroomversnelling, Dutch compelling offer #2 'Modular approach to NOM' and from the ongoing social housing renovations in Leeuwarden, some lessons learned and experiences have been obtained.

Customer journey

Within the CJ for tenants is important to:

- CJ, step 1: Inform the tenants on the plans right from the start and be sincere. This raises the acceptance level among tenants.
 - o Address the who, what, when and why
- CJ, step 1: Convince tenants of the benefits of energy renovation by emphasizing
 - o Increasing comfort of the dwellings
 - o Modern look, both inside and out
 - o New kitchen, bathroom (regular maintenance)
 - o Fixed energy performance fee (no rising energy bill)
- CJ, step 1: Make sure tenants know exactly what to expect, by whom and when;
- CJ, step 1: Solve practical issues beforehand;
 - o For instance, learn tenants how to cook on induction with a cook workshop
 - o And pay for new pots and pans
- Step CJ, step 5-9: Reduce the hassle during the renovation as much as possible. This is consistent with the findings within the REFURB project, unburdening the customer as much as possible;
 - o Renovation is non- intrusive
 - o Renovation process is transparent and fast
- CJ- step 1-11: Apply a personal approach; offer a single – point of contact, i.e. an energy coach.
- CJ, step 9-11: Deliver on energy performance as promised as this maintain trust among tenants.

Energy coach

The building company has its own team of energy coaches that act as single- point of contact for the tenants.

The energy coach can give tenants advice on smart energy behaviour.

Afterwards, the energy coach can also instruct the tenants on how to utilize their NZEB home (for instance, can they drill holes in the wall, open windows, etc.).

Quality assurance

To ensure the energy performance of the NZEB dwellings, monitoring with sensors is applied. Tenants are also required to adhere to 'normal/ regular' energy behaviour. If their use of energy exceeds the amount they pay for their energy performance fee, an energy coach will pay them a visit to track the root cause and its accountability.

At least two large Frisian building companies offer energy performance guarantees (10 years, 25 years) along with their NZEB solution, for renovated social rental dwellings or new- built.

3 TRANSFERABILITY PLAN

Based on the knowledge extracted from the REFURB partners and the experiences presented in Chapter 2, a general transferability plan to social housing is composed. In the first sections of this Chapter, the transferability to the social housing in Denmark and Estonia is studied in detailed. In the last section, the general transferability plan is presented.

For Estonia and Denmark the potential for transfer of the REFURB compelling offer was determined as social housing and free rental sector and social housing respectively.

In Estonia the rental sector (7% of total housing stock) is relatively limited in size as compared to other European countries. Nevertheless, there is both social housing as well as renting on the free market. There is transfer potential for both.

In Denmark there are considerable differences (legal, financial, typology building) in renting on the free market as compared to social housing. Laws and legislation regarding the free rental market are so strict that deep energy retrofits are almost impossible. Instead, Denmark focussed on transfer of the compelling offer to social housing, offered by housing associations. Transfer of the compelling for the social housing has been investigated further.

3.1 TRANSFERABILITY TO SOCIAL HOUSING IN DENMARK (SONDERBORG)

3.1.1 Adaptation compelling offer to social housing segments

Drivers and barriers

Some drivers and barriers of both tenants and housing associations have been identified.

Tenants

When considering a renovation project, the tenant is also sensitive regarding gains from new installations in relation to the renovation. This means that a new balcony or new bathroom can be the added value which gets the renovation project approved. In this sense, the tenants are very much like a homeowner.

Housing associations

The Housing associations have an important driver as well as some clear barriers for investing in deep energy renovation.

Driver housing association: Maintain an attractive housing stock and ensure cheap healthy housing.

Barrier: Knowledge among the residents about deep energy renovations. As it is the tenants who decide on the projects they need to become more aware about the potential for saving on their energy bill. Furthermore, there are many smaller housing associations in Denmark where they do not have the knowledge to investigate the potential for deep retrofitting projects. To meet this challenge some housing associations is merging their administration. However, this transition is moving slow and is difficult because of different culture and history between the housing association in local areas.

Customer journey

The customer Journey needs to be split in one for the housing associations and one for the tenants. This is due to the decision-making process; it is tenants we decide on whether a project will be carried or not.

The tenant is also sent on a CJ, it is the tenants that must agree with the deep energy renovation. Very important to include:

- CJ, step 1-4: Offer a catalogue of gained comfort from the retrofitting
- CJ, step 1-4; If possible e.g. expand balcony when retrofitting step (driver for tenants)
- CJ, step 5-7: Inform the tenants on the plans a process right from the start
- CJ, step 5-7: Personal approach (Renovation Coach to tenants)
- CJ, step 5-7: Reduce renovation period as much as possible
- CJ, step 8-11: Make the tenants energy behaviour visible

The (administration of the) housing association is also sent on its own CJ, when outsourcing the deep energy renovation. Very important to include:

- CJ, step 1-4: Offer a programme for screening the departments
- CJ, step 1-4: Offer a catalogue of best practices
- CJ, step 5-7: Easy tendering process (help with developing tender with focus on energy)
- CJ, step 5-7: Finance possibilities from third part investors
- CJ, step 8-11: Deliver on energy performance e.g. the quality of the work delivered and construction time

3.1.2 Necessary frameworks for transfer

The necessary frameworks wherein transfer is to take place, have been identified within the REFURB project.

3.1.2.1 Organizational framework

Research shows that there is a need for developing a product to market from consulting firms providing the tool for screening (researching) the housing stock of housing associations.

3.1.2.2 Communication and marketing framework for further transfer

There is a need for the development of credible information material for tenants, where current cases are reviewed and the benefits of the renovations for tenants are clarified.

In addition, marketing material is needed that addresses the administration and explains why they should now buy renovation expertise instead of carrying out the work themselves, as they have previously done. The material should highlight the gains the housing associations would get and a clear indication of which 'pain relievers' (added value) a consultant may be able to provide them with.

3.1.2.3 Policy framework

All housing associations need to draw up an energy policy that describes how renovations are to be carried out in the future and what energy standard new properties are to be constructed.

3.1.2.4 Financial framework

The total rent for the tenants should be the same after a retrofitting. Today only few of the housing associations have used ESCO solutions because they do not know the benefits of this method. Historically, housing associations have easy access to cheap funds to retrofit from NBF and mortgages. Therefore, they need learn how to create funds for deep energy retrofitting.

3.1.2.5 Legal framework

There is a need for the NBF fund's mandate to be expanded so that support can be given to deep energy retrofitting projects to retrofit rental dwellings to nZEB.

At the same time, it is recommended that the municipality, which is the supervising authority for the housing associations, could claim the energy standard for housing associations' buildings in return for providing guaranty for the projects.

3.1.3 Research and preparation for transfer

It is not (yet) possible to transfer directly to the social rental segment, offered by housing associations. The REFURB compelling offer (incl. technical package) needs to be adjusted to the housing stock of the six housing associations in Sonderborg. This requires first extensive research (so-called screening) of the housing stock. The compelling offer also needs to be made truly 'compelling' in the eyes of the tenants, considering their legal voting rights. In addition, additional external funding for the deep energy renovations will need to be arranged for.

To address all the issues mentioned above, a new EU Horizon 2020 project called HAPPI with all 6 housing associations in Sonderborg has been launched. Research within HAPPI, will focus on the possibilities of attracting third party financing companies e.g. pensions funds or investment companies to fund deep energy renovations in all housing associations. The idea is to bundle the retrofitting projects to make them attractive to invest in. The idea is that bundling projects will create better prices for the total renovation (economies of scale).

The HAPPI consortium will also:

- Develop marketing material for other housing associations highlighting the gains and pain relievers of hiring a consultant for deep energy renovation projects;
- Develop a screening tool. With the tool current departments and their housing stock can be investigated. Furthermore, focus on capacity building in the administration will make the housing associations better suited for tendering new deep retrofitting projects;
- Bundle energy projects (in catalogue) in concrete renovation packages;
- Design and offer tenants catalogues with the stories of the good renovation cases; cases where tenants were advised from step one;
- Design and offer tenants a catalogue that informs them on the benefits in addition to energy savings relating to a renovation;
- Use the customer journey to identify touch points for the administration and tenants to secure the projects will be approved by the tenant's democracy.
- Present the compelling offers to the tenants of the departments:
 - A normal way of presenting a retrofitting project in a department is to give the tenants one, and in some cases, two proposals to choose from. The renovation packages (compelling offers) could give the tenants more influence on the projects and maybe they would go further than the administration if they were given the opportunity.

3.2 TRANSFERABILITY TO SOCIAL HOUSING IN ESTONIA

The Estonian compelling offer for multi apartments buildings also applies for multi apartment with both owners and tenants.

There are a few rental houses which are owned by municipalities either directly or through municipal management units. These houses are eligible for KredEx renovation subsidies on the same basis as owner occupied multifamily houses represented by Home Owners Associations of respective buildings. With the difference that the main beneficiary is not an association but some municipal legal body. All technical, legal, procedural and quality control requirements apply for both cases.

3.3 GENERAL TRANSFERABILITY PLAN TO SOCIAL HOUSING

In this section, REFURB lessons learned and experiences gained with the social rental sector (Chapter 2) were used in the compilation of a general transferability plan.

Aspects addressed:

- Required adaptations REFURB compelling offers;
- Necessary framework;
- Responsibles/ executors (examples)

Process steps have been included to illustrate the moment where adaptations of the REFURB compelling offers is required.

Considering that tenants in social housing in Denmark and Netherlands have a final say in the (renovation) process, ensuring tenants acceptance has also been added to the transferability plan below.

Table 4 Generic transferability plan

Process steps	Required adaptations REFURB compelling offers	Necessary framework	Responsibles/ executors
Gather basis information social rental stock: Aspects could be: Typology buildings Age buildings Type of tenants Presence of district heating present y/n		Research	Housing association Private – public cooperation (as in the HAPPI project)
Policy on energy retrofits	Decide on and describe policy on energy retrofits - Ambition level - Goals/ milestones In case of private- public cooperations: - Set standard together - Government can make guarentees on investment later on	Policy framework	Housing association/ corporation Private – public cooperation (as is in the HAPPI project)
Determine where potential for deep energy renovation lies	Investigate deep energy renovation potential of the stock: - Maintance level - Current energy performance	Research	Housing association/ corporation Private – public cooperation (as is in the HAPPI project) Consultant/ external advisor (if necessary)

Portfolio decision – making:	<p>Which part of the stock should be renovated now:</p> <p>Based on combination maintenance & potential for deep energy renovation</p>	<p>Information framework Policy framework (ambition level)</p>	<p>Housing association(s)/ corporation(s) Private – public cooperation (as is in the HAPPI project)</p>
Derive optimal technical package for renovation project	<p>Technical package:</p> <p>Technical package, i.e. the combination of technical (energy) measures differs from project to project</p>	<p>Technical framework</p>	<p>Housing association(s) Building company Private – public cooperation (as is in the HAPPI project)</p>
Financial solutions	<p>Focus is on large scale renovations; requires large investments:</p> <ul style="list-style-type: none"> - Rent increase? - Green loans - Subsidies (if available) - Possibilities to apply economies of scale - External (additional) financing - Energy performance fee (ESCO financing structure) - Government to guarantee investment <p>Aim: To ensure a viable business case for the house association(s)/ corporation(s)</p>	<p>Financial framework Legal framework</p>	<p>Housing association/ corporation Banks/ funds Revolving funds Private – public cooperation (as is in the HAPPI project)</p>
Research organisation form/ structure of deep energy retrofits	<p>Different types of organizing the renovation, large scale:</p> <ul style="list-style-type: none"> - As single organisation - Cooperation with other housing associations? - With a consortium in a European project? 	<p>Organisational framework</p>	<p>Housing association(s)/ corporation(s) Private – public cooperation (as is in the HAPPI project) Building company</p>
Tendering process	<p>Preparing and entering tendering process, contacts with building company/ suppliers</p>	<p>Information and marketing ne Organisational network</p>	<p>Housing association(s)/ corporation(s) Private – public cooperation (as is in the HAPPI project) Building company Suppliers</p>
Enrich renovation package; transform into compelling offer tenants	<p>Addressing the drivers tenants</p> <ul style="list-style-type: none"> - maintenance wishes - aesthetics - comfort - luxury - more space <p>Removing the barriers tenants:</p> <ul style="list-style-type: none"> - renovation non-intrusive - fast renovation process - transparent process: 	<p>Information and marketing framework</p>	<p>Housing association/ corporation Private – public cooperation (HAPPI project) Building company Suppliers</p>

	<p>who, what, when, how</p> <ul style="list-style-type: none"> - practical issues resolved 		
Inform and entice tenants to accept compelling offer	<p>Informing tenants on maintenance needs and non-financial benefits</p> <p>Offering a catalogue of good examples renovated rental dwellings</p> <p>Offering tenants a choice between two compelling offers, theirs to decide.</p>	Information and marketing framework	<p>Housing association/ corporation</p> <p>Private – public cooperation (HAPPI project)</p> <p>Building company</p> <p>Process facilitators/ intermediaries (Buurkracht alike)</p>
Before, during and after renovation	<p>Offer an energy coach:</p> <p>Before: personal approach</p> <p>During: unburdening, troubleshooting</p> <p>After: Give smart energy advice</p>	<p>Information framework</p> <p>Technical framework</p>	<p>Building company</p> <p>Housing association/ corporation</p>
Quality assurance	<p>Offer an energy performance guarantee:</p> <ul style="list-style-type: none"> - Monitor with sensors to check energy performance - Energy coach is to investigate and solve any deviations 	<p>Technical framework</p> <p>Information framework</p> <p>Legal framework</p>	<p>Building company</p> <p>Housing association/ corporation</p>
Dissimination of good cases		Communication/ marketing framework	<p>Housing association</p> <p>Umbrella organisation housing associations</p> <p>Building company</p> <p>Umbrella organisation building companies</p>

3.4 TRANSFERABILITY TO OTHER SEGMENTS

3.4.1 Office spaces

To develop a compelling offer for private office spaces, a value proposition needs to be developed.

The focus for businesses when renting office spaces is still the place of the office space (i.e. location) (see Figure 6).

How companies prioritize when renting office space:

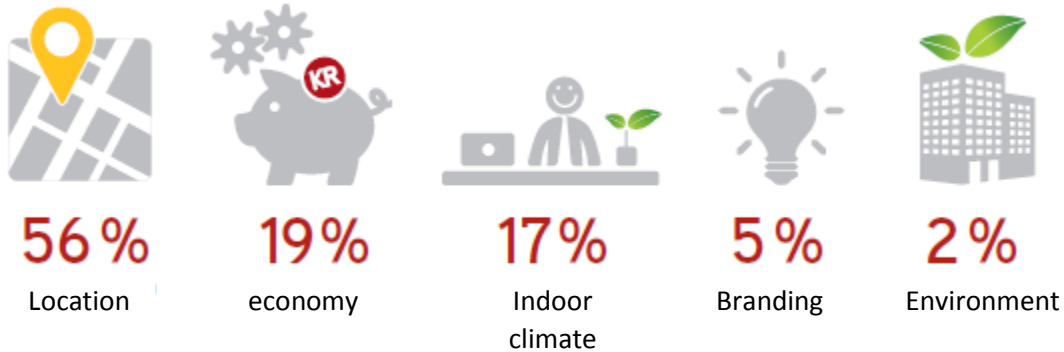


Figure 6 How companies prioritize when renting office space (GBCD rapport 2016)

The value proposition for renovated office spaces for business focusing on indoor climate is portrayed in Figure 7.

The value proposition analysis shows that business preferences are:

- Office spaces with the right ventilation and temperature
- Better comfort when working
- Easy moving into the new office
- Automatic systems that fits the work schedule

The business gets more productive workers from the right comfort level. An automatic system provides the right light, temperature and airflow giving the best comfort to workers.

High comfort is equal to higher productivity and lower sick days, and thereby the company gain on the better comfort.

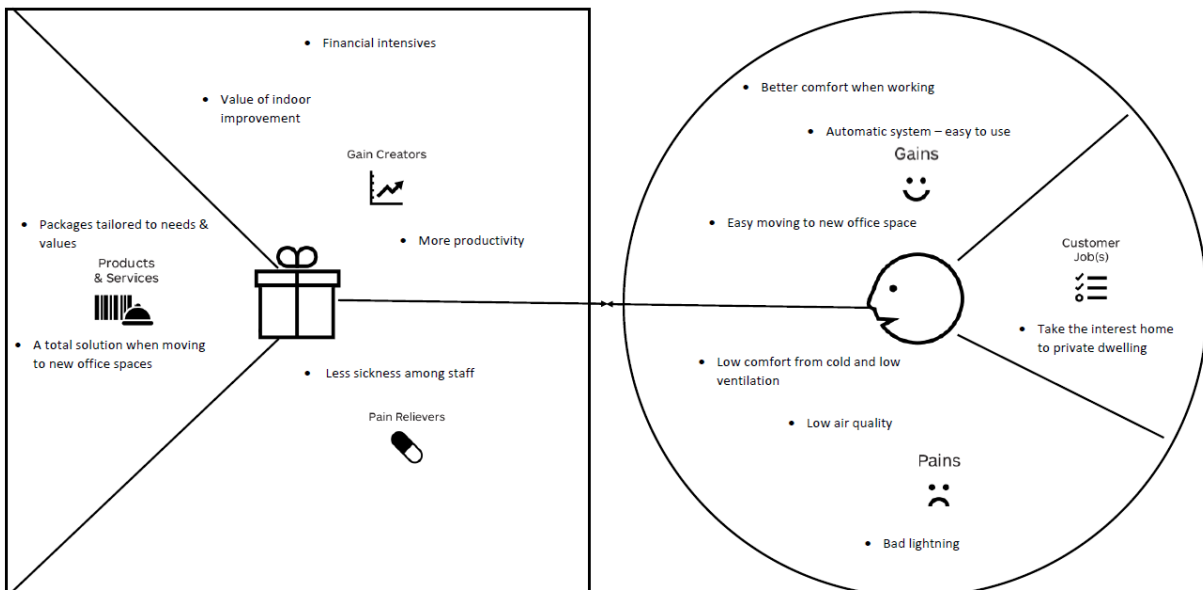


Figure 7 Value proposition renovated office spaces

3.4.2 Corporate communities

Buurkracht has developed a proposition largely based on the insights from the REFURB project: Bedrijfkracht (Business power) and VVE Zonnecoach (Solar coach for building owners associations).

Bedrijfkracht <https://bedrijfkracht.nl/>

REFURB has inspired Buurkracht to start developing Bedrijfskracht based on:

- Clear focus on a certain market segment: CSR communities
- Use a customer journey approach
- To make use of social and behavioral drivers & barriers (among others: advice, unburdening and guidance, decision making and group action)

Bedrijfkracht is essentially Buurkracht (Neighbourpower) for business. So instead of saving energy with the community 'neighbours', Bedrijfkracht aims at the community of colleagues within companies and organizations. Most companies and organizations in the Netherlands have adopted corporate social responsibility policies (CSR policies). In all these CSR policies, sustainability and the energy transition play a significant role. Bedrijfkracht supports employers to engage their employees in their CSR policies by creating awareness among employees of their energy consumption at home (for instance, using thermal imaging cameras) and by offering them matching solutions (e.g. offers for insulation).

3.4.3 Associations of owners

Buurkracht has developed a proposition largely based on the insights from the REFURB project: VVE Zonnecoach (Solar coach for building owners associations).

REFURB has inspired Buurkracht to start developing VVE zonnecoach based on:

- Clear focus on certain market segment: Owners of multi apartment dwellings
- Use a customer journey approach
- To make use of social and behavioral drivers & barriers (among others: advice, unburdening and guidance, decision making and group action)
- To make use of context drivers and barriers (multi- stakeholder issues)
- Create a single point of contact (the solar coach)

De VVE zonnecoach <https://devvezonnecoach.nl/>

De VVE zonnecoach supports associations of owners of multi apartment dwellings in realizing collective solar panel systems on their dwelling(s). This is a first step in getting dwellers interested in taking on more energy saving measures.

It is a free and independent service by a coach to support the social and decision-making process for the board and members of the association. And the coach provides answer to legal, economical and technical questions.

3.4.4 Schools Tartu Estonia

CJ & single - point of contact

For educational buildings the CJ will be of less importance. Even more attention must be dedicated to technical consulting, considering the required complex renovations. As most of these buildings need to be repaired or renovated in coming years anyway it would be a good possibility to carry the renovation through up to nZEB level.

Technical package

Also differing from residential buildings, it is impossible to show financial gains from deep renovation. According to a study TREA commissioned from Tallinn Technical University, there is no possibility that renovating a school on any level would pay back in any length of time. The results of the study about economy of renovation of school buildings.

Three renovation packages were compared:

Package I

Mechanical ventilation with heat recovery,
Added insulation on walls 200 mm, roof 250 mm
Windows $U=1,2$

Package II

Mechanical ventilation with heat recovery,
Added insulation on walls 250 mm, roof 350 mm
Windows $U=0,9$
Demand based low energy lighting

Package III

Mechanical demand based (VAV) ventilation with heat recovery
Added insulation on walls 250 mm, roof 350 mm
Windows $U=0,9$
Demand based low energy lighting

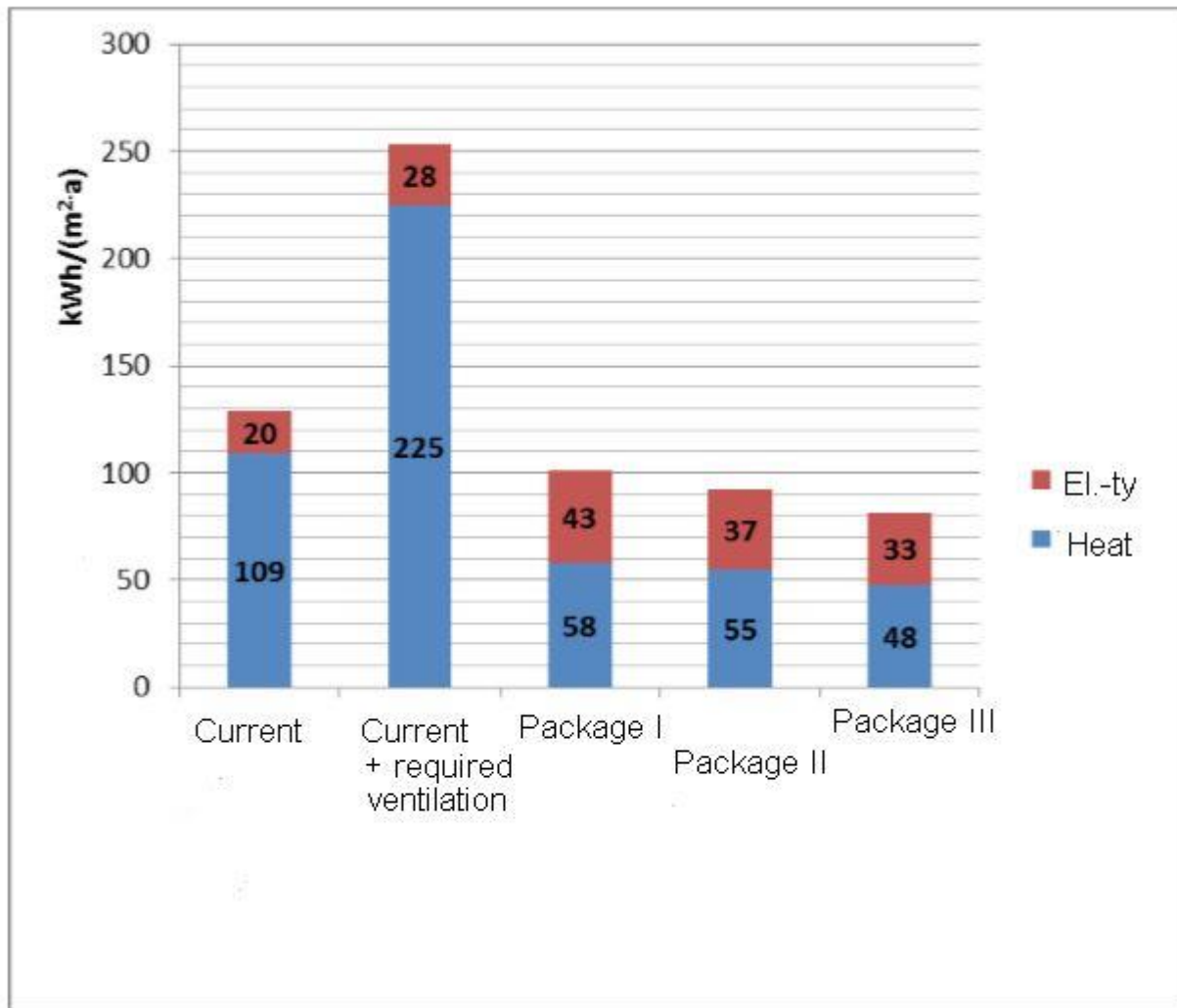


Figure 8 Energy consumption with different packages

As can be seen in Figure 8, if required ventilation without heat recovery is added to status quo then energy consumption doubles.

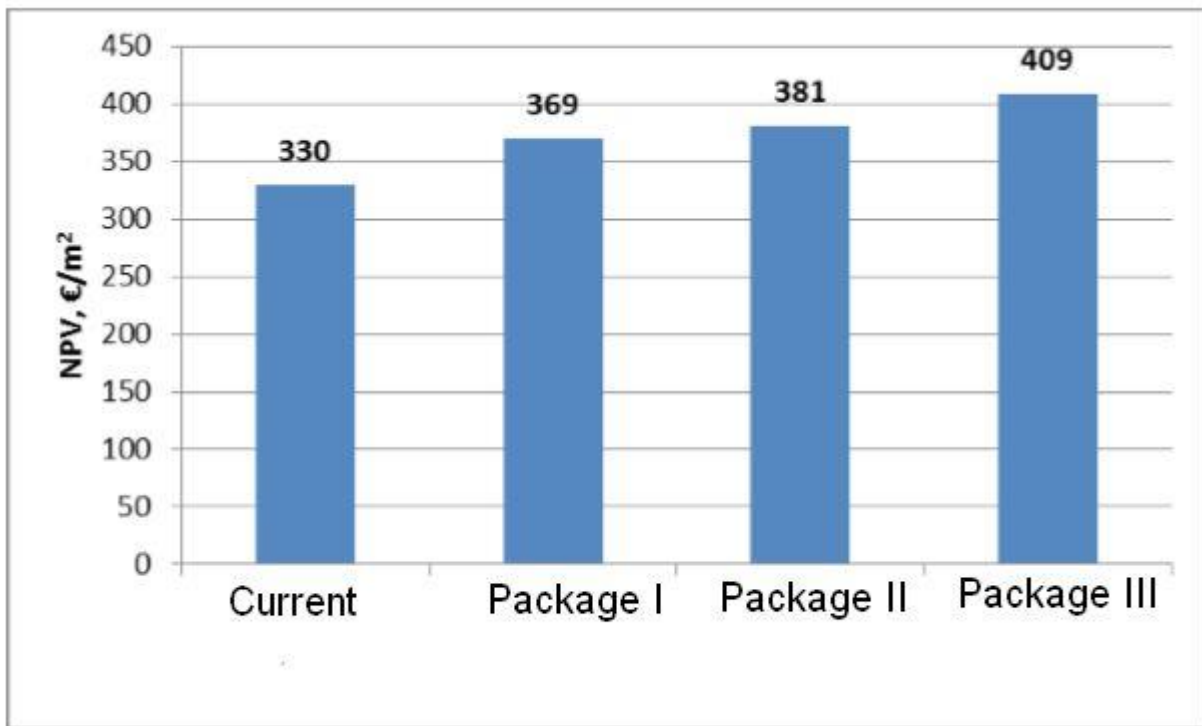


Figure 9 Net present value over 20 years

Figure 9 shows net present value over 20 years of renovation packages compared to status quo. The better the renovation the higher the cost.

Barriers

The main barrier is finding financing considering the excessive costs. It is feasible to use the same scheme as with residential multifamily houses where part of funding is based on one of emission trading schemes and channelled to beneficiaries through KredEx Fund.

Drivers

Unlike Housing Associations who do not possess capability for project management such as acting as a buyer for renovation work, schools themselves or respective city officials have adequate competence for acting as such. Based on TREAs experience though, there is still a need to manage and oversee specific aspects of energy efficiency.

Paradoxically the deeper the renovation the greater the cost. Thus, the reasoning for renovating schools needs to be based on different political decisions and the gains need to be shown elsewhere – quality of education, preserving cultural heritage, health of children etc,

3.4.5 Office buildings Estonia

Office buildings are more like to residential buildings than schools in a sense that expected financial benefits are similar or even greater than for multifamily houses.

Barriers

Most of the office buildings in need of renovation are of type “shared office spaces” which means that the problems are like those of rental housing. The final beneficiary is undetermined and so is the organisational body who should initiate deep renovation.

Drivers

On the other hand, as office have already a capable management and managerial staff it should be simpler to conduct the entire process of renovation.

Financing

As always it is to be considered what should be the sources of financing. If part of the funding came from emission trading, then what are the respective benefits.