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Summary

Work package 6 is set up to ensure further uptake and improvements, the rollout and transferability of the REFURB approach and its compelling offers (described in D4.4). WP6 consists of the following tasks, where this report is the deliverable for Task 6.2:

- Task 6.1: Pilot test and improvements
- **Task 6.2: Rollout plan – (keep) increasing the impact of the REFURB approach¹**
- Task 6.3: Analyse the transferability of the project's results – transferability plan

Regardless of differences due to country- specific characteristics, each of the REFURB countries (NL, BE, DK, ES) has been able to write its own REFURB national rollout plan to ensure scale up of REFURB best practices and to cause impact, either quantitative i.e. number of renovations triggered or qualitative i.e. changing the mindset of demand-side and supply-side.

The national rollout plans (Chapter 1-4) can now also serve as examples for other EU regions and countries. The rollout of each country was divided into three phases. The three phases for the rollout of nZEB renovation solutions show some similarity with the phases for market uptake of new innovative products:

1. Phase 1: Supportive policy and legislation to create and boost the nZEB market
2. Phase 2: Market innovation, education and quality schemes for nZEB
3. Phase 3: Communication and marketing, successfully targeting most homeowners with an offer 'they cannot possibly refuse'.

The national rollouts follow a bottom-up approach from local/regional to national level. Mutual learning and sharing of REFURB best practices creates synergy attracting new stakeholders and market players stimulating REFURB rollout on national and European scale. Details of the NL, BE, DK and ES rollout plans are to be found in Chapter 1 to 4.

Lastly, to ensure effective national rollout, some EU policy recommendations have been made. Some of the REFURB recommendations include that:

- EU and national legislation need to address and recognize the important roles of municipalities, public private partnerships and local societies to take further responsibility for implementing necessary actions along the REFURB Customer Journey.
- EU needs to maximize its pressure on the EU27 countries to implement energy efficient measures (supporting EU's nZEB ambitions).
- EU shall also support supplementary carbon-reductions at household level by installing local energy production (wind, solar, heat pumps) either at household level or at local society level – supporting the EU's nZEB ambitions.
- EU regulations on use of obligatory use of EPC and an evaluation of the connection between sales price and EPC in all EU-countries, will trigger the market and higher the demand for more energy efficient single-family homes.
- EU binding targets in a EU-efficiency directive of 30% in 2030 and energy savings obligation per year from 1,0 to 1,5 % will press the local government to focus on both energy efficiency and renewable energies.
- EU-target for differentiated energy efficiency efforts, so that measures are directed towards those parts of the building stock, where the effect is greatest in a long-term perspective

¹ The REFURB approach entails the combination of: Segmentation, compelling offers, CJ, single point of contact, one stop shops i.e. REFURB best practices to bridge the gap between the demand and supply side.

- EU continues to support the engagement of involving kids/youth at school and during studies² as important ways to strengthen the citizen/family energy awareness and competences.

² *EU North Sea Interreg 2IMPRES project*

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Introduction

Deep renovations of the residential sectors buildings towards Nearly Zero Energy Buildings (nZEB) is 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 you can’t refuse” solutions targeting the residential sector.

Within the deliverables of REFURB work package 2 and 3 the supply side and the demand side for nZEB were mapped. In D4.5, available financial solutions for nZEB have been gathered. With the lessons learned within WP2, WP3 and D4.5, the REFURB approach³ was compiled and used to develop country- specific compelling offers, described in D4.4.

Work package 6 is set up to ensure further uptake and improvements, the rollout and transferability of the REFURB approach and its compelling offers. WP6 consists of the following tasks, where this report is the deliverable for Task 6.2:

- 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 objective of the REFURB project is to have impact; on a national and on a European level. This deliverable D6.2 describes how participating REFURB partners (DK, BE, ES, NL) will reach this impact, by describing the achieved impact quantitatively (= number of expected shallow and deep energy renovations) as well as qualitatively i.e. changing the mindset of demand- and supply-side.

To ensure REFURB’s impact on a national scale, the participating REFURB partners (DK, BE, ES, NL) have each written their own national rollout plan. The national rollout plans provide a description of actions which have been undertaken during and will be undertaken after the REFURB project. The national rollout plans can serve as examples of rollout for other European regions and countries.

Regarding the expected impact of the rollout of the REFURB approach, it is important to distinguish these dimensions:

1. The short term versus the long - term impact;
 - a. The participating REFURB partners (NL, BE, ES, DK) are to successfully implement the REFURB approach on a national scale:
 - i. Short- term aim: The short- term impact is to convince the national nZEB market of the added value of implementing the REFURB approach. The impact can be measured on a national scale by means of: Increased awareness, mutual learnings and sharing in adjacent projects, change in attitudes, supportive legislation, integration within training/ education, integration in start- stop subsidies schemes, the creation of pilot projects and initiatives, and so forth. The impact of the national rollout also provides justification for the CPIs set for their country after the project duration (2018 – 2020);

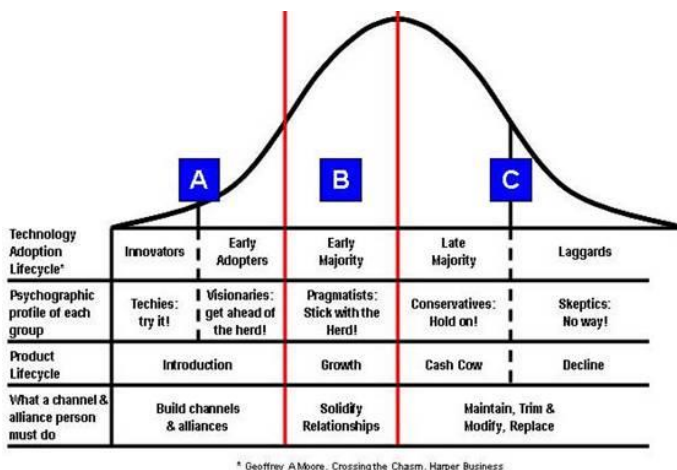
The REFURB approach entails the combination of: Segmentation, compelling offers, CJ, single point of contact, one stop shops i.e. REFURB best practices to bridge the gap between the demand and supply side.

- ii. Long – term impact: The long-term aim is to eventually reach phase 3, where the building sector is willing and capable in reaching the early majority of its national homeowners by successfully offering them a compelling offer, leading to the desired increase of numbers of deep energy renovations and CO₂ reduction (>2020);

2. The national roll-out strategy versus the European- wide strategy;

- i. The REFURB partners (NL, BE, ES, DK) will prepare a rollout strategy on a national scale.
- ii. The national rollout strategies can serve as best practices for national rollout within other European regions and countries.

Three phases are distinguished within the national rollout plans. The three phases for the rollout show some similarity with the phases for market uptake of new innovative products (see Figure 1). By creating lots of early adapters, one can eventually reach the early majority of homeowners, on national scale (see Figure 1, reaching the top of the Gauss curve).



* Geoffrey A Moore, Crossing the Chasm, Harper Business.

Figure 1 Phases of market uptake new products and services

Within REFURB task 6.2, a three- phased market uptake is presumed, which therefore also results in a 3- phase approach for the rollout:

1. Policy and supportive legislation; to create the nZEB market conditions and attract early adapters

Local/ regional government takes on the responsibility to create the right market conditions for nZEB and to attract early adapters i.e. creating the critical mass for the supply side. Policy and supportive legislation are put in place. Offering start- stop subsidies can be part of local/ regional or national policy. The supply side will start to react, with nZEB frontrunners engaging in product development and innovation. Private- public partnerships start to arise and more products come to market. National government supports the process.

Goal of rollout, phase 1: Local/ regional government is willing and able to create the right market conditions for nZEB. National government supports this process.

2. Market innovation and matching quality schemes

In phase 2, the nZEB market starts to show signs of maturity. Private- public cooperations act as important market boosters. There is long- term trust in market potential of nZEB solutions among the supply side. Suppliers start to offer more products with matching quality schemes. Product innovation is supported by research. Education and product training provide the market with skilled workers. National government offers support for uptake of local/ regional best practices and takes away barriers.

Goal of rollout, phase 2: The supply side is willing and able to invest in nZEB innovations.

3. Communication and marketing; reaching most homeowners

In phase 3, the nZEB market has matured. With tailored communication messages and marketing, the early majority among homeowners is gradually reached and effectively targeted. nZEB starts to be considered the 'new normal' among a growing number of homeowners and tenants alike.

Goal of rollout, phase 3: Homeowners are willing and able to invest in nZEB solutions.

D6.2 is structured as follows: Chapter 1-4 provides the national rollout plans for Netherlands, Belgium, Estonia and Denmark. Chapter 5 offers conclusions and EU policy recommendations based on the national rollout plans in Chapter 1-4.

1. National rollout plan Netherlands

1.1 ANGLE OF APPROACH, METHOD AND PREPARATION

1.1.1 Policy context Netherlands

The municipality of Leeuwarden, the Province of Fryslân and Buurkracht all operate within a policy context related to the energy transition in the Netherlands, with actions taking place on several policy levels. The policy context of the energy transition provides ample opportunities for the rollout of the REFURB approach. Actions are aimed to accelerate shallow and deep energy renovation within the built environment.

On national level, the energy renovation of the built environment is embedded in the National Energie agenda and the recently established Regeerakkoord (2017). Dutch society is to become energy neutral by 2050, which also very importantly includes becoming a gas free society. The use of natural gas is to be phased out completely, including the built environment. Natural gas is a depletable resource and more importantly, its extraction causes major damage to cultural heritage and property in the neighbouring province of Groningen. Natural gas is currently still used by almost all households for heating and cooking purposes. This is no longer a sustainable situation; there is a need for energy transformation of the built environment. Leading principle for energy renovation in the Netherlands is the Trias Energetica: First save energy (low hanging fruits), then produce enough green energy and only if necessary, use fossil fuels but use them only if needed and in the most efficient way.

The Regeerakkoord has set clear targets for the annual number of dwellings that will need to become 'gas less'. These targets can now serve as powerful windows of opportunity for the rollout of lessons learned within the REFURB project. The municipality of Leeuwarden participates in the Green Deal 'Aardgasvrije wijken' (= 'Gas less neighbourhoods'), where best practices are frequently shared among the many and diverse stakeholders involved. In addition, there is also a new law coming up in the Netherlands: The Omgevingswet. This law is planned to become enforced by 2020 and will provide all municipalities with more possibilities to manage the energy transition on a local level, especially with regards to the spatial aspect (where to put solar energy, windmills, renewable heat etc.). Energy renovation is a crucial aspect of the energy/ heat transition as it will be impossible to cover the current energy use with renewable sources only. A considerable amount of energy will have to be saved first thus creating momentum for energy renovation.

By now, all Dutch municipalities and provinces have some sort of plan for the energy transition of the built environment. This is no different for the municipality of Leeuwarden nor the Province of Fryslân. These plans take many forms and shapes, but they provide Buurkracht with many opportunities for cooperation with municipalities and provinces to boost actions on a neighbourhood level. Increasingly, these cooperations also entail co-financing of energy-transition enabling activities.

It is expected that the Dutch national government will soon assign the task to create heat-transition plans (to get rid of natural gas) to the municipalities. Municipalities will then continue and intensify their work in close cooperation with energy grid operators, provinces, national government, housing corporations, businesses and finally homeowners to create such plans in a sound and acceptable way. The main purpose of these plans is to cooperatively decide before 2021 where and when alternative (renewable) heating should be in place for all the built environment within the boundaries of the municipality. And additionally, for all areas that are planned for transition before 2030, a cooperatively decision must be made as to which

alternative renewable energy source will be chosen, the energy infrastructure that is needed to make it possible and how sustainability is secured for many years to come.

These heat transition plan will logically become a part of the local spatial planning and vision as soon as the Omgevingswet comes in to place in 2020 (as described above).

An essential part of the heat-transition plans will be to reduce the heat demand of all buildings and dwellings. This paves the way for a staged approach in which the heat demand is first reduced and next made CO₂ emission free and finally the whole building is made CO₂-emission free (including all electricity use). Of course, avoiding lock-in will be a critical issue when choosing the right (sequence of) steps.

1.1.2 Local policy embedding

1.1.2.1 Municipality of Leeuwarden

During the REFURB project, the municipality has started to embed the energy transition in dedicated policy documents. On a local level the energy renovation the energy transition is embedded in the Leeuwarder Energy Agenda (LEA, 2016). Goals for energy saving within the built environment are also included in the LEA. However, to ensure concrete actions, a separate project assignment on this topic was compiled, with a concrete number of energy renovations to be reached each year, within a short- term period.

On a local/ regional level the topic of energy renovation of the built environment is embedded in the Frisian Energy Strategy (FES), with the coordination of its execution now being handled by the Province of Fryslân. The Frisian Energy Strategy is supported (among others) by all Frisian municipalities, the Province, the Frisian Water board and market stakeholders. Best practices to accelerate deep energy renovation on a Frisian scale are often shared within the network of the FES, making it a powerful platform for regional rollout.

1.1.2.2 Buurkracht

Buurkracht is well equipped to assist municipalities on at least two important aspect of energy transition plans:

1. Offering a proven (customer journey) approach to reduce the heat demand / energy savings with dwellers;
2. Organising a representation from dwellers per neighbourhood to take part in heat transition plans.

1.1.3 Angle of approach and method for rollout REFURB approach

1.1.3.1 Municipality of Leeuwarden

In a project assignment, as part of the execution of the Leeuwarder Energy Agenda, the municipality of Leeuwarden has actively set itself goals for the number of energy renovations that are to be reached each year. These goals are always to be coupled with goals that stem from the social domain. Boosting energy renovations within Leeuwarden and Fryslân should also always result in the creation of more green jobs to boost the regional job economy and should also always result in the prevention or reduction of energy poverty. Households with lower incomes are not to become the victim of the energy transition.

The Leeuwarder approach is already fully in line with the REFURB approach. The rollout strategy starts with scaling up the Leeuwarder best practices to a regional scale; the scale of province of Fryslân. The aim on regional scale is twofold:

1. Continuation of all our current activities related to the use of energy within the residential sector in Leeuwarden and start up new projects to keep boosting the number of energy renovations; building and expanding on lessons learned. Here, the municipality takes on the role of organiser/ initiator/ process facilitator. Best practices continue to be scaled up to regional level (province) and national level (Netherlands);
2. Removing the major barrier of NZEB renovation among the private residential sector, which is still the financial barrier.

1.1.3.2 Buurkracht

Buurkracht is part of Enexis Group, a large Dutch energy grid operator with 4500 employees and 1500 mio Euro annual turnover. Enexis Group is publicly owned by municipalities and provinces in the Netherlands. These shareholders have demanded that Enexis plays an increasingly active role in realizing the national Energie Akkoord (Energy Deal). Because of this, Buurkracht was founded in 2014 to support homeowners in making their dwelling more energy efficient. Since then, Buurkracht has been improving and growing to reach the goal set by Enexis for 2020: in 2020 30.000 houses have improved their energy label with two labels steps, which equals 72 mio kg Co2 reduction.

To reach the goal for 2020, Buurkracht will apply a threefold strategy:

1. Improve

Improve our current customer journey to increase the number of homeowners that take energy saving measures.

2. Cooperate

Increase cooperation with mainly: Energy Cooperatives, Provinces, municipalities and NGOs in the field of Nature & Environment aimed at co-organising and co-financing support to local bottom-up energy saving initiatives.

3. Diversify

Buurkracht currently only supports bottom-up initiatives aimed at saving energy together with neighbours. We will diversify into giving support to bottom-up initiatives aimed at other themes important for neighbours to tackle together. This way we help connecting and activating neighbours and build a strong network in the neighbourhood. This strong network will next serve as a platform for local energy transition.

The timing of the REFURB project and the Buurkracht concept was perfectly matched. The REFURB project is now resulting in the 3-phase rollout strategy. For Buurkracht this has been an enabler for becoming more effective in developing the Buurkracht tools.

In each of the 3 rollout phases Buurkracht was the 'early adaptor' and therefore the cooperation was very important for REFURB to get direct feedback from the Buurkracht initiative. For Buurkracht the REFURB project has enabled a better and smoother creation of the tools. A win-win situation for both parties, the cooperation has resulted in a successful REFURB implementation.

1.1.4 Preparations during the REFURB project

1.1.4.1 Municipality of Leeuwarden

During the REFURB project the municipality of Leeuwarden has made a lot of preparations for the acceleration of energy renovations within the build environment. These actions have led to a solid structure

and the right preconditions for an effective regional rollout. All preparations were carried out fully in line with the REFURB approach.

First, the municipality of Leeuwarden has taken intensive action to keep increasing its circle of control, by networking with a wide variety of stakeholders within the NZEB market. Right from the start of the REFURB project, the municipality of Leeuwarden also applied its multi-faceted approach to stimulate and facilitate the uptake of energy measures and energy renovation within the local and regional build environment (among other important policy goals). Multi-faceted relates to utilizing several aspects of the REFURB approach simultaneously. A multi-faceted approach creates synergy, as the whole is more than the sum of its parts. Synergy attracts more stakeholders and importantly, also more early adapters among homeowners and tenants.

In a nutshell the preparations included the following:

Implementing and maintaining the Customer Journey and a one stop shop for energy saving via the website Slim Wonen in Leeuwarden. The website provides customers with free and independent energy advice and advice on energy measures. There is also a single point of contact, energy coach Klaas. Upscale of the Slim Wonen approach from local to regional level was achieved in 2016, when all Frisian municipalities decided to work together via Duurzaam Bouwloket. Duurzaam Bouwloket is now the Frisian one stop shop for energy measures. Via Slim Wonen in Leeuwarden, ambassadors for energy saving are found and educated. The education of the energy ambassadors is done in cooperation with Friese Poort, a regional vocational school, with its hands-on approach and workshop in the Duurzaam Doen Huis. The ambassadors have been acting as energy coaches ever since, 'creating' more early adapters for energy saving and energy renovation within their own immediate network (neighbours, family members, friends).

With the recorded meta-information from the Slim Wonen in Leeuwarden site/ Duurzaam Bouwloket, the municipality has gained insight in the level of energy saving and energy saving measures carried out on neighbourhood scale. With this information, the municipality can 'target' certain neighbourhoods with tailored and dedicated energy saving campaigns. For instance, an insulation auction was held in a neighbourhood with dwellings that were quite poorly insulated and where homeowners had relatively lower incomes. With obvious benefits: Lower energy bill, lower energy costs and much more living comfort. The neighbourhood approach of Slim Wonen in Leeuwarden is still going strong. Many neighbourhoods in Leeuwarden have started their own energy cooperations and have set neighbourhood targets for energy saving and renewable energy production (see D6.1).

The role of a municipality has greatly changed because of the energy transition. Municipalities facilitate and stimulate bottom-up energy initiatives. Creating a strong local, regional and national network for energy saving and energy renovation as part of the daily job is evidently a prerequisite. To share and exchange best practices and lessons learned regarding energy renovation with other municipalities and various other governmental structures has proven to be fruitful. This cooperation also resulted in the creation of the three very diverse and innovative VNG/ REFURB compelling offers, all examples of private-public cooperation. The three Dutch compelling offers have been documented earlier, in D4.4 "renovation packages".

A major barrier in accelerating deep energy renovation in Leeuwarden and Fryslân among homeowners, is the considerable price of available NZEB solutions. The municipality offers its homeowners attractive loans to reduce costs and to take away the financial barrier for homeowners. Examples of sustainable loans to are the former Friese energiepremie and the current Duurzaamheidslening (in English: "Sustainable loan")⁴.

⁴ <http://www.slimwoneninleeuwarden.nl/subsidies-en-financiering/gemeentelijke-financiering>

1.1.4.2 *Buurkracht*

During the REFURB project Buurkracht has been steadily building towards up scaling to national level. These preparations were fully in line with the REFURB approach.

Creating and continuously improving our customer journey

Right from the start of Buurkracht in 2014, a customer journey approach was deployed. Based on extensive research on the barriers and drivers of homeowners have in applying energy saving measures in their dwellings, a service design was created fully supporting the customer journey homeowners go through when they are energy renovating their dwelling.

Key in our approach is the strength of the community. Local bottom- up community initiatives overcome 3 major barriers:

1. The complexity of the process – Energy renovation is not simple nor transparent. It is difficult to find the best options for your house and it easily becomes a hassle. That is why many homeowners drop out of the process (the CJ) without renovating. The local community initiative takes away the hassle by finding the best options for you;
2. Distrust of suppliers – The local initiative is independent and non-commercial and personal in approach, based on building a relationship of trust with the community;
3. (perceived) High cost – The community initiative makes insightful what the actual costs and profits are. And with collective buying a significant reduction in price can be negotiated.

Buurkracht as an organisation supports the local initiatives with – among other things -:

Free energy and independent energy advice. A certified energy advisor provides an energy scan of the neighbourhood, providing insight in the best energy saving options. And each participant can use our free online tool to get in- depth insight in the possibilities and cost of energy renovating their house (available in both a 'short version', based on national averages and a 'long version' based on homeowners own, personalized inputs).

Free insight in energy consumption – every participant can apply for a free smart meter providing insight in their energy consumption and giving it meaning by comparing their consumption to that of their neighbours.

Communication support – local initiatives are provided with the help of a neighbourhood coach who guides them through the process and helps them with making a communication plan and provides all the materials like flyers, posters and a website for the neighbourhood.

Awareness campaigns – Buurkracht has several 'off the shelf' campaigns for initiatives to use. For example, a 'thermal imaging campaign' where the initiatives can borrow a professional thermal imaging camera to take pictures of neighbours houses to raise awareness for the need of insulating your house.

Support in selecting a supplier (e.g. for solar panels) for the neighbourhood and advise how to negotiate a good deal/ group discount.

Following this approach 250+ neighbourhood initiatives have already started.

Network

Buurkracht has built an extensive national network with contacts within national government, municipalities, provinces, suppliers, academic world (universities/researchers), NGO's, cooperatives etc. This has been important in sharing and developing knowledge to improve results and serves as an incubator for actual cooperation in energy renovation activities.

Cooperation

Buurkracht is cooperating with many stakeholders to accelerate the energy transition. For example, they cooperate with over 70 energy cooperatives in collectively finding initiators and starting new local energy renovation initiatives. And we co-finance neighbourhood coaches with the Province of Fryslân, Province of Groningen and Province of Noord - Brabant. And for the second year in row, 2 additional grid operators (Cogas and Rendo) have joined Buurkracht, co-financing the program.

Legislation

Buurkracht and Enexis have been active in influencing and advancing the possibilities for 'gebouwgebonden' financiering, a type of energy loan that is transferable as it is connected to the property instead of the person (i.e. the homeowner).

1.2 ROLLOUT PLAN PHASE 1 POLICY AND SUPPORTIVE LEGISLATION

1.2.1 Municipality of Leeuwarden

Phase 1 of the rollout is all about creating awareness, boosting the NZEB market and, if needed, also offering supportive legislation with the aim of boosting the market for shallow and deep energy renovation. This is what the municipality of Leeuwarden and Buurkracht have done during the REFURB project.

In 2018, the municipality of Leeuwarden will continue to apply her multi- faceted approach to accelerate energy renovation.

This means, first, that all current activities (described earlier) will be continued.

The website (= one stop shop) www.slimwoneninleeuwarden.nl will be maintained as it. The website offers homeowners an easy CJ, independent advice, trustworthy supply partners, a single- point of contact, one-stop solutions to NZEB and some financial solutions or incentives. Slim Wonen in Leeuwarden is considered by homeowners as a very reliable brand and therefore serves as a powerful start of the CJ.

In addition, a second energy coach will be hired in 2018. The energy coach is especially important in helping people with lower income save energy and hence save valuable money. Energy coach Klaas has paid one or more unique visits to 350 people since the start. This amount can be doubled with a second energy coach.

Within the heat transition, a renewable source of heat will need to be selected on neighbourhood or district scale. This will also have its impact on the pace of deep energy renovations, as the two are intertwined. From 2018 on, the municipality of Leeuwarden/ province of Fryslân will gradually start to select the first existing neighbourhoods to be transformed to gasless neighbourhoods. Leeuwarden has already got a lot of experience with gasless newbuilt but does not yet have a lot of experience with the transformation of existing neighbourhoods to gasless. Therefore, the Dutch renowned research institute TNO has been asked to carry out a full research into the heat options for each part of Fryslân. Careful research is necessary to secure the optimal energy solutions for each city, village, street or dwelling. After all, there is no room nor time for lock- ins or regret measures.

The ministry of Economic Affairs stimulates and offers funding to transform/ renovate 100 neighbourhoods to gasless neighbourhoods. The municipality of Leeuwarden has applied for this funding, with the intention

of transforming three parts of the city. If the subsidy is allocated, the funds will be used to renovate (to net zero energy) social rental dwelling blocks in two neighbourhoods (with high rise apartments) as well as individual dwellings in the neighbourhood of Aldlân, which is mostly occupied by homeowners. News on whether the subsidy of the Ministry will or will not be allocated to Leeuwarden is expected soon.

Regardless of this subsidy, the municipality has already hired a so-called ‘heat manager’ at the beginning of 2018 with the aim of facilitating and boosting the process of the heat transition in Leeuwarden. For instance, legal and financial barriers related to the heat transition can be taken away by the heat manager.

The municipality will also continue to support the three VNG/ REFURB compelling offers, which were reported earlier, in deliverables D4.4 and D6.1. These three compelling offers are fuelled by private- public cooperation, with process financing provided by the VNG (the umbrella organisation of Dutch municipalities). Uptake of the ‘a la carte’ compelling offer was stimulated by start- stop subsidy for NZEB, provided by the Province of Fryslân. In 2017, 50 dwellings were renovated to NZEB with help from this subsidy. At the end of 2017, a second round of NOM subsidy was allocated by the Province of Fryslân. This second subsidy round was again an immense success, as it was rapidly exhausted. In 2018, another 50 dwellings in Fryslân will be renovated to NZEB.

The VNG/ REFURB compelling offer named ‘Village ESCO’ is supported by the municipality of Leeuwarden as well as the ANNO municipalities, located up north in Fryslân. A total of 91 homeowners have agreed to join the ‘Village ESCO’ to renovate their dwellings to NZEB. 11 dwellings are situated in Harkema (ANNO municipalities) and another 80 dwellings in the village of Baard, now part of the municipality of Leeuwarden (since 1st of January 2018). Currently, the funding of the energy renovation of the 91 dwellings as ‘basket of dwellings’ is still considered ‘too risky’ by the financial institutions. Intensive communication between the representatives of the energy cooperation, the two municipalities, the province, the revolving fund FSFE, relevant ministries and (traditional) financial institutions, have not yet proved fruitful but nevertheless remain ongoing. It is very important for this ‘Village ESCO’ to work out as intended because such a bottom- up ESCO construction could provide all homeowners within the Netherlands a sound financial solution for energy renovation. The ESCO is linked to the property and not to the homeowner and can therefore take away one of the major barriers for energy renovation within the Netherlands. To keep the process going, a third round of process funds has recently been allocated by the VNG.

And lastly, the VNG/ REFURB compelling offer ‘Fryske Streamdeal Particulier (Modular approach to NOM)’ is also still ongoing and developing. A 2018, a pilot will project will start, which entails deep energy renovation of a block of 8 dwellings. With this pilot project, valuable lessons on how to renovate privately owned dwellings with this NZEB solution will be obtained. To keep the process going, a third round of process funds has recently been allocated by the VNG.

1.2.2 Buurkracht

Buurkracht phase one will take place in 2018. In this year they will:

Continue and improve their customer journey

In 2018 Buurkracht will continue their customer journey and at the same time improve it. Improvement will be done with the input from different sources of research aimed at lowering cost per kg CO₂ reduction, e.g.:

- A target audience and lifestyle study (with Motivaction) will be translated into target group diversified communication and contact moments.
- A study into the decision-making process for energy renovation within families (with a focus on the different roles for men and women) will provide insight in how to adjust the customer

journey to successfully influence the decision making/negotiation process that goes on in the homeowner's home.

- From EU project ENERGISE where Buurkracht is member of the Expert Panel. ENERGISE is an innovative pan-European research initiative to achieve a greater scientific understanding of the social and cultural influences on energy consumption. Funded under the EU Horizon 2020 programme for three years (2016-2019), ENERGISE develops, tests and assesses options for a bottom-up transformation of energy use in households and communities across Europe. <http://www.energise-project.eu/>
- From the Triple A research where Buurkracht is an observer member. This is an EU Interreg project in which the Triple-A method will be tested: Local authorities will be looking to raise awareness of exactly what low-carbon technologies are on the market and provide better access to these technologies via technology demos, consultancy and financial advice tailored to the homeowners needs and resources <http://www.triple-a-interreg.eu/>
- From the GRIDFLEX research project: Insight in how Buurkracht can support energy cooperatives in realising local sustainable energy solutions. In this project local storage (sea salt batteries) and home energy management systems will be tested in combination with a bottom-up approach. <http://gridflex.nl/>
- From an intern who is mastering in "Social networks in a sustainable society". He will support us in mapping social networks in neighbourhoods and gaining insight in how to better employ these networks to improve the success of the neighbourhood initiatives.
- And of course, learnings from the REFFURB project.

In addition to this Buurkracht will add improvements to drastically shorten the customer journey (in time, not in steps), decrease costs and increase conversion. Among other things:

- Buurkracht will go increasingly digital. This means doing online what can be done online and adding more self-service modules and develop and introduce a Buurkracht App for Android and IOS.
- Develop more standardised communication formats and tools
- Develop and introduce standard building blocks for neighbourhood teams to plan and organise activities in their neighbourhood. These building blocks can be combined into a complete local campaign. Examples of building blocks are: a planning tool ('the good-plan-board') a tool to map the social network, an intervention with a thermal imaging camera.
- Support the customer journey with local and national campaigns, employing an elaborate multichannel mix including Facebook, Twitter, SEO, Google Ad words.
- Strengthen the after sales care in our customer journey to create more ambassadors and to increase the number of participants that takes an additional energy saving measure, after the first one has been taken. Service telephone calls a few months after the energy saving measure has been installed are considered as a method to achieve this.

Go national & scale up

Up until now Buurkracht has been limited to the concession area of the Enexis grid operator (reaching only about 1/3 of the population). In the last quarter of 2018, Buurkracht will launch a national campaign introducing Buurkracht in the rest of the Netherlands. Together with the improvements mentioned above, this should result in 100.000 participants at the end of 2018.

Increase cooperation:

Buurkracht will increase the number of cooperations and co-financing with provinces and will start cooperation with intermediaries (such as Reimarkt and Green home) that can provide their

neighbourhood teams with decent quality and price offers for energy renovation measures. Buurkracht will incorporate these in our customer journey to speed up the process and take away the burden from the neighbourhood teams.

Start preparations for diversification

Research with the University of Groningen showed that the energy saving initiatives in neighbourhoods supported by Buurkracht not only yield energy savings/CO₂ reduction, but also created more social cohesion in neighbourhoods. Combined with the fact that saving energy is not the primary interest for most people has led Buurkracht to believe there is room for Buurkracht 2.0.

Buurkracht 2.0 is the exact mirror image of Buurkracht 1.0. In Buurkracht 1.0, the bottom-up initiative aimed at saving energy together with neighbours is supported. As a bonus, Buurkracht also creates extra social cohesion. The first steps in Buurkracht2.0 is to build/expand social cohesion through supporting bottom-up initiatives that organise activities addressing the primary interests in a neighbourhood. For example, initiatives that tackle the problem of not having enough parking places in the neighbourhood. Or streets where people drive too fast or even issues of loneliness. The strong network thus created, will next serve as a platform for local energy transition.

In 2018, Buurkracht will lay the groundwork for Buurkracht 2.0 by making it possible to connect and activate neighbours around other initiatives than saving energy alone.

Additionally, two 'sisters' for Buurkracht will be introduced: Bedrijfkracht that is essentially Buurkracht for businesses. So instead of saving energy with the community 'neighbours', Bedrijfkracht aims at the community colleagues within companies and organisations. And VVE zonnecoach that aims at supporting owner associations for apartment buildings in getting collective PV systems on the roof of their building. Both employ customer journey thinking, just like big sister Buurkracht.

1.3 ROLLOUT PHASE 2 MARKET INNOVATIONS AND QUALITY SCHEMES

1.3.1 Municipality of Leeuwarden/ Province of Fryslân, phase 2

Phase 2 has already started and Leeuwarden and Fryslân foresee a continuation of activities. Large regional building firms have already developed NZEB solutions. However, as of today their actions are still mainly focussed on the segment of 'social rental housing', although individual homeowners are also reached more and more. The social rental segment in Leeuwarden (and Fryslân as a whole) is relatively large and includes consistent building typologies and is therefore an attractive segment for supply partners.

The municipality of Leeuwarden continues to actively utilize its circle of control to help boost the uptake of existing NZEB solutions among the social rental sector. This is roughly done in two ways (also see D6.3):

1. Via agreements made between the municipality and the housing corporations on sustainable aspects of the social housing rental dwellings. Under a specific law (Woningwet 2015), municipalities can make such agreements with social housing corporations on various aspects. The municipality of Leeuwarden has also utilized this option and has made agreements on energy performance levels with its two large housing corporations. One corporation has agreed to renovate its housing in so-called 'label jumps', i.e. a phased approach. This also includes placing solar panels on the roofs. The other social housing corporation has, as mentioned earlier (D6.3), agreed to renovate its entire stock

(with 10.000 rental dwellings in Leeuwarden and a total of 20.000 in total) to NZEB by 2030. The regional building company involved offers an energy performance guarantee for these NZEB social rental dwellings of 25 years.

2. The NZEB market is also boosted by initiating in private –public cooperations, also within the social housing segment. In 2017/ 2018, a lot of efforts have been made by a public- private consortium to finalize the Fryske Deal, an ambitious plan to renovate 3000 rental dwellings in Fryslân. The Fryske Deal has unfortunately run into some practical and legal issues but is still scheduled as such and will be carried out fully in 2022. The Fryske Deal will make a positive contribution to deep energy renovation in the social housing sector, as the NZEB solutions developed will be transferable to social housing on a national scale.

The idea behind the Fryske Deal is to create the ‘critical mass’, necessary to boost the regional NZEB market, lowering the price of this NZEB solution and thereby stimulating its uptake by the private residential sector. However, as of today there are still limited possibilities of transfer from the social rental housing sector towards the private residential sector. Transfer is mainly limited due to this financial barrier (high price) and because financial solutions in the private residential sector are still scarce and experimental (such as the village ESCO). In addition, single dwellings differ a lot in their typology, which makes such an industrial approach much less attractive, for both homeowners as well as supplier.

Private- public cooperations not only focus on boosting deep energy renovation within social housing. The municipality will also continue to be engaged in the private- public cooperation in the neighbourhood of Aldlân, where an affordable (around 35000 Euros) and tailored compelling offer for the neighbourhood was developed. The compelling neighbourhood offer was compiled by the consortium of homeowners (gathered in the Foundation Aldlân Duurzaam, in English “Aldlân sustainable”), supply side, municipality and intermediaries (see D6.1). In 2018, at least two pilot dwellings will be renovated to NZEB. Once successfully implemented, the NZEB solution is expected to be picked up by the neighbourhood in a faster pace, resulting in higher numbers of deep renovations. A roadmap for the neighbourhood and quality agreements will be made. The municipality of Leeuwarden will once again facilitate and stimulate this process and share lessons learned on regional and national scale.

Recently, another interesting development took place regarding NZEB renovation in Leeuwarden. The Abe Bonnema Foundation, which protects the legacy of the architect Abe Bonnema, has offered to support the energy renovation to NZEB of 50- 100 so- called Abe Bonnema dwellings in the city of Leeuwarden. This is an initiative in line with LF2018, Leeuwarden- Fryslân Cultural Capital of Europe. As there are many Abe Bonnema dwellings located in the neighbourhood of Aldlân, the decision was made to start with a pilot project in Aldlân which entails renovating a block of 8 Abe Bonnema dwellings. The neighbourhood of Aldlân has become quite a remarkable neighbourhood, with not one but two compelling offers.

Lastly, the concept of the energy coach for lower incomes, has been proven an enormous success and will be carried on and expanded in 2018. In 2018, a second energy coach will be hired as such. So far, energy coach Klaas has paid one or more visits to 350 unique homeowners since the start in 2017. With a second energy coach, this number can be doubled for 2018, meaning 700 homeowners/ tenants. In Leeuwarden, being the capital city of Fryslân, there are a lot of households with lower incomes. It is very important to keep addressing this segment. By taking simple energy measures and by promoting smart energy behaviour a lot of energy and money can be saved. Both energy coaches are and will remain financed by the municipality of Leeuwarden.

1.3.2 Buurkracht phase 2 (2019)

In 2019, Buurkracht 2.0 will be expanded and introduced on a national scale. For several social themes (including Safety, Care, Mobility) partners will be added to be able to support a complete customer journey on these themes. For example, if a neighbourhood wants to set up a car sharing initiative, a partner will provide tools to make reservations for a car, a tool to unlock the shared car, administrative tools etcetera. Buurkracht will provide tools to activate and connect neighbours around the car sharing initiative.

For the theme 'sustainability / energy transition' three major developments are planned:

1. Actively partner up with municipalities and grid operators to engage neighbourhood initiatives in making plans for the heat transition in their neighbourhood. (see paragraph 1.1 on heat-transition planning process in the Netherlands.)
2. Adopt and promote NZEB solutions developed by the Fryske Streamdeal and others in the Netherlands, as part of the Buurkracht's customer journey
3. Develop or adopt tooling that enables homeowners to make a step by step energy renovation plan for their house with no regret measures and financing options.

1.4 ROLLOUT PHASE 3 MARKETING AND COMMUNICATION ON GOOD EXAMPLES

1.4.1 Municipality of Leeuwarden

In phase 3, also the municipality of Leeuwarden and the Province of Fryslân also foresee a continuation of their current activities.

Good examples of NZEB renovation (on neighbourhood scale) will continue to be disseminated among the many inhabitants of Leeuwarden and Fryslân.

The municipality has already communicated the developments in Aldlân with the broader public:

- News on the creation of the compelling offer by the neighbourhood consortium was shared recently on the website <http://www.slimwoneninleeuwarden.nl/actueel/stichting-duurzaam-aldlan-op-weg-naar-energieneutrale-wijk> as well as the local newspaper (section Aan de Grote Klok, December 2017).
- The pilot project of the Fryske Deal Particulier in Aldlân was shared with the broader public on the 15th of March 2018, during a lunch meeting in Leeuwarden⁵. Figure 2 shows Alan Laws, presenting on behalf of the municipality Leeuwarden and the REFURB project. Representatives/ homeowners of the neighbourhood (Foundation Aldlân Duurzaam) informed the audience about their intrinsic motivation for deep energy renovation and the process so far.

⁵ <https://mailchi.mp/d2df8f35f34a/lunchlezing-broodje-energie-161639?e=28456a2f2c>



Figure 2 Lunch meeting presenting the actions in neighbourhood Aldlân

The idea behind the communication is that other neighbourhoods will want to follow suit.

The municipality of Leeuwarden will therefore keep communicating the need for deep energy renovation considering the energy transition, and especially regarding the heat transition. The communication message is clear and consistent: The use of natural gas (or any type of fossil fuels) is no longer acceptable in the Netherlands. Natural gas for heating and cooking purposes can be replaced with either ‘all electric’ solutions or with some type of sustainable heat. The heat transition therefore serves as a powerful window of opportunity for accelerating deep energy renovation as the renovations will then start to take place on a neighbourhood scale.

The municipality of Leeuwarden has a long history of ‘neighbourhood approaches to energy saving’ with Slim Wonen and will support and facilitate the process, especially with regards to effective communication with its citizens. But before such communication can take place, first a good insight in optimal sustainable heat options for each neighbourhood in Leeuwarden will have to be obtained. As mentioned above, TNO is currently doing research on this topic, weighing the heat options on the scale of Fryslân. Results of this research are expected mid-2018. As soon as the results are there, the municipality of Leeuwarden can start communicating to its citizens when and where natural gas will be phased out first. And, what type of deep energy renovation would be fitting to ensure that we reach our national goal in 2050. Given the magnitude of this operation, this process will have to take place in phases. It will give the municipality the opportunity to learn and improve its communication on the heat transition towards its citizens.

1.4.2 Buurkracht

In phase 3 Buurkracht foresees a continuation of the activities in phase one and two.

1.5 IMPACT

1.5.1 Impact Leeuwarden/ Province of Fryslân

The impact of the rollout of the municipality of Leeuwarden/ Province of Fryslân is twofold:

1. Qualitative impact; the ‘soft’ impact. This is the impact caused because of mutual sharing and communicating lessons learned and best practices within the network of stakeholders.
2. Quantitative impact; the ‘hard numbers’. This is the impact where actions directly lead to certain numbers of shallow or deep energy renovation each year.

Qualitative impact

Leeuwarden has and will continue to share its lessons learned and its best practices with its wide network of stakeholders, which includes other networks as well as umbrella organisations.

Besides from regional scale up within the FES, the Frisian Energy Strategy, lessons learned will be shared also on a national scale to ensure the national rollout. National rollout will be achieved via the immediate and broad network of the municipality, i.e. via multiple ‘communication channels’:

- The VNG; The umbrella organisation for Dutch municipalities;
- Via our contacts on a national level; direct contacts at the ministries.
- Via Stroomversnelling;
- Via the network Green Deal aardgasvrije wijken (Green Deal on reaching a gasless society in 2050)
- Via the network ‘Duurzame dorpen’ (Network of sustainable villages); which includes villages from all over the Netherlands, including some villages in Vlaanderen;
- Via actively participating and promoting of our best practices on European scale. The municipality of Leeuwarden may decide to enter a new European call in the (near) future. However, as it is very important to maintain policy consistency, Leeuwarden will likely enter calls that are in line with the current approach.

Quantitative impact

The activities of the municipality of Leeuwarden have lead or will lead to the following (estimated) numbers of shallow and deep energy renovations, for each year.

Table 1 Quantitative impact rollout municipality of Leeuwarden

| Activities municipality of Leeuwarden | Shallow/ deep renovation | 2015/ 2016 | 2017 | 2018 | 2019 | 2020 | > 2020 |
|---------------------------------------|--------------------------|---------------|---------------|---------------|---------------|---------------|------------------------|
| Slim Wonen in Leeuwarden approach | Shallow | 800 dwellings | 800 dwellings | 800 dwellings | 800 dwellings | 800 dwellings | 800 dwellings per year |

| | | | | | | | |
|---|-------------|-----------------------|--|---|--|--|---|
| A la carte energy renovations + with NOM subsidy province (via Slim Wonen portal; Freedom energy, Susteen...) | Deep | 10 dwellings per year | 10 dwellings per year | At least 10 dwellings per year | At least 10 dwellings per year | At least 10 dwellings per year | At least 10 dwellings per year |
| Fryske Streamdeal (see also Abe Bonnema dwellings) | Deep | | | A housing block of 8 dwellings in Aldlân | | | |
| Village ESCO in villages Harkema and Baard (cooperation between energy cooperation, Leeuwarden, ANNO municipalities, Province, revolving fund. | Deep | | | 80 privately owned dwellings in the village of Baard (now part of Leeuwarden) | | | |
| Jan van Scorelstraat/ Van Loonstraat Leeuwarden (rental dwellings to NZEB) | Deep | | 55 rental dwellings in Leeuwarden were renovated to NZEB | | | | |
| Wielepolle (rental dwellings to NZEB) | Deep | | | Housing corporation is currently renovating in another neighbourhood (Wielepolle) Started October 2017 – finish spring 2018 Total 50 rental dwellings to NZEB | | | |
| *** Housing corporation will keep going and tackle another neighbourhood | | | | | Estimated At least 50 rental dwellings in another neighbourhood | Estimated At least 50 rental dwellings in another neighbourhood | Estimated At least 50 dwellings in another neighbourhood |

| | | | | | | | | |
|--|-------------|------|--|--|--|---------------|---------------|--|
| Fryske Deal (social rental sector) | Deal rental | Deep | | | | | | 2022: 3000 rental dwellings will become NZEB |
| Compelling offer neighbourhood Aldlân | | Deep | | | At least 2 dwellings | > 2 dwellings | > 2 dwellings | >2 dwellings |
| Gasless neighbourhood Leeuwarden Related to funds ministry of Economic Affairs (100 aardgasvrije wijken) | | Deep | | | ???? Depends on whether budget ministry will be granted. | ??? | ??? | |
| Activities Abe Bonnema Stichting Leeuwarden (- 8 dwellings in Aldlân) | | Deep | | | 50 – 92 other Abe Bonnema dwellings in Leeuwarden; time span not made concrete | | | |

** Housing corporation currently renovating its entire stock to NZEB. It is likely that the housing corporation will start renovating in another neighbourhood in Leeuwarden in 2019, 2020 and so forth.

Activities by the Province of Fryslân include, on a provincial scale (excl. Leeuwarden):

Table 2 Quantitative impact NZEB subsidy Province of Fryslân

| | | | | | | | |
|---|------|--|--------------|--------------|--------------------------------------|--------------------------------------|--------------------------------------|
| NOM subsidy Province adding to renovation in Fryslân (excl. Leeuwarden) | Deep | | 40 dwellings | 40 dwellings | ??? depends on new NOM subsidy round | ??? depends on new NOM subsidy round | ??? depends on new NOM subsidy round |
|---|------|--|--------------|--------------|--------------------------------------|--------------------------------------|--------------------------------------|

The estimated number of shallow and deep renovations for both the municipality of Leeuwarden and Fryslân combined have been determined. Definite numbers per year (2018-2020) depend on the progress of projects. Most of the projects are quite innovative in nature and their progress can be rather unpredictable. On the other hand, a multiplier effect can be expected from the strong emphasis on phasing out the use of natural gas, thus resulting in higher estimates. (see table 3).

Table 3 Estimated shallow and deep energy renovations Leeuwarden and Fryslân combined

| Estimated total energy renovations | | 2015/ 2016 | 2017 | 2018 | 2019 | 2020 | > 2020 |
|------------------------------------|--|------------|------|------|------|------|--------|
| Shallow | | 800 | 800 | 800 | 800 | 800 | 800 |
| Deep | | 10 | 100 | 200 | 300 | 400 | > 400 |

1.5.2 Impact Buurkracht

The ultimate target for Buurkracht is CO₂ reduction.

They achieve this goal through neighbours taking (shallow) energy saving measures together. In 2017 the target was 3 mio kg CO₂ which equals 2500 measures. In 2018 the target is 6 mio kg additional CO₂ reduction (so 9 mio kg cumulative), that equals 5000 measures. Goal for 2020 is 72 mio kg CO₂ reduction.

The target is also on the Business Balanced Score Card for its Board of Directors (Buurkracht is part of Enexis Group, a large Dutch energy grid operator with 4500 employees and 1500 mio Euro annual turnover). A consequence of this target being part of the BBSC is that achieving it must be checked by an external accountant. So, Buurkracht needs to prove they have reached the goal. Each year, the accountant checks four things:

1. The calculation module
2. Examples of lists with measures from each of the Buurkracht's neighbourhoods
3. A download from the CRM system containing an overview of all energy measures taken
4. Results of a control-survey

Some background with these four items:

Calculation module

The neighbourhood teams or neighbourhood coaches compile a list with measures taken in a neighbourhood. This list contains Postal code, House number, Type of measure at this address, quantity of the measure (e.g. m² of insulation) at this address. Input for the list either comes directly from the homeowner or from the supplier.

The amounts of measures must be transformed into CO₂ reduction. For this, a calculation module has been developed. The calculation variables are provided by an independent external party: Milieu Centraal, based on their ongoing research. In short, they provide us with the M³ of natural gas and the kWh of electricity saved per amount of measure taken (e.g. x m³ of gas per m² roof insulation) and with the amount of CO₂ per m³ gas/kWh electricity.

Examples of list with measures

The accountant takes a sample from the lists with measures, compiled in the neighbourhoods (as described above) and checks these.

Download from CRM system

Buurkracht uses Salesforce to log all customer related data, including all the energy saving measures taken in all participating neighbourhoods. The accountant is provided with a downloaded report from Salesforce that

shows an overview of types of measures taken and their quantity at individual dwelling level (postal code + house number) in one calendar year.

Control-survey

A survey is sent to all Buurkracht participants once a year, asking if they have taken measures, which measures and how much and if Buurkracht played a role in taking these measures. By comparing the answers from the homeowners in this survey to the data in our system, the reliability of the measures collected is validated by the neighbourhood teams/neighbourhood coach.

Last year >95% matched with the collected measures and as an extra bonus 250 additional measures, not reported by the neighbourhood teams/neighbourhood coaches were collected.

Additional indicators

An additional indicator to determine the success of the rollout will be based on energy consumption data from smart energy meters.

By 2020 all households in the Netherlands will have been offered a smart meter by their grid operator. Expectation is that a least 90% will accept this offer. In addition, Buurkracht offers priority placement of the smart meter in neighbourhoods that start a Buurkracht initiative.

When joining Buurkracht, an individual homeowner with a smart meter can opt to display their energy consumption data in their personal Buurkracht dashboard. Doing this, they also give Buurkracht permission to use their anonymized data for analysis purposes. Buurkracht is busy developing a model in cooperation with the University of Groningen to analyse the energy consumption data of all participants (well over 11000 at this moment) to determine 'the Buurkracht' effect. This means comparing consumption in a neighbourhood before and after Buurkracht. And comparing this to neighbourhoods where Buurkracht is not active. This will enable us to make statements like e.g. in neighbourhoods with Buurkracht annual energy consumption drops by 3,5 % where in neighbourhoods without Buurkracht only a 2% drop has been observed.

2 National rollout plan Belgium

2.1 CONTEXT AND PREPARATIONS

Since the start of REFURB, a few initiatives have taken place in Belgium on regional level (region of Flanders).

'Renovatiepact' (EN: Renovation Alliance) is an initiative of the Flemish government together with regional stakeholders with the objective to increase the depth and renovation rate of the existing buildings stock in Flanders. The initiative consists of several work packages (WPs), some of which are closely affiliated with the REFURB topics: WP1 Long-term ambitions, WP2 Renovation advice, WG3 Building passport, WP5 Financing, WP6 Business models and demonstration projects.

<http://www.energiesparen.be/energiebeleid/renovatiepact>

Since 2017, the two DSOs in Flanders Eandis and Infrax are rolling out a network of 'BENO-coaches' (EN: nZEB-coaches). Currently, 81 nZEB-coaches are active. This network is linked to the grant-system in Flanders: The 'burenpremie', a grant to stimulate collective renovations⁶ and second, the 'totaalrenovatiebonus', a grant to award deep renovation of residential buildings⁷ (see further), either step-by-step or in one go.

<https://www.vlaanderen.be/nl/bouwen-wonen-en-energie/bouwen-en-verbouwen/burenpremie-voor-collectieve-renovatieprojecten>

New quality standards focusing on energy renovation measures or renewable energy systems were introduced in Belgium since the start of REFURB. These quality standards are linked to voluntary subsidy schemes and include, among others: Quality requirements for indoor insulation of the building envelope, quality requirements for installers of renewable energy systems such as heat pumps or thermal solar systems, quality requirements for renewable energy systems.

<http://www.energiesparen.be/binnenisolatie/aannemers>

<https://www.rescert.be/nl>

Ten pilot projects concerning deep renovation or collective renovation of residential buildings were launched in 2014. Best practices and lessons learned are exchanged via a Knowledge Platform. The platform is hosted by a consortium led by the Belgian Building Research Institute (BBRI), consisting of research organisations and sectoral organisations from the building sector. Six focus areas are further explored via workshops and documentation on this platform: Client-relationship, financing, business cases, energy performance, sustainability and cost-optimality.

<https://www.kennisplatform-renovatie.be/>

Other European projects on deep renovation have started in Flanders during REFURB's runtime. Relevant projects include:

- Interreg project See2Do involves local municipalities and focusses on increasing awareness among citizens with regards to energy renovations.

⁶ Burenpremie (EN: "neighbours-grant")

⁷ Totaal renovatie bonus (EN: "bonus for deep renovation")

- Interreg project Triple-A
- H2020 project iBRoad
- Life+ project BE REEL!

<http://www.grensregio.eu/projecten/see2do>

<http://www.triple-a-interreg.eu/>

<http://ibroad-project.eu/>

2.2 ROLLOUT PHASE 1

Regional level

In each of these initiatives mentioned earlier, the Belgian REFURB partners actively participated to exchange knowledge and stimulate mutual learning in the short-term and to prepare ground for the roll-out of REFURB knowledge in the long-term. This can be evidenced with the following milestones:

- VITO has been commissioned by the Flemish Energy Agency (VEA) to adapt the calculation method of EPCs to create two new tools: EPC+ and a voluntary Renovation Advisory tool. New features of both tools include the composition of a renovation roadmap, cost information of renovation measures and improvements of the look and feel of EPCs (use of energy label with class F to A+, icons to indicate co-benefits of renovation etc.).
- REFURB partners contributed to WP6 of the Renovationpact on business models and demonstration projects. Findings of this WP were integrated in the LIFE+ proposal BE REEL!
- Bostoën and Leiedal participated in the deep renovation pilot RenBEN. The experience gained in RenBen was fed into REFURB and led to the development of Mijn Energiekompas and the Renovation Coach
- Leiedal actively exchanged experiences of 'Warmer Wonen' with regional and local policy level in meetings with the alliance of Flemish cities and municipalities (VVSG), round tables organised with policy makers (e.g. round-table organised by CD&V),... 'Mijn Energie Kompas' and 'Renovation Coach' were officially launched by the Flemish Minister of Energy Bart Tommelein in March 2017.
- In addition, Leiedal's experience and lessons learned of 'Mijn Energie Kompas' and the 'Renovatie Coach' inspired the regional DSO Eandis for their network of nZEB-coaches. Eandis was involved in the selection process of Leiedal's Renovation Coach and participated in a study trip to REFURB partner Buurkracht, organised by Leiedal.
- Recticel is one of the industrial partners who contributed to the training of installers for indoor insulation of the building envelope, organised by training institutes accredited by VEA.
- VITO is partner of the VLAIO deep renovations knowledge platform and co-organised the workshops dedicated to Financing and Business cases
- VITO and Recticel contributed to the collective renovation pilot RenoseeC. A collective renovation with 20 participants have been realised. A business model has been developed as outcome of the pilot.
- VITO has supported deep renovation pilot Ecoren. An approach for collective renovation for Belgium has been tested in the social housing segment.
- The Belgian partners shared experience and influenced the European projects mentioned earlier (i.e. See2Do and Triple A, iBRoad and BE-REEL!) by participating in conferences or workshops and inviting experts in REFURB events.

The activities of the Belgian REFURB partners contributed to a raised awareness in Flanders concerning deep renovation of residential buildings.

Local level

Leiedal worked towards a very strong local and subregional anchoring of the knowledge and insights gained by the REFURB-project. A regional renovation program was set up, modeled according to the "customer journey" concept, with a renovation coach, a website, the MyEnergyCompass.be-tool, the pool of high-quality contractors, a communication campaign and a CRM-system as key features. The renovation program is rolled out with a strong involvement of the "Warmer Wonen" (*warmer living*) network, the regional network of stakeholders and local authorities streamlining their policies, initiatives and services concerning the improvement of housing and living quality. Warmer Wonen acts as a "one stop shop" (with the Renovation Coach as single point of contact) for the citizens to access all the services and support of these stakeholders. A CRM (Custom Relationship Management) and monitoring tool is built to facilitate the operational cooperation amongst Warmer Wonen partners in guiding homeowners.

Warmer-Wonen partners will prepare further rollout of the renovation program. Instruments like the "ELENA-fund" of the European Investment Bank will be used to generate more impact. An application is under preparation, together with other cities and subregions in Flanders.

In general, we have observed an increase of initiatives on regional policy level with the objective to increase the rate and depth of home renovation in Flanders: The public-private alliance of the 'Renovatiepact'; new standards and quality requirements for the building envelope, building systems and renewable energy technologies; and demonstration pilots on deep renovation. The existing network of information points on energy renovation and sustainable building has been expanded from NGOs per province to a regional network.

In addition, more and more stakeholders on local policy level (cities and municipalities) show interest and are taking up these initiatives, not only within Leiedal's region but in Flanders as a whole, with one stop shops from public initiatives emerging. Leiedal's one stop shop Warmer Wonen is a frontrunner but similar public initiatives are popping up or existing initiatives are enhanced further in cities and municipalities: Ecohouse in Antwerp, Milieuwinkel in Ghent, Mechelen Klimaat Neutraal in Mechelen etc.

Actions after REFURB:

- 1) Further support the rollout of public one stop shops in cities and municipalities in Flanders

Key objective and activities:

- Further elaborate the services and scope of the Warmer Wonen one stop shop, strengthening its position as frontrunner in Flanders;
- Exchange experience and skills of RenovatieCoach with the nZEB-coach network of DSOs Eandis and Infrac and other public one stop shops in regions, provinces, cities and municipalities in Flanders (in particular cities involved in BE REEL!);
- Secure involvement in the workgroups 'business models' and 'renovation advice' in the 'Renovatiepact' initiative.

Key stakeholders: DSOs Eandis and Infrac, Associations of cities and municipalities in Flanders (VVSG), frontrunner cities and municipalities in Flanders (involved in BE REEL! (Antwerp, Ghent, Mechelen)

Involved REFURB partners: Leiedal, VITO

Timing: short-term (2018 – 2020) and mid-term (until end of BE REEL!)

- 2) Further contribute to standards, methods and tools to stimulate energy efficiency measures of buildings

Key objective and activities:

- Further enhance standards, methods and tools to stimulate energy efficiency measures of buildings and this way increase market investments.

Key stakeholders: regional and national policy level (VEA); standardization bodies and research institutes (NBN, BBRI);

Involved REFURB partners: VITO, Recticel

2.3 ROLLOUT PHASE 2

REFURB-partner Bostoен withdrew from the energy renovation market during the project's runtime.

For a turnkey contractor as Bostoен, specialised in building and selling newly built low energy houses in large scale projects to private customers, the renovation of private houses turned out to be too time-intensive and therefore not cost efficient. Standardization of technical solutions for deep renovations seems very difficult for renovation of privately-owned dwellings in Belgium. That is why Bostoен withdrew from the renovation market.

Jumatt, a sister company of Bostoен, would be ready to produce 3D prefabricated low energy extensions (whether as temporary housing), if the demand of the market would be high enough for standardization and large scale collective renovations. Although some initiative such as the 'BENOVatiecoach' and the 'burenpremie' are very promising in stimulating collective renovations, unlike in other markets such as the Netherlands, the supply side still seems to wait for a real market push for collective renovations that makes it possible to make renovations on a bigger scale more cost- efficient for the supply side.

The withdrawal of Bostoен might indicate difficult market conditions for energy renovations. To explore this further, the REFURB consortium conducted a market consultation with selected supply side actors. While this market consultation was limited in scope, it allowed the partners to get a better view on the market-readiness for new business models in energy renovation in Belgium – Flanders. The following interviews were conducted:

- BouwUnie, federation of specialised contractors (December 2017)
- VCB Limburg, federation of general contractors (5th of February 2018)
- Renovate Belgium (January 2018)

The subsidy system for nZEB-coaches has been launched in 2017 and has been taken up by the market. Interested organisations and companies must register with DSOs Eandis and Infrac to recruit nZEB-coaches.

An overview of current registrations⁸ shows a wide variety of organisations: public actors and NGOs alongside market players such as architects, engineering firms and consultants.

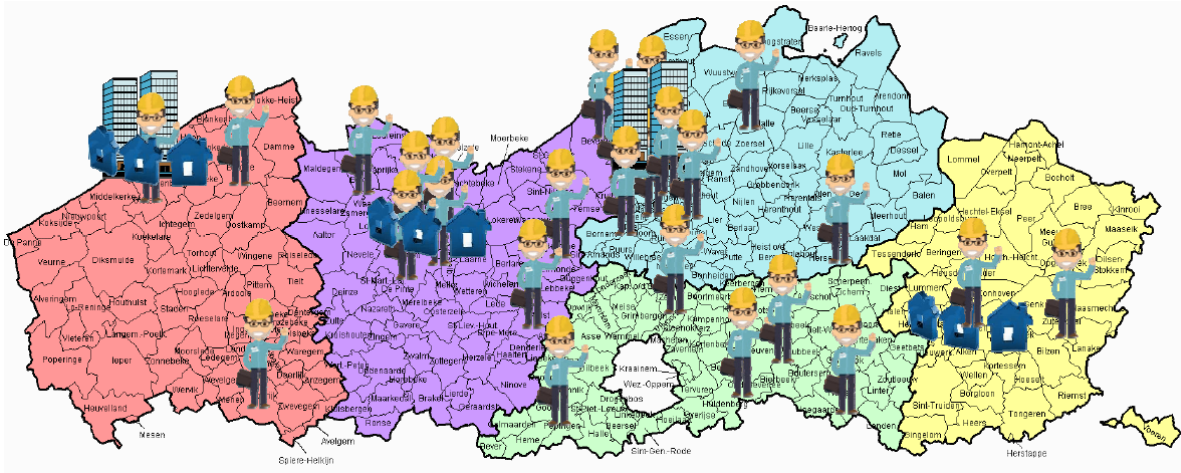


Figure 3 Map of Flanders with indication of the nZEB-coaches, single family housing renovation projects and multifamily housing renovation projects. The whole region is covered with 84 active nZEB-coaches in December 2017 (source: Eandis)

Business models for one stops shops of home renovation are emerging. This can be also observed in the overview of nZEB-coaches: While a few organisations offer this service for free (and thus depend on the public financial support), a few organisations or companies offer this service as a paid-service. Other initiatives in Flanders indicate that the market is experimenting with potential business models recently:

- Leiedal is currently exploring to further develop the business model of the RenovatieCoach with support from the ELENA-fund.
- Pilot projects on home renovation such as RenoseeC are experimenting with business model for a commercial one stop shop with involvement of the 'traditional' actors such as building product manufacturers, architects and contractors.
- Remarkably, it is observed that there are also business models emerging from *new* actors in the building sector, such as financial institutes and energy providers: COZIE, a start-up of energy provider Engie, offers home renovation services from January 2018 and the bank KBC launched a home renovation service as well in February 2018.

The interviews with the market actors indicate that it might be a challenge to involve existing building professionals in these business models. NAV, one of the leading architect's associations in Flanders, expressed their critique on these renovation services in several press releases⁹ and launched a website to point out the role of the architect in the renovation process¹⁰. Nevertheless, there are initiatives that try to encourage collaboration between building professionals and one stop shops:

⁸ https://www.eandis.be/sites/eandis/files/documents/liijst_met_benovatiecoaches.pdf

⁹ [http://www.nav.be/artikel/747/nav-lanceert-renovatiedviesbe/;](http://www.nav.be/artikel/747/nav-lanceert-renovatiedviesbe/)

[http://www.nav.be/artikel/752/zonder-architect-aan-een-renovatie-beginnen-nee-toch/;](http://www.nav.be/artikel/752/zonder-architect-aan-een-renovatie-beginnen-nee-toch/)

<http://www.nav.be/artikel/1340/renovatiedvies-aan-bodemprijzen-houdt-risicos-in/>

¹⁰ <https://www.renovatiedvies.be/>

- Leiedal introduced a pool of contractors as part of the service offered by Warmer Wonen, with a second call for qualified contractors in January 2018. A similar call aiming at architects was not yet successful.
- The Renovate Belgium campaign is an initiative of mainly Belgian affiliates of Renovate Europe members and producers for energy efficient building materials active on the Belgian market. They share the ambition to help achieve the challenges of carbon emission reductions, job creation and energy security by offering energy saving materials to drastically reduce energy consumption in buildings.
- Recticel collaborated with five other building product manufacturers (Borgh, Deceuninck, Eternit, VMZinc and Wienerberger) to launch an integrated product solution for external wall insulation: Isofinish¹¹. It is an insulation and finishing system for outer walls in new buildings or renovation projects created and promoted by the following building producers in Belgium. The purpose is to offer an integrated wall solution to the customer, while still allowing customization of the external finishing according to personal taste.

The interview with Renovate BE highlighted the role of policy to secure market demand and this way stimulating market initiatives from the supply side. In this regard, the European LIFE+ project BE REEL! with the involvement of the Flemish and Walloon region together with the cities Ghent, Mechelen, Antwerp, Moscron and La Louvière could be an important 'market-push', as 8.500 dwelling units will be renovated to low energy standards in the next 7 years.

Actions after REFURB:

- 3) Further explore the potential of one stop shops from market initiatives

Key stakeholders: building sector but also new players such as banks, energy providers

Involved REFURB partners: Recticel BE, VITO

- 4) Stimulate capacity-building of the supply side and facilitate collaboration among the different market actors

Involved REFURB partners: Leiedal, Recticel BE

2.4 ROLLOUT PHASE 3

The aim of phase 3 is that homeowners are empowered to invest in energy renovations and can do so. Therefore, a new market in energy renovations should be created, which can function without start/stop subsidies. However, figures published by the Flemish Energy Agency clearly show a slow-down in 2016 with regards to insulation activities and installation of energy efficient heating systems. This indicates that this new market has not been reached yet.

¹¹ www.isofinish.be

| jaar | isolatie-indicator | verwarmingsindicator | globale indicator renovatiegraad |
|------|--------------------|----------------------|----------------------------------|
| 2012 | 2061 | 2027 | 2044 |
| 2013 | 2044 | 2028 | 2037 |
| 2014 | 2046 | 2030 | 2038 |
| 2015 | 2047 | 2030 | 2039 |
| 2016 | 2050 | 2032 | 2041 |

Figure 4: Indicators showing the estimated years in which all homes in Flanders will have partly insulated roofs, walls, floors or double glazing (left), a condensing boiler or heat pump (middle) and an aggregation of the two indicators (right). (source: ¹²VEA)

During REFURB's run-time, communication campaigns to the general public with regards to energy renovations were initiated. An important driving force has been the public-private partnership 'Renovatie Pact'. The REFURB-partners have contributed to these activities, including:

- Warmer Wonen serves as the one stop shop for homeowners in Leiedal's region. The tool 'Mijn Energiekompas' and the service 'Renovatiecoach'. The Warmer Wonen website showcases success stories and experiences of homeowners who conducted energy renovations.
 - The communication campaign "Ik BENoveer" has been initiated by the Flemish Energy Agency, together with stakeholder from industry including Recticel BE. The campaign includes the website 'MijnBenovatie.be' (EN: 'I renovate my home to nZEB-level')¹³, which informs homeowners about step-by-step renovation towards nZEB.
 - The tools developed by the Flemish Energy Agency under the framework of 'Renovatiepact' will be implemented in short-term: A light version of the 'Woningpas' (EN: Dwelling Passport) will be introduced in 2018 and the new EPC will enter into force in January 2019. Both policy instruments are expected to increase awareness in energy renovation.
 - Furthermore, the Flemish Energy Agency is exploring an additional online tool to provide renovation advice to homeowners to complement the Dwelling Passport and EPCs. VITO and Leiedal are involved in this work, as they participate in the dedicated working group of the Renovation Pact.
- 5) Continue involvement in private-public partnerships, in particular 'Renovatiepact'

Key stakeholders: Flemish Energy Agency

Involved REFURB partners: Recticel BE, VITO, Leiedal

- 6) Stimulate organisation of the supply side and collaboration among the different market actors

Involved REFURB partners: Leiedal, Recticel BE

¹² <http://www.energiesparen.be/sites/default/files/atoms/files/Presentatie%20Opvolgingsindicator%20VEA.pdf>

¹³ <https://www.mijnbenovatie.be/>

3 National rollout plan Estonia

3.1 CONTEXT AND METHOD ROLLOUT STRATEGY

The Estonian residential building stock consists mainly, ca 75% of dwellings of multifamily houses. A multifamily house by Estonian legal definition is a residential building with three or more dwellings in it. There are around 20,000 of such buildings in Estonia. Most of these buildings were built between 1960s and 1991 then erection of such houses ended abruptly. These houses are characterized by high U-values of elements of envelope and out of date utilities systems. The average size of such buildings is 40 apartments with living area of 2500 to 300 square meters.

Already in the beginning of 2000s, it became clear that the construction capacity needed to renovate all these houses is of the same magnitude as was the capacity of building these houses in the first place and it would take decades to accomplish the task. (Teuvo Aro et al. Eesti korterelamud, paneelelemute remonttööd. Tööde maksumus ja eeldused. Tallinn Yniversity of Technology, AX Consulting. 2005)

Minimum energy requirements for buildings in Estonia were set according to the first edition of EPBD in 2002. The definition and requirements of nZEB were included in Building Code in 2011. After that these requirements have been revised twice. At present minimum energy efficiency (EPC) of new residential multi family buildings is set to be 150 kWh/m²a (Minimum Requirements for Energy Performance, <https://www.riigiteataja.ee/en/eli/520102014001>). Minimum requirements for nZEB multi family buildings is 100 kWh/m²a (idem).

All of those multifamily houses constructed around mid-XX century are beginning to be in need of major repair just to maintain their service age. Combining this with the need to enhance energy performance due to EPBD directive and rising energy prices KredEx Fund in cooperation with Ministry of Economics and Communication started to provide financing for thermal and otherwise renovation of residential buildings in 2008. Starting with soft loans and adding to this, renovation grants in 2010.

3.2 ROLLOUT PHASE 1

Upon adaptation EPBD by the Estonian government in 2007 and consequent providing of soft renovation loans, there appeared a need to promote energy efficiency in buildings and raising awareness of possibilities of using the loan in reducing energy costs. Soon after that Estonian legislation on energy efficiency of buildings was passed.

To promote energy efficiency even further KredEx Fund launched two awareness raising campaigns in media.

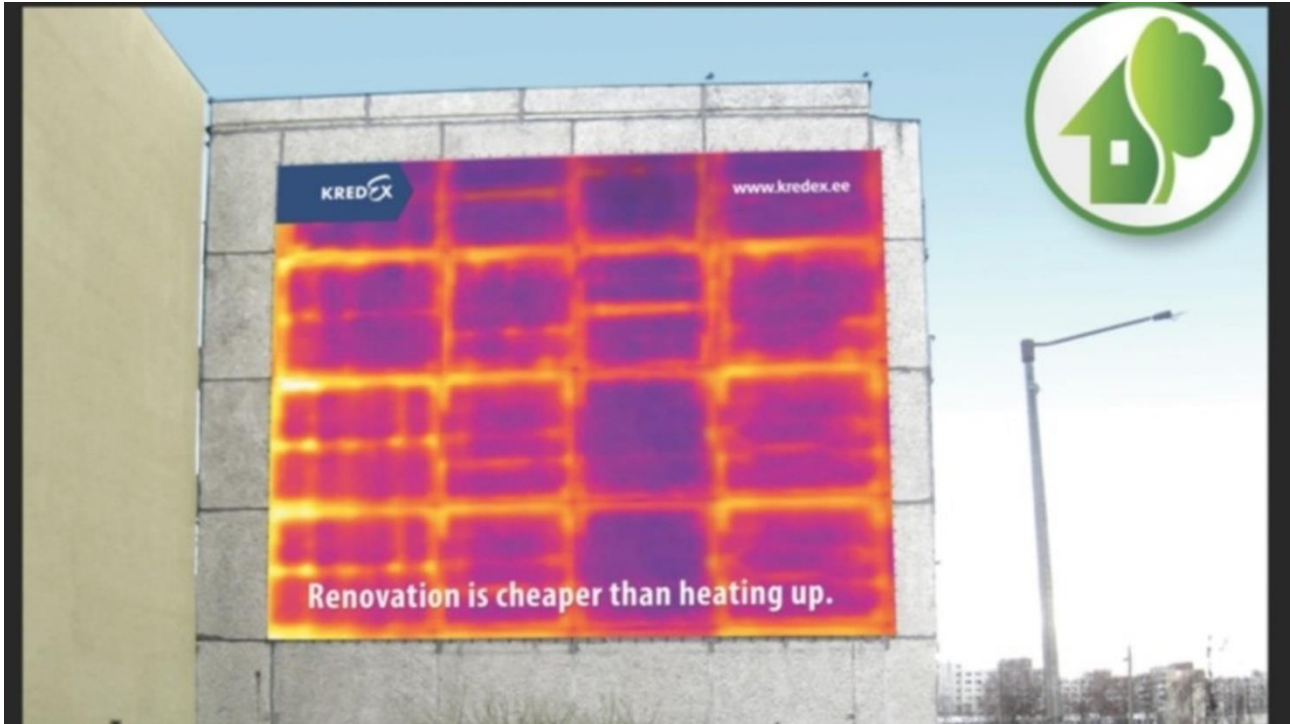


Figure 5 KredEx Fund awareness raising campaign

In addition to marketing campaigns a group of consultants was trained and hired. The consultants were selected among persons who had previously worked with energy efficiency and had an academic background in some area of construction. These consultants were hired by KredEx Fund and were tasked to consult homeowner's associations who wanted to renovate their respective buildings. The consultants were assigned regions of which they would be responsible.

The renovation project financed by KredEx Fund soft loans and/or grants were to be subject to requirements of Building Code to assure the quality of renovation works i.e. compulsory hiring of an independent Building Inspector in a construction.

The government involvement in the process – product side or otherwise is not required and has actually never been with KredEx Fund acting in the role of Executing Agency.

3.3 ROLLOUT PHASE 2

By 2013, the funds of renovation grant established in 2010 were exhausted. Approximately 400 houses were renovated to different levels of enhanced energy efficiency. Also, several conclusions were made about how to improve the process and avoid technical mistakes that occurred in during the process.

The main conclusions and suggestions for improvement:

The requirements being a prerequisite to receive the grant included a demand for indoor climate to be of level 2 according to EN-15251. As the demand was laid out rather generally and no specific requirements were established this demand was met rather seldom. During the next grant period specific requirements were added as to specific air flow parameters depending on the size and layout of an apartment.

More specific requirements were set to limit the type of heat recovery systems that can be used in renovation. For example, reciprocating decentralized ventilation units e.g. inVENTer do not meet the criteria anymore.

It became obvious that the management of a Home Owners Association usually do not have background or knowledge of project management to go through the renovation process, especially in interaction with designers, architects and contractors. To assist them it was made compulsory to hire a technical consultant. The technical consultant is a professional with technical background who has passed through special training. Technical consultant is an impartial agent who must guard the interests of the Home Owners Association.

Some other minor changes were made but of lesser impact.

It was hoped after the first funds were exhausted that the renovation process would continue without subsidies. Alas this did not happen and projects that were left without a grant just stopped.

In 2015 new funds opened and renovation grants were admitted again with different requirements (see above).

3.5 ROLLOUT PHASE 3

During the 3+3 years of renovation 400+400 multi-family residential buildings were renovated.

In cooperation with Horizon 2020 Lighthouse project SmartEnCity, TREA currently runs a pilot project to renovate residential houses built 1963 to 1968 to nZEB standard – EPC = 90kWh/m²a. There are 22 houses involved in this phase of the project. The first houses are due to be renovated by the end of 2018. The full REFURB legacy for Estonia is summarized in Figure 6.

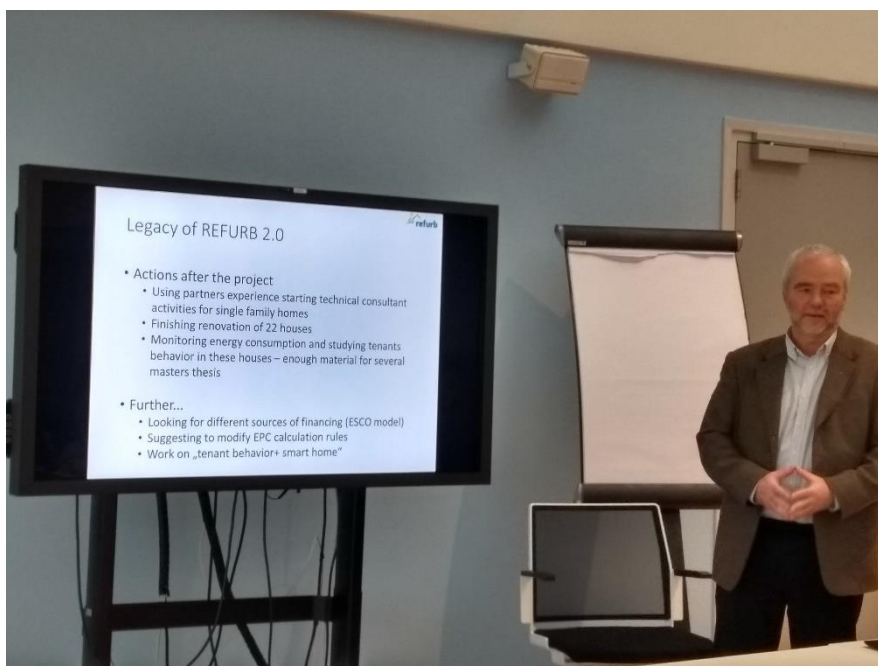


Figure 6 REFURB legacy Estonia

During all the years of renovation a few specialized construction companies have emerged who have accumulated know-how and experience in renovating houses built in the third quarter of the XX century. Also design and architectural offices have accumulated much needed experience to go on with ever needed tasks of renovating outdated residential buildings.

3.5 IMPACT OF THE NATIONAL ROLLOUT

Although one of the expected goals of using a renovation grant was to create enough pilot and example projects to have the renovation process continue without grants and subsidies. But this hope was not fulfilled.

There are several conclusions to be made from experiences in renovation so far.

Financing

Renovating multifamily houses to nZEB standard without a grant is financially not feasible except in Tallinn and its vicinity. The reason is that during the economic boom period as the present which is paradoxically partly caused by the grant itself the price of renovation may exceed 700 € per square meter of living area whilst the same square meter on free market costs approximately 1000 € in Tartu's case. Having in mind that Tartu is the second biggest city in Estonia and the real estate prices are above Estonian average means that Home Owners Associations just do not get a loan from banks for nZEB renovation. Also, it must be reminded that these apartments are of 1950s floor plans and thus do not meet the modern standards. There have been serious calculations to have the houses demolished and build new houses on their place instead.

Fiscal impact

In their research on fiscal impacts of renovation grant Arjakas and Kurnitski argue that national subsidies on renovation should continue, even from national budget, for two reasons. The first is that these houses need to be renovated anyway or the country will face a severe shortage of housing in capital areas together with ghettoization in smaller towns especially in North Eastern region. The second argument is that the fiscal payback time of such a grant will be only two years. (Arjakas, M.; Kurnitski, J. jt. Eesti hoonestuse (elamumajanduse) valdkonna arengukava 2030+ lähteolukorra analüüs, Tallinn 2013). Funds assigned for renovation grant also bring in private funds and loans which generate taxes, revenues and jobs.

Unintentional impact

Problems with getting a loan for renovation mean that in smaller towns and rural areas, where real estate prices are substantially yet lower than in bigger cities, no sensible kind of renovation is possible at all. As a result, in these places the living conditions get worse and living costs rise which leads to unintended adverse regional policy – people leave small towns for capital area.

4 National rollout plan Denmark

4.1 NATIONAL NZEB CONTEXT

In 2015, the average energy use in Danish residential buildings (both rental and private houses and flats) is 120 kWh/m²/year in 2015 and has been on the same level since 2010. Among politicians in Denmark there is often the opinion, that Denmark is ahead of other EU-countries when it comes to energy consumption. When comparing within the 6 REFURB countries Germany, Belgium and Slovakia all have higher energy consumption in residential buildings than DK, but Slovakia and the Netherlands have a lower energy use. For Slovakia, there are many multiapartment buildings, so that is the reason why the average energy use is lower than for DK. For the Netherlands, where the building stock and the climate are very comparable with that of the Danish, the energy consumption has lowered 15 % over from 2010 to 2015, due to an active energy politic, support programs and subsidy structure.

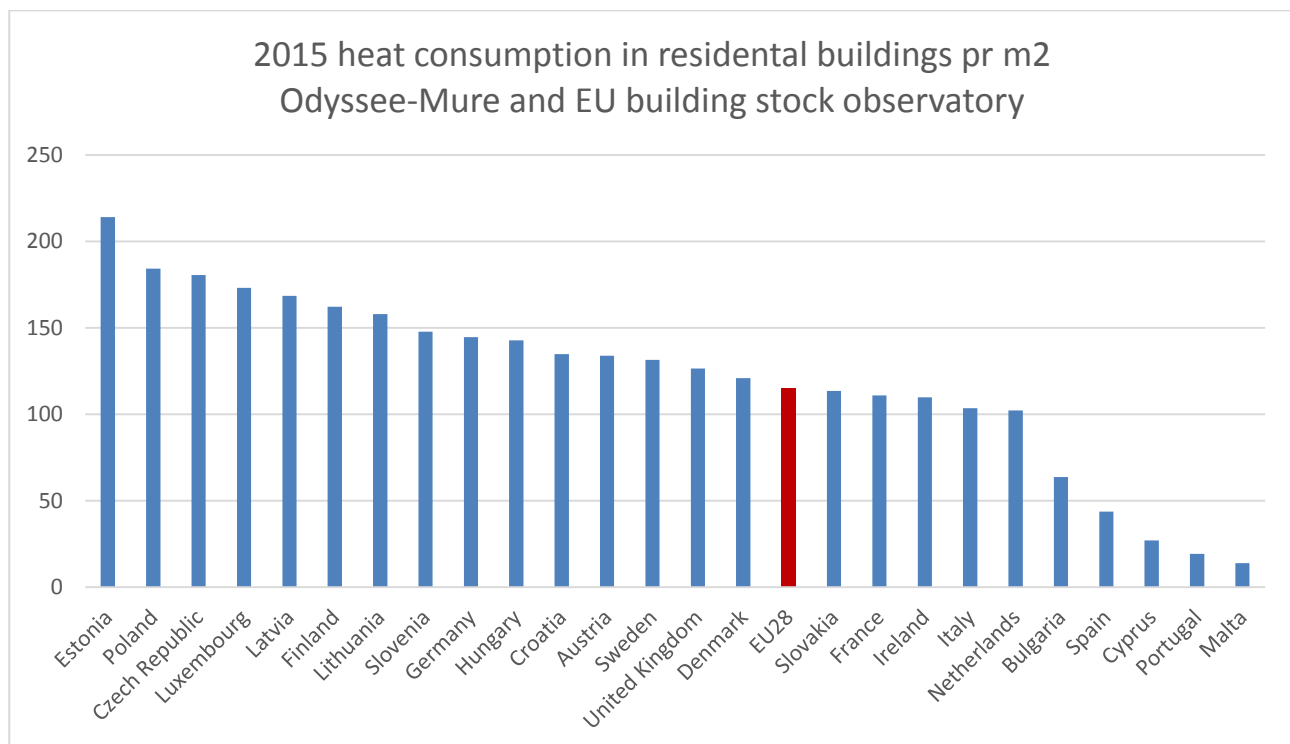


Figure 7 Heat consumption residential buildings Odyssee- Mure and EU building stock observatory

In Denmark, the energy use of buildings accounts for 41% of total final energy consumption. Approximately 83% of the energy is used for heating and hot water. Analysis from SBI estimate that, in choosing between renewable energy and reducing energy consumption, it is profitable to reduce energy consumption by making existing buildings 30 to 40% more energy efficient. The average energy consumption of the Danish Buildings is 120 kWh / m² / year, which means that it is likely to be profitable when the average consumption is reduced to approx. 80 kWh / m² / year towards 2050. Moreover, the Danish building

regulations for new buildings requires an average energy use of 37 kWh/m²/year¹⁴ for 2018. For existing building there are no requirements for the total energy use, but there is one where all replaced building elements must be energy class A. Below the progress in setting target for energy demands for new building across Europe is shown (Figure 8).

Figure 1 - Key years for nearly Zero-Energy Buildings (Directive 2010/31/EC) (Source: EPISCOPE³)

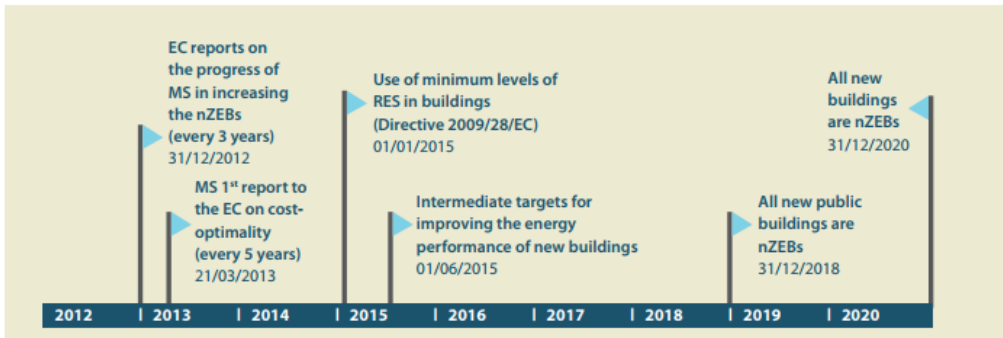


Figure 8 Key years for nZEB buildings (Directive 2010/31/EC)

Figure 2 - Pathway to nZEBs for Denmark and the Slovak Republic: maximal primary energy consumption [kWh/m²y] for single family houses (Source: BPIE, 2014)

| Maximum required primary energy consumption in new buildings [kWh/m ² y] | | | |
|---|---|---|-------------------------------|
| Country | Before 2015 | 2015 | 2021 |
| Denmark | 52,5 + 1650/ (heated gross floor area) | 30 + 1000/ (heated gross floor area) | 20 (nZEB) |
| Slovak Republic | 109-216 (Energy Class B) | 55-108 (Energy Class A1) | 54 (nZEB, Energy Class A0) |

Figure 9 Pathways for nZEB Denmark and Slovak Republic

The figure above (Figure 9) shows the Danish definition of nZEB compared to the Slovak Republic. The Danish requirements for NZEB is a factor 2.7 more strict than the Slovakian requirements. The Danish definition of nZEB renovation for existing building is 20 kWh/m²/year. This leads us to the conclusion, that Denmark has maybe the highest standards for requirements for energy consumption in buildings, but the actual energy use in existing buildings is not the highest. This means there is still room for improvement.

Regardless of the intersection between renewable energy and energy efficiency, a significant saving in heat consumption in buildings is a prerequisite for achieving the goal of fossil-free electricity and heat supply in 2035.

In practice, an important part of the green change takes place in the municipalities through strategic energy planning - especially through efforts to reduce the municipality's overall heat demand. Over the past 10 years, measures have been implemented targeting housing and building owners -for example- the national Better Housing Concept and the national communication effort through "Save Energy" plus many initiatives

¹⁴ 30 kwh/m2/year plus 1000/m2. For an average single-family house at 150 m2, the energy demand is therefore 37 kWh/m2/year

ran by frontrunner municipalities or private- public partnerships. The effect has been there, the energy consumption per square meter has been reduced, but at the same time the living space has been increased so that total energy consumption is largely unchanged. In a new report, CONCITO, dated December 2017, it is concluded that the potential is large, but regulatory measures and other initiatives have had limited impact. At the same time, analysis from the Danish Building Associations show that homeowners tend to overestimate the energy efficiency of the housing - especially for homes at the most energy-efficient end. In addition, Bolius' homeowner analysis shows that the appetite for energy innovations is downward.

4.2 NATIONAL POLICY CONTEXT

On the national level, the energy renovation of the built environment is embedded in the energy settlement from 2012, which is going to be renegotiated in the beginning of 2018. Different industrial organizations and NGOs are trying to higher the governments ambition for energy efficiency and energy savings in existing buildings, so it is possible to reach the Danish goal for a fossil-free electricity and heat supply in 2035. Recently, December 2017 the Danish government agreed to make the HomeJob subsidy programme permanent, but with a weakened possibility to get the subsidy for energy advice and energy control.

However, a Danish EU-politician is in head of negotiating the new European building regulation and his aim is to move forward the ambition at national level, and to turn the new text into reality. Because energy efficiency measures in buildings are considered a true engine for job creation and improved quality of life. There is a progress in the reinforcement of national long-term renovation strategies, including elements such as milestones, measurable progress indicators.

In general, on a regional level there is in 2018 focus on energy and resource efficiency and technology push for SME's to create growth and jobs. Earlier in 2010-2015 the regions had focus on supporting projects that aim to raise the demand for energy efficiency and energy refurbishment and create jobs.

On a local plan, 71 of Denmark's 98 municipalities signed an agreement to lower the CO₂ emission in own buildings with 2 % each year. This gives an indication of interest for energy saving and efficiency, but not an obligation to facilitate energy savings in the private building sector.

Many municipalities also cooperate intermunicipal on strategic energy planning.

4.3 THE DANISH ROLL OUT APPROACH AND STRATEGY

The rollout strategy is based on the core elements of the REFURB project as described in the REFURB D4.4. Constituting the compelling offers report. This include the REFURB segmentation methods, the REFURB Customer Journey, the REFURB packages etc.

In this report for Denmark, the use of the "REFURB concept" phrase, will cover all elements developed as part of the REFURB project.

The Danish rollout strategy has a bottom-up "local to national" approach, based on a 3-step progression approach, where:

- 1) The municipality in cooperation with local actors in private- public partnership is implementing necessary actions to initiate and secure a local functioning customer journey;
- 2) Combined with stronger engagement of national stakeholders;

3) And securing national government improving incentives and promotion of energy retrofit at national level based on the REFURB approach. Stronger national support will potentially attract more municipalities and help scale up the REFURB concept to all 98 Danish municipalities.

The local approach is the starting point, because the local stakeholders as municipalities and local PPPs (Public Private Partnerships) are close to the homeowners and it is here, that trust and commitment can be created for both the municipality and local craftsmen.

A more detailed description of the approach is shown below.

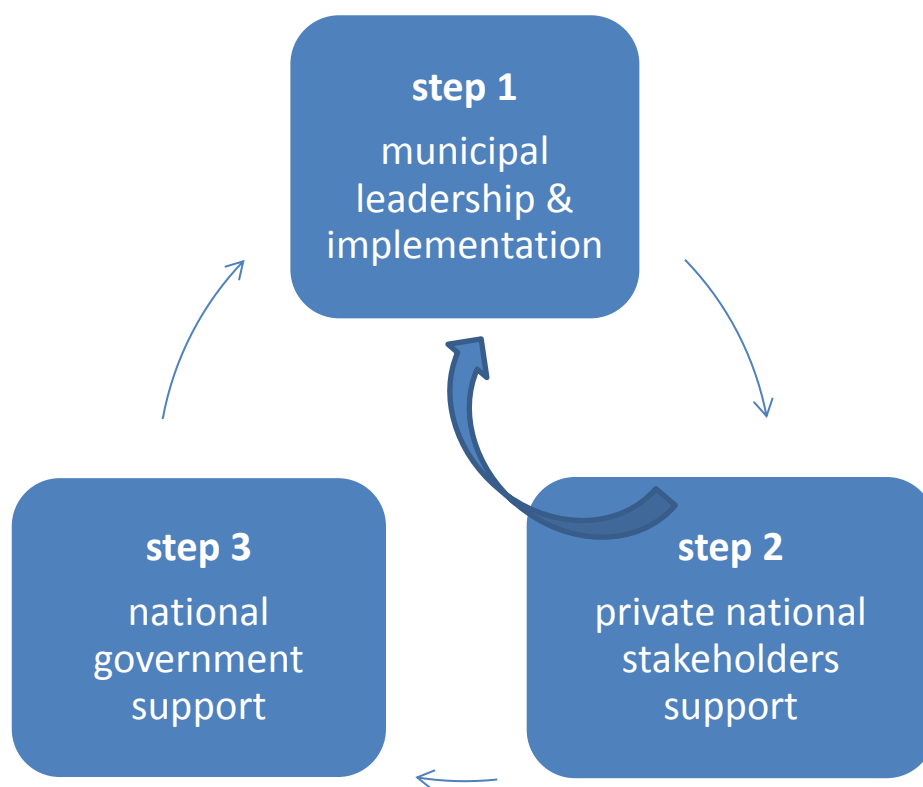


Figure 10 Rollout approach Denmark

Step 1 – Municipal leadership and implementation

Several Danish municipalities have in the last 5-8 years created their own approaches to motivate homeowners to energy retrofit their homes. Main motivational driver has been to engage citizens in the city transformation journey but phasing out old oil-burners and supporting the local job creation have also been important drivers. These attempts all serve as important local learning platforms for adaption of the REFURB approach as a new common platform.

Step 1 built on engaging the following network of towns:

1. **The Danish Energy Towns:** 7 Danish ambitious municipalities including Sonderborg have lately formed the Danish Energy Town alliance. For more information, please study the annex DK-1. All municipalities are considered frontrunners among the municipalities and have all several years of

experience with engaging local homeowners. The network ambition is to share and scale up best practices and experiences among the network towns.

2. **The Homeplan towns:** 5 innovative Danish towns have with support from Realdania¹⁵ recently launched the Homeplan initiative that focuses on the way Danish towns can deploy the use of BigData in targeting and reaching out to homeowners for giving individual digital advices for energy retrofit. The ambition is to launch a second round with additional 5 new towns lead by Clean Green Business Growth by the end of 2018. The Homeplan therefore creates a platform of 10 municipalities, however two of them, Middelfart and Høje-Taastrup, are already participating in the Danish Energy Towns network.

The rollout ambition is to use the mentioned network of towns with all together 15 leading and innovative Danish towns as operating platforms for scaling up the REFURB concept during 2018/19.

Step 2 – Private national stakeholders support

The step 2 stakeholder will support and accelerate the already taken step 1 initiatives.

The BetterHome Company is a supply-driven national key actor within energy retrofit of private homes. Established by the four Danish leading companies within green energy solutions: Danfoss, Grundfos, Velux and Rockwool. The BetterHome Company has been disseminating for several years that there is a retrofit engagement role for the private sector across Denmark, especially when it comes to deep renovations in the major towns. In 2017, 300 houses have been retrofitted by means of a deep energy renovation with an investment per home of approximately EUR 70,000.

The BetterHome concept has a good insight in filling out the commercial part in the implementation of a retrofit. This part is described as phase B task/duties in the customer journey as described in Annex 2 of this report.

The interests of the key national stakeholders are all described later in this report.

Step 3 – National government support

Considering a successful step 1 Municipal ramp-up, supported by the step 2 national stakeholders, step 3 will focus on what kind of national frame setting improvement initiatives need to be implemented to further scale up and accelerate the rollout of the REFURB approach in Denmark.

Core elements in step 3 will therefore be to address incentives for homeowners and supporting the local approach.

The DEA Danish Energy Agency and the regulations from the government will support the 11-step customer journey on the initial 3 important steps: giving information, inspiration, motivation and energy guidance. This initial inspiration will potentially motivate for the action/implementation step 5-8 (driven by private

¹⁵ Realdania is a philanthropic fund and change agent with a mission to improve the quality of life and benefit the common good by improving the built environment. <http://www.realdania.org/whatwedo>

market) and the additional step 10-11, where national government can support the dissemination of good examples and inspire for a second homeowner iteration of the Customer Journey.

The below model provides a good overview of how the 3-step integration strategy (horizontal) is working hand in hand with the REFURB Customer Journey’s 3 vertical phases.

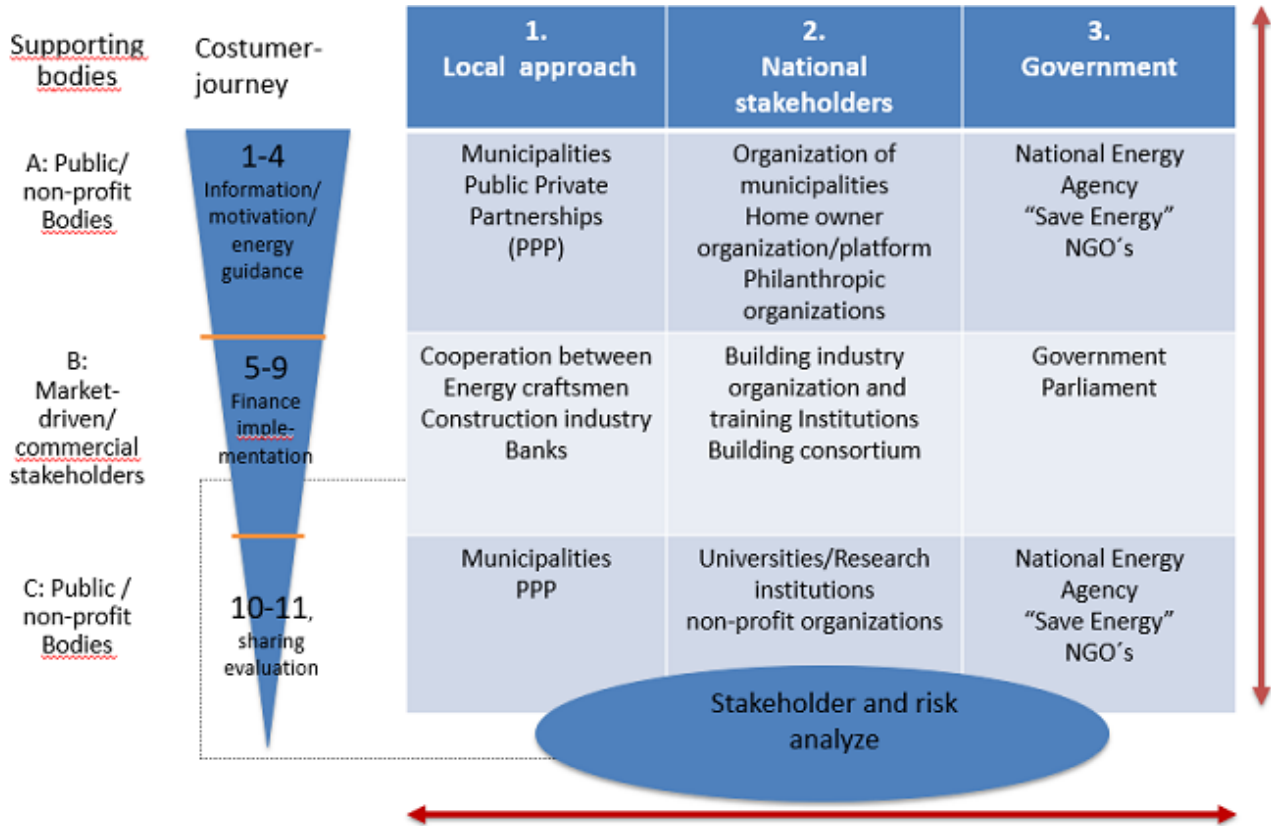


Figure 11 The 3-step integration strategy (horizontal) with the REFURB Customer Journey’s 3 vertical phases

Preparations and dissemination during the REFURB project

ProjectZero and the CLEAN Cluster have been in close contact with stakeholders at both local and national level during the entire REFURB project and thereby prepared the grounds for the rollout of the REFURB approach.

These discussions and relationships will act as solid foundation for further stakeholder discussions including a scheduled REFURB rollout-workshop as mentioned later in the action plan.

The BetterHome supply driven one-stop-shop concept, the government supported BetterHousing education and marketing concepts are already available in the market - and will as mentioned above serve as structures and centres of competence for the rollout of the REFURB concept.

The main historic preparatory REFURB activities related to rollout strategy during 2017 are mentioned below. The overall dissemination activities in 2015-2017 are mentioned in D7.1.

Table 4 Overall dissemination activities in 2015-2017

| Level | Subject | Meeting/Article | When |
|----------|--|--|-----------------|
| Regional | Construction and testing of the compelling offer | Focus group meetings – 2 interactions with both the supply and demand side | March-sep. 2017 |
| National | Interest analyze and politics to support | Meeting with 6 industries associations/ stakeholders | Oct.-nov. 2017 |
| National | Knowledge about REFURB and announcing for at REFURB consortium | Presentation and poster at Building Green | 1-2 nov. 2017 |
| National | Announcing for a REFURB consortium | Article about REFURB | 15. nov. 2017 |
| National | Political pressure for better frame conditions | Roundtable energy efficiency and financing | 16. nov.2017 |

4.4 ROLLOUT STRATEGY AND PLAN FOR DENMARK

4.4.1 Phase 1: Main action lies with local government and local stakeholders

Preparing the customer journey and the ground for action and that no customer is left alone during its travel along the customer journey. The associated structure/organization should be financed by the local stakeholders. The REFURB concept is being implemented so far mainly in Sonderborg. For Sonderborg, the REFURB concept will serve as a fourth iteration of the ProjectZero homeowner journey, which started in 2009 by the creation of the ZEROhome family (iteration 1), continued with 1.300 free energy checks (iteration 2), paid energy check (iteration 3), making the REFURB approach iteration 4.

The REFURB rollout challenge is however to use the experience from Sonderborg and similar “ready” experienced municipalities across Denmark for the rollout and scale up of the REFURB concept into Denmark’s 98 municipalities.

The REFURB local rollout strategy will build on the REFURB concept and the 2 networks of towns: Danish Energy towns and the Homeplan towns. Both networks already focus on next level energy retrofit of homeowner buildings. The Danish Energy towns plan to inspire and share their best practice experiences in

an open platform respectively the Homeplan towns, where the ambition is to create a digital and practical pathway using Big Data to kickstart homeowner's renovation journey.

The ambitions with this strategy plan is to scale the REFURB concept to initially 15 towns during 2018, with the potential of further scaling and reaching out to Denmark's 98 Danish municipalities during 2019-2020.

The role of the municipality and its PPP-partners during step 1

The municipality plays a key role as initiator and driver in the initial 4 steps of the Customer Journey, where creating a local burning platform for refurbishment, showing direction, building trust and capacity including also information (PPP-website detailing the journey, Facebook messages targeting specific EN/YF segments etc.), communication and local storytelling to key local stakeholders. These are all important local duties to be implemented and performed by the local government. Supplemented potentially with organizing/offering energy checks as step 4.

During CJ-step 5-9 the responsibility shifts to private stakeholders including local banks (and finance institutions) that will support the journey by advice and potentially also attractive energy loans. Supported by well-educated and trustworthy energy craftsmen and locally available energy advisers. All partners should be exposed on the local PPP-website to build confidence and make it easy for the homeowners to start and continue their journey.

In step 10-11, the municipality is back in the driver's seat and accepts the importance of communicating best practice cases (as part of the storytelling), that will inspire more homeowners to carry out energy refurbishments and the travelled homeowners to continue their journeys with a second, third or fourth iteration – starting in CJ-step 4.

Local PPP's (Public Private Partnerships) play important roles in motivating the homeowners along the locally defined REFURB Customer Journey for energy refurbishment. The municipalities shall take responsibility for forming local alliances/partnerships with the local private stakeholders. Here it can be more time efficient to join forces with neighbouring municipalities and across the municipalities borders form PPP with a solid number of private companies represented. The partnerships will secure a local solution-oriented approach.

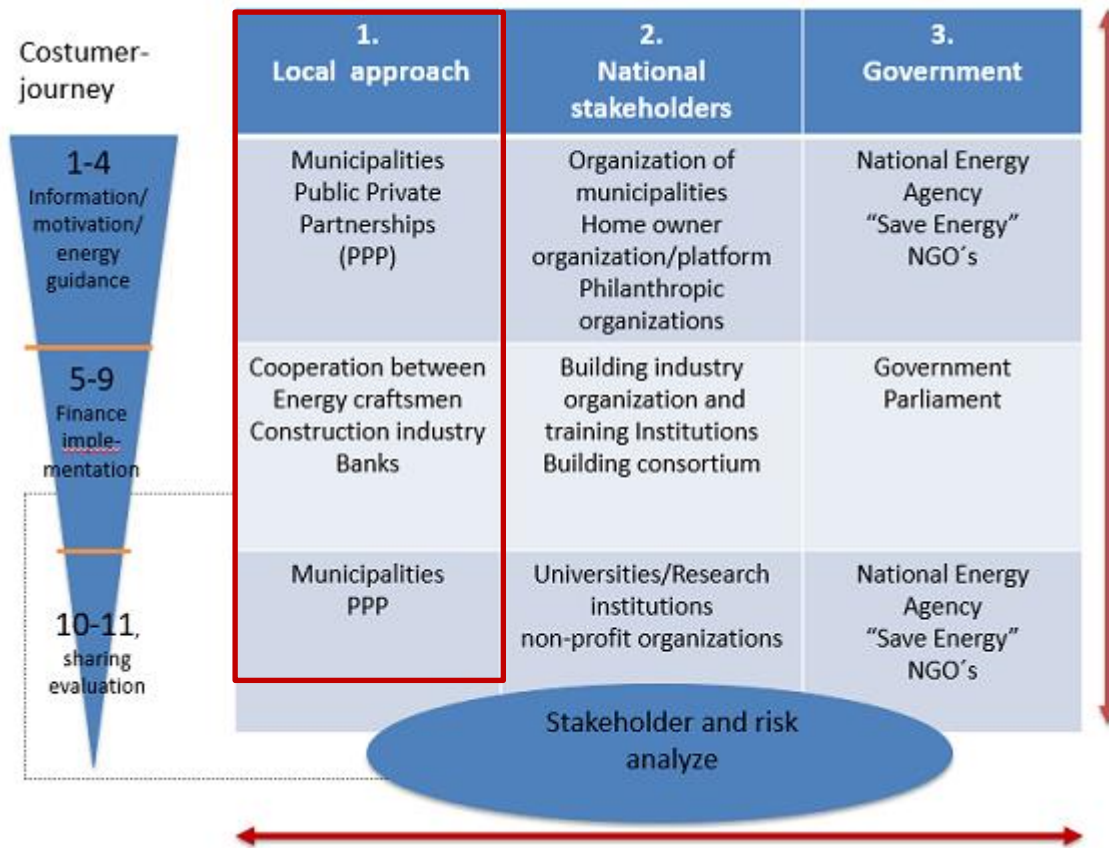


Figure 12 Local approach in rollout strategy Denmark

Using committed/experienced towns as platforms for local scaling across Denmark

The rollout strategy is based on two tiers of Danish town networks. For more information about the associated network towns and the network scope, refer to the Annex 1 of this report.

Tier one – Danish Energy Towns initiative

The first tier is the Danish Energy towns alliance, where 7 leading Danish municipalities (Frederikshavn, Skive, Ringkøbing-Skjern, Horsens, Middelfart, Sønderborg and Høje-Tåstrup) will improve their sharing of best practices to speed up their common scaling up of the energy transition.

All 7 municipalities have comprehensive experience in engaging local homeowners in energy retrofitting, either at family, rural area or municipal level including engagement of local stakeholders like banks, craftsmen, real estate agents etc.

The 7 municipalities and their “Danish Energy town” initiative is an excellent platform to scale up the REFURB concept and learnings from Sønderborg (also being part of the initiative) to potentially all named 15 municipalities (see Annex 2). The core in the rollout strategy during step one, is that each municipality understands the importance of the municipal leaderships and accepts the role.

Tier Two – Homeplan towns

The second tier of towns for the REFURB rollout strategy is built on the newly launched Realdania Homeplan initiative, where 5 leading Danish municipalities (Middelfart, Høje-Taastrup, Fredensborg, Fredericia and Roskilde) will test a new tool based on Big Data to identify the potential and the most “interesting” and valuable homeowners for retrofitting their homes by energy retrofit, shift of heat-source, get rid of their old oil-burners etc. The municipality, using the tool, will first screen the potentials and second inform the homeowners about their opportunity based on a personalized, digital energy advice/investment case.¹⁶ The energy advice will be based on information from the National Energy Agency’s information centre “Save Energy” and the REFURB learnings. The Homeplan initiative is expected to be developed and launched during the first half year of 2018. The ambition is by the end of 2018 to launch a second round with additional 5 new towns lead by Clean Green Business Growth (Odense, Kolding, Nordfyn, Billund, Faaborg-Midtfyn).

The municipality of Middelfart is the leading municipal partner in the Home Plan concept and additionally in head of the steering committee for Green Business Growth. The municipality of Middelfart and Realdania have also agreed to let the GBG municipalities be the wave of testing the Homeplan-learnings and is positive towards integrating the learnings from REFURB. Moreover, the GBG secretary will fill the cap by connecting the digital energy advice in step 4 to educated energy craftsmen, Better Housing consultants and banks, so that the energy advising also leads to implementation of energy refurbishment. This additional rollout plan is already agreed on to be integrated in the action plan for GBG in 2018.

Most of the net 10 municipalities mentioned above have different experience in engaging local homeowners in energy retrofit, either at family, rural area or municipal level including ex. engagement of local stakeholders like banks, craftsmen, real estate agents etc.

To activate homeowners, a successful launch of the Homeplan toolbox will require the municipality to invest in local communication and storytelling and thereby already active the CJ-step 1-4. This will make the Homeplan launch initiative an excellent pre-process for integration of the REFURB concept as the action-based part – supporting the homeowners journey from business/investment case (CJ-step 4) to the Customer Journeys additional 7-8 steps for completion of the journey. The next step in the roll-out for the Homeplan towns is to expand the test of the tool to the additional in total five Green Business Growth municipalities during 2017/2018 based on the current public private partnership and to include the new learnings from the REFURB project about retrofit packages, investment prizes and impact on energy saving and energy performance (EPC) in the digital energy advice.

Like Middelfart, also the municipality of Høje-Tåstrup is a member of the already mentioned (tier 1) Danish Energy Towns network.

Local value creation and business model

Together the 15 involved municipalities and their Danish Energy towns network and the Homeplan initiative will be an excellent platform for scaling up the REFURB concept and learnings from both Green Business Growth (6 cities) and ProjectZero (Sonderborg) to potentially in total 15 municipalities. The core in the rollout strategy step 1, is that each municipality accepts their roles and responsibilities for these local next level engagement initiatives for homeowners.

¹⁶ <http://www.renoveringpaadagsordenen.dk/energipolitik/nyt-vaerktoej-skal-understoette-kommunernes-renoveringsindsats/>

Requirements for rollout and scaling

The scaling up will require that:

- the municipalities will form local PPP-cooperation structures in or across each municipality with the municipality as the initiator, facilitator and the initial driver
- capacity is being built at local level to qualify the local stakeholders to understand roles and responsibilities and support the homeowners along the customer journey's, the 11-step model
- local strategy should focus on implementing the two selected REFURB DK-packages targeted the YF (Young Families) segment and the EN (Empty Nesters) segment – for more information, please study the REFURB Delivery D4.4 The Compelling Offer report
- the municipality/municipalities together with the PPP-organization promote the journey's initial 3 steps:

The gain for the municipality, the local stakeholders and the homeowners will be:

- access to the documented REFURB concept without having to pay additional charges for concept development
- local skills and competence development that will boost local companies for future competition and prepare a solid ground for new job creation along the Customer Journey stakeholders
- a better indoor-climate at the homes making them more attractive for existing and future homeowners
- long - term savings in energy cost that will allow homeowners to spend more money locally and create a better life.

Stakeholder analysis for strategy step 1

In the stakeholder analysis below, the confirmed interest in the REFURB project is mapped and the motivation (value proposition) to empower the REFURB scheme is shown.

Table 5 Stakeholder analysis Denmark

| Local stakeholders | Confirmed interest in REFURB concept for deep energy refurbishment (positive/negative) Energy Towns 2018 | Confirmed interest in REFURB concept for deep energy refurbishment (positive/negative) Homeplan/GBG Cities 2018 | Value proposition Motivation to empower the REFURB scheme (advantages/disadvantages) |
|-----------------------|---|---|---|
| Municipalities | The 7 municipalities working in the “ Danish Energy towns ” Network have expressed their strong interest in a continued joint journey towards engagement of homeowners and local stakeholders. | The 10 municipalities being part of the Realdania “ Homeplan cities ” initiative has shown interest and commitment to test a digital Big Data approach for potential energy saving areas and individual digital energy advice, starting with 5 municipalities during 2017/2018 and 5 more GBG municipalities joining by the end of 2018/beginning of 2019. | The 15 municipalities all have a strong interest in continuing their homeowner engagement activities for energy savings in the private building segment The REFURB concept and the lessons learned from both the GBG (6 cities) and ProjectZero (Sonderborg) create a robust next level platform for the municipalities to continue their city transition journey based on the city-networks (Tier 1) and the Homeplan |

| | | | |
|--|---|--|--|
| | | | <p>project/GBG (tier 2).</p> <p>The network also creates safety for the engagement of national stakeholders and national government and future political framework conditions.</p> |
| Local Homeowners | <p>Tested positive in Sonderborg as part of the REFURB development, but need to be scaled up based on local traditions in each municipality</p> | <p>Tested positive in 6 GBG municipalities as part of the Refurb development, but need to be integrated in website/social media and combined with the individual, digital energy advice in each municipality</p> | <p>The REFURB concept and packages are expected to create a better indoor climate, lower energy consumption and cost and improve the buildings energy-label making the building more valuable, when (one day) advertised for sale</p> <p>For young families (YF), the main value creation is: time, space for activities, health, indoor climate, value securing primary through package solutions (start package and indoor package) and secondary through a la carte solutions.</p> <p>For empty nesters (EN) the main value creation is: comfort, energy saving, value securing though a step-by-step approach or package (The start package, the comfort, the energy and the a la carte packages).</p> |
| Local craftsmen | <p>Tested positive in Sonderborg with 10 local craftsmen companies, but need to be scaled up based on local traditions in each municipality</p> | <p>15 dedicated active energy craftsmen/Better Housing advisers have participated in the focus group interview. Potentially 225 educated energy craftsmen.</p> | <p>The REFURB Concept is creating a bigger market as more homeowners will join the customer journey and retrofit their homes to nZEB.</p> |
| Local banks | <p>Tested positive in Sonderborg with Broager Sparekasse, Arbejdernes Landsbank and Sydbank, but need to be scaled up based on local traditions in each municipality.</p> | <p>Tested positive with Middelfart Sparekasse, Merkur Bank, Nordea Bank and Jyske Bank but need to be scaled up based on local traditions in each municipality.</p> | <p>The REFURB Concept is creating a bigger market for loans as more homeowners will join the customer journey and retrofit their homes to nZEB.</p> |
| Local estate agents | <p>Tested positive in Sonderborg with 6 real estate agents but need to be scaled up based on local traditions in each municipality.</p> | <p>Tested positive with 1 real Estate agent, Nybolig, who also participated in the focusgroup interview.</p> | <p>The Refurb Concept is creating better and more valuable homes, that can be sold at higher prices.</p> |
| Technical colleges and vocational schools | <p>Tested positive in Sonderborg with EUC Syd but needs to be scaled up based on local traditions in each municipality.</p> | <p>Tested in 6 municipalities, 225 energy craftsmen educated in a cooperation between IBC and the GBG PPP-partners. A craftsmen list is at the website.</p> | <p>The Refurb Concept is increasing the demand for education and learning from local stakeholders</p> |

Risk analysis during the rollout strategy step 1

Treats:

- There is a risk that the ambitious Homeplan bigdata/digital approach will face either technical or society/data-legislation challenges as this is based on data “being validated” and changing laws
- Financing, organizing and interest for a national workshop. The interest will depend of the results of the Danish energy settlement for energy efficiency in buildings
- Refurbishment in the private building segment is not a burning platform for municipalities and homeowners due to economic growth, high employment and low energy prices
- Creating and co-financing a PPP is new to the local society and will be considered too difficult
- The 15 municipalities loose interest in the implementation as working with PPP-structures is out of the traditional municipal box
- The 15 municipalities loose interest in the implementation because homeowners do not respond as expected for several reasons
- The homeowners burning platform is for the time being limited to fossil free energy supply and not energy refurbishments in general. Little focus on energy saving due to good economy and low energy prices.
- There is full employment in the big and central located municipalities. There are plenty of building projects and a lack of craftsmen. The craftsmen are mostly interested in big building projects. Therefore, there is less motivation for creating new green jobs in partnership with local stakeholders

Opportunities:

- Taking the local renovation initiatives to the next level based on the REFURB concept is a major opportunity for all participating 15 municipalities, especially when the upcoming renewed Danish energy settlement provides better framework conditions and subsidies. The outskirts municipalities are all seeking solutions to fix the challenge and create new green jobs in partnership with local stakeholders
- Creating new services and businesses for local private companies based on local lessons learned
- Growing local competencies and co-creation skills

4.4.2 Phase 2: National private stakeholders

Important national private stakeholders have already been informed about the REFURB concept and have taken part in the initial rollout discussions. The national stakeholders have expressed their interest in continued dialogue and discussions regarding a full-scale implementation of the REFURB concept.

The national private stakeholders include:

- The BetterHome one-stop shop company (step 5-9 in the REFURB customer journey)
- Realdania – a philanthropic organization (step 1-4 REFURB). Also supporting step 5-11 in non-REFURB related initiatives.
- Industry, building branch associations and finance institutions (step 5-9 in the customer journey)

The most important stakeholder in step 5-9 to implement the REFURB findings is Better Home. Therefore, this incentive is brought discussed below.

Better Home – an important building consortium empowering nZEB renovation

The BetterHome is an important one-stop concept and is a building consortium, financed by 4 mayor building companies, is a national supply driven initiative, where homeowners are offered to jump directly to the implementation phase and get an offer from one of the connected craftsmen. See details in D3.3-3.4.

The Better Home concept offers homeowners a choice in 3 simple packages: energy, comfort and the modernization. The concept makes it easy for potential customers to get an online energy report about the energy saving potential but is also a way to get leads to the craftsmen, manufacturing the 4 companies' products. The customers simply enter their name, address and energy use. The other difference is, that it is the Better Home secretary, that is choosing the craftsmen to the customers pointed out by qualification and geography. The 4 companies 'brand is the customers security for feeling safe with the solutions and the craftsman sent out. Normally it is the customers that are choosing the craftsmen. Also, a way to make it easy for the customers. The customer is in contact with only a few people, making it easy and fast for the young family with little time to get an offer. Another difference is that the secretary provides the Better Home craftsmen with a simple online calculator for energy saving potentials and courses to update the craftsmen in effective communication with the customers and keeping up with the milestones.

The Danish REFURB partners have offered to give all findings from REFURB to Better Home, because there is a need and plenty of market for both local non-profit approach and private national supply driven approaches. BetterHome can easily integrate the 5 REFURB packages (start, indoor climate, comfort, energy and a la carte) and the calculated energy savings, expected EPC and extra value of the house. For empowering NZEB into the Better Home concept there is a need for not only an offer from a craftsman but for energy advices from qualified building experts/energy consultants with a holistic view on the dwelling.

Realdania initiatives: information, inspiration, digital energy advices (step 1-4)

An important national stakeholder includes Realdania, a philanthropic organization, that funds projects to improve the built environment. Realdania support initiatives on all levels. In relation to REFURB the support to information/inspiration, step 1-3 (BOLIUS) and Homeplan, step 3-4. Realdania must be underlined, but Realdania also supports renovation projects for building heritage buildings (step 5-9) and research projects (step 10-11)

Realdania is already supporting the homeowner platform BOLIUS, that gives good and practical advices to homeowners on all kinds of subjects related to the home (energy, climate, garden, maintenance, cleaning etc.). BOLIUS has an active and successful digital approach and an important role towards homeowners to communicate the advantages of energy refurbishment and give inspiration with tips and tricks for good and well documented energy behaviour and energy investments.

Realdania has now announced its ambitions to launch the "Homeplan" (Boligplan) focused on how BigData from the municipalities BBR (building registration) can help the municipalities identify target groups for energy retrofit of private homes and give digital individual energy advice through the electronic post (e-box). The tool also allows to give back digital, individual energy guidance e.g. if the energy use is higher than the average and the energy supply is based on oil. The energy guidance will be based on the energy advices from the government supported energy information initiative "Save Energy". Moreover, the findings from REFURB and the packet solutions with calculation of price, energy savings and EPC give valuable overview and information to the homeowner. The municipalities can integrate these findings in the individual digital guidance. "The Home Plan", aims to give municipalities a new digital tool that makes guidance for energy transition and energy refurbishment less time demanding. This makes Realdania a key national stakeholder for the REFURB rollout strategy. The tool is tested in 5 cities in the beginning of 2018 and the aim for Realdania is to get the tool implemented in 30 cities during 2019.

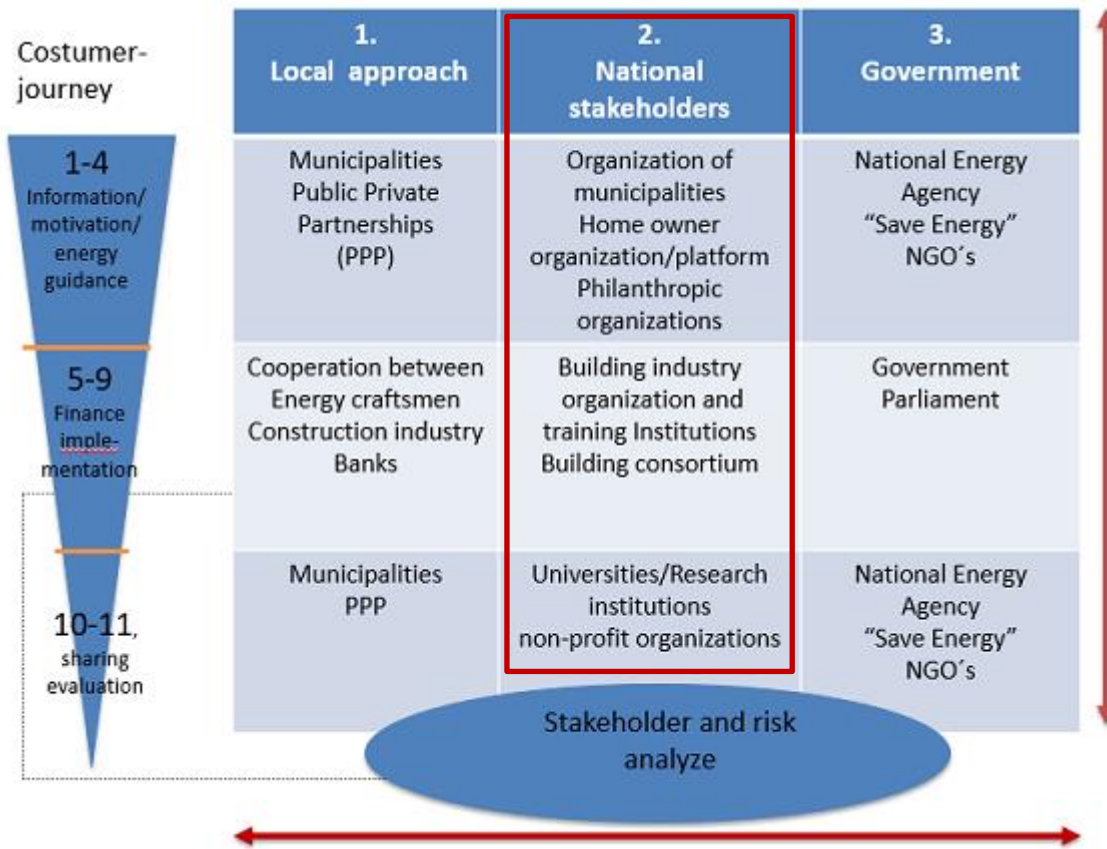


Figure 13 National stakeholders in rollout strategy Denmark

Training Institutions supporting step 5-8: On a national level the knowledge institutions and education institutions support the supply side of construction companies, energy craftsmen and financial institutions in offering them education. There are several Danish educational schemes to update the skills of the construction industry and the craftsmen. The financial institutions are organized in national organizations. There is a need for the national finance institutions to support local bank initiatives and have a policy on how to train the bank advisors¹⁷ in letting energy investment advices and a long-term energy investment plan be obligatory in a customer meeting, when negotiating the conditions for a bank loan.

National building and branch organizations, finance institutions (step 5-9)
The role of the building and branch organizations is to create the best market conditions and growth for its members and to support the local and regional building industry with information and inspiration. The national finance institutions and the regulations from the government are setting the frame conditions for the local banks.

Universities (step 10-11): Finally, the universities make market analysis and evaluations of energy refurbishment projects (to document the potential energy saving potential, the effect of EPC, the effect of different pilot project etc.). The evaluations from the universities give important input to the local stakeholders to be able to share the good cases and inspirational evaluations on a local level. In this phase universities also get input and information back from the local stakeholders.

¹⁷ Fx like Spar Nord and Jyske Bank

Stakeholder analysis of the national stakeholders in supporting NZEB refurbishment and the local approach

In the stakeholder analysis below the confirmed interest in the REFURB project is mapped and the motivation (value proposition) to empower the REFURB scheme. There might be other stakeholders, but the ones mentioned below are the ones that the Danish REFURB partners have had meetings with.

Table 6 Stakeholder analysis national stakeholders

| National stakeholders | Confirmed interest in REFURB concept for deep energy refurbishment (positive/negative) | Value proposition Motivation to empower the REFURB scheme (advantages/disadvantages) |
|-------------------------------------|--|--|
| Danish Building Organization | Positive to give municipalities a bigger role, e.g. through energy saving plans for private segment. | <p>Represents 6.000 companies in the Danish building sector. Active in trying to influence the energy settlement for a clear target for energy savings in buildings.</p> <p>Wants to keep a balance between energy saving and green energy supply.</p> <p>Positive towards energy regulations, that can raise the energy standard in buildings. Want to strengthen the use and effect of the EPS.</p> <p>Satisfied with the permanent Home-job agreement 2017, that due to a subsidy system will keep the interest in energy efficient solutions in buildings.</p> <p>Want the energy company's energy saving obligations to be separated into demands to different sector, also the building segment.</p> |
| Danish Industry | <p>Finds the package solutions interesting – gives a good overview for the young family</p> <p>Agrees with focus on in-door climate and comfort.</p> | <p>Interest in jobs for the industry and craftsmen</p> <p>Represents industry and supplier</p> <p>Neutral towards the Home-job agreement</p> |
| Technique | The package solutions give a good overview. Important to use qualified energy advisers. | Interested in business opportunities for the installers and plumbers. Alternative financing is interesting (RESURS Bank) for the technical part of the deep energy refurbishment and for the heat pumps |
| The Builders Association | Wants more monitoring for energy savings and focus on energy performance | Interested in big buildings |
| The Better Home | Wants free market conditions and no subsidies. Acknowledges the | Important to sell comfort, health and security There is trust in the well – known brands for |

| | | |
|----------------|--|--|
| Company | importance of the national and local stakeholders, that take responsibility for information and motivation (CJ.1-4). The Better Home approach with focus on the CJ journey 5-9 is depending on. Likes the package approach in REFURB | homeowners in the big cities. In the country side, there is trust in local craftsmen and local initiatives from the municipality |
|----------------|--|--|

Risk analysis:**Treats:**

- The interest for a national workshop will depend of the results of the Danish energy settlement for energy efficiency in buildings.
- Refurbishment in the private building segment is not a burning platform for the national stakeholders due to economic growth, high employment and low energy prices.
- The national finance institutions have not been presented the final compelling offer and the importance of letting energy advice be part of the conditions for an attractive energy loan. The impression is, that it easier for regional/local and philanthropic banks to give attractive energy loans. The biggest national banks need to fulfil central efficiency obligations and do not have the same possibilities to be active in local initiatives.
- There is almost full employment in the construction industry caused by government investments in new hospitals etc. There are plenty of buildings project and a lack of craftsmen. The craftsmen are mostly interested in big building projects. Therefore, there is less motivation for making regulations for creating new green jobs. The picture is different in the major towns than in the minor towns, where there are less new government investments.

Opportunities:

- If the upcoming Danish energy settlement gives clearer targets for energy efficiency in buildings target, better framework conditions and subsidies this will raise the interest from the national stakeholders and the research on energy efficiency from the university.
- An analysis of the use of the economic incentives and energy apps for energy savings in buildings will higher the knowledge level on good investments
- A growing use of smart energy apps to calculate energy savings and lean the business routines within the small craftsmen companies, will result in higher income and more interest among the single-family homes.
- Growing local competencies and co-creation skills though the national knowledge centre for energy savings (VEB) and the Danish building research institutions (mainly DTU, SBi, AAU)

4.4.3 Phase 3: Main action lies with the national government**Creating awareness and support + supportive legislation**

The Danish Energy Agency is already aware of the REFURB concept and is interested in using parts of the communication messages, the customer journey and package solutions within their planned information campaigns. Moreover, the Danish Government and Parliament are expected to agree on a new broad energy settlement in the first part of 2018. This settlement is expected to include both targets and actions for fossil free energy supply and energy savings. The stakeholders include

- Political support from government and parliament

- DEA Danish Energy Agency
- “Save Energy” information initiative financed by DEA
- Various NGO-network including Ecological Council trying to influence the coming energy settlement

The national stakeholders have expressed their interest in continued dialogue and discussions regarding a full-scale implementation of the REFURB concept.

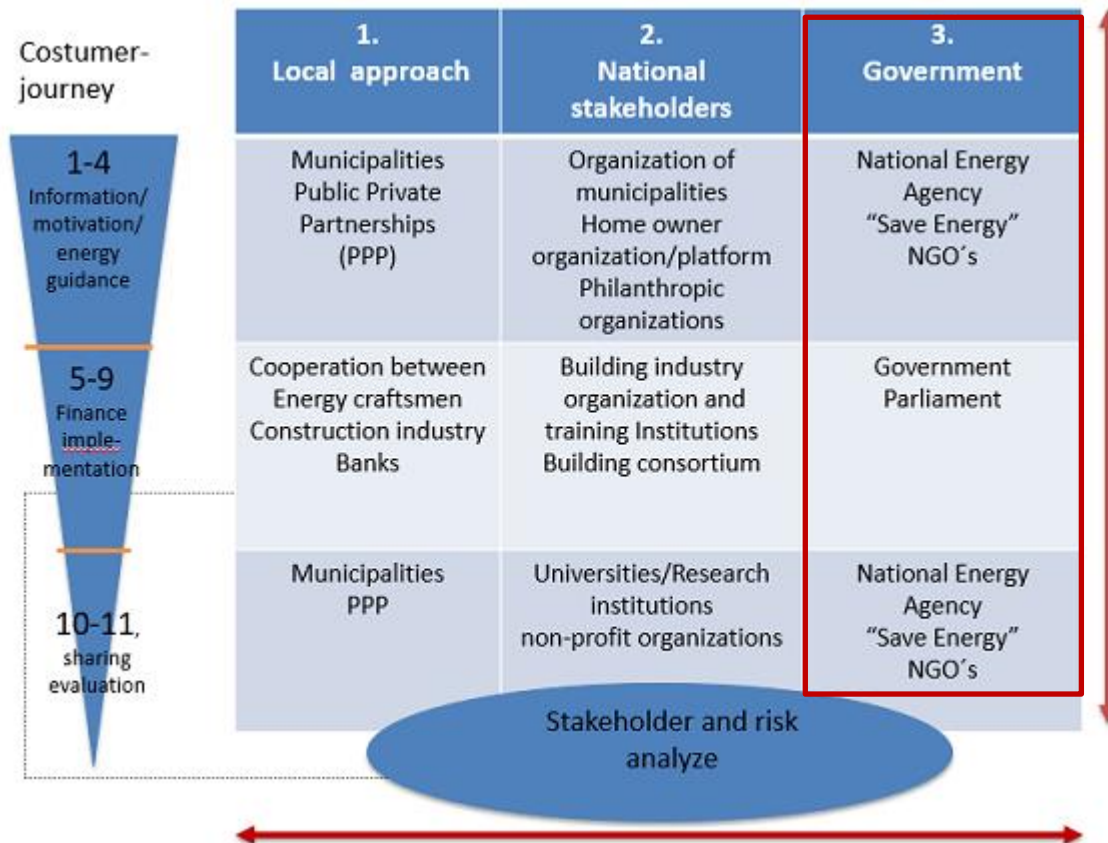


Figure 14 Government in rollout strategy Denmark

There are policy areas that need to be regulated or strengthened for empowering the motivation for both homeowners to carry out deep energy refurbishment and municipalities to support the homeowners in their customer journey. These are mentioned below and in REFURB deliverable D4.5.

It is important to get energy efficiency in the existing building stock higher on the political agenda in Denmark to secure that the cost of switching to green energy supply does not get too big. According to AAU, Brian Vad Mathiasen, the extra bill to fossil free energy supply will be 2 bill DKK/year until 2050, if the energy saving rate stands on the same level as today. Especially in office and housing there is a need for incentive. The society has a need for energy savings which is not the homeowner's needs. Therefore, the responsibility for energy savings cannot alone be based on a voluntariness.

Need for homeowner incentives: For homeowners there is a lack of incentives to save energy. As well as a special need to deal with other values and importantly to support younger families in their knowledge of energy conversion. Through the REFURB project we have developed attractive package offers for comprehensive energy innovation, but also discovered that there are far higher incentive structures in, for example, Germany, Netherlands, Belgium and Sweden, which we are often compare with. In Denmark a grant of 2-5% of the total cost is very little compared to other countries, offering 10-20% in subsidies.

The REFURB easy-to-understand packages can only be successful in DK, if we get an energy agreement that rewards homeowners for a good energy standard (e.g. deduction in property tax as in Belgium or better loans / grants whose homeowner commits to an energy standard as in Germany) and that communication is changed to comfort, health and responsibility with energy benefits. It should be argued that value increase / energy label of a dwelling is a better financial investment as compared to negative interest rates in the bank.

There is a need to connect energy loans and energy guidance so that an attractive loan is provided based on a long-term energy investment plan. Banks have a decisive role in boosting energy conversion and should therefore be given the opportunity to demand this.

Need for improved municipality incentives: If the municipalities and the connected PPP's shall have a role in facilitating and empowering the homeowners in deep energy refurbishment there need to be clear political goals for energy savings in buildings and a need for a common objective of nZEB renovation.

There is a need for economic support from the government to the municipalities to facilitate creation of PPP-partnerships

There is a need for funding of PPP – partnerships, that can operate the digital energy advising Homeplan after a test period. The PPP can also be the link to entrepreneurs and craftsmen to make the implementation done. The PPP can be followed up by an effect evaluation and cases.

The role of the Government layer is described below:

Government: The National Energy Agency has an obligation to communicate about energy savings possibilities in buildings and green energy supply options. (step 1-4). The obligation is threefold – to customers/homeowners; to businesses and to the local authorities. This task of communication has been delegated to the “Save Energy” initiative with information and inspiration. The “Save Energy” initiative supports municipalities in their efforts in convincing homeowners to save energy, e.g. by participating in energy events organized by the municipality. Independent and general information and advice about the advantages of shifting from oil to heat pumps and the advantages of energy refurbishment are given (step 4). In step 5-9 the regulations from the government about Building regulation (BR18) and subsidies influences the framework conditions for the construction industry and the energy craftsmen. Different branch organizations and the Danish REFURB partners join forces and try to influence the next energy settlement in spring 2018 through the roundtable cooperation “Energy refurbishment on the agenda”. Finally, in step 10-11, the National Energy Agency and the “Save Energy” platform follow up with a national case bank, that the municipalities and PPP's can use on a local level.

Stakeholder analysis:

In the stakeholder analysis below the confirmed interest in the REFURB project is mapped as well as the motivation (value proposition) to empower the REFURB scheme.

Table 7 Stakeholder analysis interest REFURB concept and value proposition

| Government | Confirmed interest in REFURB concept for deep energy refurbishment (positive/negative) | Value proposition Motivation to empower the REFURB scheme (advantages/disadvantages) |
|----------------------|---|---|
| Danish Energy Agency | Positive to segmentation, the YF is ready | Obligation to inform about the advantages |

| | | |
|--|--|---|
| | <p>to receive guidance. The EN, - the packages give an overview. Would have liked insulation from the outside to be a part of the packages but acknowledges that the packages then would get to expensive. Wants to integrate the REFURB customer journey and way of communicating for energy savings in a new national energy campaign. Agree with not showing pay-back time, but instead argue for need of maintenance and aesthetic. Acknowledges that the Better Housing one-stop shop concept (2014-2016) did not succeed due to timing and no subsidies for energy check-up at that time</p> <p>Recommend looking at the result, January 2018, of the DEA funded different PPP-partnerships initiatives in 2016-2017</p> | <p>of energy savings. (CJ 1-3).</p> <p>Expects an energy settlement based on information campaigns, free choices and no regulations</p> <p>Want energy targets for energy savings in buildings, but the Danish Energy Agency is working for the government, but do not have any political power to influence the decision from the government.</p> |
| Building and Business agency /(Bygge- og erhvervstyrelsen) | No knowledge of REFURB | Part of the responsibility for Buildings has moved from the Energy Agency |
| Government | No knowledge of REFURB | Prioritize fossil free energy supply. Want voluntariness and no further regulations for energy refurbishment. |
| Parliament | No knowledge of REFURB | Agreement on a permanent but less strong Home-Job agreement, that can secure the demand for craftsmen to renovate buildings also in the outskirts of DK. |
| Energy on the Agenda: Roundtable of: IDA, FRI, Danske Arkitektvirksomheder, Arkitektforeningen, Økologisk Råd og Dansk Byggeri (Ecocouncil and Danish Builders association) | Positive to all initiatives that keep focus on the importance of energy saving in buildings and an economic balance between transforming to green energy supply and energy efficiency. . | Binding national target for energy efficiency improvements by 2030 with a sub-target for buildings. An action plan with milestones and directions for investments in energy efficiency, especially in buildings in the short term, will be prepared, which during the agreement will lead to a cost-effective conversion to fossil independence by 2050. The energy efficiency efforts must be differentiated so that measures are directed towards those parts of the building stock, where the effect is greatest in a long-term perspective. Instruments and requirements for energy efficiency must be considered, building age, location and heating, so that the investment is optimized |
| Ecological Council | Positive to give municipalities a bigger | Active in trying to influence the energy |

| | | |
|--|--|---|
| | <p>role, fx through energy saving plans for private segment.</p> | <p>settlement for a clear target for energy savings in buildings</p> <p>Wants to keep a balance between energy saving and green energy supply</p> <p>Positive towards energy regulations, that can raise the energy standard in buildings. Wants to strengthen the use and effect of the EPS. Want the energy company's energy saving obligations to be separated into demands, per different sector, including the building segment.</p> |
|--|--|---|

Risk analysis:

Treats:

- The failed success of the earlier Better Housing frightens and hold back the political will to new national initiated concepts
- The interest for a national workshop will depend of the results of the Danish energy settlement for energy efficiency in buildings
- Refurbishment in the private building segment is not a burning platform for the government due to economic growth, high employment and low energy prices.
- There is different interest in the parliament and the government. The liberal government believes in free choice and no regulations for energy efficiency in buildings. However, parliament believes in the effect of regulations and use of EPC. It is also often heard from the government, that Denmark is ahead of other countries when it comes to energy efficiency in buildings.
- There is nearly full employment in the building industry, except in the outskirts of Denmark. The politicians therefore see no need for further subsidies that might overheat the market.

Opportunities:

- If the upcoming Danish energy settlement gives clearer targets for energy efficiency in buildings, better framework conditions and subsidies, this will reward the homeowner for a better energy standard, will raise the interest from the society in general, from the homeowner, to the local and national stakeholders.
- If EU decides to give more regulations on obligatory use of EPC and an evaluation of the connection between sales price and EPC in all EU-countries, this will trigger the market and raise the demand for more energy efficient single-family homes. If the EU council agrees on an Energy Efficiency Directive, which requires an overall EU energy efficiency binding target of 30% in 2030 and energy savings obligation per year from 1,0 to 1,5 %. The negotiations started in June 2016. No compromise has yet been reached.¹⁸
- A national energy Settlement, that sets a binding national target for energy efficiency improvements by 2030 with a sub target for buildings.
- A broad energy settlement in the parliament and an action plan with milestones and directions for investments in energy efficiency, especially for buildings in the short-term, will give stability and

¹⁸ https://ec.europa.eu/energy/sites/ener/files/documents/technical_memo_energyefficiency.pdf
<http://www.consilium.europa.eu/en/press/press-releases/2017/06/26/increased-energy-efficiency/>

better business cases for companies, as they know the future policy will lead to a cost-effective conversion to fossil independence by 2050.

- The energy efficiency efforts must be differentiated so that measures are directed towards those parts of the building stock, where the effect is greatest in a long-term perspective. Instruments and requirements for energy efficiency must thus consider building age, location and heating, so that the investment is optimized.
- Better funding opportunities for national pilots for deep energy refurbishment. Monitoring the effect of deep-energy refurbishment. What is possible to achieve in energy saving in the real world. Less focus on national mapping and reporting.

4.4 JOINT ACTIONPLAN AND TIMETABLE CONTRIBUTIONS FOR STEP 1-3

The sequence of the rollout will be as follows:

- During January/2018 CLEAN Cluster will organize a New Year reception/GBG partner meeting and present the content of the Homeplan initiative and the action plan for the 6 GBG cities, where both Homeplan and REFURB concept are included.
- During Q2/2018 ProjectZero and CLEAN Cluster plan to organize a joint REFURB concept workshop targeting the 15 municipalities and key local stakeholders. The workshop will inspire how the local PPP's shall be established and how learnings from the REFURB project can be used in both the Homeplan approach and in the Danish Energy Towns approach. The organization of this workshop is subject to the availability of external funding – either by Refurb project or by third party.
- The Danish Energy Town initiatives will during Q2/2018 start taking their initiatives to the next iteration level based on the REFURB concept and the lessons learned from Sonderborg. Creating and strengthening local PPP-structures and building a common platform will be part of this next step. The SmartEnCity Network (see Annex 1) will support further discussions among the 7 municipal network members.
- The Realdania Homeplan initiative will during the Q1/Q2-2018 develop the tools to be first tested in the 5 participating towns and later scaled up to another 5 Danish towns (GBG cities)
- During Q4/2018 it is the ambition, that the Danish Energy Agency with support from ProjectZero and Clean Cluster will facilitate a follow- up on the energy settlement combined with a second REFURB workshop allowing the municipalities to meet, discuss and exchange learning and define a new common actions/timeline for their own learning and the further scaling up to all 98 Danish municipalities. In this workshop, there will also be participants from the national stakeholders (rollout strategy step 2) and from the national government (step 3) allowing all parties to synchronize their initiatives into potentially one plan for Denmark. The organization of this workshop is subject to availability of external funding by third party.

Action plan and timeline for the roll-out of for the REFURB compelling offer

The below action plan for 2018-2019 is based on an aggregation of the various actions described in the three steps rollout strategy described above.

Table 8 Rollout action plan and timeline

| Action | Initiated by level | Responsible | Q1-2018 | Q2-2018 | Q3-2018 | Q4-2018 | Q1-2019 | Q2-2019 |
|--|----------------------|---|---------|---------|---------|---------|---------|---------|
| New Year's event and partner meeting - Combination of Homeplan and Refurb in 6 Green Business Growth cities | Local/Regional | CLEAN | x | | | | | |
| Inspiration and information about the Refurb findings and package solutions are uploaded on ProjectZero and CLEAN's GBG websites. | Regional | CLEAN GBG and ProjectZero | x | x | | | | |
| Joint Refurb workshop I | National | ProjectZero /CLEAN | | x | | | | |
| Local scaling of Refurb in 7 Danish Energy towns municipalities | Local | Involved municipalities , inspired by ProjectZero | | x | x | x | x | x |
| Homeplan – tool development and testing in 5 associated towns | National | Realdania and involved municipalities | x | x | x | X | | |
| New Danish Energy Law 2030 | National | | x | x | | | | |
| Joint Refurb workshop II | National/ Government | Supported by CLEAN/PZ | | | | X | | |
| Homeplan – testing in 5 GBG towns | Local/Regional | | | | | X | x | x |
| Common open platform for the Danish Energy Towns | National | Inspired by ProjectZero | | | | X | x | x |
| Homeplan – roll-out to a total of 30 municipalities | Local | Supported by Realdania | | | | | x | x |

4.5 IMPACT

The impact of the rollout is determined by means of defined CPI's for the Danish rollout. The target figures for the project lifetime (2015/2016-2018) are Sonderborg figures. The figures for beyond project lifetime is estimated figures for national scale up (Danish Energy towns and Homeplan/GBG).

| | project lifetime | | | | beyond project lifetime | | | annually beyond 2020 |
|--|------------------|----------------------|--|------------|-------------------------|-------------|-------------|----------------------|
| | 2015/2016 | 2017 | 2018 | cumul | 2019 | 2020 | cumul | |
| NUMBER OF RENOVATIONS | 18 | 240 | 500 | 758 | 1.000 | 1.500 | 3.258 | |
| DK-shallow renovation | 18 | 240 | 500 | 758 | 1.000 | 1.500 | 3.258 | |
| DK-deep renovations | | | | | | | | |
| EXPECTED SAVINGS AT RENOVATIONS | | | | | | | | |
| DK-shallow renovation | 40% | | | | | | | |
| DK-deep renovations | 80% | | | | | | | |
| AVERAGE DATA FOR HOUSES BETWEEN 1960-1974 | | | | | | | | |
| Area used for calculations [m2] | 145,1 | | | | | | | |
| Average energy consumption [kWh/year] | 19.792 | | | | | | | |
| EXPECTED COST OF RENOVATION, [€/year], CPI1 | | | | | | | | |
| DK-shallow renovation, pr house | 43.542 | | | | | | | |
| DK-deep renovations, pr house | 87.083 | | | | | | | |
| DK-shallow renovation, total | 783.749 | 10.449.986 | 21.770.804 | 33.004.539 | 43.541.608 | 65.312.412 | 141.858.559 | |
| DK-deep renovations, total | 1.567.498 | 20.899.972 | 43.541.608 | 66.009.078 | 87.083.216 | 130.624.824 | 283.717.118 | |
| EXPECTED RENEWABLE ENERGY PRODUCTION [kWh/year], CPI2 | | | | | | | | |
| DK-shallow renovation | 22.657 | 302.100 | 629.374 | 954.131 | 1.258.748 | 1.888.122 | 4.101.002 | |
| DK-deep renovations | 7.552 | 100.700 | 209.791 | 318.044 | 419.583 | 629.374 | 1.367.001 | |
| EXPECTED PRIMARY ENERGY SAVINGS [kWh/year], CPI3 | | | | | | | | |
| DK-shallow renovation (40% saving) | 142.500 | 1.899.997 | 3.958.328 | 6.000.825 | 7.916.656 | 11.874.984 | 25.792.465 | |
| DK-deep renovations (80% saving) | 285.000 | 3.799.995 | 7.916.656 | 12.001.650 | 15.833.312 | 23.749.968 | 51.584.930 | |
| EXPECTED REDUCTION OF GHG [TONS CO2 EQ./year], CPI4 | | | | | | | | |
| DK-shallow renovation | 11,73 | 156,45 | 325,93 | 494 | 651,86 | 977,79 | 2.124 | |
| DK-deep renovations | 7,87 | 104,95 | 218,64 | 331 | 437,28 | 655,92 | 1.425 | |
| Co2-emissions used for calculation | | | DK-share | | | | | |
| Electricity | 413 | g/kWh | 4% | | | | | |
| District heating | 0,119 | g/kWh | 50% | | | | | |
| Natural gas | 0,205 | g/kWh | 29% | | | | | |
| oil | 0,265 | g/kWh | 13% | | | | | |
| wood | | | 4% | | | | | |
| Average energy consumption in the Danish target group (detached houses 1961-1972) | | 136,4 kWh/m2 pr year | | | | | | |
| REFURB TARGETS - DK contribution (2015,2016,2017+0,25*2018) REFURB | | | DK - calculated | | | | | |
| CPI1 | | | 50,03 mio euro | | | | | |
| CPI2 | | | 0,64 GWh | | | | | |
| CPI3 | 9,07 GWh | | 9,10 GWh | | | | | |
| CPI4 | | | 417,14 tons CO2 | | | | | |
| EXPECTED COST OF RENOVATION, [€], CPI1 | | | | | | | | |
| | | | deep renovation unit cost (€) | | 87.083 | | | |
| | | | shallow renovation unit cost (€) | | 43.542 | | | |
| EXPECTED RENEWABLE ENERGY PRODUCTION [kWh/y], CPI2 | | | | | | | | |
| | | | deep renovation unit renewable energy production (kWh) | | 420 | | | |
| | | | shallow renovation unit renewable energy production (kW) | | 1259 | | | |
| EXPECTED PRIMARY ENERGY SAVINGS [kWh/y], CPI3 | | | | | | | | |
| | | | deep renovation unit primary energy savings (kWh/y) | | 15833 | | | |
| | | | shallow renovation unit primary energy savings (kWh/y) | | 7917 | | | |
| EXPECTED REDUCTION OF GHG [TONS CO2/y], CPI4 | | | | | | | | |
| | | | deep renovation unit GHG emission reduction (t CO2/y) | | 0,437 | | | |
| | | | shallow renovation unit GHG emission reduction (t CO2/y) | | 0,652 | | | |
| A shallow renovation could be: | | | | | | | | |
| New low-E windows | | | | | | | | |
| • Insulation around windows | | | | | | | | |
| • Roof insulation | | | | | | | | |
| • (Insulation below floors (not possible in all constructions) | | | | | | | | |
| • (solar cells) | | | | | | | | |
| • Automatic control of heating system | | | | | | | | |
| A deep renovation could be: | | | | | | | | |
| • New low-E windows | | | | | | | | |
| • New external insulation | | | | | | | | |
| • Roof insulation | | | | | | | | |
| • Focus on airtightness | | | | | | | | |
| • Mechanical ventilation with heat recovery | | | | | | | | |
| • (solar cells) | | | | | | | | |

Figure 15 (estimated) impact rollout Denmark (Jan 2018)

5. EU policy recommendations for rollout in Europe

Regardless of differences due to country-specific characteristics, each of the REFURB countries (NL, BE, DK, ES) has been able to write its own REFURB national rollout plan to ensure scale up of REFURB best practices. Mainly a bottom-up approach is applied; from local/ regional level to national level. REFURB best practices have been generated on local/ regional level and can now be scaled up as such. Existing and newly-formed networks/ alliances of frontrunner municipalities and cities can form a nation-wide platform to share and scale up these best practices. National policy needs to be (made) in accordance with and consistent with actions taking place on local and regional level to ensure effective rollout.

Mutual learning and sharing of REFURB best practices creates synergy. Market synergy attracts new stakeholders and market players, offering their innovative products and nZEB solutions. This will stimulate REFURB rollout on national and European scale.

Some EU policy recommendations were included in the Danish rollout strategy, which builds on the role of municipalities as ambitious initiators, coordinators and drivers for setting the local REFURB game plan and implementing the REFURB Customer Journey. Same thinking and mindset can be downscaled to local societies:

- *The REFURB recommendation is that EU and national legislation therefore need to address and recognize the important roles of municipalities, private-public partnerships and local societies to take further responsibility for implementing necessary actions along the REFURB Customer Journey.*

In the future energy system, where electrification and transition to renewables attracts much attention, it must never be forgotten to give energy efficiency in homes/buildings/houses the highest priority. This is already confirmed by the Trias Energetica¹⁹ principle, referenced to in the earlier REFURB Deliverable D4.4 Constituting the compelling offer.

In the EU memo about negotiations for an EU energy efficiency target for 2010 it is underlined, that achieving decarbonization by 2050 is cheaper in the long run with a 30% energy efficiency target in 2030 as the average annual system costs are € 9 billion lower as compared to a 27% energy efficiency target only. Energy efficiency contributes to the reduction of greenhouse gases and goes hand in hand with renewable energies to enable the energy transition²⁰.

- *In all legislation, EU needs to maximize its pressure on the EU27 countries to implement energy efficient measures (supporting EU's nZEB ambitions).*
- *EU shall also support supplementary carbon-reductions at household level by installing local energy production (wind, solar, heat pumps) either at household level or at local society level – supporting the EU's nZEB ambitions.*
- *EU regulations on use of obligatory use of EPC and an evaluation of the connection between sales price and EPC in all EU-countries, will trigger the market and raise the demand for more energy efficient single-family homes.*

¹⁹ <http://www.eurima.org/energy-efficiency-in-buildings/trias-energetica>

²⁰ https://ec.europa.eu/energy/sites/ener/files/documents/technical_memo_energyefficiency.pdf

- *EU binding targets in an EU-efficiency directive of 30% in 2030 and energy savings obligation per year from 1,0 to 1,5 % will press the local government to focus on both energy efficiency and renewable energies.*
- *EU-target for differentiated energy efficiency efforts, so that measures are directed towards those parts of the building stock, where the effect is greatest in a long-term perspective.*

Continued research studies (AAU/SBi, Kirsten Gram-Hansson 2011 etc.) regarding the rebound effect²¹ conclude that the behaviour of the people living in the homes is as important as the technical solutions, therefore the user practices shall be given stronger attention at any time, to secure that there is competence and attention built at household/family level.

- *EU continues supporting the engagement of involving kids/youth at school and during studies²² as important ways to strengthen the citizen/family energy awareness and competences.*

There are some recommendations to be made stemming from the Estonian experience with renovating multifamily residential buildings with owner occupied apartments of heterogeneous social composition:

1. According to our experience and a price level in Tartu renovation of this kind of houses without grants or subsidies is financially not feasible. What the impact of not renovating this type of houses will be has to be deliberated locally.
2. A large impacting element to feasibility of renovation is the price of district heating. In Tartu's case where district heating comes from cogeneration and is fed 90% by renewables the price for heating has been stable or slightly lowered during past few years. If the price for heating was significantly higher than the payback time would be shorter and arguments for renovation would be stronger.
3. When rapidly scaling up deep renovation there is a danger of running into shortage of skilled labour. Training of different building skills should be intensified prior to massive renovation of existing buildings. Especially this concerns HVAC specialities. The institution of the technical advisor is of the utmost importance. Especially in situations where houses are managed by persons with non-technical backgrounds or even by a committee. Independent technical consultant constitutes a single point of contact or a "one-stop-shop" for the dwellers of a house to be renovated. Thus, the technical consultant needs to master also social skills apart from self-explanatory technical knowledge.

²¹ http://vbn.aau.dk/files/56121142/WREC_Households_energy_use_0435EEE.pdf

²² EU North Sea Interreg 2IMPRESZ project

ANNEX 1 –

TARGETED DANISH NETWORK OF TOWNS FOR REFURB 2.0 SCALING

Table 9 Targeted Danish network of town for upscale REFURB

| Targeted Danish towns Refurb 2.0 early adaptation | Danish Energy towns (Energibyerne) | Homeplan towns (Boligplan-byerne) | Homeplan2 GBG (Boligplan Grøn Erhvervsvekst) | BetterHousing towns (BedreBolig testbyerne) |
|--|---------------------------------------|--------------------------------------|---|--|
| Frederikshavn | x | | | |
| Skive | x | | | |
| Ringkjøbing-Skjern | x | | | |
| Bornholm | | | | x |
| Esbjerg | | | | x |
| Horsens | x | | | |
| Skanderborg | | | | x |
| Sønderborg | x | | | |
| Odense | | | x | x |
| Høje-Tåstrup | x | x | | x |
| Middelfart | x | x | x | |
| Fredensborg | | x | | x |
| Fredericia | | x | | |
| Roskilde | | x | | |
| Faaborg-Midtfyn | | | x | |
| Nordfyn | | | x | |
| Billund | | | x | |
| Kolding | | | x | |
| Morsø | | | | x |
| Skanderborg | | | | x |
| Næstved | | | | x |
| #of towns | 7 | 5 | 6 | 9 |

Danish Energy towns

The Danish Energy towns consist of 7 Danish towns considering a stronger network cooperation as part of the EU H2020 SmartEnCity project. The towns all have a strong local political support for their transition toward a ZEROcarbon society; the towns are all members of the SmartEnCity Network and have agreed to share their best practice experience and in cooperation improve the national political conditions for local climate transition projects. The Refurb experience already gained in Sønderborg is a good bridge for scaling it to the additional 6 network members.

Homeplan towns

The Homeplan towns consist of 5 Danish towns, who have committed themselves to participate in the newly launched Realdania Homeplan initiative. The participating towns: Middelfart, Høje-Taastrup, Fredensborg, Fredericia and Roskilde will test a new tool based on BigData Building registrations to identify the potential and the most “interesting” and valuable homeowners for retrofitting their homes by energy retrofit, shift of heat-source, get rid of their old oil-burners etc. The Municipalities, using the tool, will first screen the potentials and second inform the homeowners about their opportunities based on a personalized, digital

energy advice/investment case.²³ The energy advice/support will be based on information from the National Energy Agency's information center "Save Energy".

The municipality of Middelfart is the leading municipal partner in the Homeplan-project and also a member of the steering committee for GBG Green Business Growth.

Homeplan2/GBG towns

The scaling of the Homeplan project is already agreed to take place based on a cooperation with 6 GBG Green Business Growth municipalities (Odense, Middelfart, Nordfyn, Faaborg-Midtfyn, Kolding and Billund). Realdania is also supervising this scaling and Realdania has shown interest in integrating the learnings from REFURB.

Middelfart Municipality plays an important role in transferring the learnings from Homeplan to Homeplan2/BGB, as they will participate in both projects. Middelfart Municipality is also a participant in the Danish Energy Towns project.

BetterHousing towns

The 9 BetterHousing towns were the basis for the BetterHousing launch in 2014. The towns have all been involved in promoting the launch of the BetterHousing advising concept, related capacity-building and local coordination/discussions with local stakeholders. It is assumed that the build capacity will be valuable for adding the 9 towns to the Refurb scaling ambition.

²³ <http://www.renoveringpaadagsordenen.dk/energipolitik/nyt-vaerktoej-skal-understoette-kommunernes-renoveringsindsats/>

ANNEX 2 – THE CUSTOMER JOURNEY AND ITS ASSOCIATED ROLES AND RESPONSIBILITIES

The customer journey is illustrated below as a circular model, where the initial four (consideration) steps will lead the homeowner to decide and implement during step 5 -9 (act) and to reflect by sharing experiences and wanting more in step 10-11, which will positively fuel a new iteration starting in step 4.



Figure 16 The REFURB customer journey and its 11 steps

The 11 steps can be extracted into the following CJ-phases A, B and C - based on the shift of driver and stakeholders:

Table 10 Relation between customer journey and stakeholders in rollout strategy Denmark

| CJ-phase | A | B | C |
|-------------------------------------|---|--|--|
| CJ-steps associated | Step 1-2-3-4 | Step 5-6-7-8-9 | Step 10-11 |
| Homeowners role | Consideration | Act | Sharing and wanting more |
| Key local and national stakeholders | Public/non-profit bodies: Municipality, Public Private Partnerships NGOs, homeowner platforms, Save Energy information | Commercial and market driven stakeholders: Local craftsmen, banks, real-estate agents, building and energy suppliers, training institutions, Building Consortium | Public/non-profit bodies: Municipality, Universities, Research institutions, NGO´s |

| | | | |
|---|--|---------------------------------------|---|
| Stakeholders drive and interests | Public obligation to inform, motivate and drive the green transition and create green growth | Commercial and market driven interest | Public obligation to evaluate and share results of the green transition |
|---|--|---------------------------------------|---|