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(NeZeR)**

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Roadmap for NZEBR and RES in Sweden

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1 SUMMARY

The NeZeR project promotes the implementation and smart integration of Nearly Zero Energy Building Renovation (NZEBR) measures and the deployment of Renewable Energy Sources (RES) in the European renovation market. The scope of NeZeR is in urban residential houses and dwellings and the aim of the project is to make NZEBR the prevailing means for refurbishment.

This report comprises the outcome of work package 5 (Impact through national clusters). The roadmap has been drawn, on a national level, from the perspective of different stakeholders, previously identified in WP. The roadmaps also take into account the technical, functional, and economic aspects, addressed within WP2 (Criteria for NZEBR technologies and solutions) and WP3 (Feasibility of NZEBR over traditional renovation).

Generally, a roadmap can be described as a strategic plan that describes the steps needed to achieve stated outcomes and goals. In this project it includes tasks and priorities for action and suggestion of metrics that allow the tracking of the progress towards the final goals. The tracking process will occur after finalizing the NeZeR-project.

The roadmap has been created in close cooperation with the national NeZeR clusters. One national cluster workshop was organized specifically to provide input to the development of the roadmaps for the different stakeholder groups. After the workshop all data was gathered and some additional interviews were carried out to complete the survey.

The results have been summarised in a matrix for each country where gaps and barriers, suggestions of actions, resulting impact and indicators have been proposed for various stakeholders,

Important stakeholders in Sweden are;

- National Government
- State Agency
- Municipal Government
- Architects, designers, consultants and planners
- Public Housing Companies
- Contractors
- Tenants

The most urgent actions to promote NEZBR in Sweden are;

- Financial grant to reduce rent for tenants after deep renovations. Action has been made by the government and authorities and it is now up the building owners to apply for the grant and to keep up the pace of the renovations. The same goes for the lowered tax on solar energy.
- The other important action is to create a national or regional information centre which will provide independent, holistic and reliable information for those planning for future energy saving measures. This action should be initiated by the government or local authority and -possible be managed by a municipal department, such as Boverket (National Board of Housing, Building and Planning) or Energimyndigheten (National Board of Energy Authority).

2 INTRODUCTION

The NeZeR project promotes the implementation and smart integration of Nearly Zero Energy Building Renovation (NZEBR) measures and the deployment of Renewable Energy Sources (RES) in the European renovation market. The scope of NeZeR is in urban residential houses and dwellings. The specific types of residential houses are selected in each of the five partnering countries in order to choose the most important national house types.

The aim of the project is to make NZEBR the prevailing means for refurbishment and to improve the performance of the existing residential building stock, decrease the energy use of the building stock, achieve significant emission reductions of the building sector, and decrease the non-renewable energy dependency of Europe.

In order to facilitate the implementation of NZEBR and uptake of RES, roadmaps for NZEBR and RES have been created. The focus countries are Finland, Romania, Spain, Sweden, and The Netherlands. This report presents the roadmap for Sweden.

The roadmaps include general descriptions of how to achieve mainstream NZEBR and utilization of RES from the perspectives of different stakeholder groups, e.g. city authorities, property owners and housing associations, construction sector (architects, developers, component producers) and the user perspective. However, it has been up to each country to select the most important stakeholders from their respective conditions.

2.1 Purpose of the roadmap

The purpose of the roadmap is to complement the action plans developed in the NeZeR WP4 by concretizing actions that various stakeholders need to take to make NZEBR the prevailing means for refurbishment. The roadmap may contribute to achieving the EU targets for existing buildings, mainstreaming NZEBR in the NeZeR countries and enable implementation of the action plan by guiding the stakeholders.

2.2 Methodology

Generally, a roadmap can be described as a strategic plan that describes the steps needed to achieve stated outcomes and goals. In this project it includes tasks and priorities for action and suggestion of metrics that allow the tracking of the progress towards the final goals. The tracking process will occur after finalizing the NeZeR-project.

The roadmap development process has been divided into four phases:

- Planning and preparation
- Development of a roadmap document
- Review and consultation with key stakeholders
- Refining and launch of the roadmap

The roadmap has been created in close cooperation with the national NeZeR clusters. One national cluster workshop was organized specifically to provide input to the development of the roadmaps for the different stakeholder groups. After the workshop all data was gathered and some additional interviews were carried out to reach other stakeholders and to confirm the outcome.

During the workshop it was important to give the stakeholders the right conditions, rather than steering them. The stakeholders are the actors on the NZEBR market. Nevertheless, to get a roadmap that is as concrete as possible the stakeholders were asked to also include policy instruments for example legislation, incentives and information.

The results have been summarised in a matrix for each country where gaps and barriers, suggestions of actions, resulting impact and indicators have been proposed for various stakeholders, see 1.

	GAPS AND BARRIERS	ACTION ITEMS	IMPACT	INDICATOR
National Government				
State Agency				
Municipal Government				
Architects, Designers, Consultants and Planners				
Public Housing Companies				
Contractors				
Tenants				

Figure 1 Example of roadmap matrix.

2.3 Scope and boundaries (and connection to other NeZeR WPs)

The roadmap has been drawn, on a national level, from the perspective of different stakeholders, previously identified in WP5 of the NeZeR project (Impact through national clusters). The roadmaps also take into account the technical, functional, and economic aspects, addressed within WP2 (Criteria for NZEBR technologies and solutions) and WP3 (Feasibility of NZEBR over traditional renovation).

Results from WP2 and WP3 on technical and non-technical aspects have been kept in mind during the development of the roadmap. The roadmap provides recommendations on future actions for different stakeholders with special attention on the challenges and non-technological barriers for NZEBR and RES identified for different stakeholder groups.

The roadmap differs from the city action plans (WP4) in the sense that they focus on the stakeholder perspective including the individual perspectives of different stakeholders. The Action plans in WP4 were developed for the cities and the roadmaps, on the other hand, have been created on the national level and for different stakeholders. However, the action plans have been used as input for creating the roadmaps.

2.4 Identified stakeholders

The most important stakeholders to include in the roadmap development were identified based on the stakeholder analysis performed in task 5.1 of the NeZeR project. The following were identified as the most important stakeholders in Sweden:

- National Government
- State Agency
- Municipal Government
- Architects, designers, consultants and planners
- Public Housing Companies
- Contractors
- Tenants

However, the whole NeZeR cluster was invited to the roadmap workshop, so input was also received from other stakeholders, e.g. R&D organisations, centres for energy efficiency improvement and sustainable building as well as purchasing organisations. The stakeholders and experts of the national clusters were thus involved in the process.

3 BASELINE

3.1 Current situation, building stock, energy use

Below is a description of the baseline situation for multifamily buildings in EU and Sweden.

User needs and market barriers on the European renovation market

Directive 2010/31/EU (called EPBD) on the energy performance of buildings states that existing buildings undergoing major renovation shall fulfil minimum energy requirements. Renewable energy production shall be included if this is technically, functionally and economically feasible. The EPBD has resulted in the development of national building codes, norms for calculation of the energy performance of buildings and energy certification of buildings. Thanks to the EPBD requirements, all EU Member States have calculated the cost-optimal energy performance requirements for new as well as renovated buildings in 2013. In addition to the EPBD, the Energy Efficiency Directive (Directive 2012/27/EU, EED) from 2012 includes requirements on energy efficiency improvement of national government buildings and mandates EU countries to establish National Energy Efficiency Action Plans (NEEAPs) to implement a long-term renovation strategy for the building stock.

However, major renovations aiming for nearly zero energy performance have not yet had a market break through.

The initiators and planners of the energy upgrade face several barriers of different categories. The economic barriers include low energy prices (to change behaviour) and the lack of cost effective products. Tenants' and building owners' lack of knowledge regarding energy use and energy efficiency improvement form a knowledge barrier. Priority to comfort and high indoor temperatures and priority to personal gains over responsibility for the environment are examples of individual and cultural barriers. Structural barriers relate to the lack of feedback on energy use, the lack of services for energy efficiency as well as organizational barriers related to the decision making processes in housing cooperatives. Political barriers include insufficient coordination of initiatives, incentives and regulations.

Energy efficient renovation measures have been investigated in several research projects in the participating countries (Finland, the Netherlands, Spain, Romania and Sweden). In spite of the ambitious and relevant research results, the gathered information is still scattered in various reports and weakly disseminated among practitioners, building professionals and decision-making stakeholders. The decision makers need knowledge on the gains of energy efficiency improvement. This is valid both for private and professional decision makers. Knowledge today is often only accessible for specialists and is not communicated towards the public.

Current situation in Sweden

The total building stock in Sweden was 4.46 million dwellings in 2014 (national statistics). Of these, approximately 44 % were one- or two-dwelling buildings with an average consumption of 106 kWh/m² and 56 % were multifamily buildings with an average consumption of 134 kWh/m². Swedish authorities have identified a large potential for energy efficiency improvement measures within the Swedish residential sector, but according to the 1st strategy for energy efficient renovation of buildings in 2013 (according to the National Board of Housing, Building and Planning), the uptake of this potential depends on which support mechanisms are established. Investigations related to the 2nd strategy (National Board of

Housing, Building and Planning) from 2016 conclude that the profitability is the largest obstacle for renovation of multifamily dwellings.

During 1965-1975 approximately 1 000 000 dwellings were built in Sweden, within an ambitious housing program called the "Million Program". The aim was to provide affordable housing for a million households. Today approximately 830 000 of these multi-dwelling buildings still exist and a majority of these require deep renovation. The Swedish Energy Agency has identified buildings constructed within the "Million Program" as a prioritised type of building for deep renovation. The Swedish Energy Agency has financed demonstration programs to facilitate energy efficient renovation of the "Million Program" buildings. These consist mainly of prefabricated elements in concrete and are poorly insulated. Studies show that the energy consumption in these buildings is nearly 40% higher than in new buildings. The dominant renovation needs are mostly maintenance work on facades and roofs as well as renovation of the ventilation system. These structural elements have a direct impact on energy consumption and can provide direct benefits in terms of energy performance. In addition to these direct energy impact actions there is also a great need for the renovation of elevators and sewage strains.

3.2 Policies and incentives

Relevant fiscal incentives have been identified in WP3 of the NeZeR project. A separate report can be downloaded from the NeZeR website (www.nezer-project.eu). Below is a short summary of the fiscal incentives in Sweden.

Sweden has a range of different national energy policy instruments, administrative (energy performance certificates), economic (support to municipalities and county councils) as well as informational instruments (municipal energy and climate advisory services), that affect energy use and greenhouse gas emissions. However, there only exist a few financial incentives that promote near-zero energy renovation and RES in public buildings.

The Swedish Energy Agency initiated the so-called LÅGAN-program (low energy use in buildings), with a budget of €2.3 million over five years to promote NZEB on the occasion of new construction and renovation. LÅGAN also aims to highlight a national market for buildings with low energy consumption and to contribute to a broad range of national suppliers of products and services, and ensure clients of such. Project support is provided to achieve 50% energy consumption reduction in both the new and retrofit sectors and to show high demonstrative value. However, due to current legislations there are limits to how much solar electricity a property owner (business and individuals) can self-produce before they are forced to pay energy tax. Thus, current legislation hinders a large number of businesses and individuals from using the solar panels efficiently. Taxation on solar cells has reduced the demand for RES completely.

To turn this development around the government intends to propose a reduction of the normal tax rate (currently 29.2 cents / kWh) to 0.5 cents / kWh by deduction in excise declaration. That is a reduction of over 98%. The reduction would mean both that the very large majority of solar energy producers be completely tax free and even more producers of solar electricity for its own use tax reduction to 0.5 cents / kWh. The measure is covered by the General Block Exemption Regulation in the EU state aid rules. The reduction will be made at the end of June 2017.

There used to be a grant for energy efficiency improvement of public buildings (2005-2008), called OFF-ROT. Support was given to investments in energy efficiency improvement and conversion to renewable energy sources in premises used for public activities. Both private and public property owners could apply for this support. However, in order to be granted aid,

investments had to be made in facilities used for public activities, such as education, health, sports, etc.

Recently a governmental rent grant was introduced in Sweden (October 2016). The Beneficial's are the tenants of the "Million Program" buildings undergoing deep renovation in economically disadvantaged areas. The grant is applied for by the property owner and can be as much as 20% of the cost for the renovation and is paid out to the tenants during a 7 years period. Requirements to apply for the grant is that the building has an energy demand of >130 kWh/m² (Atemp) and that the energy saving after renovation will be at least 20%. Maximum level of grant is 1000 SEK/m² (Atemp). It is too early to say how this will affect the near-zero-energy renovations in the long term.

It is difficult to obtain profitability in renovation to NZEBR level for multifamily buildings, e.g. from the post war era. The technology to reduce the energy consumption exists but in order to reach a very low level of energy consumption comprehensive measures are required. There is a lack of financial incentives to justify NZEBR renovations. The energy efficiency improvement measures conducted in a post-war buildings give a reduction in energy use of 40-50%, thus these are cost-effective measures. However, in order to reach NZEBR level much more is required, but the additional investments needed to reach this level are not profitable, i.e. to achieve a NZEBR level the costs are higher than what is achieved in terms of reduced operating costs. As the LCC calculations (see NeZeR report D3.2) have shown, the high initial cost associated with NZEBR renovation overshadow the achievable energy efficiency renovation benefits and fiscal incentives would be needed in order to increase the proportion of NZEBR buildings in Sweden.

4 ROADMAP

Currently, there is a strong support to promote NZEB renovations around Europe. However, there are still numerous causes of different origin that make it difficult to reach this target.

Economic aspects as well as the decision making process play a relevant role when undertaking NZEB renovations.

For multifamily buildings in private or mixed (private and social housing) ownership, the decision-making process and the financing of investments are major bottlenecks. The higher the upfront investment the more difficult is the intervention. Energy efficiency improvement measures are related to long term planning and the ownership turnover cycles are often shorter than the payback period for the measures.

Additionally, in the case of Sweden for instance, energy efficiency improvement measures do not allow the landlord to raise the rents unless the measures improve the apartments' standard which means that these types of renovations cannot be funded by increased rent. However, recently a governmental rent grant was introduced in Sweden (October 2016). The beneficial's are the tenants of the "Million Program" buildings undergoing deep renovation house in economically disadvantaged areas.

With respect to technical aspects, it is still very difficult to obtain profitability in renovation to NZEB level of very old multifamily buildings, e.g. buildings from the post war era. The post war buildings often demand extensive measures and are not easily converted to buildings with low energy consumption.

In general, the technology to reduce the energy consumption exists but comprehensive measures are required to reach a very low level of energy consumption. Furthermore, sometimes measures can also be hindered due to some restrictions, as the protection of cultural heritage.

Finally, another barrier to reach NZEBs is related to social aspects. Despite the implementation of advanced technologies, e.g. heating solutions, there is still an evident lack of knowledge related to its use and there are inappropriate behavioural habits that are difficult to change.

Overall gaps and barriers for NZEBR have been identified in D2.3. Through workshops with the Swedish cluster and additional interviews the following roadmap has been found for Sweden.

4.1 National Government

Gaps and Barriers: The foremost barrier in regard of government is that politicians are selected for 4 years. This creates a risk of non-conformity which makes it difficult to have the long-term perspective with stable regulations needed for substantial energy efficiency improvement of buildings. One example of this is the tax reduction on solar energy which has been removed and now is coming back (2017) during the same election period. This kind of change causes insecurity and thus barriers for investment in renewable energy for buildings.

Action Items: Make long-term policies and adapt regulations that stimulate awareness of NZEBR. And even more important, keep the regulations over a long period.

Impact: The impact will be that all stakeholders know what to expect and act upon, which will stimulate them to work with long-term plans.

Indicator: Lower energy demand and higher awareness on national level.

4.2 State Agency

Gaps and Barriers: Most stakeholders have stated that NZEBR is not profitable today. For example current financial models do not allow property owners to accumulate capital to finance deep renovations. Property owners must therefore renovate little at a time and cannot make the larger measures necessary for deep cuts in energy demand. In addition, property owners and consumers lack easy entry to get comprehensive and independent information about energy efficiency improvement.

Action Items: Create incentives to more cost efficient energy efficiency improvement of buildings, e.g. by establishing grants. Make changes in building regulations and energy declarations (e.g. push for more renewable energy). Create a national information centre that provides comprehensive and independent information. Investigate the possibility to have green loans and green valuation of properties with regard to energy performance.

Impact: With financial grants, NZEBR will become more profitable. It will also stimulate long-term management plans among property owners. A green valuation of properties with regard to energy performance would very much set focus on deep renovations and would promote NZEBR.

Indicator: More governmental granted financial aid applications, which mean more NEBR. Buildings are being valued with regard to energy demand and these figures are being used in calculations and financial reports.

4.3 Municipal Government

Gaps and Barriers: For municipal decision makers there are other requirements that are prioritized and thereby more important than energy efficiency improvement. Today more investments are made in new construction rather than renovation. Additionally, one-year-budgets make it difficult to conduct long term measures and thereby create limited possibilities to influence the outcome. Each municipal department have their own budgets and goals, which means that it is hard to get an overall view on energy efficiency improvement.

Action Items: Increased cooperation between stakeholders and between different municipality departments. Create calculation models based on all sustainability factors (economy, environment and social) that can be used cross-functional for all departments.

Impact: NZEBR becomes more profitable when measured in other values than monetary values. For example deep renovations don't only improve the energy demand of the building but also improves the indoor air quality for the tenants. Cooperation between different departments with the aim to achieve NZEBR and RES increases. Projects calculated on the all sustainability factors increase.

Indicator: Lower municipal energy demand. More satisfied citizens.

4.4 Architects, Designers and Consultants

Gaps and Barriers: There is a lack of knowledge among this stakeholder group; NZEBR is seen as complicated and uncertain. With no one responsible for the holistic view, the solutions that are carried out do not always turn out to be as energy saving as planned. The lack of a common definition of NZEBR and EU directives regarding renovations also create barriers. Some of the respondents in this stakeholder group also pointed out that the supervision of the compliance to the existing regulations is not always fulfilling and sufficient.

Action Items: Create harmonised calculation methods. Engage housing cooperatives and help them with renovations (e.g. a coordinator takes full responsibility of renovations or checklists). More informative efforts; technology is developing rapidly and many installers have not coped with the development and still believe that it is not profitable. Add resources (at Municipal level) for supervision or move supervision to regional / national level. Develop new business models, packages etc.

Impact: With harmonised calculation methods and a more holistic view, the end result will be better, showing that NZEBR can be profitable. This will lead to more NZEBR being built. Also, more buildings planned and designed as NZEBR will also be built as NZEBR in practice.

Indicator: More good practice examples. More NZEBR are being built.

4.5 Larger Property Owners

Gaps and Barriers: The same lack of knowledge and holistic view that was found among the Architects, Designers and Consultants was also found for the stakeholder group “large property owners”. Profitability (Payback, Net Present Value, Life Cycle Cost) is calculated in different ways which creates uncertainty.

This stakeholder group also pointed out the problem to raise the rents for energy efficiency improvement, which is necessary to get profitability. Taxation on solar cells has reduced the demand for RES completely¹. One stakeholder claimed that it is today profitable to reduce energy consumption by approximately 20-30%, but beyond that it becomes too expensive.

Action Items: Increased knowledge and harmonised calculation methods. Financial aid such as grants to cover part of the renovation cost². New business models for municipalities that allow property owners to accumulate capital over more than one year in order to finance deep renovations. Need of regulation that pushes towards renovations according to new production levels.

Impact: The stakeholders in this group are very positive to the financial grant that was introduced in October 2016. All the respondents were going to apply for the grant, some of them to start up renovations that were not planned without the grant. Other chooses to continue with their planned renovations but added more measures to lower the energy consumption even more. NZEBR becomes more profitable. If renovations are subsidized more NZEBR, among both public housing and private property owners, will be achieved. More long-term renovations will also push for more NZEBR.

¹ [This barrier was identified during the roadmap development. However, the government recently declared that the tax will be reduced substantially from June 2017 for large solar PVs.](#)

² [This barrier was identified during the roadmap development. However, the government recently declared that a new grant will be introduced for deep renovation in specific socially vulnerable areas. See section 3.2.](#)

Indicator: More NZEBR carried out. Lower energy demand. More satisfied tenants since they get better indoor climate and also have the financial means to stay even if rent is raised.

4.6 Contractors

Gaps and Barriers: The fact that the property owner cannot raise rents for energy efficiency improvement measures is a large barrier. It is more profitable to build new buildings than to renovate. Also, deep renovation often requires evacuation of the residents during the renovation, which is problematic. There is huge need for both new buildings and renovation of existing building. However, recently the interest from the customers has shifted from energy performance to social sustainability issues.

Action Items: New business models. Educate the contractors and spread the information about good practice examples.

Impact: A more holistic view on building economy.

Indicator: More good practice examples. More NZEBR are being built

4.7 Tenants

Gaps and Barriers: Tenants are not a homogenous group. Some of the tenants live in their apartments only because they cannot afford another home. This group cannot accept a higher rent for any reason and are generally not interested in environmental issues. Another common group among the tenants are young people (e.g. students). This group on the other hand are often very interested in environmental issues and are more willing find new solutions (e.g. voluntary work). However, none of these groups want to pay for energy savings that end up in the property owner's pockets. Another barrier is that property owners want quick payback time on their investments.

Action Items: New, mutual financial incentives. One stakeholder suggested a cost-sharing model of a third each for the tenant, the property owner and the future energy savings. Start up a dialogue with tenant and municipality at an early stage, since people care about their living environment. Long term calculations and investment plans among property owners.

Impact: New models for cooperation tenants, municipal and property owners will lead to new ways to finance more NZEBR.

Indicator: More satisfied tenants and citizens, more NZEBR being built.

4.8 Priorities and timelines

The most important actions to achieve the goals should be prioritized and listed. The actions should, if possible, be put in a time frame.

This will be gathered at the final national cluster workshops in January 2017.

5 ROADMAP IMPLEMENTATION, MONITORING AND REVISION

The third phase is to launch the roadmap. It can be launched in different ways, for example by press release(s) and/or selective electronic distribution of the roadmap. The final version of the roadmap should contain a set of priorities such as policy advances, technology demonstrations; regulatory changes etc. In order to achieve the goals of the roadmap, it is important to produce a plan for implementation of these activities after the finalisation of the NeZeR project.

The roadmap should be a living document and it can be useful, after the implementation of the roadmap, to conduct expert workshop(s) to reassess priorities and timelines as progress and new trends emerge. Therefore it might be required to update the roadmap. For example it is important to track changes in energy factors as roadmaps are implemented.

This will be further described after the final national cluster workshop.

6 CONCLUSIONS

The conclusions of the roadmap for Sweden very much confirm what was stated in the baseline. What was hypothetically stated thus has been empirically confirmed.

RoadMap Sweden

	GAPS AND BARRIERS	ACTION ITEMS	IMPACT	INDICATOR
National Government	Lack of continuity due to 4 yrs cycle	Make policies, adapt regulations, stimulate awareness	Long term perspective, stimulate all stakeholders	Energy demand and employment
State Agency	No comprehensive and independent information. Financial model.	National information center. Financial grant. Green loans.	Long-term renovation plans. Well informed building owners.	More NZEBR. Valuation of properties with regard to energy demand.
Municipal Government	Financial model. Other requirements outcompete NZEBR.	Increased cooperation between departments. Green loans.	NZEBR more profitable, more NZEBR in practice.	Municipal energy demand, satisfied tenants.
Architects, Designers, Consultants and Planners	Lack of holistic view and responsibility. No def of NZEBR. Poor supervision.	Harmonized calculations. Define NZEBR. Add resources for supervision.	Better end results, more NZEBR in practice.	More good examples, more NZEBR being built.
Public Housing Companies	Financial model, not raise rents. Evacuation of tenants. Tax on RES.	Financial grant. Lower tax on RES.	Better end results, more NZEBR in practice.	More NZEBR. Satisfied tenants.
Contractors	Financial model, not raise rents. Tax on RES. Education, holistic view.	New business models. Financial grant. Lower tax on RES	Holistic view of building economy	More good examples, more NZEBR being built.
Tenants	Not interested in financing savings for property owners.	Mutual financial incentives. Dialogue. Longterm investments.	New models for cooperation. More NZEBR.	Satisfied tenants and citizens. More NZEBR,

Figure 2, Swedish roadmap matrix

It remains to be very difficult to obtain profitability in renovation to NZEBR level for multifamily buildings from the post war era. The technology to reduce the energy consumption exists but in order to reach a very low level of energy consumption there is a need for e.g. increased knowledge, better policy instruments, financial incentives, harmonised calculation methods and comprehensive measures. The post-war buildings often demand extensive measures and the retrofitting is very expensive to convert into buildings with low energy consumption.

Among all stakeholders financial matters have been raised as a large barrier. Some stated that with today’s calculation method and financial model, energy saving beyond 20-30% is rarely profitable. The same problem is identified by Höglund (2015); there are no financial incentives to justify NZEB renovations.

The financial model where property owners are not allowed to accumulate capital over time, or raise the rent, contradicts NZEBR since it most often equals deep renovations with evacuation of tenants. In addition, energy efficiency measures do not allow the landlord to raise the rents unless the measures improve the apartment’s standard, which means that these types of renovations cannot be funded by increased rents. The new financial grant that was

introduced in Sweden in October 2016 however opens up some more possibilities. The interviewed stakeholders were positive to the new grant. Many of them will apply for the grant and they also stated that this financial aid enables more NZEBRs and more extensive renovations. However, the Energy Efficiency Companies doesn't believe that the grant will have a large impact on the rate of NZEBR. They rather promote more education and information.

Regarding investments in solar electricity for buildings, there used to be limits to how much solar electricity a property owner (business and individuals) could self-produce before they were forced to pay energy tax. That legislation resulted in substantially decreased investments. However, very recently, the government declared that the tax will be reduced dramatically, which will probably result in increased investments.

A quite surprising knowledge gap was found between the tenants and the other stakeholders. Opposite from what most stakeholders believed young tenants (mostly students) are very interested in environmental issues and want to have the possibility to influence their living environment. If given the right incentives and information at an early stage this group of tenants are willing to find new business models for NZEBR where they co-found the renovation. The authorities and property owners that were interviewed stated that all tenants have little interest in energy savings, which is probably still true for socially vulnerable tenants. However, the stakeholder group "tenants" is not a homogenous group, one building can hold tenants with very different conditions and objectives, which may also be a barrier for NZEBR.

The need for comprehensive and independent information is also an obstacle for many stakeholders. Both tenants, property owners, decision makers, consultants and installers get fragmented information from suppliers and other interest groups, but no one gives "the whole picture" with a holistic view. Several stakeholders talked about the need for comprehensive and independent information for example via a national or regional centre. Furthermore, there is no clear definition of NZEBR and calculation methods are not harmonized which makes it hard to comprehend information.

Currently too few buildings are being built in Sweden which also seem to be an obstacle and among society focus has shifted a bit from environmental sustainability towards social sustainability.

To summarize the most urgent actions to promote NEZBR in Sweden are;

- Financial grant to reduce rent for tenants after deep renovations. Action has been made by the government and authorities and it is now up the building owners to apply for the grant and to keep up the pace of the renovations. The same goes for the lowered tax on solar energy.
- The other important action is to create a national or regional information centre which will provide independent, holistic and reliable information for those planning for future energy saving measures. This action should be initiated by the government or local authority and possible be managed by a municipal department, such as Boverket (National Board of Housing, Building and Planning) or Energimyndigheten (National Board of Energy Authority).

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8 APPENDICES
