HOW ENERGY EFFICIENCY RETROFITS CONTRIBUTE TO ENERGY POVERTY ALLEVIATION. THEORY, BEST PRACTICE IN THE EUROPEAN UNION AND CASE STUDIES FROM THE REELIH PROJECT IN ARMENIA, BOSNIA AND HERZEGOVINA AND NORTH MACEDONIA

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Residential Energy Efficiency for Low-income Households project is one of the many assistance projects supported by the American people through the United States Agency for International Development (USAID). Since 1992, the American people through USAID have provided a broad range of development programs in Armenia and Bosnia and Herzegovina and North Macedonia, shifting from an initial humanitarian emphasis to assistance for economic, political and social transition.

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1 Introduction

The current study is a report on the energy poverty aspects of the REELIH project in Armenia, Bosnia & Herzegovina and North Macedonia implemented by Habitat for Humanity. The aim of the assignment to the team of Metropolitan Research Institute (MRI) and Buildings Performance Institute Europe (BPIE) was to implement an evaluation of the REELIH projects in the three countries to find out how they were able to contribute to the fight against energy poverty by encouraging energy efficient renovation of multi-family residential buildings.

REELIH project resulted in a breakthrough in the three countries by changing the local environment towards supporting energy efficient interventions in the multi-family housing stock. Through REELIH local subsidy schemes and renovation procedures were developed that were able to encourage the renovation of multi-family buildings. In spite of the success of REELIH in its pioneering role the question remained: how important it would be to assist the most needy households in buildings with mixed social composition in order to scale op the current renovation schemes. By this, group targeting of energy poor and individual targeting of energy poor became an equally important question of the research.

Based on the contract between MRI/BPIE and Habitat the research team first clarified what the term “energy poverty” covers and how it is measured by different indicators. Then the definition is interpreted into the REELIH environment (regarding Armenia, Bosnia & Herzegovina and the Republic of Macedonia) with the ambition to analyse whether the indicator sets already in use in most European Union countries can also be used in the three REELIH countries. Based on the criteria of energy poverty a preliminary evaluation of the REELIH project in these countries is elaborated. Finally policies for fighting against energy poverty by means of energy efficiency in different European cities are analysed. Through the detailed analysis of useful policies the research team intends to formulate suggestions towards the REELIH partners and Habitat for Humanity on how to lobby for policies that can be implemented under local conditions in order to put more emphasis on the support for energy poor in the renovation projects.

The current report is based on extensive literature review and field trips to Armenia, Bosnia & Herzegovina and North Macedonia in April-July 2019. The field experience was complemented by virtual interviews with financial and social experts from the Western Balkan.

2 Conceptualising energy poverty

The notion of energy poverty and fuel poverty are often used interchangeably. However, it is possible to distinguish between their use in the traditional literature[1].

- **Energy poverty** usually refers to the lack of access of modern energy services in developing countries; its use is typically restricted to gas and electricity.

[1] One of the pieces of this relevant literature is the European study on energy poverty and vulnerable consumers: https://ec.europa.eu/energy/en/studies/energy-poverty-and-vulnerable-consumers-energy-sector-across-eu-analysis-policies-and (page 2)

- **Fuel poverty** is used to define energy affordability problems in developed countries; it refers to all types of energy sources used in households.

In addition, there is a geographic distinction in the use of the two concepts. The term "fuel poverty" is more frequently used in Irish and British research and policy contexts, while energy poverty is the preferred term in continental Europe. Thomson (INSIFGT_E, 2015, p.2), having analyzed 187 EU policy documents, found that within the official documents of the European Union, energy poverty is the preferred terminology over fuel poverty.

In this paper and the broader research project, we opt for the term energy poverty, however we include all types of energy sources (gas, electricity, district heating, wood, coal) that are used to provide heating in a home. This broadened definition is adjusted to accommodate all commonly used heating sources of the REELIH countries.

There are various approaches to define and measure energy poverty, but all of them boil down to the inability of households to heat/cool their homes (or provide necessary energy services) at affordable costs. As the REACH research[2] highlights "*Energy poor household is one that has a difficulty, or sometimes inability, to be able to afford its basic energy needs. Basic energy needs considered by this represent the ability to have adequate energy indoors services: heating, cooling, cooking, lighting."*

Analyzing the definitions two important aspects of energy poverty must be emphasized:

- **Quality aspect**: providing proper level of heating, cooling, lighting.
- **Affordability aspect**: providing the proper energy services at affordable prices.

The combination of these two aspects is essential from a policy perspective: energy poverty is not eased in case only the costs are subsidized but the service level remains the same (e.g. in case the price of fuel is subsidized but it allows to provide moderate heating for a family), or in case energy efficient interventions are implemented and the heat comfort is improved but the renovation costs increase the operational costs of the household.

The indicators measuring the level of energy poverty have to combine these two aspects. The following sections summarize two standard ways of pinning down energy poverty based either on monetary calculations (expenditure approach) or the self-assessment of the households (called consensual approach in the literature[3]).

2.1 The expenditure approach: defining energy poverty through monetary calculations

The most common used indicators to approach energy poverty from an expenditure approach rely on two components: **cost of energy and household income.** The level of energy poverty is therefore based on a ratio between those two. Both energy and household income can be defined in a number of ways.

Cost of energy may include:

- Only those energy sources that are linked to major energy grids: electricity, gas, or district heating.

[2] REACH was an international research project, focusing on energy poverty in the Balkan, funded by the Intelligent Energy Europe program between 2014-2017

[3] E.g. in Selecting Indicators to measure Energy Poverty (2016)

- All types of energy used and not linked to the grids, including coal, wood, oil.

The notion of energy poverty is not limited to heating and cooling (the main performance indicator when analysing energy efficiency in buildings). It may also incorporate other types of household energy use like appliances and cooking. Considering that electricity can be a major source for heating/cooling, as well as for appliances, it is obviously difficult to separate these forms of usage in the first place. In many cases, the diversity of the components of electricity usage is not transparent, and it may not be obvious from a definition whether it refers only to heating/cooling costs, or additional types of energy usage as well.

The cost of energy is calculated in two different ways:

- The real cost of energy, paid by a given household (according to bills).
- The calculated/modelled cost of energy that would be needed to heat up the apartment to an adequate level (e.g. based on WHO's recommendation: 21°C in the living room; 18°C in other rooms; to be increased by 2 degrees in households with children or persons suffering from illness or disabilities).

Household income may include:

- The net income level - after taxes - of a household, including all welfare and other sources (disposable income).
- Income level equalised to the size and composition of the household. (E.g. a household with one single person needs higher income/head than the one with two salaries)
- The residual income that is calculated after the energy costs (real or modelled) are paid.

The combination of the two components – cost of energy and household income - measures the ratio of energy expenditure to household income, in comparison to certain absolute or relative thresholds. This is the main indicator used in the "expenditure approach".

Several countries use the expenditure approach to measure energy poverty. For example, in the **Republic of Ireland** "Energy poverty is a situation whereby a household is unable to attain an acceptable level of energy services (including heating, lightning, etc.) in the home due to an inability to meet these requirements at an affordable cost." It is measured by the following indicator: "[the household] spends more than 10% of its disposable income on energy services in the home" (INSIGHT_E 2015, p.34). This method is relatively straightforward, given that accurate data are available on income and energy cost level of a representative set of households. However, it may be unable to factor out relatively wealthy households that have substantial income but "luxury" energy consumption, whose residual income (after energy costs are deduced) still remain sufficient. Furthermore, it may exclude those poor households that keep their energy costs artificially low in order to safeguard the rest of their income. Extensive research in different EU countries shows that poor households limit their energy use to inadequate levels, and thus lower their spending. E.g. "Both the 1991 and 1996 EHCS showed that low income households often spend significantly less on fuel than required and suffered cold homes as a consequence." [4]

[4] Moore, 2012 P. 3

In some countries, the definition in use is less precise when it comes to measurement. In **France** for example (2010) a person is considered fuel poor "if he/she encounters particular difficulties in his/her accommodation in terms of energy supply related to the satisfaction of elementary needs, this being due to the inadequacy of financial resources or housing conditions" (INSIGHT_E, p. 34). This definition is complete in terms of its content, but less useful in terms of measurability. For instance, the notion of difficulty is not determined accurately, nor are elementary needs or inadequate financial resources. Due to the lack of exact measurement and precise methodology, there is no officially accepted and operationalized understanding for energy poverty in France.

Similarly in **Slovakia** (2015): "Energy poverty under the law No. 250/2012 Coll. of Laws is a status when average monthly expenditures of household on consumption of electricity, gas, heating and hot water production represent a substantial share of average monthly income of the household." (INSIGHT_E, p. 35). According to the proposed, but not yet accepted methodology a household can be considered as energy poor if disposable monthly income is lower than the minimum monthly disposable household income threshold. This threshold measures only the low income level but does not provide information on the energy usage.

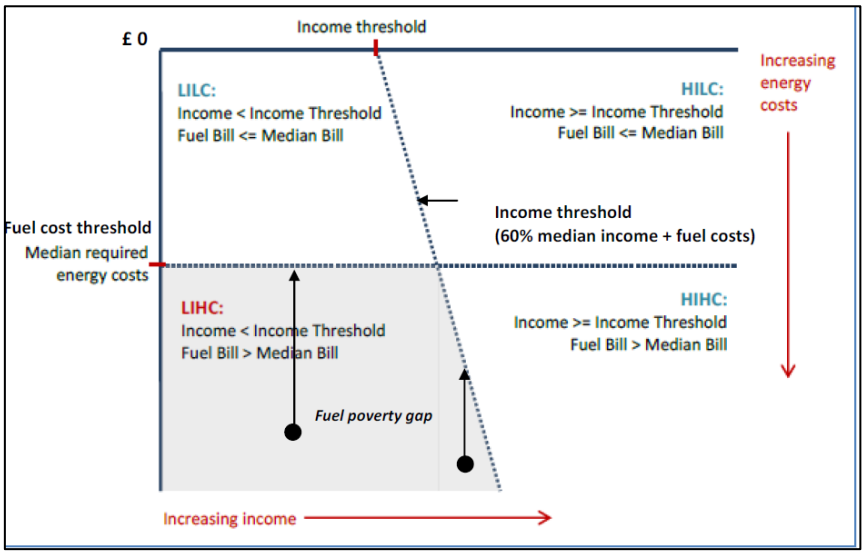
In the **United Kingdom** (2013), the definition of fuel poverty was the following: "A household is said to be in fuel poverty if it needs to spend more than 10% of its income on fuel to maintain an adequate level of warmth." (INSIGHT_E, p. 36). This terminology is further developed than the Irish one, in that it relies on the expenditure approach, estimating the costs that would be needed in order to reach an adequate level of warmth. This definition was based on the most frequently used indicator elaborated by Brenda Boardman in 1991[5] according to which the **crucial threshold under which a household can be considered energy poor is the case when it spends twice as much as the median expenditure on energy**. The calculation of this indicator highlights that the percentage, that was 10% in Ireland or in the UK till 2013 is not an absolute percentage that can be automatically used in any other countries, but rather an indicator that must be calculated in all countries. (e.g. based on this calculation method the crucial threshold would be 13% in Poland[6].)

Using Boardman's definition as a relative indicator (as both incomes and costs of energy change in time) the 10% ratio would be totally different even in the UK nowadays (some 12.2% in 2008). This fact may have led to the change in the official energy poverty indicator in England to use the **Low Income High Cost** – LIHC - approach, in which: "A household is considered to be fuel poor when:

- its required fuel costs are above the national median level (modelled to the building type, size of the flat and the household composition)
- was it to spend that required amount, it would be left with a residual income below the official poverty line" [60% median income]

[5] Brenda Boardman: Fuel poverty: from cold homes to affordable warmth, Belhaven Press 1991
[6] Szpor, 2016, Page 9

Figure 1: Fuel poverty under the Low Income High Cost Measures



Source: Centre for Sustainable Energy, 2014, p.5

This definition is sophisticated and touches some of the essence of energy poverty, but it requires a strong information basis, as it builds on an estimation of the energy performance of a given building as well as the income level of its residents. On the other hand, its clear advantage is that instead of simply assessing the rate of expenditure to the income of the household, it investigates the amount of the residual income. This is beneficial, since it acknowledges that the residual income indicates the financial state of a household rather accurately. However, this method has a major drawback (besides the heavy data requirements): it assumes that a household should have more than median calculated energy usage in order to be energy poor. Poor people may live in very small apartments with lower than median energy costs, that could still have problems paying their bills.

The indicators of the expenditure approach are usually calculated from household surveys (e.g. English Household Survey, Household Budget Surveys), sometimes complemented by energy performance modeling on a smaller sample.

2.2 The consensual approach: defining energy poverty through subjective definitions

Subjective definitions are based on what the households self-report; they are assessments of their comfort level and the affordability of their housing costs. This data are gathered by annual surveys in the European Union extended to some non-member states like Macedonia (Survey on Income and Living Conditions - SILC).

The SILC indicators measuring different dimensions of energy poverty are:

1. living in homes free of damp and mould
2. paying energy bills on time
3. ability to cool home properly
4. ability to keep home adequately warm

The data from 2012 are presented by the following maps:

Figure 2. Share of population with dwellings with leakages and damp walls (2012)

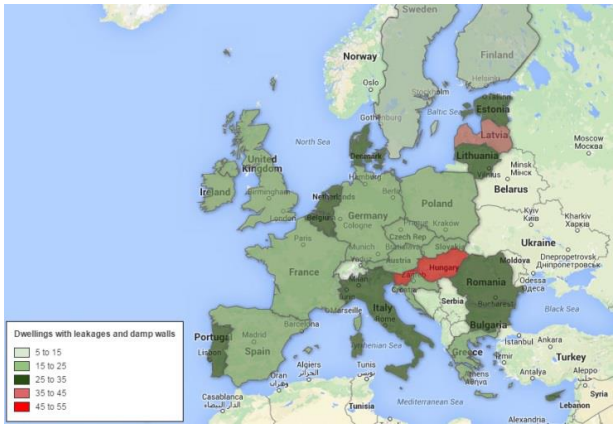


Figure 3.Share of population with arrears in accounts (2012)

Figure 4. Share of population unable to keep home comfortably cool

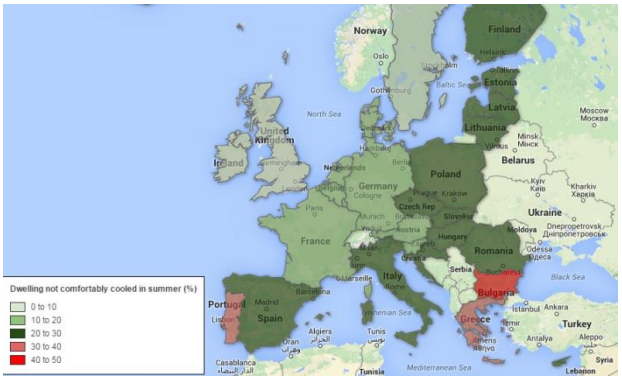


Figure 5. Share of population unable to keep home adequately warm

Source: INSIGHT_E, p. 16

As the figures show, different countries appear the most vulnerable, when it comes to different indicators; thus we could say that these indicators point to different understanding of energy poverty. The first indicator (share of population living in apartments with leakages and damp walls) refers to the physical state of the building which impacts the energy performance of the stock, but this connection is not straightforward. For instance, a building with favorable energy parameters may have blight and damp if it is made of clay, while it may not be leaking and having blight even if the energy parameters are rather poor, e.g. due to inadequate insulation around the windows.

Taking a closer look at the last indicator on the ability to keep home warm (that is the most widely used among SILC indicators regarding energy poverty) and assessing the latest data from 2016, it is visible that the split is less a Central-European/West-European, but rather a South-European/West-European divide.

Table 1. Share of population reported to be unable to keep home adequately warm (2016)

	Share of households in average (%)	Share of households among those below 60% of median equivalised income (%)	Share of households among those above 60% of median equivalised income (%)
EU 28	8.7	21	6.1
Austria	2.7	8.7	1.7
Belgium	4.8	16.2	2.7
Bulgaria	39.2	61.9	32.5
Croatia	9.3	21.7	6.3
Czech Republic	3.8	13	2.8
Cyprus	24.3	49	19.5
Denmark	2.7	7.9	2
Estonia	2.7	6.1	1.8
Finland	1.7	3.8	1.5
France	5.0	14	3.6
Germany	3.7	12.4	2
Greece	29.1	52.5	22.8
Hungary	9.2	22.7	6.9
Ireland	5.8	14.6	4
Italy	16.1	32.4	11.8
Latvia	10.6	22.7	7.3
Lithuania	29.3	29.8	29.1
Luxemburg	1.7	4	1.3
Malta	6.8	13.6	5.4
Netherlands	2.6	7.9	1.8
Poland	7.1	16.7	5.1
Portugal	22.5	42.7	17.8
Romania	13.8	25.6	9.8
Slovenia	4.8	14.2	3.3
Slovakia	5.1	17	3.4
Spain	10.1	23.2	6.3
Sweden	2.6	4.6	2.2
United Kingdom	6.1	14.2	4.5
Macedonia	25.7	39	21.9
Serbia	13.3	21.6	10.4

Source: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=sdg_07_60&plugin=1

The difference between countries cannot be easily accounted for by the differences in their GDP; neither by the rate of people being at risk of poverty. Climatic conditions do not provide a proper explanation either (energy poverty seems to be higher in Southern Europe, despite generally lower heating needs). The effect of the financial crisis could be excluded also as several years passed since 2008. **The most probable explanation for this divide is the restricted availability of proper heating sources, combined with generally lower level of GDP**. In the Southern European region it is very common that the apartments are not equipped with adequate heating facilities, considering that winter is not cold enough to

require this. Still, temperatures below 10°C are uncomfortable without heating. This lack of infrastructure may be the reason why the share of households over the income of 60% median still reported inadequate heating conditions[7].

The table also reveals that **energy poverty is a joint consequence of physical and financial attributes** as the share of households that are not able to adequately keep their home warm is substantially higher among people that have lower than 60% median income than among those that are over that threshold. However, it is also important to note that the average is very close to the share of households over 60% income, which presupposes that the majority of households that reported inability to keep home warm belong to those less poor (i.e., having an income over 60% of the median).

Proper level of cooling is less discussed in the literature than heating, however, taking into account the consequence of climate change it may become a crucial aspect as well, which should have policy relevance: when supporting energy efficiency new interventions should be involved like creation of a thermal mass, shading and night ventilation.

The data of the SILC survey overall highlight some strengths and weaknesses of the consensual, subjective approach:

- Strengths:
    - it is easier to collect than expenditure data as people tend to provide information more about their comfort level than on their incomes and expenditures;
    - possible to create EU (and extra) wide comparison;
    - it captures the wider consequences and causes of energy poverty.
- Weaknesses:
    - self-reporting: poor households may not want to identify themselves as energy poor;
    - subjective measures may not be proportionate to expenditure;
    - not based on a truly broad consensus of what factors constitute deprivation: persons may report energy poverty based on consumption preferences rather than lacking resources.

2.3 The consequences of different definitions

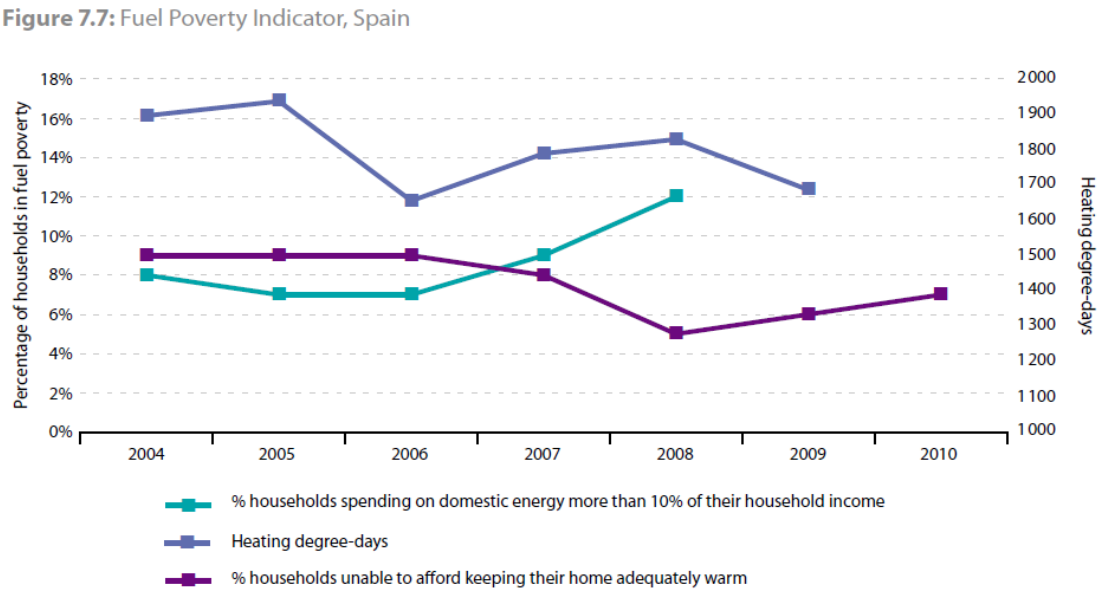
The approaches used (expenditure based versus consensual) and the thresholds created influence the location of energy poverty targets significantly. An example: the definition on energy poverty in the UK changed in 2013 and consequently have changed the groups considered energy poor. According to the preceding definition, more than half (53%) of the energy poor households were single, while their share according to the new definition became only 26%. According to the new definition 27% of the energy poor households have children while their share was only 11% according to the previous definition.

[7] This explanation was identified by the MRI-BPIE team, however was also mentioned in other pieces of the scientific literature like in the INSIFGT report.

According to a survey in England: “Comparing those who identify cost as a reason for being unable to heat their home, with those officially classed as being fuel poor in 2007, showed that there were fewer people in fuel poverty under the self-defined measure compared to the official measure. In addition, of those who self-identified themselves as fuel poor, only one in four were actually fuel poor by the agreed definition. Similarly, only one in seven occupiers who were actually fuel poor responded that they could not keep comfortably warm in winter.„[8]

The next figure also shows, in case of Spain, how the different indicators lead to different shares of the population being affected by energy poverty (not knowing the overlaps between the different groups.)

Figure 4. Energy poverty indicators in Spain



Source: Manual for statistics on energy consumption in households, 2013 p. 153

An analysis from Hungary[9] also shows that by comparing the two main indicator sets developed in the United Kingdom (1.higher than two times median expenditure on energy and the 2. LIHC indicator) very different target groups can be defined. The threshold based on the twice median expenditure was 30% based on data from 2011 (while it was around 12% in the UK). 10% of the households belonged to this category in Hungary (according to the National Survey on Living Conditions and Household Budget of 2011). In case we use an indicator close to the LIHC definition – however based not on modelled optimal energy consumption but on real expenditures - then 21% of the households would be regarded as energy poor. According to the first indicator (twice median expenditure) most of the energy poor are one person households. However according to the LIHC type of indicator families with children are much more endangered. According to this analysis **in case of both two**

[8] Manual for statistics on energy consumption in households, 2013, p. 152
[9] Fülöp, O, Lehoczki-Krsjak, A: Energiaszegénység Magyarországon, 2014

indicators detached houses are overrepresented among energy poor households (they have a 63% share in the normal population, while having 76 and 80% among energy poor).

In addition a recent working paper (Hegedüs and Somogyi 2018) analyzed the Housing Survey of 2015 in Hungary, and found that those households where more than 40% of the income is spent on housing costs can be found in all housing types in the same proportion (13-16%). At the same time, those households that do not face critical housing cost/income rates, but have a low residual income after the housing costs are paid (below the 60% of the average income), are twice as more frequent among single family houses than among residents living in housing estates. Moreover, flats without appropriate technological conditions are three times more common among family houses than in housing estates. **All types of housing problems (critical housing cost/income, substandard flats, low residual income) are the most frequent in smaller settlements** (below 5000 residents). Among social housing units— which should be the most protected share of the housing stock—all types of housing problems are twice as much than the average.

In Poland, in a recent analysis (Rutkowski, 2016), researchers applied the English Low Income-High cost definition as well. Instead of modelled energy cost they used an expenditure approach, using paid energy bills. According to the LIHC indicator, fuel poverty in Poland concerns 12.2% of households. Most often they live in villages (66% of households), in detached houses (65%), they are blue-collar workers (13%), pensioners (22%), people living in social benefits (25%) or farmers (33%). Their houses have rather large floor areas and their incomes are relatively low; these two factors combined result in energy expenditures being an excessive burden on their monthly budgets. Besides the LIHC definition, the question of energy poverty was also surveyed based on the self-assessment of the examined households. They were asked whether they were able to keep their homes adequately warm. The subjective measure of fuel poverty, i.e. declared lack of thermal comfort in the place of living in winter, reveals a different picture. The fuel poor, according to subjective measure, live mainly in cities (66% of households), in blocks of flats (61%), and in old dwellings (42% lives in buildings built before 1946). They are both blue-collar (30%) and other workers (16%), and pensioners (27%). Apart from relatively low incomes, the key factor related to this measurement of fuel poverty is the low energy efficiency of buildings, which in turn is highly correlated with their age. According to the subjective fuel poverty indicator, the problem concerns 11.5% households (approx. 4.2 million people).

The UK as well as the Hungarian and the Polish cases indicate that the different definitions lead to different target groups, that is why "**Who is fuel poor depends on the definition; but the definition depends on who you want to focus on and this involves political judgment**" (Boardman, 2010,p. 21)

One may question the usefulness of energy poverty indicators in case they appoint to different layers of the society, into different characteristics of energy poverty, and all together may result in a high share of the society. **What may be the use of an indicator that is not able to state exactly on household level who belongs to the group of energy poor and who does not**? According to the experience of the experts[10] there are multiple benefits of using and calculating energy poverty indicators, as:

[10] Based on the presentation of Sergio Tirado Herrero on the 25 of November 2019 at the international conference on energy poverty (Budapest, Energiaszegénység, Háztartások nehézségeitől a klímaválságig)

- It makes the problem of energy poverty visible for the decision makers;
- It helps creating energy poverty strategies by defining the different aspects of energy poverty (e.g. after 10 years of elaborating specific studies on energy poverty and working out energy poverty reports in every 2 years, Spain has created its National Energy Poverty Strategy in 2019);
- It points to the need for combining energy and general social policies.

2.4 The difference between energy poverty and income poverty

One may consider that the energy poor are income poor at the same time. However, as statistical analysis shows in Hungary[11], 54-60% of the energy poor are not income poor. (Income poor considered to be a household in case it has less than 60% of the median income of the society.) This result indicates that most of the income poor are energy poor at the same time, while less poor people may be energy poor additionally in case they have extraordinary problematic heating conditions or unfavorable parameters of their buildings. This assumption is strengthened by the statement of Buzar (Buzar 2007, p. 225): "The number of households suffering from energy expenditure problems does not match officially poverty lines defined by the state. This is because the amount of useful warmth in the home is also determined by factors such as the quality of the housing stock, heating systems, and daily occupancy patterns. Thus, aside from income, energy poverty-amelioration policies must also address technology and housing stock issues."

The Polish analysis shows a somewhat more mixed picture. According to the statistical data in Poland (Rutkowski, 2016) 12.2% of the Poles were energy poor in 2016, while "only" 6.6% was income poor[12] and energy poor at the same time. There were 5.6% who were energy poor but not income poor, while there were 7.9% of the population who were income poor but not energy poor. The latter is an interesting phenomena that may be explained mostly by methodological reasons: according to the Low Income High Cost (LIHC) indicator only those households are energy poor who has higher energy expenses to be spent on heating their homes than the median (this case the actual costs that a household with similar housing conditions and household composition spends). Consequently households that act atypically, meaning that heat their homes less than the others in their building and household types do (e.g. underheat due to financial difficulties) are not considered energy poor. By this mean a substantial amount of income poor households are not included into this definition.

On the other hand, it also happens on the contrary. As presented in table 1 most of the people living under 60% of the median equalized income did not report to be in energy poverty, on the other hand relevant share of the population above 60% median income reports to be in energy poverty. This fact also strengthens the consideration that **energy poverty is a complex issue that has a strong factor rooted in income but has additional dimensions as well**.

This consideration is important to stress for policy reasons: in case we think income poverty is equal to energy poverty than we tend to fight against it with traditional income related tools like preferential prices or allowances. These tools handle part of the consequences of energy

[11] Fülöp, O, Lehoczki-Krsjak, A: Energiaszegénység Magyarországon, 2014, p. 828
[12] Income poverty threshold defined as 60% of the median of equivalent income in the population

poverty but not the cause of it. In case we accept the complex nature of energy poverty than we have to use tools coming from the energy sector as well.

Table. 2. The possible tools to handle the dual nature of energy poverty

Generic income related tools	Income/energy combined tools	Generic energy related tools
• **Allowances to housing costs** • **Programmes to handle arrears (e.g. co-financing of debts, counselling)**	• Subsidized price level for certain target groups (e.g. for households using low amount of energy, or for vulnerable customers) • Allowances to energy consumption (e.g. subsidies to purchase solid fuel) • Prohibition of disconnection of vulnerable customers	• Subsidies to implement energy efficient renovation of the housing stock • Subsidies to change to more efficient heating sources • Subsidies to install RES in areas where grids are not available • Trainings to use energy more efficiently

Source: own compilation

Energy poverty is metered and interpreted on household level, it became the characteristics of certain households. While some of the policies to fight against energy poverty can only be implemented on building level. This fact may cause serious policy considerations in case of multi-family buildings: whether to support the renovation of the whole building or whether to implement targeted subsidies that provides extra assistance to energy poor households. This is one of the most crucial questions in creating the strategy on energy poverty in the REELIH project.

3 Challenges of measuring energy poverty in the REELIH countries

As was mentioned in the previous chapter energy poverty is a phenomenon that is related to a household not being able to finance/connect to proper level of energy services. It was also mentioned that this phenomenon is measured by different indicator sets (expenditure based and consensual) some of which provide a direct comparison with other EU member states (e.g. SILC indicator), while others set relative thresholds measuring energy poverty inside the country (share of people spending twice as median on energy, Low Income High Cost indicator). We have realised that **practically none of these indicators can be created in the three REELIH countries, as there are no data for measurement, or the data is not processed this way**. Consequently energy poverty can only be assessed in an indirect way, evaluating the nature of the phenomenon and defining the group of people that are in the highest risk of being energy poor.

3.1 Armenia

Armenia is a landlocked country in the South Caucasus region of Eurasia. Its territory is slightly under 30,000 square kilometres; its population is about 3 million, which makes it the most densely populated of the former Soviet states. It is bordered by Georgia on the north, Turkey on the west, Azerbaijan on the east and south, and also by Iran on the south. Roughly one third of the population (1.08 million people) live in the capital Yerevan. According to the National Statistical Service of Armenia, within permanent population, in the

beginning of 2019, the share of urban and rural residents was about 64% and 36%, respectively. Large Armenian diaspora populations live in the United States, France, Russia, Germany, Turkey and Iran.

There are approximately 19,150 multi-story apartment buildings in the country, 4,860 of which (25,4%) are located in the capital Yerevan. 4,420 apartment buildings (approx. 23% of all multi-unit buildings) are constructed of pre-fab concrete.

Armenia has a markedly continental climate with hot summers and cold winters and relatively short snowy months. The country is mostly located on a mountainous and highland terrain. The main energy source for the housing sector was district heating before 1996, when the system collapsed. Currently the residential sector is served by a diversity of heating systems as shown in the following table.

Table 3. Source of heat of dwellings (%)

	Urban (511,014 units)	Rural (252,440 units)
Private heating system	24	4.6
Central heating	1	0.45
Gas furnace	36.7	15.8
Electric heater	17	0.96
Wood heated stove	11.7	55.5
Animal dung heated stove	0.75	16.3
Other	0.51	0.38
No heating at all	2.84	0.44
Not stated	5.5	5.57

Source: National Census of 2011, https://www.armstat.am/file/doc/99486453.pdf

As the table above shows the heating sources are significantly different in urban and rural areas. While in urban areas gas and electricity are the main sources, in rural areas solid fuel – including animal dung – are in use.

There are no proper datasets to estimate the level of energy poverty in Armenia. There is a frequently quoted sentence, which source however cannot be found: “Energy poverty is a growing problem Armenia, especially in rural areas. Recent study done by UNECE suggests that at least 30% of population in the country can be considered energy poor, i.e. they have to spend more than 50% of total family income on energy and heating.[13]”

Energy poverty is not an officially recognised term in Armenia. The national energy legislations currently is occupied with establishing the normative energy standards of buildings and making the first steps towards energy passports. Even if the new legislative framework was built on a preliminary research in 2010, there is still no clear picture on the characteristics of the crucial part of the housing stock from energy efficiency point of view.

UNDP works in Armenia for 6 years and intends also to work out renovation schemes for different types of residential and public buildings. In looking for the pilot buildings to work with UNDP elaborated an analysis on the housing stock in Armenia according to which the households that suffer the most from energy poverty live in the countryside, mainly in those

[13] This sentence appears in different home pages, e.g. in https://eeas.europa.eu/delegations/armenia/38332/eu4civil-society-energy-efficiency-armenian-communities_en

regions where the climate is cold and the economic parameters are problematic (e.g. high level of unemployment.) In these regions (e.g. Shirak region) the multi-family buildings are built by pure concrete, without insulation, the common parts are not heated, and there are many empty, unheated units. Heating only part of the apartments into low temperature is a common phenomenon all over the country.

Even if we cannot obtain a proper dataset on the situation of energy poverty all around the country, we may have some insight from Yerevan (which is naturally the city with the best economic situation in Armenia). Habitat Armenia conducted a survey in Yerevan in March 2014 with 500 households (100 of them living in family, 400 of them in multi-family buildings - random sampling), in the framework of the REELIH project. The main source of heating according to the sample was natural gas complemented by wood (in family houses) and electricity (in multi-family houses). 66% of the respondents said to have less than 150,000 AMD (285 EUR) monthly household income and 77% of the respondents answered to pay more than 25% of their household income on utilities (51% reported to pay between 25-50%, 18% said to pay between 50-75%, and 7% reported to pay more than 75%). It is hard to believe in these numbers, as people would not be able to live under these circumstances, still it shows that the economic situation is crucial. It is also underlined by the fact that only 6% of the respondents said that they have air conditioner, however the summertime in Yerevan is very hot, and air conditioner is not considered a luxury even in Bosnia or Macedonia, whose climate is a bit milder. Consequently even if we do not have exact data on national level that would help to create proper energy poverty indicators, there are indirect datasets indicating that the affordability of energy and the quality of housing is a crucial issue in Armenia.

3.2 Bosnia and Herzegovina

Bosnia and Herzegovina is a former Yugoslav republic in South East Europe, with a territory of 51,000 square kilometres, and a total population of nearly 3.5 million according to the last Census from 2013. It is bordered by Croatia to the north and west; Serbia to the East and Montenergo to the south; also the country has a very short Adriatic coastline around the city of Neum. Sarajevo is the country's capital and largest city with a population of almost 440,000 people, followed by Banja Luka (200,000), Tuzla (121,000), Zenica (115,300), Bijeljina (114,700), Mostar (113,000), and the country has 9 further cities with populations between 50,000 and 100,000.

The current territorial and political setup of the state is defined by the Dayton Peace Accords signed in December 1995, ending the 3.5-year long Bosnian war. Geographically, the state is divided into two Entities: the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS). In addition to that Brcko district also belongs to the country. FBiH is further divided to ten Cantons. There are 79 municipalities in FBiH and 62 in RS. According to the results of the 2013 Census, the enumerated population was 3,531,159 persons, of which 2,219,220 (62,85%) lived in FBiH, 1,228,423 (34.79%) lived in RS, and 83,516 people (2,37%) lived in Brcko District. Thus the country is seriously divided spatially and its administration and legislative power is also divided, which creates serious problems in harmonizing policy solutions. E.g. legislation about Home Owners' Association management, operation, financing is completely different in the Federation, in the different cantons and also in RS.

Table 4. Share of multi-family and family dwellings in BiH (%)

	Share of multi-family dwellings	Share of family house apartments
Federation of BiH	18.6	81.4
Republika Srpska	12.9	87.1
Brcko District	9.5	90.5
BiH total	**16.4**	**83.6**

Source: Survey on Household Energy Consumption in BiH, 2015

As the data from the table above clearly shows, **vast majority of the residential dwellings are in family houses in BiH**. So even if REELIH puts multi-family buildings in the centre of its activities, it is important to see that it may affect only 1/8 of the housing stock the most.

Table 5. Source of heating in percentage of the total dwelling stock (%)

	District heating	Central heating*	Electricity	Natural gas	Fuel oil	Coal	Wood
Federation of BiH	9.6	20.4	4.13	0.98	0.07	6.02	58.8
Republika Srpska	5.2	16.3	3.24	-	0.09	0.67	74.5
Brcko District	-	21.1	6.25	-	-	1.25	71.4
BiH total	**7.9**	**19**	**3.8**	**0.58**	**0.08**	**4.04**	**64.6**

Source: Own compilation based on the data from the Survey on Household Energy Consumption in BiH, 2015
* Central heating in 85-90% is based on wood and coal in all Entities

As the table above clearly shows, **wood is the most dominant heating source all over the country,** which is less polluting than coal if burnt under proper conditions, but still heavily contributes to air pollution.

It is interesting to compare the national level data, with data regarding certain cantons. ENOVA implemented a detailed survey on the housing stock of Sarajevo canton in 2016 and found that 42% of the total floor area of multi-family buildings is heated by district heating, 33% by electricity and 20% by natural gas. Solid fuel does not pay substantial role this case. However in case of family houses, in Sarajevo Canton 43% is heated by natural gas, and 50% is heated by solid fuel (wood, coal, pellet, briquet). The worse housing stock (regarding the kWh need for heating/m²) in Sarajevo Canton consists of family houses built before 1960, and multi-family buildings built before 1970.

Table 6. The average share of the apartments which is heated in wintertime (%)

	Urban areas	Rural areas
Federation of BiH	69.5	56.8
Republika Srpska	67.2	47.3
Brcko District	55.3	54.4
BiH total	**68.4**	**56.7**

Source: Survey on Household Energy Consumption in BiH, 2015

The combination of high share of wood used for heating and the fact, that only part of the apartments are heated indicates that it will be extremely difficult to generate any kind of energy poverty indicator as the high level of debts cannot be considered (there is no debt if the energy does not come through the grid) and the share of family income spent on energy may also be misleading as it is spent on only partial heating of the flat, which may not result in proper thermo-comfort.

This question is not a theoretical one, but something with very strong policy implications. E.g. **family houses in Bosnia are in general spacious** (two storey high with 80-100 m² on each level) and were built for multiple generations. ("The measure of the success of your life was the size of your house.") Due to the strong migration from the countryside but also from the country itself most of these houses are partly empty and inhabited by pensioners, who are able to heat only part of the building. There is a paradox here for which it is not easy to find a policy solution: **people in these buildings may be considered energy poor as they do not have enough funds to warm up the building properly, however it would be extremely costly to renovate the buildings from energy efficiency point of view, knowing that they will remain partly empty afterwards**.

According to the Household Budgetary Survey of BiH from 2015, the average share of household income spent on energy, gas, water and other fuel was 9.4% both in the Federation and in Republika Srpska (133.2 KM, about 70 EUR/month). This share was somewhat lower in urban areas (8.4%) than in rural areas (10.2%). As this indicator is a very simple one and does not deal with equalised income, naturally the single households, and mainly the elderly have somewhat higher share of housing costs. Unfortunately we do not have information on which percentage of the households spend more than two times the median expenditures of their incomes on energy. Based on the Household Budgetary Survey these information must be available, but may not have been calculated yet.

According to social experts (World bank, Caritas, People in Need) the most vulnerable families regarding energy provision live in the countryside in family houses or in small towns. Even if there is a consideration that people in the countryside have better access too cheap wood, and heat smaller part of their (bigger) homes, the Household Budgetary Survey still shows that they spend somewhat higher percentage of their (smaller) income on energy than in urban areas.

We cannot calculate properly the rate of households being in energy poverty, but we may take the Macedonian numbers (24% energy poor based on SILC), and assume that in BiH this rate may be similar taking into account the similar characteristics of the country. The question is what we can do with a national level number when we try to identify energy poor households on individual and building level. One possible solution can be to look at the social safety net, and the possible overlaps between energy poor and socially vulnerable.

The social system is fragmented in Bosnia & Herzegovina: there are different allowance schemes in the different cantons and the different allowances interfere with each other. In certain cantons the amount of aggregated allowances may reach an average income, however it seems, that the target group of social assistance is defined in a very narrow way. In Tuzla Canton for example those families are defined to be in social need that has less than 100 EUR income, these are practically the families without any official income. In Sarajevo Canton allowance for the payment of district heating, natural gas, electricity and solid fuel is available for households where the income/family member does not exceed 35 EUR/head, or in case of a single pensioner 82 EUR/head, or in case he/she is disabled. The

living space for one person cannot exceed 44 m² and 10 m² for all additional person. The amount of the subsidy varies each year according to the budgetary possibilities. It is obvious to state, that the share of population affected by the social allowance system is much lower than the rate of people who can be regarded as energy poor based on any kind of indicators.

Box 1. Sarajevo energy efficiency support scheme

Sarajevo Canton (consisting of 9 urban municipalities) set up a new grant scheme in spring 2019 to support the complex energy efficient renovation of family, multi-family houses and public buildings. (For some years the issued subsidies for multi-family buildings based on energy audits by UNDP, but this was a marginal sized scheme.) The new support scheme was initiated in order to do something against the critical air pollution in the city. The scheme was planned and currently is implemented by the Sarajevo Regional Economic Agency. They plan to have two public calls every year (the first one was opened in March 2019). Applications require some basic documentation that could be completed without the help of an expert.

According to the original plans the grant could reach up to 45% of the intervention costs. In addition the Agency announced a public call to the banks to provide loans for the remaining 55% on preferential interest rate (3%), up to 10 years duration – both individual loans and loans to management companies. The municipality intended to pay the interest difference. The interesting part of the subsidy scheme is that the planners already calculated that for vulnerable households in privately owned multi-family houses it may cause problems to benefit from the support, thus they set up a Solidarity Fund. This fund would cover 100% of the interventions for those families that are in need. However there are only assumptions so far what does “people in need” mean. The set of criteria will relate to the moderate size of the flat, number of people in one household, income level, and the regular categories, like “veterans, disabled, living on low pension” etc. will also be applied . There was no clear idea about the exact thresholds and the size of the target group of the Fund. According to the plans the Fund will have moderate resources in the first year and will not be widely promoted as they intend to test its use.

The subsidy system was planned the way it was described above, however, as the reality shows in autumn 2019, due to the lack of proper public funds the successful applicants will get funding only for implementing the technical audits and not the renovation itself.

The practice of the REELIH project in Banovici also created a kind of interpretation on who the vulnerable are, who should be assisted in the energy efficient regeneration process in a multi-family environment: in negotiating with the HOAs volunteering for the energy efficient renovation the local municipality took the responsibility to pay the costs for 3 owners in a 12 unit building when it turned out that otherwise the other owners would not agree on the project. Thus there was no clear definition on who is vulnerable (energy poor), rather it was agreed on based on very practical considerations.

3.3 North Macedonia

North Macedonia was also part of the former Yugoslavia, becoming independent in 1991. It is located in South-East Europe, north to Greece and south to Kosovo and the Serb Republic. The country has 2 million inhabitants including the largest city of Skopje (500,000 inhabitants).

North-Macedonia is the only country from the three REELIH locations where one might have some assumption on the scale of energy poverty based on indicators. The SILC survey is

also implemented in North Macedonia, just like in other countries of the EU. According to the latest available SILC data from 2017[14] **24% of the Macedonian households stated that they are not able to keep their homes properly warm**. This rate is one of the worst comparing to EU countries, only Bulgaria (36.5%), Lithuania (28.9%) and Greece (25.7%) have worse ranking.

As SILC is a subjective indicator, one can never be sure what the reasons are behind this statement, whether it is about too high cost burden, whether it is about under-heated rooms, or whether it is about the fact, that apartments are only partially heated. Still, it shows that nearly quarter of the households are not satisfied with their energy conditions.

We are not able to create a precise expense based indicator, as we do not have access to up-to-date national data on the household budgets, but there are partial surveys that might be useful in defining the scale of the energy poverty problem. According to a survey of 2,922 households in 2013 the following data was collected (among others):

Table 7. Major characteristics of households (2013) [15]

	Agricultural neighbourhood	Mixed neighbourhood	Urban neighbourhood
Number of households interviewed	105	599	2 218
Heating by solid fuel stoves	97.1%	91.3%	69.5%
Heating by electricity	0.8%	3.7%	18.7%
Share of household income spent on housing, water, electricity, gas and other fuels	9.3%	12.3%	14%

According to the data above the share of income spent on energy is less in the agricultural areas than in urban ones. The reason behind it most probably is the availability of solid fuel on moderate or no price in the countryside. Which means that **even if the housing conditions or heating comfort may be worse in the countryside than in urban areas, energy poverty may not be more severe. However this lower internal cost (for fuel) may be counterbalanced by higher external costs (air pollution)**.

The data provided by this national survey can be complemented by a more detailed one, that included only multi-family buildings in some districts of Skopje and some bigger cities of North Macedonia. These surveys – carried out by Habitat Macedonia in early 2019 - were about the basic parameters of multi-family building stock. The following table shows, that even if the heating facilities are different (in some districts of Skopje there is district heating, but in all other cities there is not) electricity combined with wood is the most commonly used heating form in urban multi-family units. (While, according to the household survey of 2013 it becomes obvious, that solid fuel is far the most commonly used heating source in the country, as the housing stock consists of mainly single family houses.) In addition, the Habitat survey makes it also clear that relevant share of the buildings are in bad physical

[14] https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do
[15] Ilievski, 2014

state (leaking roofs, falling facades), so besides energy efficiency questions most of the buildings need urgent repair.

Table 8. State of the multi-family buildings in selected districts of Skopje, and towns of North Macedonia (in share of buildings)

	Karposh (Skopje)	Aerodrom (Skopje)	Chair (Skopje)	Gazi Baba (Skopje)	Prilep	Veles	Negotino
Most common heating form (and its share)	District heating (61%)	District Heating (64%)	Electricity (82.2%)	Electricity (37.6%)	Wood and electricity (48.1%)	Wood and electricity (28.6%)	Wood and electricity (83.7%)
Damaged façade without insulation	51.8%	46%	65.6%	77.3%	27.4%	28.7%	81%
Leaking roof without insulation	35.1%	54.5%	32.3%	69.3%	57.1%	29.3%	79.5%

There is a common assumption that multi-family buildings have a socially very mixed composition that is why it is nearly impossible to appoint buildings with worse or better social status. However this table (and also the interviews) shows, that there are districts of Skopje and towns of North Macedonia that are inhabited by higher income residents. And as the local municipal finance is heavily based on the income level of its residents, these municipalities have also bigger public sources to support any renovation activities (not surprising, that in Karposh and Centar municipalities of Skopje the local municipality provided 100% subsidy for energy efficient interventions of the multi-family building stock, while in other Skopje municipalities the support rate was 25-30%[16])

Based on the household survey made by Habitat Macedonia (2019) it seems, that even in higher-middle status areas (Gjorche Petrov municipality in Skopje and Veles city) only part of the apartments are heated: in Gjorche Petrov 50.75 m² is heated from the average 66.69 m² (in MFBs). In Veles these numbers are 36.88 m² heated from the average 60.5 m². These ratios may be even worse in case of family houses.

Regarding the share of income spent on energy the survey shows that in average households in Gjorche Petrov, in multi-family buildings, spend 11% of their household income on energy on a yearly basis, however this ratio goes up to an average 17% in winter time. These rates are 9.8% and 13% in Veles. Unfortunately we do not have access to these data bases to calculate the median (and the twice median) energy expenditure and calculate which percentage of the households spend more than twice the median cost on energy. However, what was already communicated in the REACH project[17] "If the English definition of energy poverty is transposed to Macedonia, than the percentage of vulnerable households rises to the 45% of the total number".

There are also other possibilities to estimate the scale of the energy poverty problem: based on the data of the Macedonian National Electricity Distribution Company (which is the only

[16] Recently, there is a tendency of Karpos and Centar municipalities which has been providing 100% subsidies for the common spaces (façade) to decrease the percentage of subsidies.
[17] Ilievski, 2014 p. 21

service provider in the country) over 40,000 household had unpaid electricity bills in 2014.[18] Taking into account that nearly all households are connected to the grid, and electricity is the most widely used heating source we may take the total number of households (about 570,000) as a basis, saying that **7% of them were in arrears.**

Another way of finding the ones with the lowest income and being the most endangered by poverty we can rely on the data of social services. The social allowance system is currently changing. (The new law was enacted in May 2019.) According to the previous version of the legislation poor people were eligible to get a maximum of 1,000 MKD/month (16.3 EUR) to contribute to the payment of district heating, electricity, coal, wood, oil. Poor people were considered the ones that were officially unemployed or not being capable to work. 35,000 households got support by this mean in the last years, but part of them only for some months, while others for 12 months. 9,000 payments were implemented in a year, which means that only a very marginal part of the households benefited from this support on a regular basis. In addition these households that benefited from heating allowances lived mostly in social housing blocks and in family houses of the countryside. **People with social title lived very rarely in privately owned multi-family buildings, so any targeted allowance scheme in case of the renovation of private multi-family buildings can hardly be built based on the social allowance eligibility**.

In addition this system is now undergoing major update. The new system is based on a guaranteed minimal income for vulnerable household and in addition the sectoral subsidies remain (e.g. heating allowances will also be issued to these families, 1,000 MKD monthly in 6 months/year. According to the calculation of the ministry 35,000+5,000 households may be the object of such guaranteed minimum, which **is 5-7% of the total households.** This might be much less than the share of energy poor households in reality, but still represents a substantial group.

Even if we have some assumption on the average rate of energy poor households it is still a question how to identify them in case there is a need for a targeted intervention. The box below displays a possible solution that was already applied:

Box 2. Looking for the energy poor in Skopje – the REACH approach

The REACH project (Reduce Energy Use and Change Habits - co-funded by the Intelligent Energy Europe Programme) was implemented in 2014-2017 in 8 South-East European countries, among them in North Macedonia. The programme aimed at conceptualising energy poverty and supporting small scale interventions in the apartments of energy poor households. In order to work with energy poor families first they had to be identified. In North Macedonia the implementer partner was MACEF (Macedonian Centre for Energy Efficiency), who had to establish a new mechanism for discovering who is energy poor.

In Macedonia the researchers intended to find apartments that were in the biggest need of intervention. They worked only in Skopje, so they had to work inside the parameters of the city. They automatically excluded district heated buildings considering it a “luxury”, as all rooms have to be heated, there is no room for under-consumption. (In addition district heating companies are very efficient in evicting people in case of non-payment, thus only those who live in district heated buildings can afford it.)

Finally the actions of REACH were targeted to a district of Skopje (Gazi Baba) were mostly former workers are located and the housing conditions were close to average of Skopje. MACEF cooperated with Red Cross to find households in financial need – having arrears in

[18] Ilievski, 2014 p. 7

electricity or heating. Consequently they defined energy poverty in two steps: energy problems by excluding district heating, and poverty problems by defining the households in need with the help of a social organisation. Finally they mostly worked with households who live in family houses. Most of the clients were pensioners not being entitled to full pension (having 200-250 EUR/months maximum).

As the case of the implementation of REACH project indicated, even if we have an assumption on the scale of energy poverty on national or local level, it is still a challenge to practically decide which households an energy efficiency programme should concentrate on in case it intends to provide special help to the most vulnerable. The already running subsidy programmes provided some alternative solutions:

- The decision on who is vulnerable is based on the opinion of the community: e.g. in three buildings managed by Habitat's own management company (Habidom) the owners agreed to pay the share of some households whom they considered vulnerable. However these were small communities, where people knew each other well.
- In local municipal programmes supporting energy efficiency renovations (e.g. the one in Gjorce Petrov district in Skopje) social targeting of the subsidies is considered – but not promoted. It happens, that in case an owner is entitled to social allowances he/she gets 100% subsidy instead of the regular 25-30%. As very few households are eligible for such allowances in privately owned multi-family buildings, this targeting affects marginal share of households.

Republic of Macedonia signed the Energy Community Treaty in 2006. Based on this Act the country has taken obligations to implement the acquis communautaire on energy, among others on treating energy poverty. Since then the term "energy poverty" appears in some strategic documents, however no exact definition on it was elaborated. The phrase is treated as part of the generic poverty and vulnerability concept. According to the draft law on Energy Efficiency (20 August 2018) energy poverty is mentioned only as a generic phenomenon from which residents should be protected, and the means of protection should be elaborated in a Renovation Strategy in the future.

4 Evaluation of the REELIH programme from energy poverty point of view

In the coming chapters the experiences of the field visits in Armenia, Bosnia & Herzegovina and North Macedonia are summarised to evaluate the strategy of the local REELIH projects from energy poverty point of view.

4.1 Armenia

Habitat Armenia in the framework of the REELIH project assisted the implementation of moderate scale energy efficient interventions in the common parts of the multi-family buildings (mostly change of entrance doors and staircase windows, improving the lightning system) in the cities of Yerevan and Vanadzor. The assistance combined two major source of financing:

- the use of the subsidy scheme operated by the municipalities (40% grant),

- the use of commercial bank loans (joint loans to the communities with personal guarantees behind). There are different types of funds that finance the bank loans to HOAs, but practically those ones were the most popular - having the best conditions – that were funded by Habitat Armenia.

By 2018 13 buildings were partially renovated through the assistance of Habitat Armenia in the framework of the REELIH project in Yerevan and Vanadzor.

Assisting the renovation of HOA buildings is a complicated task in Armenia as there are serious deficiencies in HOA legislation, the fine-tuning of the legal framework is still in progress[19]. The overall aim is to make the operation of HOAs more transparent taking into account that in Armenia a Home Owners' Association may consist of dozens of buildings. In the current system it is one of the biggest strength of HOAs that they are able to reallocate funds from one building to the other without the approval of the inhabitants, by this mean they can accumulate the reserves of many buildings into one in order to implement renovation. However it is the biggest impediment as well as no inhabitant can be sure where his/her money is going to, which limits the willingness to pay. The collection rate varies between 30-90%. The enforcement for payment of the management and operation fees is very poor in Armenia, which means that practically it is hardly possible to collect the payment by court decisions (eviction is also prohibited by the Constitution). So the whole payment system regarding maintenance and management fees is based on trust (or mistrust).

Based on all these uncertainties and the general mistrust in HOA management Habitat Armenia works with those communities in which the management is strong enough to have higher than average collection rate and is able to handle the tensions between the buildings when the renovation decision is debated. **Habitat Armenia** does not implement any kind of poverty (or energy poverty) judgement when choosing the buildings to work with, rather it **has to cooperate with the strongest communities** (e.g. Habitat requires at least 75% collection rate). Interesting enough, the target group of the individual subsidy programme of Yerevan municipality is practically the complementary group: HOAs with low collection rate, as the municipal programme provides 100% subsidy for the buildings most in need. **Thus literally the municipality works for more vulnerable households than Habitat does**. On the other hand it is important to notice that Habitat has much less resource and also can use its resources more on a repayable basis (funding commercial bank loans), consequently it has to turn to a relatively more affluent layer of the society. In addition the aim of Habitat is not only (and mainly not) the provision of subsidies, rather the establishment of a model, which will work on a more commercial basis on the long run.

Box 3. Renovation project with the assistance of Habitat Armenia

The 3 storey building is in the outskirts of Yerevan and consist of 24 flats.

As a result of the 3 million AMD (5,700 €) renovation the staircase windows were changed and the entrance door and the eastern façade were insulated. Besides these interventions the roof of the building was renovated with pure municipal funds.

[19] Habitat Armenia is part of the taskforce to assist the legal changes.

The inhabitants currently pay 15 AMD/m² as a maintenance fee, plus 200 AMD for garbage collection (about 1,000 AMD/unit/month altogether – appr. 1.9 €). This amount is very low not only compared to the maintenance fees in EU countries, but also compared to the Armenian salaries, which reflects how much building maintenance as an issue is neglected. The management of the HOA did not increase the common fee to finance the renovation costs, rather they cross-financed it from the other HOA buildings' reserves (there are 29 buildings in the same HOA community).

Through Habitat Armenia the HOA was able to get the municipal subsidy (40%) and a bank loan (for the remaining 60%), which made it possible to implement a more substantial renovation. The head of the HOA provided personal guarantee for the bank loan.

According to the audits of Habitat Armenia the energy saved as a result of the interventions was between 2-6%. Consequently the interventions did not have substantial impact on the financial situation of the residents, rather it had an impact on their comfort level (e.g. less cold stairways, somewhat warmer apartments). It is important to discover that there is limited space to implement energy efficient interventions in the common areas of the multi-family buildings. The stairways, the roofs and basements are common parts that worth retrofitting on a common basis. On the other hand the windows and the heating system belong to the individual properties. The walls of the façade may make a difference, however buildings that are covered by stone on both sides (thousands of buildings in the inner part of Yerevan) do not want to apply additional insulation as stones are relatively good insulations and considered visually attractive. In other buildings with totally or partially concrete walls - that are called "panels" – the insulation would make sense from an energy efficiency point of view, however it is nearly impossible to implement, as several owners already made interventions into the façade either by insulation or extending their apartments with an extra balcony/room. (ss displayed in the photo).

The assistance of Habitat Armenia in the framework of REELIH was based on the cooperation with Inecobank that provided AMD based commercial loan – from Habitat financial sources - with 12% interest rate up to the duration of 3 years. However in 2018

Inecobank terminated the lending procedure stating that it waits for the final changes in the legal system affecting the operation of HOAs. (Consequently the Habitat REELIH programme was also suspended in 2018 as regards the concrete renovation of buildings. Habitat Armenia currently works more on initiating changes in the framework conditions.) Besides the legal uncertainties the decision of Inecobank on terminating the issue of loans was based on their experience that it is not efficient to finance HOAs as these are relatively low amount loans (only partial interventions) while the evaluation of credibility under the confusing accounting systems and the underwriting procedure is much more complicated than in case of household or business loans. There are several types of commercial loans (mainly from international donor funds) for households to support energy efficiency, and it is much easier for the banks to supply these loans to individual clients than to provide loans to Home Owners' Associations.

Yerevan municipality that operates several types of support programmes (for roof renovations and renovation of the water and sewer system) has also formulated the critics on the confusing accounting and documentary system of HOAs which impedes the provision of financial sources in a systemic way. That is why the efforts of Habitat Armenia in training the managers for a more disciplined financial and accounting system is a crucial action to continue.

In case we intend to evaluate the activities of Habitat Armenia and the REELIH project from an energy poverty perspective we have to state that the activities were not targeted to the poorest communities not only inside the country but neither inside the targeted cities and the interventions did not result in significant reduction on heating /cooling costs thus they could not influence potential energy poverty substantially in a direct way. However we have to admit, that Habitat Armenia was rather working for the framework conditions to change: they worked on the creation of new financial schemes, created new networks with municipalities, influenced the national level legislation. These efforts will contribute on the long run to the creation of a more favourable ecosystem of renovation interventions, from which vast majority of the society can benefit from. In addition this vast majority of the society – as was described in chapter 3.1 – may have serious difficulties in securing proper thermo-comfort for an affordable price, thus indirectly the project of REELIH in Armenia may contribute to the elimination of energy poverty on the long run.

4.2 Bosnia and Herzegovina

The REELIH project is currently implemented by the company ENOVA in Bosnia. The first steps were taken by an individual consultant to Habitat, Esad Smajlovic, with the cooperation of the local office of Caritas Switzerland from 2014. In the first phase the emphasis was on the direct cooperation with pilot buildings in four locations: Tuzla, Banovici, Zivinice and Tesanj. In the last years the emphasis from working closely with buildings was moved to initiating changes in the legal and financial framework. In the early phase of the project the framework conditions developed in parallel with the pilots as new local/cantonal subsidy systems were created that were built in the financial scheme of the renovation projects (the pilot buildings obtained 40-50% grants, and the own share was provided either by cash or individual loans from banks or micro-finance institutions). In the last years a complete set of financial schemes has been developed:

- International donor funds and international banks are active in the country offering individual loans for energy efficiency (e.g. EBRD introduced a loan scheme on energy efficiency - 20% grant, 80% loan for the renovation of individual flats/houses).
- On Federation level the state resources are dedicated for the renovation of public buildings, however they are considering to introduce a scheme for housing purposes as well, though loans to management companies.
- More and more cantonal and local municipalities are dedicating resources to support the energy efficient renovation of family and multi-family buildings. E. Sarajevo canton implemented its first call for application in spring 2018, to support the energy efficient renovation of the residential stock by providing 45% grant.

In spite of the improved financial environment the main legal and organisational impediments could still not be broken through:

- One of the biggest impediments of implementing a collective renovation of HOAs is the legal obligation that owners who voted for the renovation have the obligation to finance it. Many like to interpret this condition as if there were a 100% approval needed for any large scale interventions. In reality a simple majority decision is enough, but the majority cannot enforce the payment obligation to the minority, so in case there is a willingness to finance the share of some owners who are not willing/able to pay, the renovation can be implemented. However, if there is a bigger opposition, the renovation process is terminated. This legal obligation is a major impediment, which paralyzes the renovation process and allows only smaller or much disciplined communities to implement renovation.
- The legal processes against arrears in common fees are very weak in Bosnia, a court decision may take years to get. Consequently the collection rate depends rather on the trust towards the management and the other owners.
- The accounting system is somewhat similar to the one in Armenia: the management company has only one account in which the buildings have sub-accounts (in the best case), or just separate accounting sheets. By this mean the management companies can reallocate the funds from one building to the other. (In case there would be separate sub-accounts then the owners should agree on the reallocation, but in cases where these sub-accounts do not exist the transfer is hidden from the owners.) Thus the buildings are very vulnerable to housing managers. Not mentioning the fact, that since there is often only one management company in most small cities, the competition for better managers is very limited.

Based on these impediments the REELIH pilot project for the renovation of HOA buildings had to work with those communities where the organisation and financial capacity was better than the average. Originally the project had social goals: to find buildings inhabited by vulnerable people, but it soon turned out that the financial capacity would be an impediment, so the social aspects had to be given up.

Box 4. HOA renovation in Banovici

Banovici is a municipality with 23,000 inhabitants in Tuzla canton (9,000 live in the urban part of the municipality and the majority in rural areas). The economic basis of the town was the coal mine, which still has strong importance. Multi-family buildings are located in the centre, where relatively affluent people live – with 400-500 EUR/month salaries. About 50% of these units are connected to district heating, which is about two times more expensive than electricity heating. The average maintenance fee for the multi-family unit is

7.7-10 EUR/month (which are managed by the only management company of the town).

Banovici municipality joined the Habitat programme, in which the municipality provides a 25% subsidy complemented by Tuzla Canton with an additional 25%. In addition the municipality paid the remaining 50% for those households whom they considered vulnerable. There were no clear rules of vulnerability, it rather depended on the opinion of the majority of the residents. First the municipal coordinator intended to reach at least 80% agreement on the application, and if it is succeeded then individual circumstances were evaluated. So far only 3 buildings were completed in the city (and 5 are in the pipeline) and each followed a different model. In one building all the owners took individual loans for co-financing. In other case the own share was paid from savings. In the largest project the management company took the loan, which was repaid by the owners in one year – or in exceptional cases in two years. Only in the first building 3 owners got the 100% subsidy from the 12 apartments. In the last two buildings there was no individual extra municipal subsidy provided.

In case of the biggest building that was renovated (41 apartments, displayed in the photo above) the investment cost was about 1,000 EUR/household, 50% of which was subsidized. It was also common, that people switched from wood heating to electricity by buying new heaters, which resulted in extra investment, but much less operational costs on the long run.

The municipality never analysed in details the pay-back period but they assume that the 50% own-share may be paid back in 5 years time with a 30% savings on energy (none of the buildings were district heated). According to their experience the major goal of the owners to join the programme was to fix the most crucial structural problems of the buildings (e.g. falling facades, leaking roofs). The municipality also did not think much about savings and energy poverty, rather about decreasing air pollution and increasing the aesthetic quality of the city.

The renovations do not have budgetary consequences in case district heating is the heating source - which is a major source in bigger cities of Bosnia - even if the building is metered (which is not the case in most buildings). The heating fee is calculated on Cantonal level based on m², which does not change in case of renovation. Budgetary impacts can be experienced in case of individual (e.g. wood, electricity) heating. One can only meter the heating consumption in case of district heating when the apartments are metered directly, not only the building, which is an unrealistic expectation. However in Sarajevo the canton decided to introduce individual building metering from 2020, but there may be doubts if it will really happen.

Besides the technical barriers saving energy and saving costs was a less considered aspect in the REELIH pilot projects. Either as the building was district heated and not metered individually (e.g. in Zivinice) or the owners did not count on saving energy but were happy with the higher thermo-comfort (e.g. smallest buildings in Banovici). In addition to these most

people paid more in the first 2-3 years after the renovation as they took individual short term loans that have to be paid back and they implemented additional interventions (like changing the wood stoves to electric heaters). Consequently their overall costs did not reduce on the short run, rather on the contrary.

Even if the pilot projects themselves do not seem to contribute to the elimination of energy poverty on a direct way, they pointed out the most crucial elements of HOA renovation. Based on these lessons REELIH project in Bosnia currently do not deal with individual buildings any more but rather with changing the ecosystem of renovations. In the last years Enova elaborated on cantonal level renovation strategies in Central-Bosnia, Tuzla, Goražde and Sarajevo, which included the technical evaluation of the multi-family building stock and the establishment of reliable financial sources for renovation.

4.3 North Macedonia

Energy efficiency activities in multi-apartment buildings has been implemented in North Macedonia since 2009. The REELIH project started in 2017, following the previous project "Improving energy efficiency for low income households" implemented between 2011 and 2015. Under the REELIH scheme, Habitat Macedonia cooperates with local municipalities in Skopje – which are responsible for housing issues. These municipalities provide subsidies to the buildings (30-100%) for insulating the facade, basement and roof, however they require most of the windows (70%) to be changed. Consequently the local municipalities are the ones that issue the announcement for the renovation grant and start working with the communities to evaluate their financial state.

In case the inhabitants are not able to finance the own share of the renovation and the costs of the window change then they may have the possibility to ask for the financial help of Habitat, which scheme is tied to the local renovation programmes. Habitat provides a maximum 84 months' loan to individual households. The eligibility for the loan provided by Habitat is based on an income check: the gross income per household member must be between minimum 8,000 MKD (130 EUR) and maximum 25,000 MKD (400 EUR) - the maximum must be below 75% of the national average income. (Above 75% average income a household can easily take commercial loan for paying for the interventions.) There is also another scheme in operation by Habitat: this case the management company takes the loan form Habitat and has a contract with all homeowners on the payment. These are typically short term, less than 2 years, loans.

Research showed that 25-30 Euro/month is the instalment that families are able and willing to pay. Habitat is the entity that collects the fees for the renovation and pays for the construction work. Habitat Macedonia already completed 72 buildings by means of these specific financial schemes under the framework of the REELIH project, about 50% of which was implemented in Centar or Karposh districts of Skopje, where the municipality provided 100% subsidy for the renovation of the façade.

Habitat has other financial schemes besides REELIH. E.g. Habitat provides funds for micro-finance institutions that provide individual loans to vulnerable families to renovate their family houses. This programme is running mainly in the countryside in settlements inhabited by Roma population.

Habitat Macedonia works with Home Owners' Associations that mostly have quite uncertain management structure. According to the national legislation, multi-apartment buildings

should either be self-managed (registered) or managed by a company. Still 40% of the HOAs have not officially chosen any of these options (higher share of these buildings are outside Skopje). It does not necessary mean that these buildings are not managed at all, rather it means that the owners are afraid that management companies will steal their money and there is also no single person to take the responsibility to keep all the legislative obligations and manage the building officially. These officially not managed buildings are not legal entities, do not have the right to enter into contracts and have bank accounts. Hence, under REELIH, these buildings are eligible to apply only for funds (loans). However, if there is enough interest among homeowners, Habitat Macedonia can provide further support in registration or offer management by Habidom, their daughter company.

Habitat realised the deficiencies of condominium management and established its own housing management company: Habidom, that already has 114 buildings for operation (100 buildings + 14 staircases in different buildings, as a staircase may be an independent condominium). This company provides more transparent management (e.g. having different sub-accounts for operation and reserves for each building), by this mean they could achieve to have a 95% payment rate, and are also efficient in collecting the arrears. They also used Habitat loans for renovation works in 7 buildings.

Box 5. The first renovation project in REELIH in Macedonia

The first building that was renovated with the assistance of Habitat Macedonia in 2010 was a 12 storey high condominium with 120 units (see the photo). The renovation was initiated by one of the residents. The main reason for the renovation was the fact that parts of the façade started falling down and the residents were afraid of being hurt. The pioneer resident was asking for subsidies in his municipality for a long time, while three Mayors have been changed. Finally, the resident succeeded with the third Mayor who agreed to subsidize the renovation in case that all the windows will be changed by the residents. The façade insulation was paid 100% by the local municipality and the windows were changed by a loan from Habitat that the constructor took. All the 120 owners had individual contracts with the constructor with individual guarantees. The payment for the 3 years loan was 25-60 EUR/month. (The average heating bill was 40 EUR/month in all months of the year. After the renovation it went down to 20 EUR, however the price of district heating reduced that time anyhow. The average common fee for a unit is 3.2-6 EUR/month in Skopje.) The real value of renovation, as the residents consider, is the increase in the value of the apartment (100 EUR/m² price increase they realised). Also the air conditioning needs to work only some days in summertime instead of the whole summer period.

In the renovation they did not consider any social cases to handle, in spite of the fact that majority of the owners were pensioners.

Habitat Macedonia is the only one from the three REELIH partners that takes income checks seriously. In the preliminary phase, when the consent among the homeowners has not been achieved yet, only the self-declaration of income is needed. When the decision-making

process is done and the renovation process is agreed on, a detailed analysis of the homeowners' income is required before the start of the distribution of the loans to the interested homeowners. By this mean they do not finance very low income families (as they would be unable to pay the loans back) but still do not finance the better off families having higher income per head than 75% of the national average. Habitat made a survey among its renovated buildings and realised that 40% of its clients were pensioners. The selection method of the buildings to be supported by Habitat is somewhat different in Armenia and Macedonia: the municipalities that provide the subsidies make the pre-selection. They investigate if the project is stable enough, if there is anyone that should be personally supported and they offer the Habitat loan for the residents (or the management company). The social status of the residents is not an advantage or disadvantage here, important is that all owners should pay somehow (either by cash, or being eligible for the Habitat loan). Additionally, Habitat Macedonia provides also loans to the homeowners of multi-apartment buildings without a subsidy from municipality. In such cases, the representatives of the buildings approach Habitat Macedonia's office and go though the approval process in which Habitat Macedonia provides technical support and overall supports the homeowners during the decision making process for renovation.

Regarding the budgetary consequences of the interventions (whether they result in extra costs or costs saved in net) the results are dependent from many factors. In case of changing the windows and insulating the façade the energy saved can be 30-50%. In case of district heating the HOA has to apply for the district heating company to reduce the amount of heat to the building (not all HOAs do this application). In case it is completed, or the apartment has an individual heating system, the monthly cost saved can achieve 15-25 Euro, which might be equal to the monthly instalment of the 7 year Habitat loan. It is complicate to calculate the potential financial gain/loss as in case of individually heated apartments not the complete apartment but only part of it is heated. So even if the monthly instalments of the investments equal or exceed the energy costs saved on the short run, it is possible that under similar financial conditions the comfort level may increase as more rooms will be heated or the indoor temperature may increase.

5 Energy efficiency programs against energy poverty in Europe

As Table. 2 indicated, there are several tools to fight against energy poverty, energy efficiency regarding the building stock is only one of them, however this tool handles the causes of energy poverty with the highest efficiency. Supporting energy efficiency in the building stock (which is a topic of REELIH) is a commonly used tool in order to ease energy poverty, however it is more frequent in case of social housing in the western part of Europe as energy poor people are inhabited more in that part of the building stock.

In the coming chapter four examples of fighting against energy poverty by energy efficiency are analysed in details. The examples are coming from different regions of the EU and trying to show the variety of factors behind the policies. All the four case studies concentrate on renovation regarding the privately owned housing stock as practically complete private ownership in the residential sector is the case in all three REELIH countries that is why projects in the social housing sector are less relevant.

5.1 JESSICA Lithuania

5.1.1 Background

Lithuania has a population of 3 million, 66% of which lives in more than 38,000 multi-apartment buildings that were built mainly before 1993, and 98.6% of those multi-apartment buildings are privately owned. Around 65% of multi-apartment buildings are heated by district heating.

The Lithuanian Housing Strategy was approved in 2004 (and updated in 2015) with the aim to ensure effective use of existing housing, maintenance, upgrading and modernization, including the rational use of energy resources. Two years later, the Government of Lithuania launched the renovation Program, but in 2007 it ran out of money. The intention to implement JESSICA for the modernization of multi-apartment buildings was foreseen in the Law on State Support for Housing (approved in July 2009, amended in 2013) and in the amended Programme of the Government of Lithuania (approved in December 2008, amended in 2013). The original plan was to renovate 500 buildings per year, but this goal was only achieved in 2015 first.

5.1.2 Description of the project

The Multi-Apartment Buildings Modernization Programme is one of the main instruments of the Lithuanian Government to implement energy efficiency renovations. During the 2007-2013 programming period it was financed by JESSICA Holding Fund Lithuania ("JESSICA I")[20]. JESSICA I (Holding Fund Lithuania) was established in 2009 with 173 million EUR EU structural and national funds and had four financial intermediaries. It primarily offered preferential loans for energy efficiency modernization of multi-unit buildings built before 1993.

The financial support offered by Jessica I covered:

- 100% grant for preparing the documentation (investment projects, technical project, supervision, etc.)
- 45% loan rebate if a minimum energy efficiency level is met (level D)
- Exceptional 100% subsidy on all expenses for low income households.

The participation in the renovation programme required and still requires a 50%+1 majority vote in the condominium general assembly. The programme's main element, the preferential loan could have a duration up to 20 years, with interest rate fixed for the entire loan period at 3%. Banks may have required a down payment, but not more than 5% of the costs. There was no collateral required for the loan, rather the cash-flow of the condominium was investigated.

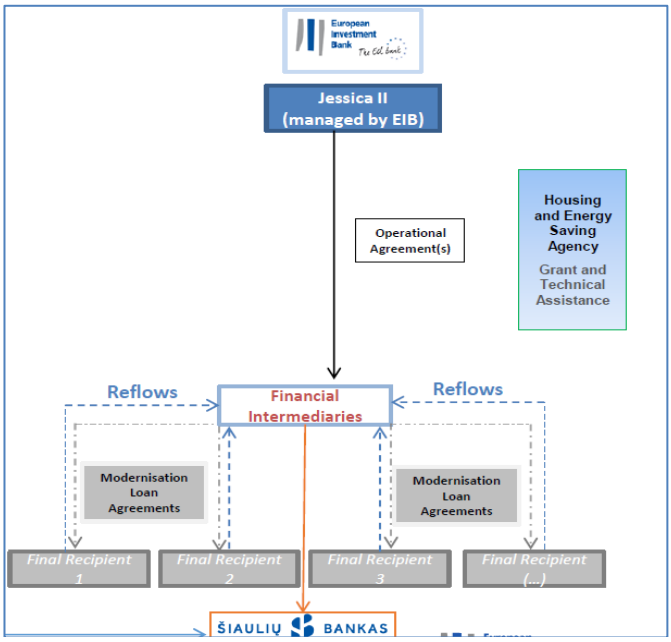
The interest for the Jessica I. fund was very moderate up till 2013 when a relevant change in the procedure was accomplished: from 2013 the local municipalities got the responsibility to assist the condominiums and submit their applications. The condominiums still remained the possibility to submit an application on their own but they also had the possibility to turn to the local municipality. Between 2013-2018 almost 2000 buildings were renovated, 75% were assisted by the local municipality.

[20] JESSICA stands for Joint European Support for Sustainable Investment in City Areas and is an initiative of the European Commission (EC), the European Investment Bank (EIB) and the Council of Europe Development bank (CEB). Jessica I was a financial engineering instrument, which blended EU and national funds to bridge the financial gap for energy efficiency projects in Lithuania.

In May 2015, Jessica II (Fund of Funds) was established as a follow-up fund to JESSICA I with 150 million EUR of 2014-2020 European Structural and Investment Funds (ESIF). One important priority for Jessica II was to maximize the leverage of its assets through private finance in order to minimize national public contributions to the scheme. To this end, the fund manager (the European Investment Bank) created a specific instrument called 'pre-financings', which are secured by the future reflows from the Jessica II portfolio. Fund of Funds basically continues objectives of JESSICA Holding Fund in the new 2014-2020 programming period.

By this instrument 180 million EUR of resources from financial intermediaries (including commercial banks and a public agency) was attracted. This was the first time that these institutions took risks of these types of loans in Lithuania. As a next step, the European Investment bank has developed a first-loss portfolio guarantee instrument, which aims to attract even more private funding.

Figure 5. Financing scheme of the Jessica programme in Lithuania



Source: Agnė KAZLAUSKAITĖ: Financial Instruments for energy efficiency in the programming period 2014-2020 (#ficompass presentation)

For Jessica II the scheme has been slightly revised and new financial conditions applied. The conditions changed over time, but according to the most recent one:

- **30% loan rebate** if a minimum energy efficiency level is met since 2018. Practically it means that the condominium takes the renovation loan and when the construction is completed and at least 40% energy saved is proved (not by metering but by calculation) than 30% of the loan equity is paid by the bank.
- **The soft loan has a 3% interest rate** in the first 5 years (loan duration may reach 20 years). Just like before 2015, there is no need for collateral other than the cash-flow of the building, however applications are rejected if more than 10% of the owners have debts in paying common fees. (However this debt can be repaid and then eligibility starts again. Sometimes municipalities help condominiums reducing their debts.)

The technical content of the renovations are always complex as at least 40% energy saved (and reaching level C energy performance) is a preconditions. So in most cases the façade, roof and basement are insulated, the heating system is modernized, sometimes the windows and doors are changed (this is usually completed already) and sometimes renewables are applied.

The applications are submitted to the BETA (Housing and Energy Saving Agency) which supervises the technical plans. The loan is issued by VIPA (Public Investment Development Agency) or one commercial bank (as currently only one bank is part of the programme) but the whole repayment procedure and checking of the renovation works is done by the project manager (who in 75% of the cases is a municipal expert.)

From 2013, when the municipalities got more closely involved into the programme, the local municipalities make an inspection to define the most inefficient buildings in their territory and they try to concentrate their assistance on them. Besides, in the last years, based on a pilot project in a smaller city, the evaluation procedure prioritizes those buildings that are in urban quarters that are covered by a “complex energy efficiency plan”. This plan takes into account that in case buildings are renovated then the demand for energy decreases so the energy production should also be reduced. Consequently these plans include actions towards the renovation of residential buildings but also pubic and commercial ones with the restructuring of the energy sources. In the last application round 50% of the applicants belonged to urban areas covered by these complex plans.

The affordability of the renovation scheme is secured by two means:

- The financial plans for the refurbishment projects are designed so that the loan repayments can be done thanks to the savings on the energy bills, so the loan instalments cannot exceed the energy costs saved. This calculation is done based on a software that is plugged in the application. So it is a major requirement for all applicants not to put extra money on the monthly energy balance. However there are exceptions from this major rule:
    - In case an owner intends to implement more energy efficient interventions in its apartment which would increase the repayment period than he/she has to sign a special declaration on it.
    - As calculations on the pay-off period are based on energy price estimations they are always uncertain. E.g. in the last years the price of district heating decreased in many municipalities as they transferred their heat source to biomass that resulted in 40% drop in prices. This case the savings on energy became much less than expected thus the loan installment exceeded the energy costs savings. In average it is calculated that a typical investment project in the subsidy scheme has a 12 year return period with the 30% subsidy rate.
- The municipality (from state resources) pays back the loan for those households that get heating compensation (allowance on heating, hot and cold water) during that period when the family is eligible for the allowance. By this mean the most vulnerable households do not have to face financial difficulties in participating in the programme. In spite of this generous subsidy scheme experience showed that these households were able to paralyze the renovation process by voting against it, so according to a regulation currently they lose the eligibility for heating compensation for 3 years in case they do not vote for the renovation. That is why in recent years these low

income households became the biggest supporters of the renovation programme. However it is important to note that the Lithuanian social allowance scheme is not very generous and only some percent of the population is eligible (it may be higher in the countryside and in smaller cities). Practically this means that only part of the energy poor gets assistance, while the others are obliged to pay their utility bills and their share in the renovation works.

5.1.3 Impacts

Even if the programme had a low start (only 25 buildings in 2011, 56 in 2012, 41 in 2013) it accelerated when the municipal assistance was introduced. The additional factor for the acceleration of the programme was to take out the obligation that only legally established home owners associations are entitled to submit an application. As about 80% of the home owners' communities are not legally organized into a HOA, they are managed by the municipalities and have their own bank account – as it is obligatory – but reluctant to deal with their common matters themselves. In the first years only legally organized HOA were eligible, but recently this is not a precondition any more, thus much more communities could enter the process by the assistance of the municipality.

By March 2018 approximately 2,500 buildings were renovated (out of the 38,000) which included about 75,000 households. Another 500 buildings has already started the implementation, this year (February 2019) 720 applications were already submitted. There are some smaller settlements where all the multi-unit buildings were already renovated in the last six years. **The average renovation cost/apartment is about 9,000 EUR.**

The minimum expected energy saving was 40% in the buildings, but it turned out to be an average of 50%, many times reaching 75-80%. The renovation has a positive impact on the real estate prices, that seemed to be 20-25% higher in case of renovated buildings.

One of the components of the success of the Lithuanian scheme its high digitalization level. The applications must be submitted electronically where several calculations are done automatically. Also the whole procurement process is done by means of web based tools which creates high competition among the construction companies, thus help keeping the construction prices moderate.

5.2 Eksikonomisi kat ikon project – subsidizing renovation in Greece

The Greek renovation programme, Eksikonomisi kat ikon (original title Εξοικονόμηση κατ' οίκον), was inaugurated in February 2011 and lasted until the programme funds were exhausted for each NUTS 2 region, separately. The last list of beneficiaries in the first programme was published in November 2016. The programme was co-funded by the European Regional Development Fund (ERDF) and national funds from the National Strategic Reference Framework 2007 – 2013. The total public budget for the programme was 396 million EUR.

5.2.1 Approach

The programme aimed to motivate citizens (owners) to improve the energy performance of their home, save money and energy, and increase the value of their property. It was the first large scale buildings renovation programme in the country. Furthermore, it aimed to support

financially low-income families that would not be able to fund the renovation of their property with private funding.

Candidate buildings were both single-family and multi-family houses and single apartments fulfilling the following three criteria:

- in regions with a property value (for taxation purposes) below or equal to 1.750 EUR/m²
- construction permit issued before 1 January 1980
- Energy Performance Certificate (EPC) class of D or lower

Although the energy poor were not explicitly the target group of the programme, it can be considered that the programme aimed **at tackling energy poverty as targeted families who lived in regions with low property value, in old houses with a low EPC class**.

In multi-family buildings, the approval of at least 50% of the owners was required in order that the building can be eligible for application. The owners' assembly had to decide on the renovation interventions that they would apply for. There was no limitation on the number of properties per citizen, while in multi-family buildings owners who did not wish to join the programme could fund the intervention with private money. Furthermore, citizens could apply for renovation of vacant apartments, if they were used the past three years.

Also apartment owners in multi-family buildings were eligible to apply, this case the object of the renovation was not the building but the individual flat inside the building.

Table 9 shows the income requirements for the three categories of potential beneficiaries and the subsidy benefit. The duration of the loan was from four to six years, but the loan was interest-free only until December 2015 (regarding the first calls). Prior to applying, potential beneficiaries needed a loan pre-approval from one of the four banks participating in the programme (National Bank of Greece, Alpha Bank, Piraeus Bank and Eurobank). In multi-unit buildings each apartment owner had to apply for the loan approval to a bank of his/her choice, individually. An energy performance inspection (to confirm that the house had an EPC class of D or lower) was compulsory to carry out. The inspection had to be conducted by one of the energy inspectors certified by the Ministry of Energy. For approved applications the inspection cost could have been included in the renovation budget. The renovation programme could also cover a consultation service expense, up to 250 EUR. After the renovation had taken place, the beneficiaries should conduct a second energy performance inspection to identify the new EPC class of their property. The aim of the interventions was to upgrade the property by at least an EPC class or **reduce the energy use of the building by at least 30%**. The maximum budget for renovation per house or apartment was 15.000 EUR, while beneficiaries would receive 40% of the application total budget in advance once their application was approved.

Table 9: Beneficiary categories, requirements and subsidy benefit

Beneficiaries Category	A	B	C
Personal annual income (PAI)	PAI ≤22.000 €	22.000 € < PAI ≤ 40.000 €	40.000 € < PAI ≤ 60.000 €
Family annual income (FAI)	≤40.000 €	40.000 € < FAI ≤ 60.000 €	60.000 € < FAI ≤ 75.000 €
Subsidy benefit	30% grant 70% interest-free loan (interest rate subsidized 100% until 31/21/2015)	15% grant 85% interest-free loan (interest rate subsidized 100% until 31/21/2015)	100% interest-free loan (interest rate subsidized 100% until 31/21/2015)

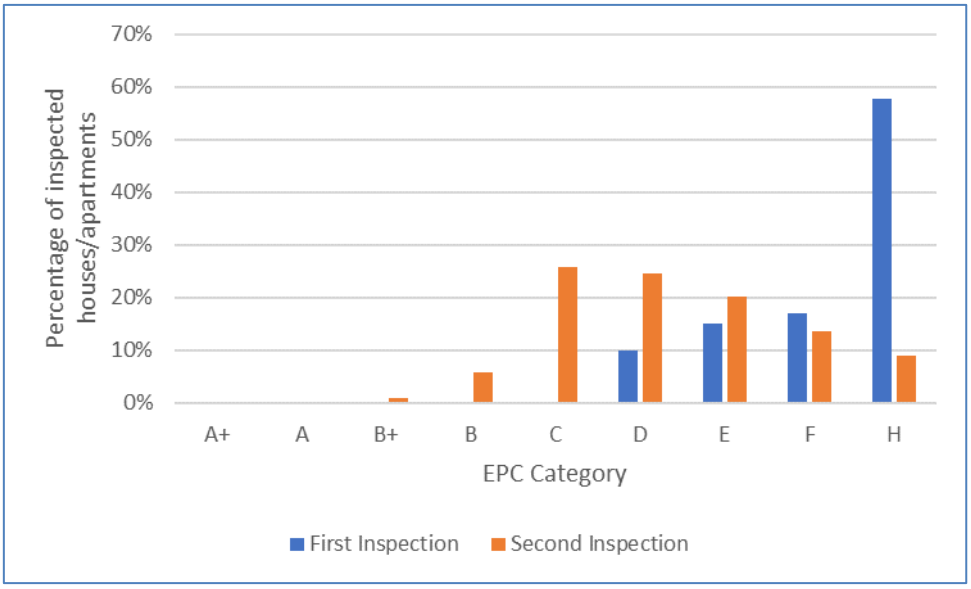
The renovation programme could cover the following interventions:

- Installation of thermal insulation on the building envelope, including the entrance and the roof of the buildings
- Replacement of window frames/glazing and installation of external shading
- Upgrade of the space heating and domestic hot water system (replacement of boiler, distribution network, installation of solar thermal collectors, upgrade of control system, etc.).

5.2.2 Changes in the programme

Six months after the start of the programme, the chosen thresholds resulted in low participation. That led to increasing criteria for the maximum property value to 2.100 EUR/m² and updating the personal and family income and the subsidy benefits as shown in Table 10. In addition, it was estimated that approximately 50% of the applications were rejected when applying to banks for loan pre-approval. Most of the buildings with a construction permit before 1 January 1980 were owned by people more than 70 years old. Banks were processing these subsidized loans as conventional loans, where their policy is to reject applications from people of that age group, resulting in high rejection rate even if the applicants had a younger guarantor. That resulted in removing completely the condition regarding the issue date of the construction permit. There were also cases where the **banks rejected applications due to the low income of the applicant, although the programme was originally aiming at subsiding low income families**. Furthermore, the banks required the loan to be issued exclusively on the name of the official owner of the house or apartment, not giving the possibility to younger relatives with a higher income to apply for the loan, even if they were living in the same house/apartment. Another issue reported was the long waiting time until beneficiaries would receive the remaining 60% of the application budget. The average waiting period was ten months. In total, more than 60,000 houses were renovated through this programme. Figure 6 shows the percentage of inspected houses and apartments before and after the renovation interventions per EPC category. After the renovation 33% of the houses and apartments had an EPC of Category C or higher, while the percentage of houses and apartments with an initial EPC of Category F was reduced from 58% to 9%.

Figure 6: Percentage of inspected houses and apartments before and after the renovation interventions per Energy Performance Certificate (EPC) category



Source: Buildings Energy Performance Certificates: 2015 Statistical Analysis. Available at: https://www.b2green.gr/el/files/B2Green.gr_PEA-Annual-Report-2015.pdf

Table 10: Updated beneficiary categories, requirements and subsidy benefit

Beneficiaries Category	**A**	**B**	**C**
Personal annual income (PAI)	PAI ≤ 12.000 €	12.000 € < PAI ≤ 40.000 €	40.000 € < PAI ≤ 60.000 €
Family annual income (FAI)	FAI ≤ 20.000 €	20.000 € < FAI ≤ 60.000 €	60.000 € < FAI ≤ 75.000 €
Subsidy benefit	70% grant 30% interest-free loan (interest rate subsidized 100% until 31/21/2015)	35% grant 65% interest-free loan (interest rate subsidized 100% until 31/21/2015)	15% grant 85% interest-free loan (interest rate subsidized 100% until 31/21/2015)

5.2.3 The current programme

A second programme (Eksikonomisi kat ikon II) subsidizing the same types of intervention was launched in 2017 with a total public budget of approximately 700 million EUR. As before, the programme was co-funded by ERDF and national funds from the National Strategic Reference Framework 2014 – 2020. However, in the second programme the loans were issued by the Hellenic Fund for Entrepreneurship and Development. Furthermore, the maximum budget for renovation per house/apartment was increased to 25,000 EUR and **the condition regarding the objective property value was removed to increase the pool of potential applicants**. In the second programme the income thresholds were split into seven categories as shown in Table 11. For categories 1 and 2 the aim of the renovation should be to achieve energy savings of at least 40% regarding the energy used by a reference building while for the rest categories the aim was at least 70% of energy savings compared to the energy use of a reference building. (As not reference buildings, but buildings with low energy performance were applying, the real energy saved was closer to 15-20%.)

To reduce bureaucracy and the long waiting period observed in the first programme, for the second programme the whole application procedure could have been done electronically by the energy inspector instead of the building owner. In that way, energy inspectors became familiar with the electronic procedure and were able to apply much quicker compared to each potential beneficiary submitting their application separately.

Table 11: Beneficiary categories, requirements and subsidy benefit of the second programme

Category	Personal annual income (PAI)	Family annual income (FAI)	Basic Subsidy benefit	Additional Subsidy per dependent child	Maximum subsidy level
1	PAI ≤ 10.000 €	FAI ≤ 20.000	60%	5%	70%
2	10.000 € < PAI ≤ 15.000 €	20.000 € < FAI ≤ 25.000 €	50%	5%	70%
3	15.000 € < PAI ≤ 20.000 €	25.000 € < FAI ≤ 30.000 €	40%	5%	70%
4	20.000 € < PAI ≤ 25.000 €	30.000 € < FAI ≤ 35.000 €	35%	5%	70%
5	25.000 € < PAI ≤ 30.000 €	35.000 € < FAI ≤ 40.000 €	30%	5%	50%
6	30.000 € < PAI ≤ 35.000 €	40.000 € < FAI ≤ 45.000 €	25%	5%	50%
7	35.000 € < PAI ≤ 40.000 €	45.000 € < FAI ≤ 50.000 €	0%	0%	0%

Based on the data of ETEAN 42,228 households were awarded, 44% of which applied not only for the grant, but for the interest-free loan as well. According to the experiences most of the applicants belonged to the 1-2 income category, thus the programme was able to meet the requirements of the poorest families (who had moderate income on paper).

In addition it is important to note, that relevant share of the interventions happened in multi-family buildings, but this does not necessary mean interventions in the building envelop. **The renovation works were practically done inside the apartments and not on the common spaces**, and contained change of the windows, change of the heaters, inner insulations and upgrading the hot water production system.

5.3 Dampoort Knapt Op! – Renovation in Belgium

The renovation project targets vulnerable families owning their own house[21] in the Dampoort district of Ghent (Belgium). The Dampoort district in Sint-Amandsberg has a typical 19th century urban planning in the outer suburbs of Ghent (the 3rd largest Belgian city).

5.3.1 Approach

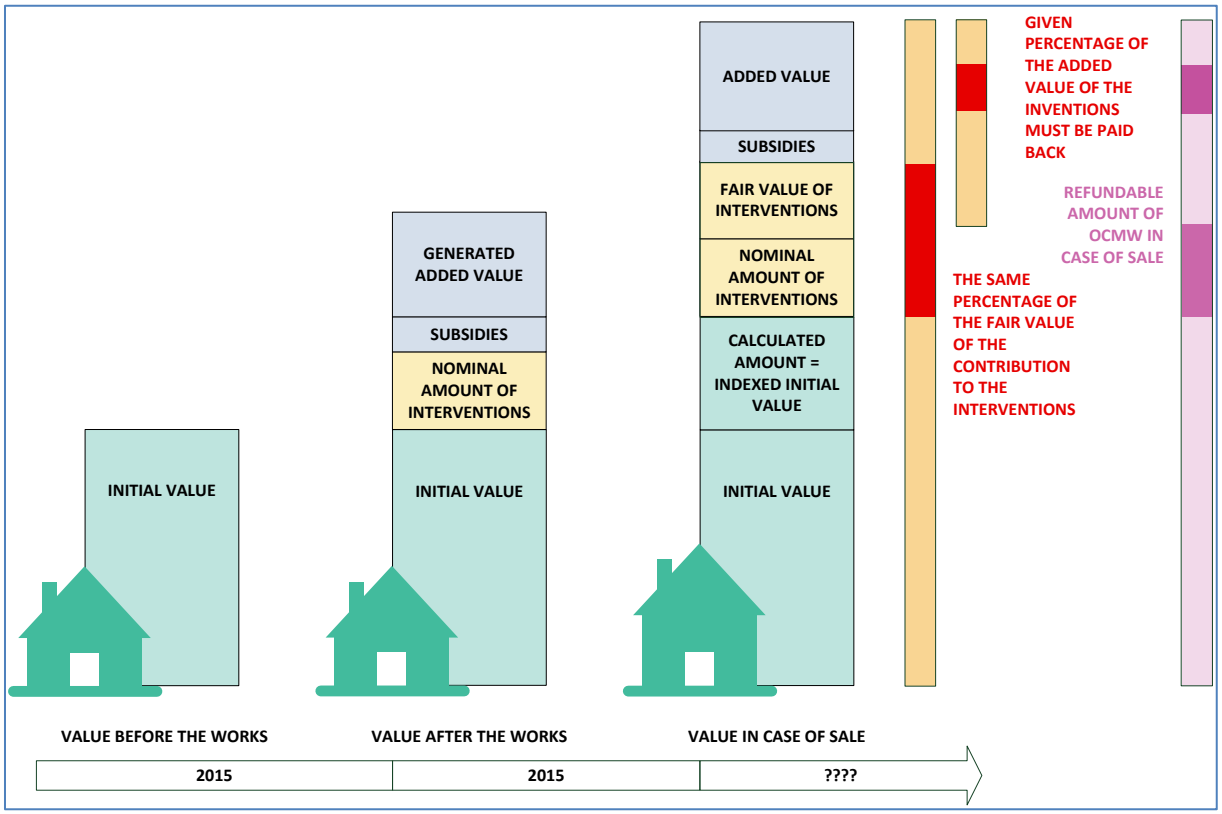
The project took a two-step approach:

1. **Developing a revolving fund**

[21] 4% of Belgian households are considered poor and own their own house. About one third of the Belgian houses in bad quality are owned by the inhabitants. Many lack the financial capacity to improve their property.

The Public Social Welfare Centre and the city of Ghent developed a revolving fund, making 30.000 EUR available per household. **The funding was provided as a long-term loan, and not as a subsidy. In case of sale or inheritance, the loan must be refunded, including an additional interest**. The repayment of the loan takes therefore into account an increased property value thanks to the 30.000 EUR investment, additional subsidies available and the increase in value over time due to overall increase in property value. This factor is further strengthened by the efforts of the municipality to implement the renovations in close proximity, thus the neighbourhood effect may contribute to the increase in property value. This scheme also means that the municipality shares the risk of changes in property value as it is theoretically possible that the value does not increase as much as expected, this case the municipality does not get back as much either.

Figure 7. Visualisation of added value to the 30,000 funding of subsides and increase property value over time



Based on the idea of Roel Spooren

2. Provision of support, advice and guidance

To unburden building owners, strong technical and social support, advice and guidance is provided.

Based on a social and building physical assessment, the consortium partners identified candidate households for the funding programme based on the following criteria:

- House situated in the specific selected area

- Household has “low-income” according to the “budget standard”[22]
- Inadequate quality of the dwelling: evaluation based on the Flemish Living Code (checklist with issues like CO-risk, humidity, single glazing, roof insulation)
- Owner can only own one property
- Presence of a fire insurance

This resulted in 62 candidates, from which the 10 most vulnerable households were finally selected for the first round of the programme. The vulnerability selection happened by parameters such as activation, health conditions, level of education, debts etc.

The technical partner in the programme (Domus Mundi – financed by the municipality) was responsible for the building related and technical aspects. They provided technical experts (mostly architects and engineers) with expertise in approaching the target group. They led for the householder on asking for offers for the works, compare prices, and guide the households on which measures and construction professionals to choose to ensure the best value for money.

The social partner (SIVI – also financed by the municipality) supported the households in aspects such as budget control, explaining legal issues (e.g. contracts), dialogue between neighbours (in a multi-cultural setting), administration, and changing energy provider.

The programme was considered as a ‘process’ and put high emphasis on building a community: **the households selected for the programme gather once a month to share experiences and support each other.**

Societal gains such as increasing local employment (as local suppliers were procured), overall welfare, health and wellbeing were key drivers of the project.

The loan is used to tackle the most urgent needs and improve the overall quality and performance of the dwelling, e.g. façade insulation, change of windows, improving heating systems, but also less evident measures such as electricity safety or improved bathroom or kitchen. If construction works were too large, habitants could move temporary to a ‘transit-house’ provided by the city of Ghent. The budget was maximised by integrating ‘DIY’ actions, incl. support from neighbours or other participants from the programme. It is important to note however that the **buildings in the programmes were more family or row houses**, thus there was no need for consensus amongst many owners in order to implement the works.

The public social welfare centre Ghent paid the invoices of the undertaken renovation measures. The budget for the project was 300.000 EUR for the first phase (2015-2017), and an additional 300.000 EUR for the second phase (2017-2019).

5.3.2 Results and follow up

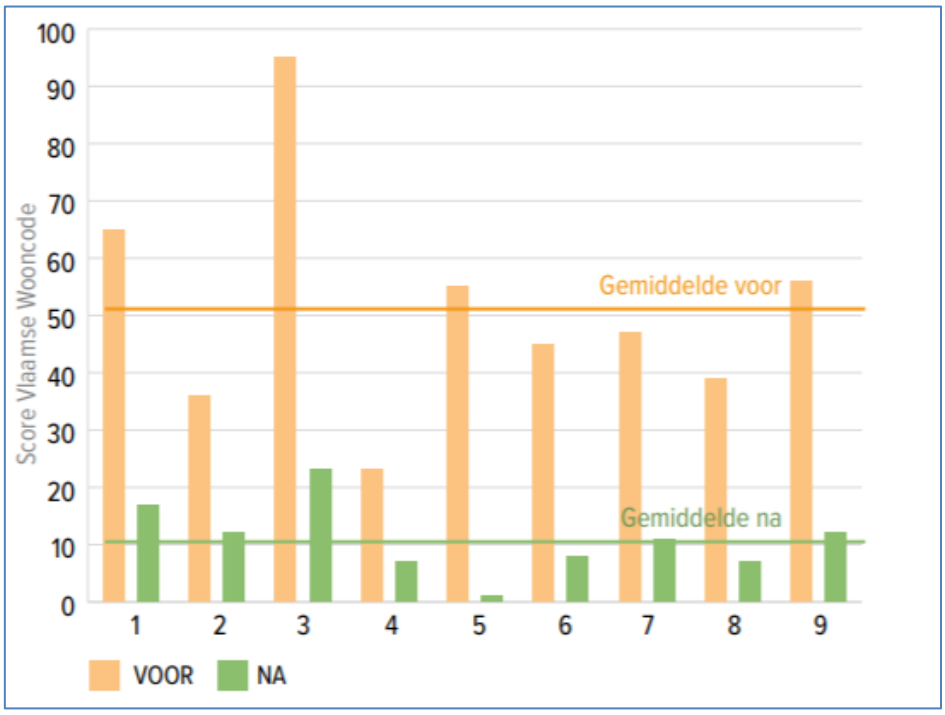
In the first phase (2015-2017), 10 households received funding, with a further 9 so far in the second phase (started in 2017). The project is about to be up-scaled recently as the city of Ghent won an Urban Innovative Action tender in 2018 which allows to implement the project for 3 more years and enlarge the number of households to 100.

In terms of energy performance, the average energy performance before the works was 520[23] kWh/m², after the works this decreased significantly to 170 kWh/m²

[22] Instrument developed by the University of Antwerp which indicates the minimal income needed for a humane living in the current Flemish society. http://193.191.186.169/remi_20141220/berekening.php

In terms of overall improvement of living quality and safety aspects, there was considerable improvement, as shown in the next figure.

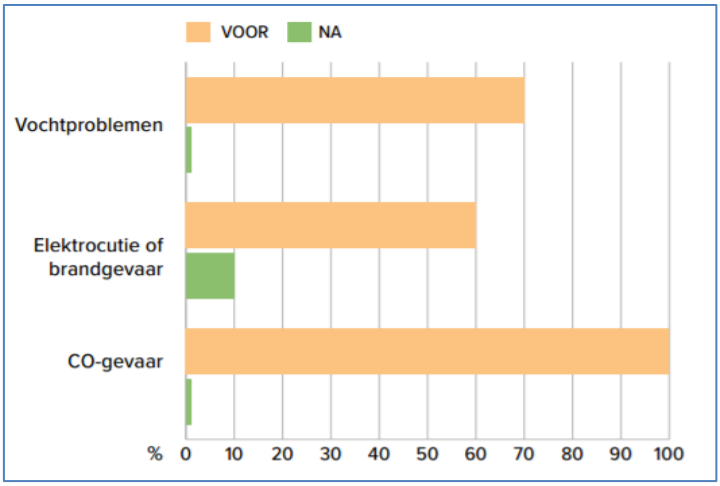
Figure 8 Impact of the renovation measures on the living quality – using the Flemish Living Code[24] as monitoring instrument



(orange "voor"=before, green "na" = after)

Safety and health risk were also successfully addressed by the project, as shown in the following figure:

Figure 9 Safety and health risks before and after the renovations



("Vochtproblemen" = Humidity problems, "Elektrocutie of brandgevaar" = Electrocution or fire hazard, "CO-gevaar" = CO hazard)

[23] 520 kWh/m²/year is comparable with the energy performance of an average single-family house in Flanders constructed in the period 1960-1970. 170 kWh/m²/year is comparable with a house in Flanders build in the period 2006-2009.

[24] The Flemish Living Code is an evaluation instrument which assesses the quality of the dwelling based on criteria like availability of roof insulation, fire hazard, CO-risk, single glazing or not, etc.

5.4 REACH – Reduce Energy Use and Change Habits

5.4.1 Description of the project

The REACH project was carried out between March 2014 and February 2017 with a total budget of 0,568 million EUR. It was funded by the Intelligent Energy Europe program and designed to offer practical and structural solutions that help to mitigate energy poverty. The project focused on the most vulnerable households, empowering them to reduce their consumption of energy and water and strived to establish energy poverty as a policy issue.

The project was undertaken in four South-East European (SEE) countries, namely Bulgaria, Croatia, Macedonia and Slovenia. The project partners included Energy Agency of Plovdiv (Bulgaria), Society for Sustainable Development Design (Croatia), Macedonian Centre for Energy Efficiency (Macedonia) and Focus Association for Sustainable Development (Slovenia).

The project was implemented in five pilot regions: Plovdid area in Bulgaria, Sisak-Moslavina county in Croatia, Skopje area in Macedonia, Zasavje and Pomurje regions in Slovenia.

The essence of the project was the recognition that general awareness raising, information or financial assistance programs do not meet the needs of the energy poor households. That's why there is a need of re-thinking the communication, advising and support for the households facing this problem.

The methodology of REACH was already tested and implemented successfully during the ACHIEVE project[25]. Findings from ACHIEVE have been replicated in REACH with adding different new angles to the concept. The REACH project took into consideration that the SEE region has some specific characteristics as compared to the EU. Energy poverty is much less tackled there (with very low or no political interest), there is no clear division between social housing and non-social housing, introducing market based prices that replaces the former subsidized prices created a big financial burden on the consumers, while there is almost no social support for energy poor households. So even if the methodology was very similar, this different socio-economic context was taken into consideration when implementing the REACH project. In these countries changing behavior plays a crucial role.

Main objectives of the project

The project had twofold overall objective: to empower energy poor households (vulnerable consumers) to take actions and change their habits, and to establish energy poverty as an issue that demands structural solutions (tailor-made policies and measures) at local, national and EU level. Considering measurable results, REACH identified its overall aim as to reduce energy use by averagely 10% and cutting their CO_2 emissions by 200 kg/year on average.

Each of the objectives was supported by specific and strategic objectives. **Specific objectives** included a) compilation of data and analysis of energy poverty situations in the four selected countries, in order to form definition(s) of energy poverty and policy recommendations; b) engagement and empowering of local actors to tackle energy poverty in 5 pilot areas; c) empowering of 1600 households to reduce their energy and water use, hence reducing their energy use by averagely 10% and cutting their CO2 emissions by 200

[25] ACHIEVE was also an EU project supported by Intelligent Energy Europe Programme of the European Union, for addressing energy poverty at a practical and structural level. It was implemented between 2011 and 2014 in 5 countries: Bulgaria, France, Germany, Slovenia and United Kingdom.

kg/year on average; d) engaging 160 decision-makers in tackling energy poverty as an issue that demands structural tailor-made solutions and create a platform for concerted formulation of structural solutions at national and EU level.

The **strategic objectives** of the action included a) identification of available approaches for energy poverty abatement that are applicable to other regions in order to launch similar actions; b) sustainability of local actions in the pilot regions and spreading it to other interested localities and countries; c) engagement of energy poor households in continuous efforts to save energy by showing them that **change of habits in combination with small initial investments can help them get out of energy poverty** and d) ensuring that energy poverty receives structural response in local, national or EU policies that will include tailor-made measures for energy poverty challenges.

Activities

Project actions were taken on two levels: practical level and structural level. Practical actions were crucial because for households facing difficulties immediate support is needed. However, on the longer term, practical actions need to be supplemented by policy level measures.

Practical actions included the following activities:

- Mapping of the energy poverty situation at the national level of partner countries and at the local level for pilot areas (conference, joint framework for data collection and analysis, reports, raising awareness of local actors through meetings, etc.)
- Transferring knowledge and skills from experienced partners to teachers, volunteers and energy advisors, who then performed energy advising for energy poor households (internal transfer workshops, developing training modules, organizing trainings)
- Visiting energy poor households, free advising about energy consumption and tailor-made advice
- Monitoring visits and results (checking the data collection and reports, constant support for advisers, methodology and tools for evaluation, telephone surveys, etc.).

Developing structural solutions was carried out by activities, like:

- Fine-tune the planned activities to the current political situation
- Recommendations for decision makers (based on a joint framework, but adjusted for each country)
- Advocacy policy work on national and EU level

5.4.2 Impact

The results of the project in numbers were the following:

- overview of energy poverty in 4 countries
- over 40 engaged local actors, more than 25 trained teachers and 250 trained energy advisors
- Visiting more than 1000 households
- Savings of about 1280t CO_2, 768 TOE of energy and 512.000 EUR
- Developed training modules and guidebooks for households
- National and EU policy recommendations presented to decision-makers, 160 decision-makers in tackling energy poverty

The project had some important policy impacts as well. For example, in Slovenia, the project was selected as one of the winning projects for disseminating good practices in the field of energy efficiency. Slovenian government adopted the concept of visiting energy poor households and is now running a nation-wide program to support those households. In Croatia key authorities gave support to REACH project, and other similar projects have been developed and are now implemented, and energy poverty is steadily raising on Croatian policy agenda.

Serbia, Bosnia and Herzegovina and Montenegro also showed interest in the concept and methods of REACH in decreasing energy poverty. The program in these countries started in 2015, with a slightly simplified methodology (one visit instead of two, no phone based evaluation of the visits).

Box 6. REACH In North Macedonia

The REACH programme in Macedonia was implemented by MACEF (Macedonian Centre for Energy Efficiency) from 2014. MACEF – as most partners in REACH – had a technical orientation, so there were several issues in the social dimension to discover. By a mixture of definition (excluding district heated buildings, targeting to a workers' district and cooperating with Red Cross to find the poorer households) they selected 400 households. They offered a 30 Euros package to all of them that contained 3 energy efficient bulbs, 10 meters of window insulation materials, water filter to infiltrate air into water and luminal foils behind the heaters. They checked the energy bills before the interventions, and once afterward, however in the summer period. (In addition it is not easy to measure the bills in case of heating with firewood.) Partly due to the deficiencies of measuring they did not experience substantial changes.

5.4.3 Energy poverty – the REACH definition

Unfortunately neither in the EU, nor in SEE countries exists a universal definition on energy poverty, and as a consequence, there is no statistic available which would be comparable across countries. In the last 30 years several working definitions were introduced, but none of them was really applicable for SEE.

Based on the households' physical and institutional settings in the SEE (inefficient residential stock, energy price liberalization, outdated energy supply system) REACH applied the following definition of an energy poor household: „*Energy poor household is one that has a difficulty, or sometimes inability, to be able to afford its basic energy needs. Basic energy needs considered by this represent the ability to have adequate energy indoors services: heating, cooling, cooking, lighting. It means being able to keep home adequately warm (as recommended by WHO), to have access to energy efficient refrigerators, freezers, washing machines, to have efficient provision of domestic hot water and indoor lighting." (Zivcic, 2016)*

REACH builds on the recognition that energy poverty in SEE is mainly caused by the convergence of low income, high energy prices, the usage of relatively expensive fuel sources and poor energy efficiency.

5.4.4 Future plans

The post action period of REACH covers 2017-2020. These four years are considered as delivery period. The expected impacts by 2020 include:

- at least three new countries that apply the REACH approach
- five generations of energy advisors trained in each pilot site (225 new advisors)
- 1600 households make a further 10% reduction in energy use
- policies and measures target 10% of energy poor households (similar to Europe)

An intention of the REACH project was to continue to represent SEE region in the EU or international level policy debates and processes. The following activities are planned:

- highlight aspects of energy poverty, which are specific for SEE region
- organizing debates in the European Parliament
- meetings with EU level decision-makers
- participating in on-going EU debates/events

5.5 Main lessons learnt from the projects

Based on the experiences of the four programmes described in the previous chapters and the lessons learnt from the programmes/projects shortly described in the annex some major conclusions can be drawn despite the different approaches.

5.5.1 Social targeting of the programmes

Most of the subsidy schemes that are aiming to foster energy efficient interventions are generic ones: they rather concentrate on the energy outcomes than the social outcomes. However the four programmes analysed above put special emphasis on social targeting:

- **In Lithuania the targeting scheme** (100% repayment of renovation loan for the most vulnerable) **connected the municipal support to an already existing social system**, namely the heating compensation scheme that is an allowance paid for financing heating, cold and hot water. By this mean there was no need for additional investigation of the eligibility criteria that reduced the transaction costs of social targeting substantially. There were generic considerations behind establishing such a connection believing that low-income households may paralyze the renovation process even if only 50%+1 majority is needed for the renovation decision. There was a common belief that better-off owners will not be willing to pay for the less affluent owners in case they are not able to contribute. Taking into account the fact that very high share of the buildings was renovated in some municipalities one may think that this social targeting scheme was able to fulfil its role and eliminated the barrier of low-income families being against the renovation works. On the other hand it is important to note that the Lithuanian social allowance scheme is rather restrictive, so not all the energy poor get the subsidy but rather the extremely poor. However it seems that **tackling the problems of the poorest can be an efficient tool to accelerate the renovation market in general**. It is also important to acknowledge that Lithuania became quite strong in digital solutions, so the eligibility of social allowances are crosschecked in different government database (taxation, other allowances, real estate ownership) and there are strong consequences of cheating, so even if there is a substantial grey economy in the country, incomes are controlled up to a certain extent, so the income eligibility criteria can be considered a kind of valid one.
- The social targeting scheme in the **Greek subsidy scheme** has changed over time. At the start of the programme there was a combined value of real estate/age of building/energy performance of the building/income of family targeting scheme, which

turned to be too restrictive. That is why the age of the building was left, such as the property value increased. Income categories changed also with different technical expectations and different subsidy levels. These conditions can be validated as far as the system is built on individual loans and individual subsidies, which is a basic feature of the Greek system. It may work in case of family houses, where several documents are needed from a family, but causes difficulties on multi-unit building level (there is no information however on how reliable the documents on the income level were, taking into account the high level of informal economy in Greece.) According to the experiences banks were reluctant to provide the soft loans to elderly and less affluent households, so **even if the programme was socially targeted, by means of using the banks' underwriting procedure it limited the social consequences of the subsidy scheme**.

- **In the Belgian case** there was a very careful targeting system: household income, target area, technical quality of the building defined the potential applicants, however to choose from them an additional vulnerability inspection was implemented on a case-by-case basis. **This very sophisticated social targeting however has very high transaction costs which might be understandable in case of a small scale pilot programme, but may not be efficient in case of a generic, nation-wide programme**.

In all three cases the targeted schemes benefited from the availability of different data bases. Data base on people having social allowance, EPC database on the performance level of buildings, tax database on checking the incomes of owners, real estate value cadastre to evaluate the eligibility of properties for subsidy were available in different countries. Evaluating the social conditions of the households require lot of efforts and transaction costs that is why any kind of data which is already available provides a great contribution to make the social targeting process economically more viable.

There are other aspects that may contribute to the affordability of the subsidy schemes, such as the direct financial gain it may result immediately after the renovation is implemented. By this mean the financial burden on the households can be eased. However this is the aspect where many projects fail. Even in the Lithuanian programme, where it was an obligation to plan the level of investments that way that the loan instalments could not exceed energy costs saved this calculation was overwritten by the reality due to the changing energy prices. According to the Lithuanian calculations the average pay-back period of a complex intervention resulting in 40% energy saved is 12 years with a 30% subsidy. This is a relatively short term if we compare it to the pay-back calculations in the REELIH countries due to climatic and technical reasons.

As the examples of the case studies (and also other examples analysed in the appendix) **show several countries struggle with creating a proper framework of energy efficiency subsidies that foster the market and leverage private funds but supports the most vulnerable more at the same time**. Each of these countries somehow considered what would have the higher overall social cost: 1) to focus on specific targets and collect individual data, with high transaction cost even if their reliability may not be sound/thorough, or 2) to risk the exclusion of relevant number of energy poor households who cannot take part in renovation projects due to low level of income, or 3) to risk the over-subsidy of more affluent households in order to support the poor with higher subsidy rate thus with higher public expenditures.

Some of the Central European countries have put these questions on their table and voted for higher level generic subsidies (e.g. in Romania there was an income based differentiation of subsidy rates, but than it was generalised on 80% afterwards). Other solution (in Lithuania) was to use the already available data sources (people who are eligible for fuel subsidies) to provide extra subsidy for those most in need. The decision between the three choices also depends on the availability of funding: as far as there is a relative overload of public funding (e.g. in case of EU funds in the EU member states) the risk of over-subsidizing is lower regarding the public budget. In the three REELIH countries however there is no overload of public funding except for the international donor funds for exceptional cases.

5.5.2 The proper level of financial assistance

In socially targeted schemes low income families get extra support compared to the generic schemes. In Lithuania this subsidy is 100%, in Greece 70%, in Belgium 100% as a refundable grant. This high level of subsidy cannot be financially sustainable if it is provided for everyone. These cases show that **regardless of the economic situation of a country the most needy households are considered to deserve very extensive subsidies**.

The Belgian solution of providing 100% grant which is repayable with extra interests in case the unit is sold or inherited is an interesting solution to bridge financial sustainability of a programme and the generous assistance of low-income families. However this solution requires high upfront investment from the municipality as it may take years to get the first repayments back, and also it may cause technical problems as lien must be put on the all apartments which would be a complicated solution in multi-unit buildings.

5.5.3 Assisting the owners to foster renovation

Energy poverty is not only about lack of financing but also about lack of ability and lack of information. Some of the above mentioned programmes put high emphasis on supporting the owners not only financially but also by technical and social assistance.

The assistance of the municipality resulted in the breakthrough in the Lithuanian programme, it was in the focus of attention in the Belgian project and also in the heart of REACH project. Using subsidy schemes and organising the renovation works require special skills mainly in case of multi-family buildings where different interests of the owners must be balanced. This is a profession and requires personal skills as well. The experience of the Hungarian soft loan system (interest free loan for the renovation of the common parts of the multi-unit buildings) also shows that many condominiums with low-income inhabitants were able to implement partial or complete renovations by means of soft loans, without direct grant in case their managers were convincing enough and were able to set a common goal for the community.

6 Summary of findings

The current research of Metropolitan Research Institute and Buildings Performance Institute Europe aimed at operationalizing the term “energy poverty” and analysing its applicability in relation to the REELIH (Residential Energy Efficiency for Low Income Households) project of Habitat for Humanity International in Armenia, Bosnia & Herzegovina and North Macedonia.

Energy poverty is getting to be more and more a popular term in the European Union calling the attention to the special phenomena when a household is not able to secure the

appropriate energy services (heating, cooling, cooking, and appliances) due to the combination of insufficient financial and technical conditions. It is important to call the attention, that energy poverty has two main dimensions: lack of financial resources, and improper state of the building or the heating/cooling and other facilities. Consequently the traditional policy tools against poverty (e.g. allowances) must be combined with efforts that aim at improving the technical conditions.

The energy poverty debate, which is complex in itself, is further complicated by the fact that the **housing stock is 95-99% in private ownership in the three REELIH countries**, so any interventions must be implemented and financed by private owners and not by public housing organisation as usual the case in the western part of Europe.

The aim of the study was to clarify the meaning of energy poverty and evaluate how any of the indicators that are used to measure the phenomenon can be applied in the REELIH countries as well. The applicability of expenditure based indicators (e.g. share of households who spend higher share of their income on energy than twice the median expenditure, Low Income High Cost indicator) and consensual indicators (ability to keep homes warm or cool them down properly) was analysed. The conclusion is, that **practically it is impossible to come up with a proper number on the level of energy poverty in the REELIH countries regarding nearly all of the indicators** because of several reasons:

- **Comparable data of the consensual approach** (SILC data on the share of people who cannot afford to heat their homes properly) **is only available in Macedonia**. The other two REELIH countries did not implement the SILC survey which means that not only comparability but the potential to evaluate the level of energy poverty based on self-reporting is not possible.
- The expenditure based indicators are in general based on **Household Budgetary Surveys** in order to have detailed dataset on household income, heating sources, cost spent on energy, etc. In Bosnia and Herzegovina and North Macedonia household budgetary surveys were implemented in recent years but the data is not yet processed this way. So there is a theoretical possibility to calculate energy poverty indicators at least on national level, but there is a need for secondary data analysis based on the row data (which is publicly not available).
- In all three REELIH countries it is quite common to heat only part of the house and/or heat only to a moderate warmth (e.g. to 16-18 C). Thus **under-consumption** of energy is quite common, consequently any indicator that deals with real energy costs will hide part of the problem, namely the improper level of warmth provided. On the other hand in case an indicator that is based on calculated energy consumption and not on real bills may take most of the residents living in big houses and having low income as energy poor. This fact results in policy concerns: do we think that people that "**overconsume**" housing are entitled to public assistance in order to keep their homes warm or the subsidy should be linked to the consumption/m² that may exclude owners with big houses?
- Some of the indicators cannot be interpreted properly because of the **heating sources**: in both three countries the share of solid fuel (wood, coal) is very high, mainly in the countryside. Thus any calculations regarding the high debt level is highly misleading.
- In all three REELIH countries there are **different climatic zones**: in some parts of the country air conditioning is essential while heating is not as much necessary, while in

the more mountainous parts cooling can be negligible while heating is essential. Consequently the consensual indicators can be interpreted differently inside the country which creates an impediment to use national measurement schemes.

As was described above there are serious impediments to calculate an indicator on energy poverty in the three REELIH countries, however the question is the following: **even if it would be possible to create a national indicator on energy poverty, what would be its policy implication?** What would be the policy implication regarding the REELIH project in Armenia, Bosnia & Herzegovina and North Macedonia? There are several factors to be considered:

- Energy poverty is an attribute that is linked to individual households and not to buildings. Taking into account the fact that the social composition of multi-family buildings in the three REELIH countries is very mixed we may assume that some of the households can be energy poor, while others are not. This fact should be taken into account when the interventions happen on building level, according to the current practice of the REELIH project.
- The share of people that are part of the social protection systems are much smaller than the share of potentially energy poor. The social safety net is very loose in the three REELIH countries, only a marginal share of people is benefitting from it. Thus there are no easy-to-use indicators on the ground to identify energy poor, or simply the poor or vulnerable.
- There are several other factors besides energy poverty that hinders the implementation of building level energy efficiency interventions, like legally uncertain Home Owner's Association, insufficient management systems, lack of proper financial products to HOA, etc. Under these circumstances it is already an achievement to implement the renovation process and focusing on the energy poor may be a too big additional challenge.

The REELIH projects were implemented in these framework conditions, so even if the local partners had initial ambitions to assist vulnerable households this was hardly transferred to practice. In both three REELIH countries not exclusively the individuals themselves but the homeowners associations were supported (even if sometimes the preferential loan from Habitat was provided to families, like in North Macedonia, but the subsidy from the public bodies went to the community directly). Thus not only the eligibility of the individuals but rather the capability of the community was considered. Other factor that required the participation of financially more stable communities in the REELIH programme was the fact that the commercial loans in Armenia, or the Habitat loans in North Macedonia, or the individual commercial loans in Bosnia and Herzegovina required solid financial background of the individual or the community. The less affluent communities would not have been able to enter into the financial schemes that REELIH could offer them. As REELIH project was an experimental one that aimed not only to support certain home owners associations but to set up a new organisational and financial scheme, it was the essential interest of local Habitat and its partners to find those communities that were able to implement such a new scheme and were able to cooperate with the coordinators. This selection aspect was the most crucial one that could have put energy poverty aspects on the second place.

There was no specific targeting applied regarding the geographic area of intervention either. The projects were implemented in the capitals and in some bigger cities, while there are

more crucial areas from energy poverty point of view in the countryside, or in smaller settlements. However it is understandable that the REELIH project, being an experimental one, had to build on the financial and organisational capacity of those local municipalities which are more affluent, which is the case of capitals and bigger towns.

There was another important factor that limited the possibilities to concentrate on vulnerable communities: in Armenia and North Macedonia direct financial sources of Habitat were used (lending to communities, banks, management companies), thus Habitat, by acting like a commercial bank, had a strong interest in getting its money back, consequently it was not possible to risk the repayment capacity of the clients too much.

What the practice of REELIH in the three countries has shown is that even if not the most vulnerable households and buildings in marginalised locations or situations were chosen there still might have been a relevant number of energy poor households involved in the projects, as energy poverty may not be a socially marginalised situation if it reaches 25-40% of the society. What we may still state that according to the practice Habitat and its partners followed, energy poverty (and poverty as such) was not a strong focus of selection of buildings or individuals to work with.

In evaluating the energy poverty dimension of REELIH project another important factor has to be investigated: whether the total costs of the households decreased as a result of the interventions, thus poverty was reduced or if the costs remained the same but the interventions resulted in increasing living conditions. In order to reach better housing conditions for the same operational cost or decrease the energy costs (by deducting the instalments of renovation loans) there is a basic need to meter energy consumption and the payment must be changed accordingly. The conditions of metering energy consumption at least on building level are not set in all three REELIH countries, which then impedes to have savings on energy costs. This was the case in Bosnia & Herzegovina and also some cases in North Macedonia where several buildings were connected to one heating centre and the HOAs did not initiate the reduction of the amount of heat to the specific building. The owners in these cases did not expect to have monetary savings they rather went for better living conditions, a more valuable and structurally more stable building without falling facades and leaking roofs.

When the energy cost savings can be exactly monitored than the crucial question is whether the energy cost saved equal to or exceeds the monthly costs of renovation (e.g. in the form of loan instalment or monthly rate of reserves put into the project). As the experience of the field visits showed this was not the case in the REELIH projects despite the fact that the relatively long pay-back periods of complex interventions were substantially lowered by the local subsidy schemes. The major problem arises from the fact that the financial tools that are to co-finance the renovations (bank loans, micro-finance loans, Habitat loans, loans from the management companies) have much shorter duration than the pay-back times of the own share of the interventions. So practically in each case the total payment of a household increased for 1-3 years, and the financial balance became more favourable afterwards.

7 Recommendations for policy makers

7.1 EU level recommendations

The relationship between the European Union and the neighbouring countries in the field of the common energy market is regulated by the Energy Community Treaty that was signed in 2005. Bosnia & Herzegovina and North Macedonia are contracting parties to the Energy Community Treaty, while Armenia is in an observer status.

For the contracting parties it will be an obligation to adopt the Clean Energy Package (while Armenia does not have this obligation). However it is still uncertain what will be the deadline for the adaptation of the European legal framework in these countries. Nevertheless the experiences of the current member states of the EU with the Clean Energy Package may serve as a guideline for the future strategies with regard to the REELIH countries.

7.1.1 Energy poverty in EU legislation

The goals of the European Union regarding energy efficiency targets are quite ambitious in light of the already implemented interventions and also in light of the financial capacity of the member states. There are parallel intentions to accelerate the dynamism of energy efficient interventions in order to reach carbon neutrality as soon as possible, while it is not carefully considered which effect it may have on the poor households[26]. However there are strong references to the protection of energy poor or vulnerable consumers in several pieces of legislation of the Clean Energy Package, but leaving the definitions and actions mostly to the member states.

According to art.2a of the Energy Performance of Buildings Directive member states are required to submit Long-term Renovation Strategies. “Each Long-term Renovation Strategy shall be submitted in accordance with the applicable planning and reporting obligations and shall encompass: … d) and overview of policies and actions to target the worst performing segments of the national building stock, split-incentive dilemmas and market failures, and an outline of relevant national actions that contribute to the alleviation of energy poverty”. Based on these obligations all member states of the EU and the contracting parties of the Energy Community Treaty have to deal with the issue of energy poverty. Member states are progressively including measures addressing energy poverty in their plans. Whereas in the first national renovation strategy energy poverty was not addressed, in the second submission of national renovation plans more than two-third of the member states identified at least one or two measures against energy poverty.[27] The measures directly addressing energy poverty however are usually few and focus on tariff release, subsidies to cover energy bills or targeted renovation subsidies for low-income subsidies and the social housing sector. Very few (if any) include specific deep renovation policies and financing for low-income and vulnerable families. Some strategies include generic renovation programmes for

[26] There are already controversial effects of the stricter energy requirements. E.g. as a result of increased energy efficiency requirements regarding gas heating boilers only new condensing boilers can be installed in case the former ones are broken. This shift between the old and the new generation heating boilers requires the change of the heating system and the chimneys as well, resulting in very high investment costs. As a result, many people turn back to wood and coal heating, polluting more than previously.

[27] Assessment of the second long-term renovation strategies under the Energy Efficiency Directive https://publications.europa.eu/en/publication-detail/-/publication/e04473ed-2daf-11e9-8d04-01aa75ed71a1/language-en/format-PDF/source-86607487 p. 29-32

residential buildings among the measures addressing energy poverty but they do not provide details or an overview of specific features to achieve this objective.

Not only the Energy Performance of Buildings Directive, but the Renewable Energy Directive also addresses energy poverty by requiring special attention for low-income and vulnerable consumers (art. 18, art. 21 & 22).

Based on the experiences of the member states on dealing with the new obligations and possibilities of the Clean Energy Package regarding energy poverty we may recommend that the **European Commission should work out a guideline on handling energy poverty in a more specific way emphasizing the possible social consequences of energy and CO_2 related interventions**. Currently the definition and creation of strategies is up to the member states that is why it is handled in a loose way in many countries. More elaborate analysis of the roots and consequences of energy poverty and the social risk of being endangered by the future trends and interventions would be more inspiring both to the current member states and the members of the Energy Community.

According to the current practice member states can purely list policies affecting the state of the buildings, the price of energy or the accessibility to energy services as measures against energy poverty without knowing their social impact, without knowing in which social segments the funds were used, whether they had any crowding out or perverse effects. **The European Union should also stress the importance of monitoring and evaluation of the national energy policies and energy efficiency policies in order to make them more explicit and targeted.**

Taking into account the high probability that the share of households being in energy poverty is more in the REELIH countries than in most of the current member states we may assume that the consequences of policies aiming to reduce CO_2 emission will be more severe from an energy poverty point of view than inside the current Union (e.g. shifting from cheap coal to more expensive sources of energy). **Thus the EU should consider in defining phasing out periods and measures while transposing the energy requirements to the accession countries.**

7.1.2 Private ownership as an additional consideration

Even if there is a great amount of scientific literature on fuel poverty and energy efficient interventions in the residential sector (and the combination of these issues in case of the social/public housing sector) there is still **lack of evidence on how energy efficiency obligations affect low income households in the owner occupied sector**, how generic subsidy schemes influence their investment decisions, how the tension between energy goals and social goals can be handled. Energy efficient investments have financial consequences for the owners of the houses. In case the houses are owned by social/public landlords these financial consequences (in the form of increase of rents) can be (partially) transferred to the tenants throughout a ‘filtering mechanism’ meaning that not necessarily all the additional costs are reflected in the rents or the costs are split into decades resulting in a still affordable rent level. (In some countries there is regulation that prohibits or reduces the ability of landlords to transfer the costs of renovation to tenants through rent increase and this usually results in a limited interest in renovation.) By providing subsidies to social landlords this split incentive can be reduced (or interest can be increased) and a well-defined group of vulnerable households can get access to affordable and energy efficient housing. However in case low income households live in their own property (and this is the case in the

REELIH countries, where more than 90% of the housing stock is privately owned) the costs of energy efficient interventions must be covered by the owners, even if they are low income households. Experience shows that even in case of high (50-60%) subsidies the monthly payments after the deep renovation are higher than before it due to the instalment for bank loans[28]. Drastic decrease in the monthly payments can only be experienced in case the renovation is paid by the accumulated savings, which is rarely the case in low-income households. Consequently, low income households can hardly benefit directly financially from the interventions and this fact may paralyze the renovation decisions in multi-family houses with mixed social background owners. These specialties of energy poverty policies regarding the privately owned housing sector must be realised by the European Union and **include the privately owned housing stock into the European level debate on energy poverty** (which is currently more oriented towards social housing). The realisation of the importance of the privately owned residential sector means the support for further research activities and support for financing.

7.1.3 Providing proper financing

Currently the major sources of energy efficient interventions in the REELIH countries are donor funds, mostly from EU organisations (e.g. EIB, EBRD). However, these funds can hardly be accessed by low income households as they go through regular commercial banking underwriting procedures. These procedures should be revised, and special funds should be established for co-financing local subsidy schemes or local NGO activities. The important point here is the stability of financing and the duration of loans. Interventions with 10-15 years pay-back time (after relevant subsidy content) cannot be financed by short term loans which is the current practice. **With the help of EU financial institutions the background for stable and affordable commercial financing should be established, that provides the possibility of issuing longer term renovation loans**. Only loans with affordable monthly instalments are able to help eliminating energy poverty by deep renovation of residential buildings.

EU funds are already accessible for the Western Balkan in the form of Pre-accession Assistance (IPA) for countries of Albania, Bosnia and Herzegovina, FYROM, Kosovo, Montenegro and Serbia. The use of these funds is based on national strategic documents, in which very low share concentrates on energy related issues, and in this theme they are financing - or co-financing - investments in the transport sector or in public infrastructure and buildings. They are hardly accessible for the residential sector[29]. However EU financing is one of the major sources of energy efficient interventions in the residential sector regarding the current EU member states, mainly in the Central-Eastern member states. **There is a need to open up the possibility of financing residential interventions in the countries of the Energy Community as well and there is a need to raise the awareness of local decision makers into this direction.**

7.1.4 Holistic approach is needed

To effectively address energy poverty, **the EU should promote a holistic approach that see joint social and energy policies,** considers the effects that reducing energy poverty

[28] Forms of financing that may limit the increase in the repayment of investment costs like on-bill financing & repayment, energy performance contracting can rather be applied on smaller scale interventions and are less applicable in case of deep renovation.

[29] Financing the future of buildings in Central, Eastern and South-East Europe, BPIE 2017

can have on air pollution (both indoor and outdoor air pollution can be reduced by renovating and replacing polluting equipment like fossil-fuelled boilers, e.g. coal and oil boilers) and the consequent impacts on health policies and costs.

From this perspective, the multiple benefits of renovation (including impacts on energy security, health, environment - air pollution, GHG emissions – comfort, indoor environmental quality etc.) shall be fully integrated in investment and policy decisions. One way of doing this would be to recognise these benefits and integrate them in Long-term Renovation Strategies and in the calculation of the cost-optimal methodology (especially IEQ)[30]

National programmes renovating low income and energy-poor homes can be highly cost-effective when considering the wider health, societal and economic benefits of renovation. Shifting public budgets from energy subsidies for the energy poor to energy renovation programmes will mobilise investment in renovation, which is a key aim of the national renovation strategies.

7.2 National and local level recommendations

Even if there are significant differences between the REELIH countries regarding their administrative system, their GDP level, their housing stock, still there are more common aspects than differences regarding the topic of energy poverty.

- In all three countries the quality of the housing stock is very poor, most of the family and multi-family buildings are built without any insulation.
- In all three countries poverty and inaccessibility of proper level of comfort is more a rural issue than an urban one. Consequently there is a contradiction in the efficiency of potential interventions: it is more cost efficient to implement energy saving investment with high density areas with higher level or organised administration and local producers, however the depth of the problem is more severe in the countryside.
- In all three countries under-consuming energy is very common, mainly in those houses which are room-heated, thus dealing with energy poverty is at least as much a quality issue as a cost issue.
- In all three countries the share of solid fuels (e.g. coal, wood) is high, which price is more moderate thus able to reduce energy poverty, however the costs are externalised by increased air pollution. Thus energy poverty issues have strong environmental dimensions.
- In all three countries the social system is weak, only marginalised share of the society is assisted. On the other hand illegal economy is strong, the role of remittances is relevant, thus it is very complicate to create a transparent social allowance scheme.
- In all three countries the apartments are nearly totally in private hands, thus any intervention on the dwellings and buildings must be implemented by private home owners (relevant share of which has left the settlement or the country leaving the dwellings empty).

[30] http://bpie.eu/publication/policy-paper-how-to-integrate-indoor-environmental-quality-within-national-long-term-renovation-strategies/ and

http://bpie.eu/publication/the-inner-value-of-a-building-linking-indoor-environmental-quality-and-energy-performance-in-building-regulation/

- In all three countries the social composition of multi-family buildings is very mixed. Even if there are better and worse neighbourhoods, the ownership structure and the heritage of the social past still kept high level of social mix, which makes socially targeted interventions extremely complicated to implement.
- In all three countries the legal background of the operation of Home Owners' Association is weak, the conditions for proper management and maintenance of the stock is not secured.

Under these severe circumstances it is extremely challenging to fight against energy poverty, mainly with regard to energy efficiency and multi-family buildings. However we have to note that there are already proceedings achieved in the last years, as the legal background of HOA legislation is in constant change in both countries, subsidy schemes are introduced on local (in Bosnia also on cantonal) level, the energy legislations are improving. Still there are a lot of tasks remained, some of which would require rather some attention than financial sources:

- The measurement of energy poverty would be improved by using the already existing database of Household Budgetary Surveys in Bosnia and Herzegovina and North Macedonia that might be complemented by modelled energy data in order to create usable energy poverty indicators. Bosnia and Herzegovina – being a potential candidate country to the EU – should introduce the SILC survey to the country in order to obtain comparable datasets not only regarding energy poverty, but several other information on household level.
- The legal framework of HOA operation should be stabilised in both three countries. These legislations should create the basis for a transparent and trustworthy management. Besides the written legislation the rule of law – how the legislations are enforced – should also be improved.
- Energy efficient improvements cannot be based on pure subsidies on the long run. A volume effect can only be achieved if commercial banks take part of the financing schemes in the form of joint loans – and not only individual loans. However banks will not develop products for HOAs until their legal framework is not stabilised, until the enforcement of the payment of common fees is not secured by court procedures and until the financial management and administration of HOAs are not regulated properly.

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9 Appendix: additional examples of programmes tackling energy poverty through energy efficiency

European Regional and Development Funds for social housing – France

Aim	To improve the overall energy performance of the social housing stock; the investments were carried out as part of the „Habiter mieux" (Living better) programme.
Essence of project/programme	Set of energy renovation works that carried simultaneously, allowing an energy gain of at least 25%. The interventions included the change of boiler or heating mode, the insulation of the exterior and/or interior walls, insulation of the attic. Stakeholders: Ministry for an Ecological and Solidary Transition, Ministry of Territorial Cohesion, The National Habitat Agency (Anah)
Target group	Social housing older than 15 years Interventions should reach 75,000 households per year in the period of 2018-2022 Additional info: between 2013 to 2016 over 170,000 households were renovated.
Country/region	France
Dates	2009-2022
Budget	€ 1,200 million It combines EU funds (ERDF) combined with domestic sources including the State 'Programme d'Investissements d'Aveni", support from energy suppliers under the energy savings certificates scheme.
How it focuses on energy poverty	Provides higher subsidies for buildings occupied by households with lower income
Impact	The implemented measures reduced the household energy consumption by an average of 40%. 59% of the beneficiaries reported satisfied and 35% were rather satisfied. The percentage of tenants complaining about cold in winter dropped from 61% to 18%. After renovation 90% of the houses were reported in a good condition, while that percentage before the renovation was less than 50%.
Success factors	Availability of technical support: on-site audit, support in selection of measures and follow up of the process
Problems encountered	At the beginning of the programme the number of refurbishments was far below the initial objective due to: (1) difficulties in identifying potential beneficiaries;

	(2) the inability of certain households to finance even a small share of the cost of work; (3) difficulties of certain households to deal with the complexity of the process (technical advice on a comprehensive renovation, financing mechanisms); (4) the reluctance of a part of the target population (especially elderly households) to accept a renovation that will make their daily life a bit inconvenient temporarily). Despite these shortcomings, the programme actually delivered savings above initial expectations. Since then the programme was reformed to addressed these initial challenges and now on track to deliver as expected.
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LEMON (Less Energy More Opportunities) - Italy

Aim	Pilot project to experiment with innovative financing models for the retrofit of social housing through an Energy Performance Contracting model
Essence of project/programme	The main actions are twofold: (1) They include training of the tenants (100) to teach them controlling energy use; (2) The development of an Energy Performance Tenancy Agreement (EPTA). The contract between the tenants and the ACERs will ensure the payback through an ESCO contract. Financing through Combination of ERDF and national grant, regular loans and an ESCO structure (15 year return, payback is built in rents). The project implements the renovation of 622 social housing units.

	Stakeholders: Emilia-Romagna region as supervisor; Agenzia per l'Energia e lo Sviluppo Sostenibile di Modena (AESS) as project coordinator; ACER Reggio Emilia, ACER Parma and ASTER, the two social housing companies; the Consortium for the innovation and the technology transfer of the Emilia-Romagna Region;
Target group	Residential buildings: mostly public housing, the project seems to include about 50 private units as well 622 social housing units (however only 561 was assessed)
Country/region	Italy / Emilia-Romagna region
Dates	February 2016 – May 2018
Budget	€ 15.29 million + additional funding (€ 0.63 million) by H2020
How it focuses on energy poverty	Focus on low income families as it includes social housing units (social housing in Italy is allocated for low income families). On the other hand it may be interesting, that the rent increase may counterbalance the savings in energy, thus the financial results for a household can be neutral (even if the project states that it "will reduce the housing costs of low-income families", but it also state that the overall housing costs (energy+rent) remain unchanged).
Impact:	Estimated impact – evaluation is to be completed soon: 5.74 GWh of primary energy 1,159 t CO_2 emissions reduction (estimated) Expected return on investment: 15 years
Success factors	Evaluation expected soon
Problems encountered	Difficulties have arisen as a result of diverging bank interests. Whereas local banks have preferred investment fragmentation (due to reduced risk), larger banks preferred larger investments.
References	http://www.lemon-project.eu/p/objectives.html https://cordis.europa.eu/project/rcn/200000_en.html https://ec.europa.eu/energy/sites/ener/files/documents/2.4_lemon_claudia_caranai.pdf http://www.housingeurope.eu/resource-577/the-sweet-taste-of-a-lemon

JESSICA – Slovakia

Aim	To accelerate the process of energy efficient refurbishment of the Slovakian multi-family residential buildings
Essence of project/programme	The Housing Development Fund provides a preferential loan – maximized in 20 years – that can provide up to 75% of the investment costs. The interest rate varies between 0 and 3%, depending on the depth of the interventions, the interest rate decreases with the growth of complexity. In the first phase - (Jessica I) - the loan focused on providing insulation to residential buildings in urban areas

	Jessica II (second phase) aimed for the complete renovation of residential buildings in urban areas. The main components have been: • Insulation • Removal of systematic deficiencies • Replacement or modernisation of elevators • Replacement of utility pipes: gas, electricity, heat, sewerage, water • Barrier free entry and other modernisations. The maximum loan amount is fixed for each type of interventions. Stakeholders: State Housing Development Fund provides the loans but the applications must be submitted though the local authorities. (The District Offices of the Ministry work out the ordered and pre-evaluated list of applications.)
Target group	Owners of apartments and non-residential premises represented by an administrator of the building (condominiums, cooperatives). Jessica finances owners in multi-apartment blocks, although in a previous program - the original state fund - family houses were financed as well From 2000 about 250-300,000 flats got funded by the programme. (There may be some slight overlaps as buildings could have been financed more than once.)
Country/region	Slovakia
Dates	2013 – ongoing
Budget	€ 11.5 million (Jessica I) € 103 million (Jessica II) ERDF and national funding (Regional Operational Programme and Operational Programme Bratislava Region)
How it focuses on energy poverty	The programme does not have an energy poverty focus. However – as the entrance barrier was low – condominiums and cooperatives inhabited by low income families had the chance to join.
Impact:	11,585 kWh/year energy saved
Success factors	The existence of trust and support among the stakeholders and the end users: Jessica scheme was preceded by several other state programmes from the early 2000s, among them loan schemes. Thus Jessica was only a switch regarding the financial resources and not a completely new programme. The loan schemes have a long history in the country and consequently the needed trust and the institutional settings were already built. The long duration and low interest rates also play an important role - thus the instalments are moderate which make the whole scheme feasible. The loan provided by the Housing Fund encouraged innovation in the financial sector as well: as the own share had to be financed anyhow. It helped the development of financially feasible loan products for condominiums. As the bank schemes became quite

	sophisticated they were able to replace the subsidized loan product to a large extent (it seems that about half of the renovated buildings received solely commercial financing.)
Problems encountered	The budget for the loan scheme is limited, thus buildings are awarded based on the combination of selection criteria (eg. the deeper the renovation the better) and on a first come first serve basis.
References	https://www.fi-compass.eu/sites/default/files/publications/Kollarova.pdf http://www.eib.org/attachments/documents/jessica_slovakia_en.pdf Analysis of subsidy schemes aiming to support energy efficient renovation of multi-family buildings in selected countries of Central and Eastern Europe. Prepared by Metropolitan Research Institute for Habitat for Humanity International in September 2015 The presentation of Jozef Tomecek in the C4E Forum, June 2016.

Warmer Homes Scheme – Ireland

Aim	To support beneficiaries of welfare payments to implement energy efficiency improvements in their houses for free
Essence of project/programme	• Non repayable grant (100%) for energy efficient interventions: Attic insulation and cavity wall insulation • External or internal wall insulation • Other secondary measures (lagging jackets, draught proofing and energy efficient lighting) • Advice
Target group	Private owners of residential buildings built before 2006. The owners must be recipients of one of the following allowances: Fuel allowance, job seeker allowance for over six months, working family payment, one-parent family payment or domiciliary care allowance. Beneficiaries between 2010-2013: 95,000
Country/region	Ireland
Dates	2010-2013, new phase launched 1 August 2018
Budget	2010 to 2013 over €82 million from national funds.
How it focuses on energy poverty	It focuses on low income families and beneficiaries of welfare payments.
Impact:	• In 2010, the implemented measures (for €1000 on average) saved 25 GWh. • The number of beneficiaries who found it difficult or impossible to pay utility bills on time decreased from 48% to 28%. • The number of families with children that could keep a comfortable temperature at home increased considerably from only 27% to 71%. • The number of beneficiaries who suffered from long-term illness or disorders decreased by a massive 88%. Recipients showed significant improvements in other health problems including heart attacks, high blood pressure/hypertension,

	circulatory problems, problems with joints/ arthritis, headaches, and physical and mental disability.
Success factors	It is very attractive for the intended beneficiaries since the refurbishment is for free.
Problems encountered	*[evaluation is not available]*
References	https://www.seai.ie/grants/home-grants/warmer-homes-scheme/ http://www.warmerhomes.ie/ BPIE, Energy Poverty Factsheet, 2017

Affordable Warmth Scheme - UK

Aim	To fight against fuel poverty and help to reduce carbon emissions and the effects of climate change
Essence of project/programme	Replacement/repair of boilers; Cavity wall insulation; loft insulation by local authorities for free for vulnerable residents.
Target group	Any kind of residential buildings (Detached houses, Semi-detached houses, Detached bungalows, Maisonettes, Flats, etc.) House owners or tenants in private houses are eligible to apply for a Storage Heater Grant or a Boiler Grant Privately owned buildings and homes wholly owned by a Housing Association may qualify for a cavity wall insulation grant if their home has an EPC rating of E, F or G. The home owner or tenant must be recipient of one the following State Benefits: Guaranteed Pension Credit, Child Tax Credit, Working Tax Credit, Universal Credit, Job Seeker's Allowance, Income Related Employment & Support Allowance or Income Support.
Country/region	UK
Dates	Introduced in January 2013, ongoing implementation
Budget	Funded by the Energy Company Obligation scheme. £1.4bn spent Jan 2013-March 2018
How it focuses on energy poverty	It supports recipients of state welfare payments
Impact:	704,226 measures installed (up to end January 2017) 501,515 properties treated (up to end January 2017)
Success factors	It is very attractive for the intended beneficiaries since the refurbishment is for free.
Problems encountered	To address challenges in 2017 revisions were proposed including: • eligibility criteria to be simplified and better targeted. Sub-criteria were removed for recipients of some means-tested benefits. The income thresholds for Tax Credit and

	Universal Credit recipients was amended to better reflect disposable household income; • eligibility for certain measures under Affordable Warmth was extended to social housing in EPC Bands E, F or G
References	http://www.affordablewarmthscheme.co.uk/ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749638/ECO_3_Final_Stage_IA__Final.pdf https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/531964/ECO_Help_to_Heat_Consultation_Document_for_publication.pdf https://researchbriefings.files.parliament.uk/documents/SN06814/SN06814.pdf

Seasonal Health Intervention Network (SHINE) - UK

Aim	Connecting energy and health, and provide social services to vulnerable households in Islington (UK)
Essence of project/programme	One-stop referral system for residents in Islington (London) to connect to the National Health Service and third sector to provide affordable warmth and seasonal health interventions. The energy related activities (in addition to social assistance such as fire safety, security and health checks) include: • Advice on reducing gas and electricity bills • Energy efficiency grants and home visits • Help with gas and electricity debt Stakeholders: council, health professionals, housing officers, social services, children's services and voluntary and community sector partners.
Target group	Any vulnerable resident can be referred but some services have stricter eligibility criteria. Particularly focuses on: Older people, people with respiratory disease, people with cardiovascular disease, young children, people with limited mobility. 60,000 Islington clients (and now expanding)
Country/region	Islington, London, UK
Dates	Launched 2010 (expanded in 2017)
Budget	Public funding (local council and health) (Islington Council/NHS Islington
How it focuses on energy poverty	Driven by desire to reduce the number of Islington residents in or at risk of fuel poverty, as well as reducing seasonal deaths and hospital admissions.
Impact:	Reduction of energy bills by £1.9 million (2010-2015)
Success factors	Multi-disciplinary approach (health, energy, employment, etc) High levels of staff motivation. Leadership and political support.

	Financial resource is enough Human resource – staff is available in a satisfactory level Commitment to tackling health inequalities. Commitment to improving housing.
Problems encountered	It takes time and effort to get the network up and running, especially with regards to recruitment of partner organisations. Getting referrals is not difficult but getting the right referrals is harder – making sure that those who need the most help are reached. A lack of shared goals/vision between partners can slow progress. Not all partners are fully aware of the links between housing and social conditions and health and wellbeing.
References	https://shine-london.org.uk/services/ http://www.nea.org.uk/wp-content/uploads/2016/01/John-Kolm-Murray-Islington-Council.pdf https://www.oecd.org/governance/observatory-public-sector-innovation/innovations/page/seasonalhealthinterventionsnetworkshine.htm#tab_lessons

Green Savings Programme - Czech Republic

Aim	The program aims to improve the environment by reducing greenhouse gas emissions through the improved energy efficiency of buildings, and the efficient use of energy sources. It supports residential buildings with very low energy performance.
Essence of project/programme	State grant up to 30% (in 2018) depending on the depth of interventions. The maximum grant amount is set for each type of intervention. The objectives of the intervention slightly changed during the different stages of the programme. The eligible interventions in 2018 were: • thermal insulation of perimeter walls, roofs, ceilings, floors; • changing windows and doors; • exchanging heat sources for heating from solid fossil fuels to efficient eco-friendly sources; • replacement of electric heating with heat pump systems; • replacement of gas heating for a gas heat pump system or a combined heat and power plant using natural gas as a fuel, solar thermal systems, photovoltaic systems; • controlled ventilation with heat recovery (recuperation). + creating green roofs and grey water systems. More complex renovations are favoured. The stakeholders are the Czech Ministry of Industry, Trade Unions, and owners of family and multi-unit buildings.
Target group	Residential buildings (both family and multi-family buildings) (Public

	buildings were also eligible in the first round of Green Savings). ?ulti-unit buildings are only eligible in the Prague region in the New Green Savings programme. In other regions only the family houses are eligible. Homeowners and house builders – both individuals and legal entities 76,600 applications, 6,000 from housing blocks (168,000 flats) till December 2012. 28,000 applications in the period between 2014 and 2018.
Country/region	Czech Republic
Dates	From 2009 under different names: 1. Green Savings, 2. Green Savings 2013 and New Green Savings 2014-2020 (as part of the Operation Programme on Environment).
Budget	The Czech Republic has raised funds for this programme from the sale of emission credits under the Kyoto Protocol on greenhouse gas emissions. It was also complemented by national funds.
How it focuses on energy poverty	It did not focus on energy poverty. As a 70% own share must be paid and more complex renovations are favoured those households can benefit the most that are capable to provide co-financing and organise themselves. No special treatment or co-financing rate for energy poor (or poor) households.
Impact:	
Success factors	The programme finances not only complex renovation but step-by-step interventions. As it has been operating for many years, people and communities could rely on it and can prepare long term renovation plans.
Problems encountered	The restriction of new Green Savings program for multi-unit buildings only in Prague can become problematic.
References	https://www.ca-eed.eu/content/download/3497/file/National%20Implementation%20Report%202016%20-%20Czech%20Republic.pdf http://bpie.eu/wp-content/uploads/2015/10/Green-Savings-Programme-Best-Practice-Case-from-Czech-Republic_Vanicek.pdf http://www.zelenausporam.cz/sekce/582/about-the-green-savings-programme/ http://japatech.zelenausporam.cz/gallery/0/176-06_sfzp_stav_a_zhodnoceni_programu_zelena_usporam.pdf https://www.novazelenausporam.cz/nabidka-dotaci/bytove-domy-zatepleni-zdroje/

Energy refurbishment of 'Los Limoneros' - Spain

Aim	To renovate a social housing complex with the involvement of tenants suffering from high unemployment rate.
Essence of project/program	The interventions included: • Installation of solar thermal panels;

me	• Gas fired microgeneration; • External insulation of the flat roof, external wall insulation, floor insulation on lower floor area; • Cross ventilation system for interior patio, smart meters. Residents were actively involved in the planning and implementation process.
Target group	4 blocks of flats including 140 apartments, all residential buildings.
Country/region	Malaga, Spain
Dates	2011 – 2014
Budget	€ 486,780 (€ 3,477 per dwelling) 75% European Regional Development Fund (ERDF) 25% local funds
How it focuses on energy poverty	The project focused on a social housing complex (social buildings in Spain houses only the most vulnerable residents.)
Impact:	43 kWh/m² after renovation (32.5% reduction) (estimated) 218,726 kg/CO_2/year after renovation (52.2% reduction) (estimated)
Success factors	Specific member of staff acted as a liaison for the project and residents to build a lasting relationship between the actors and generate mutual respect. There was a successful engagement with the president of the residents' association. Previously renovations had failed before as the residents feared that the energy renovation would result in an increase in their rent.
Problems encountered	Gaining the trust of residents was hard.
References	http://www.elih-med.eu/uploads/multimedia/pp%20sheet_Malaga%20rev.pdf http://nws.eurocities.eu/MediaShell/media/Citiesinaction_LosLimoneros_Malaga_Feb15.pdf https://policytransfer.metropolis.org/case-studies/refurbishing-los-limoneros http://www.elih-med.eu/uploads/image/ELIHMed_Evaluation_web.pdf

Energieheld - Germany

Aim	To promote energy savings in buildings by lowering the complexity barriers for homeowners (legislation, grant requirements, available craftsmen, etc.) and also bridging the gap between homeowners and craftsmen.
Essence of project/programme	The online platform helps homeowners willing to renovate their house to get in contact directly with the required craftsmen, without them having to search for the appropriate craftsmen.
Target group	Owners of single family houses

	38 customers so far
Country/region	Germany, with plans to expand to Austria and Switzerland
Dates	The company behind the plaform was created 2012
Budget	Private funding (house owners)
How it focuses on energy poverty	It does not have a focus on energy poor “only” shows a pattern that may have an efficiency effect on prices and processes that can be beneficial to energy poor on the long run.
Impact:	270,000€ of confirmed projects (by May 2016)
Success factors	No evaluation available
Problems encountered	No evaluation available
References	https://www.energieheld.de/ https://www.companisto.com/de/investment/energieheld http://www.faz.net/aktuell/beruf-chance/die-gruender/onlineplattform-energieheld-die-private-energiewende-14095844-p2.html https://www.energynet.de/2016/01/12/energieheld-sanierungen-einfach/ https://www.youtube.com/watch?v=e0xliWlcKUw

Vilawatt Project - Spain

Aim	To secure a stable energy transition process through deep energy renovation of residential buildings in one of the most deprived districts of Viladecans, helping the city tackle fuel poverty.
Essence of project/programme	The program consisted of three consecutive steps: (1) A Local Energy Operator was established to act as a local energy supplier and renewable energy producer. (2) An Energy Savings Company (ESCO), offering renovation and energy saving services to its members (the municipality, businesses and citizens) was created. (3) Finally, a financial mechanism to capitalise the energy savings (generated through contracts with households having benefited from initial investments) has been applied by the new entity to further invest in deep energy renovations in the municipality Therefore, the ESCO is planned to generate income from the energy savings in the buildings where the energy renovations take place, to fund energy renovation in additional buildings. Stakeholders: ten stakeholders including private and municipally-owned companies, public agencies and a research institute. Plus regional stakeholders active in the fields of ethical banking, community management, social innovation, renewable energy and energy efficiency.
Target group	Residential and commercial buildings, all together including 60

	dwellings.
Country/region	City of Viladecans, Spain
Dates	01/11/2016 – 31/10/2019
Budget	The project is funded by the Urban Innovative Actions. (€ 4.27 million, of which, € 1.4 million for building retrofitting.)
How it focuses on energy poverty	The project is implemented in a deprived neighbourhood.
Impact:	The project is under implementation.
Success factors	Evaluation not yet available
Problems encountered	Evaluation not yet available
References	http://www.uia-initiative.eu/sites/default/files/2018-07/Energy%20Transition%20in%20Action%20-%20UIA%20cities%20meeting%20report.pdf http://www.uia-initiative.eu/sites/default/files/2018-05/Viladecans_01-433%20VILAWATT_Lucia%20Fuselli_Journal%202_May%202018.pdf http://www.uia-initiative.eu/en/uia-cities/viladecans https://ec.europa.eu/futurium/en/energy-transition/energy-transition-partnership-years-eu-sustainable-energy-week http://www.energy-cities.eu/Viladecans-a-story-of-eggs-and-a-path-to-an-energy-transition-agency http://www.uia-initiative.eu/sites/default/files/2018-01/FINAL%20VERSION_Viladecans.pdf http://www.uia-initiative.eu/en/vilawatt-opens-its-call-demorenovations http://www.viladecans.cat/es/vilawatt-3

Urban Social Rehabilitation - Hungary

Aim	To stop the further deterioration of urban areas threatened by social segregation by means of complex (hard and soft) interventions. The interventions are place-based, and are targeted to “action areas”. Energy efficient interventions are among the possible physical interventions in this mix.
Essence of project/programme	Complex intervention in areas threatened by deprivation: • Renovation of social housing or renovation of the common parts of privately owned multi-unit buildings. (It can include energy efficient interventions), (70-100% grant) • Renovation of public spaces in the target area, (85-100% grant) • Renovation of buildings of public services -community houses, educational institutions, (85-100% grant) • Renovation of business units (e.g. shops, restaurants),

	grants according to the state aid map • Providing tailor made social services to vulnerable people – (85-100% grant.) • Implementing vocational training programmes, 85-100% grant. • Organising community building events, 85-100% grant. Stakeholders: Municipalities are the main implementers (they have to submit the proposals to the state authorities), local partners, e.g. social service providers, NGOs, condominium organisations and cooperatives
Target group	The areas eligible for such interventions have to have a certain level of social degradation measured by a set of indicators: • Low level of education • Low level of economic activity • High level of unemployment • High level of poverty and segregation • Low quality of the housing stock • Low level of energy efficiency of buildings The thresholds are different in different regions of Hungary and in the different urban areas (e.g. housing estates have less strict indicators than more segregated urban areas). Both municipally owned and privately owned multi-unit buildings can be involved in the area based rehabilitation projects.
Country/region	Hungary
Dates	2007 – 2013, 2017-2020
Budget	Approximately € 66 million Source: ERDF + state financing
How it focuses on energy poverty	The target areas are threatened by social segregation, thus the eligibility is not investigated on individual level but on geographical level. The programme has an assumption that segregated areas are mostly inhabited by poor people living in bad quality housing.
Impact:	Not measured
Success factors	Urban rehabilitation programmes opened up the possibility to think about spatial segregation and develop a toolkit to fight against it. These programmes cannot be considered as success regarding their limited impact, but they initiated a new way of thinking. The complexity they require also paves the way to think about energy efficiency in a multifaceted way.
Problems encountered	• Short term programmes (1,5-3 years) that cannot create a proper basis for long-term changes • Reluctance of most municipalities to face or address the problems • High social risk • Lack of well-prepared projects • Partnership in most cases is weak or fake • Social eligibility criteria „make the ground for" non-social interventions • Clear preference of housing estates in the first period

	• Preference of institutions to housing
References	http://fra.europa.eu/sites/default/files/fra_uploads/1474-roma-housing-conference-MMatko-ppt.pdf Urban Rehabilitation Guidebook (in Hungarian)

Clear Air programme – Poland

Aim	Reduction of smog in Poland
Essence of project/programme	A combined grant and loan scheme to finance the exchange of heat source, the insulation of walls/roof, the exchange of windows, and support the use of RES. Stakeholders: National Fund for Environmental Protection and Water Management, Regional Funds for Environmental Protection and Water Management, Bank for Environmental Protection
Target group	Owners of single-family houses are eligible both in the process of renovation and construction. It is assumed that over 3 million buildings will be renovated over the period of 10 years.
Country/region	Poland
Dates	Starts 09.2018 ends 2029
Budget	103 billion PLN from which 63.3 billion PLN in form of subsidies and 39.7 billion PLN in form of repayable loan. Sources: national budget, National Fund for Environmental Protection and Water Management, Regional Funds for Environmental Protection and Water Management. In the future EU founds are planned to be involved.
How it focuses on energy poverty	The amount of the grant will depend on the income per person in the household. The grant will be from about 30 to 90 percent of eligible investment costs, the minimum value of which is 7,000 PLN. The households with the lowest income per one family member, i.e. up to PLN 600 per month, can receive 90% grant. From the income higher than PLN 1600 / person the grant will be up to 32 percent. The remaining investment cost can be financed with a loan or own funds. People who use the loan can count on preferential conditions. They will be granted for up to 15 years with WIBOR 3M + 70 basis points not less than 2 percent annually (currently it is 2.4 percent).
Impact:	It has just started.
Success factors	It has just started.
Problems encountered	It has just started.

“Jawor” Programme - Poland

Aim	To improve EE and reduce smog by thermal retrofitting and replacing old inefficient boilers
Essence of project/programme	The program support the thermal retrofitting of external walls, roofs and flat roofs, floors on ground, the replacement of windows and doors provided the project results in a minimum 25 percent reduction in energy use as determined by an energy audit or energy assessment. The maximum eligible costs for insulation retrofitting are 35 €/m², and 94 €/m² for windows and doors replacement. JAWOR provides a loan of up to 90% of the investment cost with an interest rate of 2% and duration of 10 years. The total amount of the loan should be between €4,700 and €23,400. The regional Fund for Environmental Protection and Water Management (WFOŚiGW) in Kraków
Target	Single family buildings Private owners 129 loan agreements in 2017 Number of applications submitted: 2016 (105), 2017 (152), 2018 (50 as of June 15)
Country/region	Malopolskie and Slaskie regions in Poland
Dates	2016 - ongoing
Budget	€ 3.5 million Limitations per project: € 4,695 to € 23,475 Average loan per project € 12,132 Line of credit from international financial institutions Guarantee/risk-share mechanism Public funds Leveraged money from private banks and customers
How it focuses on energy poverty	No specific focus on energy poverty
Impact: Energy savings	Minimum 25 percent reduction in energy use of building as determined by an energy audit or energy assessment. Minimum 25 percent reduction in energy use of building as determined by an energy audit or energy assessment.
Success factors	Use of repayable financial mechanism
Problems encountered	The requirement for the applicant to pay a visit in person at the WFOŚiGW office in Kraków The requirement of an energy audit or energy assessment The requirement for SFBs to first make the investment or a part thereof and to provide two collaterals to secure the loan.

References	http://documents.worldbank.org/curated/en/457791529388949168/pdf/127331-REVISED-PolandCuREnergyEfficiencyen.pdf

ENERGIESPRONG - the Netherlands

Aim	Energy Jump is a Dutch programme focusing on creating energy neutral buildings by means of energy efficient retrofitting of residential units, public buildings and offices using industrialised technology.
Essence of project/programme	The programme was initiated by the Ministry of the Interior and Kingdom Relations, which commissioned Platform31 (a Dutch knowledge and networking organization for urban and regional development) to generate and accelerate the local projects until the end of 2016. The core of the programme is the use of pre-fabricated, industrialised technology, which allows the implementation of a complete renovation in a matter of days, without having to move out the residents. The programme provides process support throughout financing Platform31, but direct financial support for the project implementation is quite rare (although several local municipalities provided financial help for the implementation as well). The main assumption behind the programme is that a long term loan is able to finance a renovation project in which the savings cover the instalments.
Target group	Mainly terraced houses operated by social housing companies. More than 2000 Net Zero Energy refurbishments
Country/region	Developed in the Netherlands currently being replicated in France, Italy, UK, Germany, and regions in Canada and the USA.
Dates	2010 - ongoing
Budget	The Dutch Energiesprong has received funding from various sources since it took off in 2010. Originally it was financed by the Ministry of Interior and Kingdom Relations in the Netherlands. H2020 funds of Transition Zero, a project which aims to replicate Energiesprong outside NL, reaches € 1.7 million. Members of Stroomversnelling Interreg North-West Europe / E=0
How it focuses on energy poverty	Main target group is social housing companies, in which the rent is subsidised by the Dutch government. Not only financially vulnerable groups live in these houses, but at least up to the middle-class.
Impact:	The Energiesprong solution focus on retrofits which are quick, affordable, high quality and net zero energy. Pre-retrofit most of the buildings are heated by gas. The Energiesprong solution reduces energy demand with more than 80%. In addition to the 54 social housing companies and more than 60 refurbishment solution providers that carry out energy-prong renovation projects, there are now around 25 manufacturers

	offering products for the energy-prolonging renovation concept.
Success factors	The programme is popular among the social housing providers as it industrialise the renovation process and makes it possible to implement the renovation works in some days. Energiesprong uses an energy performance contract to guarantee the performance of the improvements over a long-term (minimum 30-year) period. This provides financial security to the property owner as they know that it will perform at the expected level.
Problems encountered	Private owners are less motivated to join the programme as the unit cost of intervention is still too high, thus a loan with a very long duration would be needed which the private owners cannot obtain according to the current banking procedures.
References	http://energiesprong.eu/country/the-netherlands/ http://energiesprong.eu/wp-content/uploads/2016/12/NL-long_version.pdf http://energiesprong.eu/net-zero-energy-home-makeovers/ http://energiesprong.eu/wp-content/uploads/2017/04/EnergieSprong_UK-Transition_Zero_document.pdf

Subsidy scheme to support the energy efficient renovation of multi-family buildings - Hungary

Aim	To upgrade the energy parameters of the pre-fabricated building stock.
Essence of project/programme	Grant for the energy efficient renovation of multi-unit building, financing: wall insulation, change of windows, modernisation of the heating system, installation of RES. Subsidy content: changing. Originally 33% by the state, 33% by the local municipality; in 2015: 30-50% subsidy by the state depending on the depth of interventions. There was an optional support from municipalities – and many provided up to 20%. Condominiums and cooperatives submitted their tenders to the state (to the government organisation being appointed for this intermediary role). Selection process was changing, in the later stages (esp. 2015) it was a first come first served basis.
Target group	2001-2009: Buildings built with industrialised technology, 2015: multi-unit buildings and family houses Privately owned multi-unit buildings
Country/region	Hungary
Dates	2001-2009 and 2015
Budget	National budget
How it focuses on energy poverty	The programme did not consider energy poverty as such; rather it wanted to reduce the energy bills of all people who participate in the project. As own share (33%) was mostly financed by short term preferential loans the monthly additional costs due to eth

	instalments usually exceeded the costs saved on heating. Thus, the project had no positive impact on energy poverty on the short run. It is nevertheless partially credited with stabilizing the social composition of
Impact:	Not measured. The increase in the real estate prices thanks to the energy efficient interventions was not analysed scientifically. Based on a selected number of interviews the comfort level of inhabitants increased as their satisfaction with their buildings.
Success factors	Approximately 30% of the multi-unit housing stock was partially renovated. The subsidy system encouraged the development of commercial loan products for condominiums.
Problems encountered	Uncertainty of availability: the state budget devoted for the programme changed every year and was terminated due to the financial crisis in 2009. It was reopened once in 2015. The combination of high subsidy content with the uncertainty of the schemes lead to 'subsidy dependency": condominiums and cooperatives did not take even take the preferential loans as they were waiting for the subsidy to come in the following years. Only those condominiums and cooperatives were able to obtain the subsidy that were organised and were able to collect their own share or take a bank loan. Communities with financially more problematic inhabitants (more energy poor households) had less possibility to use of the opportunity. Vast majority of renovations happened by means of the subsidy scheme thus it increased renovation prices significantly.
References	Assisting condominium renovation in poor neighbourhoods - Background study to support the development of new non-profit services to encourage the renovation of low status multi-family residential buildings. Prepared by Metropolitan Research Institute for Habitat for Humanity Hungary in December 2011 Analysis of subsidy schemes aiming to support energy efficient renovation of multi-family buildings in selected countries of Central and Eastern Europe. Prepared by Metropolitan Research Institute for Habitat for Humanity International in September 2015

ERDF Supporting energy efficiency of housing blocks - Romania

Aim	The support programme for the energy efficient renovation of multi-unit buildings had multiple aims: • To reduce heat loss and energy use • To reduce maintenance costs for heating and DHW • Reduction of polluting emissions from energy production, transport and consumption • To preserve the architectural, environmental and chromatic integration value in the urban environment
Essence of	The National Program on Thermal Rehabilitation of block of flats

project/programme	and its supplementing from EU funds. These programmes provide grant: National programme: • 50% of allocations from the state (Ministry of Regional Development and Housing) • 30% from the municipalities; • 20% of the fund from the owners' association and / or other legal sources. In case of EU supported programmes since 2011 the own share of the building can be between 10-30% depending on the social composition of the residents. The interventions include: • Refurbishment of thermal insulation of exterior wall, terrace, roof, closing of balconies, modernizing heating system (distribution system, valves, radiators, etc.), domestic hot water • Installation of solar thermal panels, solar panels, heat pumps • Repair works (façade, roof, interior finishes, ventilation ducts, sidewalks to eliminate infiltration, etc.) In both programmes the local municipalities provide assistance. They inform the communities, they provide the technical audit, they submit the applications to the ministry, they assist the implementation and provide the quality control. Stakeholders: Ministry, Local municipalities, home owners' associations
Target group	Housing blocks built during the period 1950-1990. For the EU programme only for buildings located in the county capitals of Romania (the smaller cities are financed from national funds). Both privately owned and municipally owned buildings are eligible. However as practically nearly all multi-unit buildings are privatised in Romania the beneficiaries are mostly home owners' associations. (Not all buildings created a formal association, but only formal associations are eligible for the subsidy.)
Country/region	Romania
Dates	2009-2011 and 2011- (EU funds)
Budget	National source and from 2013: EU funds. ERDF and national contribution (state budget, local authorities and owners` associations)
How it focuses on energy poverty	The income of the residents was the factor in determining the own share (somewhere between 10-30%). However this system was changed according to the Lithuanian system as a result of the high transaction costs.
Impact:	Not measured
Success factors	In the beginning of the project it was not easy to find enough applicants while currently the demand exceeds the supply. The programme has become fashionable and provides substantial subsidy for the retrofitting projects.

Problems encountered	National budgets need to complement EU funds sometimes up to 50%, which is especially challenging in times of economic and financial crisis. EU fund applications are complex to manage and the difficult administrative processes at national level multiply this complexity. In Romania at least three governmental authorities need to be involved, which often results in paralysis. Lack of long-term commitment from governments. Misalignment between national programme design and market needs. Data scarcity hinders a clear vision of the potential of the Romanian building stock. On building level: the involvement of non-residential units of condominiums is sometimes difficult (as they are not entitled to the subsidy).
References	http://bpie.eu/wp-content/uploads/2015/10/Chairmans-Conclusion-PDF-English.pdf http://www.mdrap.ro/programul-national-privind-cresterea-performantei-energetice-la-blocurile-de-locuinte Analysis of subsidy schemes aiming to support energy efficient renovation of multi-family buildings in selected countries of Central and Eastern Europe. Prepared by Metropolitan Research Institute for Habitat for Humanity International in September 2015

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