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Proposal of relevant fiscal incentives and other control instruments for supporting NZEBR

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1 INTRODUCTION

The IEE 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.

A great variety of economic instruments are available throughout Europe to support the improved energy performance of buildings. It is therefore a challenge for a member state to choose the appropriate financial support methods for accelerating the NZEBR process according to the targets of Directive 2012/27/EU. Fiscal incentives are one way to facilitate NZEBR and utilization of RES. In order to achieve the NZEBR potential in partner cities there is a need to study existing possibilities for supporting NZEBR implementation, such as fiscal incentives and/or other specific financial tools. These existing possibilities could lead to a continuous development of NZEBR process with acceptable costs for building owners.

The purpose of this document is to show the current situation of country-specific economic incentives that could support NZEBR and deployment of RES, define main barriers and propose new incentives. The earlier NeZeR-report “Report on technical and social feasibility studies” and presentations and discussions from national NeZeR cluster workshops regarding fiscal incentives were used as the background for this report.

2 FINLAND

2.1 Available fiscal incentives for different target groups

Environmental loans for private owners

The Nordic Investment Bank (NIB), which is the common international financial institution of the eight Nordic and Baltic countries, provides long-term financing to the energy, environmental, transport, logistics, communications and innovation sectors for projects that strengthen competitiveness and enhance the environment. (Mahapatra et. al., 2011). In Finland, these loans have been channelled to private house owners through the Mortgage Society of Finland, HYPO, since 2010. The environmental loans for individual households are mainly granted for improving the windows or insulation of the building or for installing ground-source heat pumps. Individual house owners form a larger group of the customers but moneywise the share of loans received by housing companies is higher.

Domestic reductions for renovation measures

In Finland work performed at home or at a vacation residence can receive domestic reduction (reduced from taxes) up to 2400€ per person (in year 2015). These measures are improvement works of the house of the vacation residence, such as installation of heat pumps and it is meant only for refurbishment, not new construction. The domestic reduction can be 45% of the performed work if it is done by a company, and 15% if it is carried out by an individual contractor. (vero.fi). Rönty & Paiho (2012) suggest that increasing the domestic reduction could be one way to motivate initiation of energy-efficiency improvement measures.

Subsidies provided by the Housing Finance and Development Centre of Finland (ARA)

The Housing Finance and Development Centre of Finland (ARA) belongs under the Ministry of Environment and is responsible for implementation of the housing policy of the state. Among other things, ARA promotes ecologically sustainable, high-quality and affordable living and provides subsidies, support and guarantees for living and construction. (ARA, 2015)

› *For detached, semi-detached and row houses:*

The discretionary energy subsidy provided by ARA is meant for improving energy economy and decreasing carbon footprint of residential buildings (detached houses or max. two apartments) or for adopting renewable energy systems. There is an income limit for the subsidy. The subsidy can reach 25% of the investment costs. The subsidies are directed to house owners through municipalities.

The energy subsidy can be used to cover costs of the following measures:

- Implementation of a ground source heat pump or an air-water heat pump
- Implementation of a wood based heating system
- Implementation of a compound heating system using renewable energy.
- Improving the external insulation or the windows of the building. (ARA, 2015)

› *For multi-family buildings:*

Since 1.1.2015 the state guarantees loans for modernization projects of apartment buildings owned by housing associations. Until year 2015 this subsidy was provided in the form of interest subsidy loans for modernization projects. The subsidy is mainly meant for pipe renovations and improvements of the exterior and energy performance of the building. The guaranteed loan can cover up to 70% of the renovation costs of the building and it can be maximum 50% of the value of the building. (ara.fi (a))

ARA also provides subsidies for condition surveys of residential buildings which have suffered from water damage or which are causing health problems. The subsidy can be up to 50% of the costs of the condition survey. (ara.fi (b))

› ***For refurbishment of historically valuable buildings:***

The state budget allocates money for subsidising refurbishment, protection and conserving of buildings with exceptional historical value. The subsidy can be up to 50% of the costs of the renovation measures. On average, the received subsidy covers 5% of the realized costs. The subsidy can be applied by individual owners but also by communities or municipalities who are responsible for the maintenance of a building. (ELY, 2014)

2.2 Existing country-specific bottlenecks for NZEBR

Main barriers for the uptake of building refurbishment measures are often related to either economic constraints or lack of information. Heljo and Vihola (2012) list down the following reasons explaining why renovation measures are NOT taken up:

1. Features of the building:
 - Building is new, in good condition, and there is no need for refurbishment yet.
 - Building is in the end of its life-cycle or it is being used in a secondary way.
 - Building has been planned for short-term use.
 - Protected buildings and retaining the historical value of a building make energy improvements challenging.
2. Construction site: The building is located in an area where the need for building has decreased and where there is no economic need for refurbishment.
3. Know-how, attitudes and decision-making
 - 75% of the apartments are owner-occupied and there are several decision makers.
 - The know-how is not sufficient because of too few reference cases.
 - Lack of skills to estimate the energy saving potential of one's own house.
 - Doubts about the suitability of measures in one's own house.
 - Low awareness about technical systems.
 - Old structures are highly valued (for example old windows).
 - There is no time to consider energy saving issues or reasons are not presented clearly enough.
4. Technical aspects and architecture
 - It is technically difficult to implement the energy saving measure (e.g. tile façade, low upper ceiling and placement of channels for heat recovery of ventilation).
 - It is difficult to carry out the refurbishment by successfully retaining the architectural features of the building
5. Cost-effectiveness and resources
 - If no refurbishment need exists, replacement of an element only because of energy saving reasons is most probably unfeasible.
 - Only short-term profitability might be assessed.
 - There is contradictive information about profitability.
 - Financing the project might be problematic.

A study carried out by Kiinteistöliitto (2011) suggests that challenges for refurbishment processes are related to, first, the communication and information received by the residents, second, supervision and building inspection, and third, the co-operation of the builder and the contractor. Rönty and Paiho (2012) point out that energy repairs compete with other needs of individuals; an owner-occupier of a

detached house might consider the options of investing in energy refurbishment, kitchen renovation or maybe in a holiday trip. In housing companies the shareholders might not be willing to pay more than what is required by a normal repair if they do not consider energy-efficiency improvements valuable. According to a study by Vainio et al. (2002) 43% of the single-family house owners living in a house built before 1960 reported problems in financing as the reason why they had not implemented renovation measures. Problems arising in the decision making process of housing companies are pointed out also by a report of the Ministry of Environment of Finland (Ympäristöministeriö, 2007) which highlights the difficulties in reaching an agreement because of the different situations in life, wealth, preferences and level of knowledge of the apartment owners.

As one fourth of apartments in the Finnish countryside are empty and the population in some towns is decreasing, renovating buildings in these areas is problematic. It has been suggested that renovation projects of old apartment buildings is feasible only in larger cities or in areas with population growth (Kotitalolehti, 2015). Banks are willing to lend money to those homeowners whose existing house loan is significantly lower than the value of the house and the household income is sufficient to cover an increase of the loan. However, if the size of the loan is close to the market value of the house or the household income is not high enough to payback the cost of the increased loan, banks see little potential in increasing their business without increasing their risk profile (Mahapatra et al., 2011). Because the value of apartments in regions with decreasing population is rather low, also the guarantee that the apartment can provide for the loan might not be high enough to receive a loan to cover the expenses of the refurbishment project. There has already been cases in Finland in which loan has not been granted for the renovation project of a housing company (Rakennuslehti, 2015).

Evidence exist that the energy subsidy provided by ARA (until year 2013) has been successful in motivating building owners to change their heating method to more sustainable one. For example in year 2012, the state allocated 10 million € for supporting implementation of renewable energy sources in residential buildings (Ara, 2012). At the same time, installation of heat pumps has increased rapidly, and in 2013 already more than half a million of Finnish households were heated with heat pumps. In 2012 13 000 ground source heat pumps were sold, and in 2011 almost 15 000 (sulpu.fi).

Even if not much research has been carried out about the benefits of the subsidy, still some reports suggest that the subsidy has been useful: For example Vihola & Heljo (2012) present that the energy subsidy has had an impact on the decreasing use of oil and electricity as the heating source and increasing the use of especially ground source heat pumps. Airaksinen et al. (2013) suggest that the energy subsidy might be one reason why the use of ground source heat pumps experienced a 72% growth in 2011. Also, several newspapers have reported about the success. According to a Finnish HVAC entrepreneur the energy subsidy was a major motivator for people to change the heating system. The entrepreneur also believed that after cutting the energy subsidy there will be fewer heating system changes (Yle, 2012).

2.3 Conclusions and suggestions for further actions

Further initiatives needed in Finland:

Energy subsidy for changing the heating system or implementing renewable energy: Until year 2013 The Housing Finance and Development Centre of Finland (ARA) provided subsidies for changing the heating system of households (basically replacing oil or electric heating with heat pump or district heating). According to several experts, the energy subsidy was a useful instrument as it increased the number of implementation of heat pumps in households (as was discussed in chapter 2.3.) However, at the moment the energy subsidy is provided only for low income households, who probably do not have the resources to change their heating system or take up energy saving measures. Therefore the energy subsidy is not very efficient in the current form and the target group should be enlarged to comprise also those households who are the most probable ones to take up energy saving refurbishment measures.

Subsidies for apartment building refurbishment in periphery areas: As was discussed in chapter 2.1. Apartment buildings can receive subsidies in the form of state guaranteed loans. However, problems arise in regions in which the apartments have very low value because of the decreasing population and therefore decreased demand of housing. In these regions housing companies might not be provided with loans for extensive renovation projects and it might be economically more feasible to demolish the building and rebuild it. Also, the increase in value of the apartments after renovation is probably not that significant in periphery areas as in cities and also this fact does not support taking up renovation measures. This is an enormous national scale challenge for Finland and new efficient instruments (such as state guaranteed loans or energy subsidies) need to be implemented to enable conserving the buildings built in the 1960s and 70s.

Other tools for supporting NZEBR (suggested in the Finnish cluster workshop no. 3):

- **Law which makes decision making for housing companies easier:** Difficulties to reach the acceptance of the majority of apartment owners in a housing company make it challenging to make decisions about the uptake of renovation measures. The law should be changed in order to enable easier decision making.
- **Domestic reduction for housing companies:** Currently only individual apartment owners can receive domestic reduction for renovation measures. Domestic reduction also for housing companies would motivate taking up renovation activities in multi-family buildings.
- **Relating the energy certificate to the transfer tax:** When the owner of an apartment changes, a certain percentage of the value of the transaction needs to be paid as transfer tax. This amount could depend on the energy performance level of the building which would motivate the owners to invest in improving energy efficiency.
- **Energy subsidy which size depends on the level of energy efficiency:** Currently the energy subsidy is granted as a percentage of the realized costs of the renovation project. If the size of the subsidy would depend on the energy performance improvement level, the motivation to take up efficient energy saving measures would be higher.

3 THE NETHERLANDS

3.1 Available fiscal incentives for different target groups

In Netherlands there are several financial measures in order to support energy performance for different target groups: The main financial measures are presented below in .

- EPV: Energieprestatievergoeding (Energy performance contribution)
- STEP: Stimuleringsregeling Energieprestatie Huursector (Energy performance stimulation for social housing)
- FEH: Fonds Energiebesparing Huursector (Energy saving fund for social housing)
- Energiebespaarlening (energy saving loan)
- Mortgage interest discounts
- Wider lending standards for Near-zero-energy houses
- EIA: Energie-investeringsaftrek (energy investment subtraction)
- SDE+: Stimulering Duurzame Energie productie (Sustainable Energy stimulation)

For each of these measures the type of support (investment subsidy, soft loan, feed-in tariff, other), source of support ((national government, local authority), target group (private house owner, housing company, commercial real estate), type of technical measures supported, subvention level (€ or %) and other requirements are presented in Table 1.

Table 1. Fiscal incentives in the Netherlands

	Type of support	Source of support	Target group	Type of technical measures supported	Subvention level	Other requirements
EPV	Possibility to collect a near-zero-energy performance-compensation from tenants (apart from the rent)	National government (new law in 2015)	social housing corporations and commercial renting-sector	Near-zero-energy-concepts: insulation, PV-panels, solar collectors heat pump, heat exchange ventilation	No subvention, but legal possibility to collect a compensation for the Near-zero energy performance (incl. produced electricity and heat)	For existing and new housing. Only legal when the energy performance of the housing is near zero.
STEP	Investment subsidy	National government	social housing corporations	Every energy (saving) measure that contributes to a better legal energy performance index (EI)	Maximum 4 500 € for one house, maximum 7.5 M€ for one corporation. Total available subsidy 395 M€	The energy performance after measurements has to be at a certain higher level (in steps). One should deliver evidence under strict rules, based on inspections.
FEH						
	Soft loan	National	social	Every	Maximum	Can be

		government	housing corporations	energy (saving) measure that contributes to a better legal	25% of the project costs. Minimum loan 75 000 €	combined with the STEP subsidy
Energie-bespaarlening	Soft loan	National government	Private owners	List of certain measures	Minimum loan 2 500 € Maximum loan 25 000 € Interest rate between 2.6 - 3.7 %. Total sum of available loans 300 M€	The applicant has to be younger than 75 years
Mortgage interest discounts	Mortgage interest discount	Some banks	Private house owners	Every energy (saving) measure that contributes to a better legal energy performance index (EI)	E.g. discount 0.2% on mortgage interest	Evidence of energy performance required
Wider lending standards for Near-zero-energy houses	Wider lending standards for Near-zero-energy houses	National government	Private house owners	Only for near-zero performance	Extra lending of 25.000 € possible	The building company has to guarantee the near-zero-energy performance for 10 years
EIA	Tax reduction	National government	Housing corporations and commercial companies	List of certain measures	41.5 % of project costs can be subtracted from tax on profits	Apply within 3 months after contract
SDE+	Feed-in-tariff	National government	Commercial companies and non-profit organisations	Sustainable energy, renewables electricity, heat, gas, wind.	3.5 billion € per year	

3.2 Existing country-specific bottlenecks for NZEBR

We can see four clusters of bottle-necks for NZEBR in multifamily housing; technical, financial, juridical and social ones.

1. Technical: The floor/facade/roof ratio in multifamily housing is often very different from a single family rowhouse. Also, roofs are flat instead of sloping. This makes the use of solar panels on the roof of multifamily housing less effective, regarding the near-zero-energy performance of the building as a whole. Other measurements or inventive design of extended roofs will be necessary.
2. Financial: A social housing company is limited in what they can ask for rent by regulations. So asking for extra rent in the case of renovation is often a problem. Also the building owner has to make the investments while the tenant has the financial benefits in the form of reduced

energy bills (“split incentive”). The new EPV regulation (table 1.) should make it possible to work around this problem. The purpose of the EPV is to transfer the budget for energy costs as paid normally by tenants, to investments in renovation by the housing company. So, the energy bill has to be high enough or the costs for renovation low enough to make the business case work. Reducing the price of renovation to the level of the energy bill, needed for a sound business case, is the biggest bottle-neck right now. One of the reasons is that there are not yet benefits from repetition and industrialisation. Builders are still piloting with NZBR and have therefore high costs.

3. Juridical: Especially in the case of multi-family housing with multi-owners it can be difficult to define and organize the individual and collective responsibilities.
4. Social: Tenants and owners have a lot of influence in giving permission to a renovation project. A minimum of 70% permission is needed in the social housing sector. Near-zero-energy-renovations are often and mainly technically focussed by professionals. Tenants and dwellers, on the other hand, have often other wishes, priorities and expectations of a renovation. Building professionals should learn to listen better to the wishes of end-users.

3.3 Conclusions and suggestions for further actions

NZEBR for multifamily housing is more complex than for single family row houses. A strategy for solving the problems is imitating the strategy of NZEBR for single family row houses; ‘solving all problems together in one strike’. In the case of multifamily housing one can think of ‘Energy service companies’ (Esco’s) who can take care of the technical, financial, juridical and social aspects. The government can stimulate and help companies (with subsidies and expertise) to make ‘a complete NZEBR offer’ for multifamily housing.

4 ROMANIA

4.1 Available fiscal incentives for different target groups

In Romania there are national programmes in order to support the increasing of energy performance in buildings that contain financial incentives, such as:

- Annual National Programme for increasing the energy performance of the multi-family buildings
- National Program for thermal rehabilitation works of residential buildings financed by bank loans with governmental guarantee
- Decisions of Local Councils
- CASA VERDE Programme (Green House Programme)

For each of these measures the type of support (investment subsidy, soft loan, feed-in tariff, other), source of support ((national government, local authority), target group (private house owner, housing company, commercial real estate), type of technical measures supported, subvention level (€ or %) and other requirements are presented in Table 2.

Table 2. National programmes in Romania

	Type of support	Source of support	Target group	Type of technical measures supported	Subvention level	Other requirements
Annual National Programme for increasing the energy performance of the multi-family buildings	Grant	Central and local (Emergency Government Ordinance no.18/2009 regarding improving energy efficiency in residential buildings)	Multi-family buildings built in 1950-1990	New thermal insulation of the exterior walls; replacement of the existing windows and external doors, including the joinery designed for access to the residential block, with energy performance joinery; hydrothermal insulation of the terrace/ thermal insulation of the floor over the last level, where there is a roof framing; thermal insulation of the floor over the underground, where the block was designed to include apartments on the ground floor.	80% grant (50% from the state budget + 30% of the funds from local budgets and / or other legal sources) 20% owner contribution	Maximum 100 kWh/m ² , y after thermal renovation
National Program for thermal rehabilitation works of residential buildings	Subsidy of loan guarantee	Central budget (Emergency Government Ordinance no.69/2010 on thermal rehabilitation	Residential buildings built up to year 2000;	Thermal rehabilitation of building envelope and installations; repair and/or closing as appropriate, balconies/loggias	a) from the beneficiaries' sources and / or from other sources accounted contribution of	

		of residential buildings financed by bank loans with government guarantee);		apartment buildings, under compliance with technical regulations in force for ensuring natural ventilation of rooms; repair, if necessary, replacement/ acquisition with the boiler block assembly / scale, i.e. boiler related to a single-family dwelling and its related facilities; the introduction, where appropriate, alternative systems for providing partial / total energy consumption for hot water, lighting and / or heating	the beneficiaries and representing at least 10% of the total expenditure provided in the general budget; b) from bank loans in lei, with government guarantee and interest subsidy, contracted beneficiaries and 100% guaranteed by the National Credit Guarantee Fund for Small and Medium Enterprises S.A. I.F.N. in the name and on behalf of the State, representing more than 90% of total expenditure provided in the general budget*	
Decisions of Local Councils	exemption for 3-5 years from annual taxes on buildings;	local authority	private house owner	New thermal insulation of exterior walls; replacement of existing windows and external doors, including the joinery designed for access to the residential block, with energy performance joinery; hydrothermal insulation of terrace/ thermal insulation of the floor over the last level, where there is a roof framing;		
CASA VERDE Programme	grant	Ministry of Environment and Forests, Environment Fund Administration	private house owner	Acquisition of equipment for production of heat, including facilities for replacing or supplementing traditional heating systems with systems that use renewable energy; Costs of installation and commissioning of the system, costs	- installation of solar panels / up to 6000 lei (~1354 €) - installation of heat pumps / up to 8000 lei (~1805 €); - installations producing thermal boiler based pellets,	Grant received after acquisition, installation and commissioning. Grant documentation submitted to Environmental Protection Agency of the area. No pre-

				of verification & tests; VAT;	briquettes, wood chips and any debris and green waste, agricultural, forestry, forestry / up to 6000 lei (~1354 €). Grant only for one project type	payment.
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* Period of repayment of bank loans with government guarantee and interest Subsidized than 5 years. Interest on bank loans with government guarantee granted to beneficiaries to be covered from the state budget through the Ministry of Regional Development and Tourism, within the limits approved annually for this purpose.

4.2 Existing country-specific bottlenecks for NZEBR

For Romania the main barriers for NZEB renovation measures are mainly related to:

1. Legislative issues: The general definition of NZEB was included in the law, but without numerical targets, which are under the approval process. These targets are maximum allowable level of primary energy use and CO2 emission, taking into consideration climatic zone, building type and mandatory RES quota.
2. Financial issues: Lack of financial incentives to stimulate NZEB renovations, high cost of the technical solutions for NZEB renovations;
3. Awareness: The market is not ready and has not enough information regarding technical-economic and social aspects.

4.3 Conclusions and suggestions for further actions

Taking into consideration that energy efficiency in buildings is a national priority, the national legislation must accelerate the implementation of certain measures to support RES deployment by introducing numerical targets in NZEB definition and fiscal incentives to stimulate NZEB renovations, such as:

- Exemption from annual taxes on buildings depending on the energy efficiency obtained after renovations, deep renovation being final stage; this should be extended at national level by local authorities;
- Introducing favourable loans for NZEBR renovations with state guaranties;
- Support for NZEBR renovations from National Budget, development of the existing national programmes;
- Continue the existing programmes increasing the energy production from renewable sources for natural person. The Environment Fund Administration will continue to grant acquisition of equipment for production of heat, including facilities for replacing or supplementing traditional heating systems with systems that use renewable energy.
- Simplifying the ANRE procedures for accreditation. At present the National Regulatory Authority for Energy (ANRE) by the Ordinance no.48/2014 approves the accreditation of producers of electricity from renewable energy sources. Thus natural persons that obtain power under 100 kW from RES can be accredited and sell electricity to grid.
- Increasing the RD&I budget allocations in order to promote and demonstrate feasibility and advantages of NZEBR;
- A complex of dissemination actions leading to the expansion of knowledge among professionals on NZEB technical solutions for rehabilitation is required.

5 SPAIN

5.1 Available fiscal incentives for different target groups

In Spain there are several financial measures in order to support energy performance for different target groups:

- ORDER of November 23, 2011, of the Minister of housing, public works and transport, amend the agenda on financial measures for rehabilitation of housing to cover the cost of professional fees for the preparation of technical reports.
- PROGRAMAME RENOVE (Basque Government).
- Programme Biomcasa II (IDAE).
- GEOTCASA Programme. Financing to authorised companies for geothermal installations in buildings.
- SOLCASA Programme. Financing to authorised firms for solar thermal installations in buildings.
- Program PAREER-CRECE (IDAE)
- EVE: Household Appliance Renewal Plan.
- EVE: Window Renewal Plan.
- EVE: Boiler Renewal Plan.

For each of these measures the type of support (investment subsidy, soft loan, feed-in tariff, other), source of support ((national government, local authority), target group (private house owner, housing company, commercial real estate), type of technical measures supported, subvention level (€ or %) and other requirements are presented in Table 3.

Table 3. Financial measures in Spain

	Type of support	Source of support	Target group	Type of technical measures supported	Subvention level	Other requirements
ORDER of November 23, 2011	Grant (subsidy) loans	Regional (Basque Country)	Property Owners	reduction of energy losses associated with the envelope of the building refurbished with respect to energy losses of the reference building between 0 and 50 with respect to the previous envelope or >50%	30% of the eligible budget up to 30 000 € Maximum or 50% of the eligible budget up to 45 000 € (>50% reduction)	
PROGRAMA ME RENOVE	Subsidy	Regional (Basque Country)	Property Owners of grouped residential blocks, constructed before 1980	improvement of accessibility, habitability and energy efficiency of buildings Passive intervention on the envelope and active intervention on	70% of reports, certifications and projects budget 50% of construction works budget 60% of construction	

				heating systems to achieve reduction of 30% of annual energy demand for heating	works budget in rehabilitating degraded areas; Up to 15 000 €by dwelling	
Programme Biomcasa II (IDAE)	Programme	National	SMES / ESCO	promotion and financing of projects of thermal biomass in buildings		
GEOTCASA		National	SMES / ESCO	promotion and financing of projects of geothermal installations in buildings		
SOLCASA		National	SMES / ESCO	promotion and financing of projects of solar thermal installations in buildings		
PAREER-CRECE (IDAE)	Monetary payment Repayable loans	National	Property Owners / Building owners / ESCOS / Tenant enterprises	Improvement of the energy efficiency of the thermal envelope; Improvement of the energy efficiency of the heating and lighting; Substitution of conventional energy by biomass in heating systems; Substitution of conventional energy by geothermal energy in heating systems Improvement of total energy rating of the building, at least 1 letter measured on the scale of carbon-dioxide emissions (kg CO2 m2 year), with respect to the initial energy rating of the building.		
EVE: Household Appliance Renewal Plan	Monetary payment	Regional	Property Owners	Household Appliance Renewal Plan		From Sept 2015 on
EVE: Window Renewal Plan	Monetary payment	Regional	Property Owners	Window Renewal Plan		From Sept 2015 on
EVE: Boiler Renewal Plan	Monetary payment	Regional	Property owners	Condensing boiler Renewal Plan		From Sept 2015 on

Other Spanish Regional Energy programs for the whole sectors (transport, industrial, etc.):

http://www.idae.es/uploads/documentos/documentos_Bol_Ayudas_CCAA_05-15ac-WEB_aeda9ca6.pdf

http://www.idae.es/uploads/documentos/documentos_Bol_Ayudas_Tem_05-15ac-WEB_2aa1bab2.pdf

5.2 Existing country-specific bottlenecks for NZEBR

Main stakeholders involved in energy renovation underline several bottlenecks when uptaking energy rehabilitations, despite the fiscal incentives. Moreover, these barriers gain importance when facing Near Zero Energy Rehabilitation. Barriers can be classified in the following five main groups:

1. Lack of knowledge and awareness: Society is not aware of the advantages of energy renovation and they do not execute NZEBR if there are no fiscal incentives. Tenants do not feel the necessity for energy renovation and they are not aware of existing technologies and their advantages. Regarding professionals the lack of knowledge on existing technologies and the difficulties to implement proper energy renovations result a reduction of the number of interventions.
2. Economic barrier: The high cost of innovative technologies for reduction of consumption and production of renewable energy becomes an important bottleneck towards energy rehabilitation. Additionally the income of tenants is a key aspect that allows or not to execute the rehabilitation. Fiscal incentives facilitate the decision but, often, they are not enough for the final acceptance. Therefore, economic strategies, together with technical solutions should be considered.
3. Social barrier: Low income and the difficulties to reach an agreement among tenants becomes a strategic issue to undertake an energy renovation. Due to warm climatic condition in Spain, the thermal requirements are not so demanding with respect to Northern and Nordic countries. Therefore energy rehabilitation is not the primary necessity for tenants.
4. Lack of organization/implication of the administration/energy companies: There is no common strategy among organizations which could facilitate and promote the renovation process.
5. Current crisis situation uncertainty reduces the private as well as public investment in the rehabilitation field and critical rehabilitations (e.g. structural retrofitting) are prioritized.

5.3 Conclusions and suggestions for further actions

Nowadays it is evident that there is a new and important market niche for NZEBR due to broad real demand; there is a large and inefficient multifamily building stock constructed between 1960-1980. Additionally, there are some funding opportunities that can motivate NZEBR, which would in parallel lead to energy/economic saving, generation of employment, building stock regeneration and upgrading and professionals' specialisation. Nevertheless, it seems not to be enough, mainly due to lack of awareness and economic barriers.

In the Spanish case, the ownership of residential buildings is mainly private and this fact leads to social and economic barriers. In order to overcome these barriers, some public funding is available, but there are no fiscal incentives which would of course contribute to undertake energy renovations.

Some fiscal incentives could be suggested for the promotion of energy renovation and even accomplish deep renovation:

- Taxes related to renovation works should be reduced and minimised for both, owners as well as companies.
- Fiscal incentives based on step by step renovation. Fiscal incentives would be directly related to the energy efficiency obtained. The final step would be deep renovation.
- Currently, the politics situation does not allow new RES installations to sell electricity. Only self-consumption is allowed. The generation of renewable energy could be promoted, allowing owners profit in order to improve the return of investment.
- Another key aspect could be the investment in research. The economic resources allocated for research should help to promote real cases interventions that could be a real example for best practices and demonstrate the feasibility and advantages of these types of interventions. Additionally, fiscal incentives could be dedicated to the implementation of innovation solutions.

In the Spanish case, the **ownership should change**. The majority of the ownership is private and social and economic vulnerability are two key aspects that have to be tackled. Different agents (private or non-private) should take the ownership of the buildings and use their own funding for energy renovation. The change of ownership leads to a change of the funding source (e.g. non-private companies can buy the building, rehabilitate it and rent some assets to recover the investment). Additionally, as the ownership of the building is in a sole entity, the decision making becomes simple. A possible approach is to provide a **financial package solution** including public funding, advantageous credits and creative financial scheme of constructors and industrials. This way, constructors and industrial complement the funding of the administration and banks. Their business would be based on charging the execution costs at the beginning of the renovation project and the profit would be divided in the medium term.

Future actions for NZEBR must be oriented to widespread dissemination of the generated knowledge and the already executed pilot cases. Although legislators' role is necessary, the existence of a gear that fits all stakeholders is also essential to create a network which could facilitate the whole renovation process.

Due to the poor cultural awareness, in order to ensure the execution of NZEB renovations, the law should become more severe and penalise those cases that do not fulfil existing standards focused to reach horizon 2020 objectives.

On the other hand, regarding technical strategies, renovations at district level give place to several advantages with respect to building level interventions as the possibility to implement technologies in an efficient and cost effective way.

Furthermore, there are plenty of technologies on the market but it must be emphasized the need for promotion of renewable energy sources combined with passive solutions. Thus, well designed package solutions must be promoted together with financial incentives.

6 SWEDEN

6.1 Available fiscal incentives for different target groups

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 of public buildings.

As of 2009, state aid is provided for the installation of solar panels. Businesses, public organizations and individuals who invest in solar cells and solar hybrid systems can seek funding. Funding is provided by a maximum of 30% of eligible costs for businesses and by 20% of the aid establishment costs for individuals. The aid intensity is calculated on the basis of the eligible installation costs. Maximum funding for a system is €130 000. Eligible costs are also limited to a maximum of €1 000 plus VAT per kW of electrical peak power of the PV system.

The interest in solar cells is increasing and thus demand for the funding has been huge, however the funding is far from enough to support all applicants. The funding is a finite funding i.e. there is a limited amount appropriated for this cause and grants are given on a first-come-first-served basis.

The total amount applied for by non-approved applications was €3.2 million, spread over 3 400 applications, at the end of 2014. Assets amounted to €4.6 million, which meant that there were no funds for 3100 of these applicants. The previous government announced a contribution of €4 million in 2015 but this supplement will then only be able to cover about 350 applications. Hence, funds equivalent to €0.1 million divided among approximately 2650 applications will still be missing. (Energimyndigheten, 2014).

Further, the Swedish Energy Agency initiated the so-called LÅGAN-program (low energy consumption in buildings), with a budget of €2.3 million over five years to promote NZEB/NZEBR 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.

6.2 Existing country-specific bottlenecks for NZEBR

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 comprehensive measures are required. The post-war buildings often demand extensive measures and are not easily converted into buildings with low energy consumption. The same problem is identified by Höglund (2015); there does not exist financial incentives to justify NZEBR renovations. The energy efficiency 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. Put in other words, the payback time is very long for energy efficient renovation investments, which hinders the implementation of NZEBR renovation. This is considered a crucial barrier.

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.

As the LCC calculations (see 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 useful in order to increase the proportion of NZEBR buildings in Sweden.

6.3 Conclusions and suggestions for further actions

In order to support near-zero energy renovation of public buildings, a possible incentive could be to implement a former incentive issued in 2005, known as OFF-rot. Support to investments in energy efficiency and conversion to renewable energy sources in premises used for public activities (OFF-rot), aimed to promote an efficient and environmentally friendly use of energy. 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. The funding was a finite funding limited to €17 million up to December 2008 and amounted to 30 percent of eligible costs.

The actions that could receive funding were:

- Energy mapping.
- Conversion of heating systems (fossil fuels and electricity to biomass, heat pumps, district heating).
- Energy efficiency (connection to cooling or installation of free cooling systems; installing electricity effective lighting systems, ventilation systems, improvement of the building's envelope, improvement of heat recovery in the premises etc.).
- Installation of solar photovoltaic systems

Moreover, 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. If the limit on how much electricity a property owner can self-produce before they are forced to pay energy is increased, it would allow an increase in solar electricity production. A change in legislation would thus give incentives to exploit the full potential of the installed solar panels, and thereby be positive for near-zero energy renovation.

Other important incentives would be to introduce favourable loans for NZEBR renovations and governmental support for NZEBR renovations.

The financial incentives, such as tax reductions or subsidies are generally considered as very important incentives for the acceleration of energy efficient buildings. In order to stimulate investments NZEBR buildings financial incentives are needed. A new OFF-rot could be an option as the support helped to speed up the conversion rate, although many of the measures would have been profitable anyway. It should be mentioned that Konjunkturinstitutet's (2009)[1] assessment found the support to be redundant as a climate policy tool and that the support had not been allocated cost-efficiently. Therefore a modification of the policy is needed to prevent the same problems from occurring, if it is to be used as an incentive to steer towards more NZEBR renovations.

7 CONCLUSIONS

In each participating country there are several incentives and other control instruments for different target groups that can be improved depending on the need to accelerate the process at the country, regional or local level.

The economic constraints or lack of information determine the main barriers and reasons why renovation measures are not taken up. The incentives and other control instruments should generally be based on a clear, logical program theory that identifies barriers in the target market and designs incentives and other strategies to reduce those barriers. The incentives and other program strategies should be appropriate to the climate, customer mix, and local market characteristics.

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