

# Tackling fuel poverty with building renovation

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## Abstract

In 2013 in the EU, 10.8 % of the total population and 24.1 % of people with low income were unable to keep their home adequately warm. As indicators of fuel poverty, these numbers reveal the severity of the problem at EU level. In order to tackle fuel poverty it is vital to define it, establish the appropriate measurements, and put in place sustainable and effective policies. To this end, this paper provides comprehensive information regarding the extent of fuel poverty in the EU, presents the various definitions used, assesses potential measures to alleviate its impact, and outlines the role of energy efficiency in buildings in tackling the problem.

Specifically, based on current approaches in defining and identifying energy/fuel poverty and on statistical data, the extent of the problem and its grave impacts in EU countries are assessed. Furthermore, measures taken to combat fuel poverty are analysed and we argue that the implementation of energy efficiency measures in fuel poor houses is the only sustainable solution to the problem. To this end, we analyse and present the social, environmental, and financial results of energy efficiency programs in fuel poor households.

Moreover, we study how fuel poverty measures are funded by presenting case studies from Greece and the UK. The results show that energy efficiency measures receive the lowest budget compared to fuel/heating support schemes despite that they additionally contribute to economic growth and social inclusion, and that financial tools such as EU cohesion funds are available.

The findings of our research offer insight into the fuel poverty problem and the role of energy efficiency in buildings as a sustainable solution that addresses the problem at its roots. A more accurate and consistent definition would allow us to determine the extent of the problem, while a long-term strategy would significantly contribute to alleviate it. Last but not foremost, there is an imperative need of gradually shifting part of national and EU budget from income support schemes and fuel subsidies to more active and effective renovation measures.

## Introduction

As part of the European Commission's *Europe 2020* strategy [1], at least 20 million people should be lifted out of the risk of poverty and exclusion by 2020 in the European Union (EU). However, a recent evaluation [2] on the progress of the strategy reveals that – mainly due to the economic crisis – the number of people in the EU at risk of poverty increased from 114 million prior to the crisis (2009) to 121 million in 2013.

Unfortunately, based on current estimations the future is not foreseen to be auspicious. Even though the EU GDP has been recovering recently, the economic crisis deepened the inequalities in the distribution of income. In 2012 the richest 20 % of the EU population received more than 5 times as much income as the poorest 20 %. Additionally, the strategy foresees that from 2012 to 2020 16 million people should enter the labour market; however, the unemployment rate is constantly increasing over the last five years, reaching 10.8 % of the EU population in 2013, the highest rate since 2000. On top of these, the European population is ageing, leading to an increase in the number of vulnerable people. It is estimated that in 2050 there will be twice as many people above 65 years old than in 1990.

Based on the above, the targets set by the Commission as part of the Europe 2020 strategy for a smart, sustainable and inclusive growth, seem to be very challenging:

- Reduce by 25 % the number of people living below the poverty line, which means that by 2020 the number of poor people shouldn't be more than 96.4 million.
- Increase the employment rate to 75 % from 68.4 % in 2013.

Towards achieving these goals, **fuel poverty**, widely recognised as one of the serious forms of poverty and social exclusion, is one of the most challenging problems that Europe has to deal with. Even though there is no common European approach on the topic, it is estimated that at least 50 million people or 10 % of Europeans are fuel poor nowadays. Considering that almost all people at risk of poverty are vulnerable on energy issues – struggling to pay their energy bills or to secure a proper thermal comfort in their homes – it is likely to assume that combating poverty without tackling fuel poverty will not be easily achieved.

In order to tackle fuel poverty, many measures have been proposed and implemented thus far. Energy subsidies and direct financial support for household heating to low-income people are used in several cases in order to combat fuel poverty. However, these measures cannot provide a sustainable long-term solution, as they are passive measures, aiming to preserve the status quo at the best, representing an increasing burden for public budgets without creating economic growth or leveraging private investments. On the other hand, the implementation of energy efficiency measures in vulnerable households has proven to be the most sustainable solution to fuel poverty, as they result not only in reduced energy demand and bills but also in social inclusion by simultaneously offering jobs and better homes. Consequently, vigorous energy renovation measures in fuel poor homes offer to the occupants a proper indoor environment and at the same time they contribute significantly to the achievement of the above-mentioned socio-economic and environmental targets<sup>1</sup> set in the Europe 2020 strategy.

## Description of fuel poverty

### DEFINITIONS

Despite the pan-European dimension of the problem, there is not a consistent approach in the EU to identify people living under fuel poverty. According to a recent study [3], 10 member states have officially defined fuel/energy poverty or non-affordable energy income threshold, which however are based in different criteria: minimum income threshold, share of income needed for paying adequate fuel requirements, vulnerable consumer categories such as retired people or with disabilities, or a mix of these. Nevertheless, only 3 countries explicitly define the term “fuel poverty”. In France “anyone who meets, in its housing, particular difficulties to have the necessary energy to meet its basic energy needs because of the inadequacy of its resources or of its housing conditions” [4] is considered to be

in fuel poverty. According to the Irish definition [5] fuel poverty is described as “the inability to afford adequate warmth in a home, or the inability to achieve adequate warmth because of the energy inefficiency of the home”. In the UK, according to the first official definition (1991), which is still unofficially used in other countries, fuel poor people are considered those who “need to spend more than 10 % of their income on fuel to maintain an adequate level of warmth” [6]. In England in 2013 a new definition [7] was proposed. This new definition uses mixed criteria of share of energy bill and income, and defines households to be fuel poor if:

- They have required fuel costs that are above average (the national median level).
- Were they to spend that amount, they would be left with a residual income below the official poverty line.

Despite lacking a common European definition, the European Council Directive 2009/72/EC [8] acknowledges that fuel poverty not only exists but also is a growing problem in the Community that needs to be directly addressed.

### MEASURING FUEL POVERTY

For the efficient treatment of the fuel poverty problem, its extent should be determined; a challenging task due to the lack of a common definition. On the absence of it, fuel poverty can be consensual measured by using proxy indicators. The European Union Statistics on Income and Living Conditions (EU – SILC) includes three variables that are commonly used as proxies of fuel poverty and, based on a recent study [9], can be used as the main indicators to describe and measure fuel poverty in the EU:

- inability to keep home adequately warm
- arrears on utility bills
- the presence of a leaking roof, damp walls, floors or foundation, or rot in window frames or floor.

### CAUSES

As it is indicative from the different descriptions of the problem, as well as from the indicators used to measure it, fuel poverty is mainly caused by three factors:

- low household income
- high cost of energy
- poor energy efficiency of the house.

### HEALTH IMPACTS

Many studies have examined the correlation between fuel poverty and health impacts. Asthma, problems in mental health, and even mortality can be attributed to fuel poverty, as the lowering of living standards, below what is considered “acceptable”, is a common practice that many fuel poor households are forced to follow [10].

Many studies have examined the link between excess winter deaths and cold indoor temperatures, with the results showing that between 30 % and 50 % of excess winter mortality is attributed specifically to housing conditions [11]. Excess

1. Reduce greenhouse gas emissions by 20 % (compared to 1990 levels), increase the share of renewables in gross final consumption by 20 %, reduce the energy consumption by 20 % through improved energy efficiency.

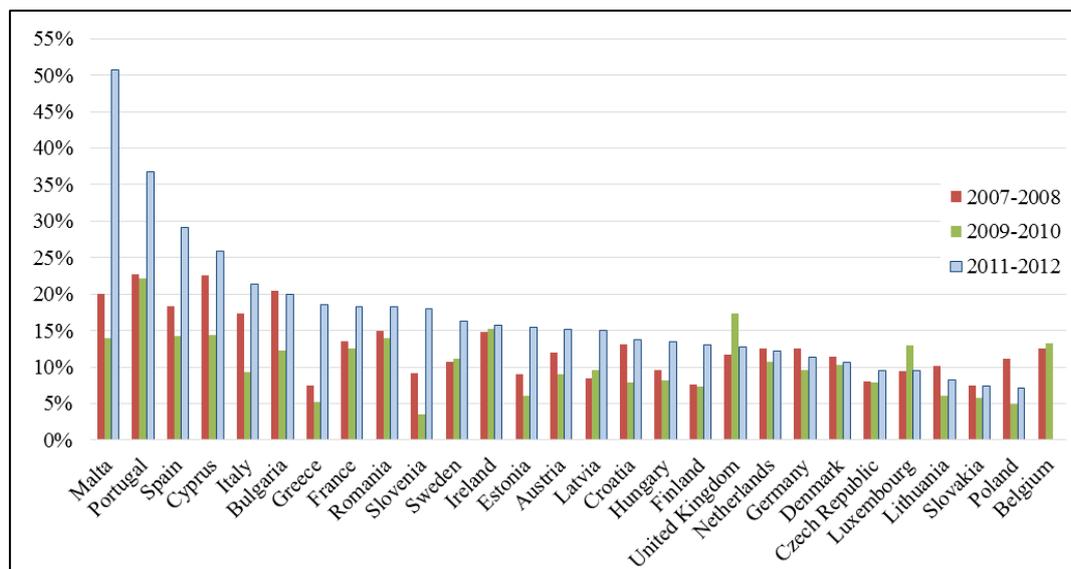


Figure 1. Excess winter deaths index (EWDI) between 2007 and 2012 in the EU28 (BPIE calculation based on Eurostat data).

winter mortality, affected not only by climate conditions but also by energy inefficient housing and the occupants' ability to pay their heating bills, is not only a problem that concerns the northern European countries but the southern countries as well. This is also apparent by the high rates of the Excess Winter Deaths Index (EWDI)<sup>2</sup> in Malta, Portugal, Spain and Cyprus (Figure 1).

Additionally, dampness, moisture and mould in indoor environments, which are usually present in fuel poor households, have severe health impacts. Asthma is the most common chronic disease in childhood and thus of major public health importance. According to the World Health Organization [11], indoor mould exposure is responsible for 12 % of new childhood asthma in Europe, while the corresponding percentage caused by indoor dampness is 15 %. Moreover, it has been proven that fuel poverty can affect mental wellbeing and social contact [12], as well as the development of children [13]. Furthermore, inadequate housing indirectly affects children's educational attainment and emotional well-being, while it can also affect their diet if households reduce spending on food to afford fuel to keep warm [11].

### Fuel poverty in the EU in 2013

Fuel poverty and general economic poverty<sup>3</sup> are two different conditions, which are nevertheless closely linked. This link is also obvious from Table 1 which presents the correlation between these indicators, as well as the connection between the

indicators and the percentage of people at risk of poverty. The calculation of the correlation coefficient presented in the following table is based on data from all EU28 countries for 2013.

As shown in Table 1, there is a strong correlation (0.85) between the percentage of people living at risk of poverty and the percentage of people falling into arrears, which means that countries with the highest percentage of poor people tend to have the highest percentage of people falling into arrears. Additionally, poor people are very likely (correlation 0.78) to live in inadequate warm houses.

Therefore, taking into consideration the fact that since 2009 the number of people in Europe living at risk of poverty has increased (from 23.3 % in 2009 to 24.5 % in 2013), reaching more than 122 million people in 2013, it is not surprising to see that at the same period two of the fuel poverty indicators have also increased. Poor people are in the heart of the fuel poverty problem as their inability to pay their utility bills or to live in a warm home without defects, is because they don't have the financial means to do so and not due to other reasons (e.g. living in a mansion which is difficult to be heated).

In the following paragraphs we will study the three fuel poverty indicators in Europe in 2013.

#### ARREARS ON UTILITY BILLS

The following figure presents percentage of people falling into arrears on their utility bills in 2013. It can be seen that Greece (35.2 %), Bulgaria (34 %) and Croatia (30.4 %) have the highest percentages of people falling behind on their payments, with Greece showing a huge increase (+86 %) compared to the 2009 share. At the other extreme, in the Netherlands (2.4 %), Luxembourg (3.1 %), Germany (3.6 %) and Denmark (3.7 %), the payment of utility bills is a problem for only a small percentage of the total population.

#### INABILITY TO KEEP HOME ADEQUATELY WARM

The inability to keep home adequately warm is another fuel poverty indicator strongly linked to poverty (0.78) as shown in Table 1. This is depicted in Figure 3 where it can be seen that

2. Based on the formula:  $EWDI = \frac{[(\text{winter deaths (Dec-Mar)}) - 0.5(\text{Non-winter deaths (Aug-Nov, Apr-Jul)})]}{(\text{Average of non-winter deaths})}$ . "West Midlands Public Health Observatory". Available at: [http://www.wmpho.org.uk/excesswinterdeathsinenglandatlas/WMPHO%20EWD%20Atlas%20User%20Guide%20\(Jan%20202013\).pdf](http://www.wmpho.org.uk/excesswinterdeathsinenglandatlas/WMPHO%20EWD%20Atlas%20User%20Guide%20(Jan%20202013).pdf).

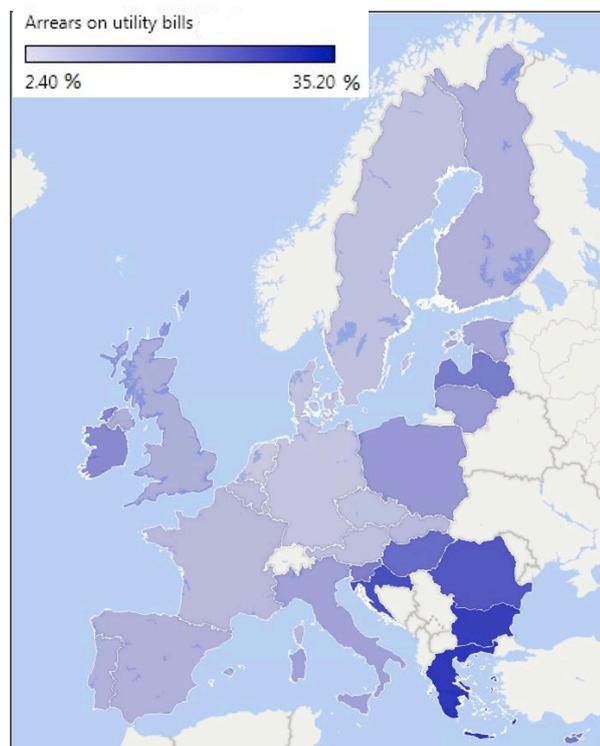
3. According to Eurostat, the at-risk-of-poverty rate is the share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers. The equivalised income is defined as the household's total income divided by its equivalent size, taking into account the size and composition of the household, and is then attributed to each household member.

**Table 1. Correlation between fuel poverty indicators (BPIE calculation based on Eurostat data).**

	% of people at risk of poverty	% of people unable to keep home adequately warm	% of people living in dwelling with a leaking roof, damp walls	% of people falling into arrears on their utility bills
% of people at risk of poverty	1	0.78	0.30	0.85
% of people unable to keep home adequately warm	0.78	1	0.40	0.64
% of people living in dwelling with a leaking roof, damp walls	0.30	0.40	1	0.23
% of people falling into arrears on their utility bills	0.85	0.64	0.23	1

**Table 2. Average share of poor and fuel poor people (proxy indicators) in the EU28 for 2009 and 2013.**

	Inability to keep home adequately warm		Dwelling with a leaking roof, damp walls		Arrears on bills	
	% of the total population	% of people at risk of poverty	% of the total population	% of people at risk of poverty	% of the total population	% of people at risk of poverty
2009	9.3 %	20.5 %	16 %	25.7	8.9 %	19.6
2013	10.8 %	24.1 %	15.7 %	23.5	10.1 %	22.9
Relative difference (2009–2013)	+16.1 %	+17.5 %	-1.9 %	-8.6 %	+13.5 %	+16.8 %

**Figure 2. Population falling into arrears on utility bills in Europe in 2013 (BPIE, based on Eurostat data).**

the poorest countries have the highest rates of people unable to keep their home adequately warm.

Bulgaria (44.9 %) and Cyprus (30.5 %) are the countries with the highest rates of people who are not able to keep their homes adequately warm. Greece (29.5 %), Lithuania (29.2 %), and Portugal (27.9 %) follow. Therefore, three Mediterranean countries with mild winters are among those suffering the most from inadequate warm houses. On the contrary, in colder Northern countries (Sweden, Finland, Luxembourg and Austria), only a low percentage (<2.7 %) of the total population is unable to have an adequately warm home.

#### DWELLINGS WITH LEAKING ROOF, DAMP WALLS, FLOORS OR FOUNDATION, OR ROT IN WINDOW FRAMES OR FLOOR

The third fuel poverty indicator is the percentage of the population living in a dwelling with a defect, notably a leaking roof or damp walls, floors or foundation. In this category, Portugal (31.9 %), Cyprus (31.1 %) and Latvia (27.7 %) show the highest percentages, while in Slovakia, Sweden and Finland less than 9 % of the population live in homes with these defects (Figure 4).

#### CONCLUSIONS FROM FUEL POVERTY INDICATORS

Fuel poverty is a major threat for a significant proportion of the European population, with rates that vary significantly across different Member States. Bulgaria, Cyprus and Greece have high rates for all three fuel poverty indicators, while in Finland,

Sweden, the Netherlands and Luxembourg fuel poverty seems not to be a major problem. It is worth noting – and maybe surprising – that fuel poverty is less of an issue in colder countries than in warmer ones. Apart from differences in relative income, an explanation can be found in the fact that a colder climate means that energy efficient dwellings become much more of a necessity, with progressively tougher building standards introduced over the years as technologies develop. Additionally, the percentages of fuel poverty indicators increase significantly when referring to people at risk of poverty or to other vulnerable categories (e.g. elderly people, single parents).

### Measures against fuel poverty

Fuel poverty is driven by three main factors: household income, cost of energy, and energy efficiency of the property. Therefore, in order to minimize their impact and therefore alleviate fuel poverty, the following actions can be proposed:

- income increase
- fuel prices regulation
- energy efficiency improvements in dwellings.

An increase in the fuel prices would mean that higher share of the household's income should be allocated to energy costs to maintain a standard level of warmth in the house. Therefore, if fuel prices rise, the average income should increase proportionally in order to keep the household out of fuel poverty. However, in Europe since 2007 electricity and gas prices have significantly increased while the mean equalised net income has not grown in the same pace (Figure 5). Furthermore, from 2007 to 2011 (latest available data) the unit consumption per dwelling for space heating has only slightly decreased (from 1.05 to 0.96 toe/dwelling [15]). Therefore, it is reasonable to assume that Europe is moving deeper into fuel poverty.

Based on the above, it is essential that state support should be effective and meeting the needs of fuel poor people. The required support can be provided by implementing different measures, which however are not equally effective. Energy price regulation and direct financial support to low income households may only offer a temporary solution to the fuel poverty problem, as they are dynamic measures and strongly dependent on many economic factors. For the same reason, social tariffs and energy subsidies are not sustainable and effective measures against fuel poverty requiring continuous and even increased funding from the public budgets. Therefore, these solutions do not solve the fuel poverty problem in the long term only addressing its effects rather than the cause of the problem.

On the other hand, many studies [16] illustrate that increasing the energy efficiency of fuel-poor homes is the only long-term sustainable solution. The improvement of the overall energy performance of a building may result in reduced energy bills and better thermal comfort in homes. Additionally, energy efficiency improvements can deliver multiple benefits, not only with regard to environmental and economic issues but also impacting social aspects, i.e. reduced unwanted mobility, local employment, improved overall health, etc. Moreover, renovation measures can act as leverage for social inclusion, when fuel poor people are actively involved in the implementation procedures.

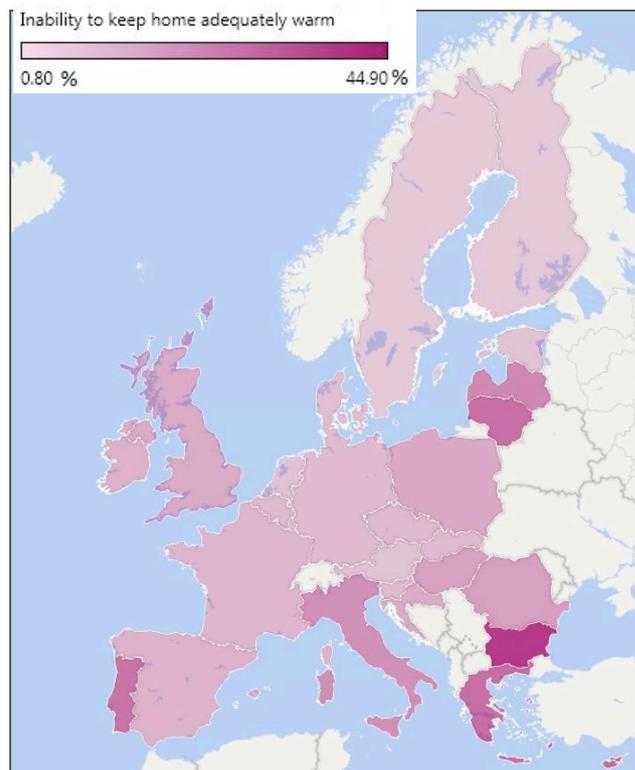


Figure 3. Population unable to keep home adequately warm in Europe in 2013 (BPIE, based on Eurostat data).

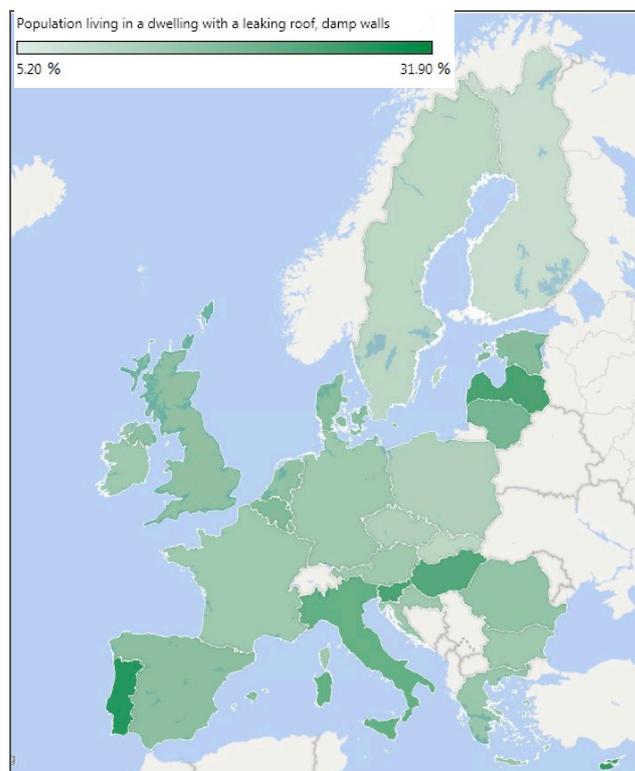


Figure 4. People living in a dwelling with leaking roof, damp wall, floors or foundation in Europe in 2013 (BPIE, based on Eurostat data).

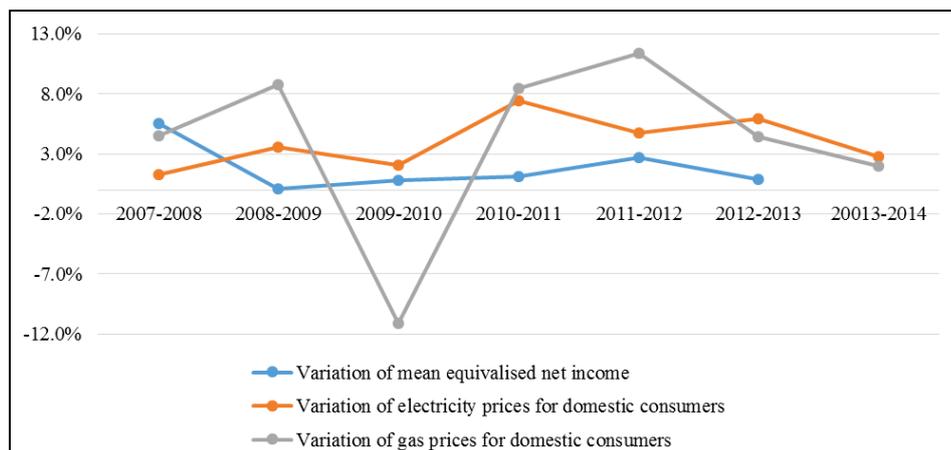


Figure 5. Energy prices and mean equivalised net income variation in the EU (BPIE calculation based on Eurostat data).

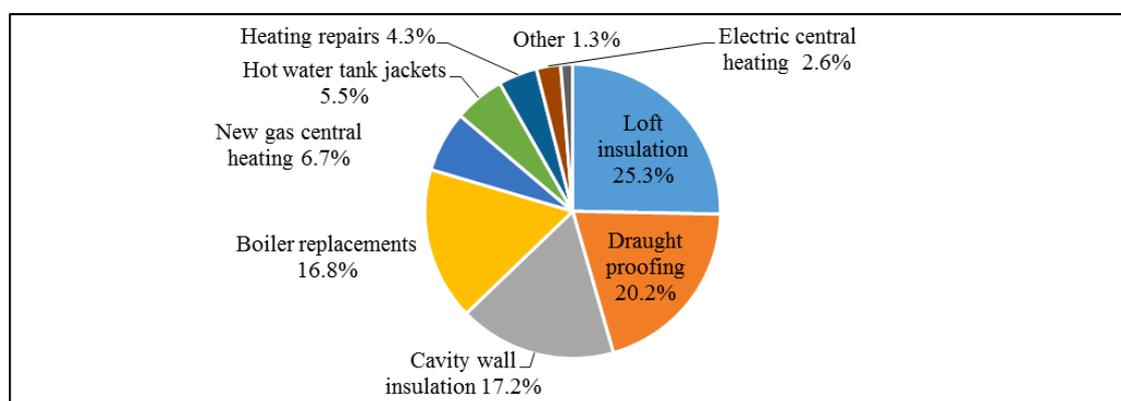


Figure 6. Measures implemented through the Warm Front Scheme. [17]

### Energy efficiency programmes in fuel poor households

As proof of the above-mentioned arguments, the current chapter presents programmes from several European countries that provide financial support for the implementation of energy efficiency measures to fuel poor and vulnerable households.

#### WARM FRONT SCHEME (UK – ENGLAND)

The Warm Front Scheme [17] in England was designed to help vulnerable households lift out of fuel poverty by implementing energy efficiency measures in their homes. This programme was launched in 2000 by the Department for the Environment, Food and Rural Affairs (DEFRA) and was administered by two scheme managers: TXU Powergen and Eaga Partnership Ltd. After 2008 the scheme was overseen and funded by Department of Energy and Climate Change (DECC) and already from 2005 the only scheme manager was Eaga Partnership Ltd. Until the completion of the scheme in 2012/13, 2,324,500 households were assisted, with a total budget of £2,843 billion.

To benefit from the Warm Front Scheme applicants had to be qualified for Cold Weather Payments and live in low efficient houses (rating of D or less in a scale from A to F). In such cases eligible applicants could get improvements worth up to £3,500 or £6,000 where oil central heating and other alternative technologies were recommended. Beneficiaries had to pay only if the cost of the work was more than the grant available. The measures implemented through the scheme included: loft

insulation, draught proofing, cavity wall insulation, boiler replacement, new gas central heating, etc.

According to the benefits entitlement checks carried out during 2010/11 [18], the average weekly increase in benefits per customer identified was £36.44 per week (i.e. 1,894,79 per year). Additionally, based on the annual assessment of the scheme the CO<sub>2</sub> emissions in an average household was reduced from 7.5 tonnes per year to 6 tonnes per year.

Apart from the economic and the environmental benefits, the scheme also had positive health impacts for the beneficiaries. A study [19] conducted in 2008 showed that Warm Front recipients had decreased levels of anxiety and depression. More specifically, the prevalence of anxiety or depression fell by 50 %, from 300 to 150 per 1,000 occupants after Warm Front measures, while additionally, the beneficiaries of the scheme were 40 % less likely to report a high level of psychological distress.

#### ARBED (UK – WALES)

Arbed is a Welsh Government programme aiming to reduce the energy used in households by funding the adoption of energy efficiency measures, especially in low-income households. Through the scheme properties owned by Registered Social Landlords (RSLs), Local Authorities (LAs) and owner occupied homes can be funded.

Arbed was established in 2009 and is divided in two phases. The first phase finished in 2012, and the second will con-

tinue until 2015. In the first phase, the Government invested €36.6 million, leveraging an additional €32 million, of which at least €20 million were invested by local authorities and around €10 million by energy companies. During this period, over 7,500 households [20] (1,147 properties [21]) in Wales benefited from the programme. The implemented energy efficiency measures included external wall insulation, Solar PV, solar thermal, fuel switching as well as energy saving advice; and most of them were installed in properties built before 1980.

The above mentioned measures, brought a significant improvement in the energy classification of the properties. Before the programme, 88 % of the benefited properties were classified in the second-worst F energy performance category, whereas after the improvements 91 % were categorised in the C class. This improvement affected not only the properties' value, but also the total CO<sub>2</sub> emissions which were reduced by 3,025 tonnes per year [20]. Additionally, savings on energy bills were estimated at €216/household/year, while the potential financial savings for all households involved in the programme were calculated at €285,000/year [21].

Furthermore, the interventions from the Arbed programme brought a significant increase in the comfort level of the households, as stated from the 35 % of the beneficiaries who provided feedback. Additionally, 64 % stated that since energy efficiency measures were installed in their homes they feel warmer in them.

Regarding job creation, 1,704 person-training weeks were provided by the programme, ranging from short term trainee positions to 3 and 4 years apprenticeships. Moreover, fifteen energy wardens were employed and received significant training and work experience to improve their long-term work prospects.

In the second phase of Arbed, approximately €45 million will be invested in energy efficiency actions. This amount comprises €33 million from the European Regional Development Fund (ERDF) and €12 million from the Welsh Government. More than 4,800 existing homes will have benefited from the programme until 2015, while emissions will be reduced by 2,540 tonnes of carbon [20].

#### WARMER HOMES SCHEME (IRELAND)

The Warmer Homes Scheme targets vulnerable and fuel poor homes, and provides advice and funds for the adoption of energy efficiency measures. The scheme is administered by the

Sustainable Energy Authority of Ireland (SEAI) and involves local community organisations. From 2000 to 2013 over €82 million were distributed through the scheme and more than 95,000 homes were supported [22].

The energy efficiency interventions are totally funded by the scheme and include measures such as: attic insulation, draught proofing, energy efficient lighting and cavity wall insulation. Only for 2010 [23], the implemented measures resulted in saving 25 GWh and reducing CO<sub>2</sub> emissions by 33,000 tonnes.

Furthermore, substantial percentage of the beneficiaries were lifted out of fuel poverty. Specifically, the percentage of the beneficiaries [24] who were unable (or who found it difficult) to pay the utility bills on time showed a significant decrease from 48 % (before the interventions) to 28 %. Additionally, before the implementation of the energy efficiency measures, only 27 % of the families with children were able to keep a comfortable temperature at home, while after the interventions this percentage increased considerably to 71 %.

In 2009, the Department of Social and Family Affairs published a study [25] evaluating the health impacts of the Warmer Homes Scheme. According to the study results, people benefitting from the scheme enhanced their vitality (energy and fatigue), while they also improved their general health conditions. Specifically, the number of beneficiaries who suffered from long term illness or disorders decreased by a massive 88 % after the adoption of energy efficiency measures. Additionally, the recipients showed significant improvements in health problems associated with heart attacks, high blood pressure/hypertension, circulatory problems, problems with joints/arthritis, headaches, and physical and mental disability.

#### RENOVATION PROGRAMME OF 800,000 SOCIAL HOUSING DWELLINGS (FRANCE)

In 2009 the European Regional Development Fund (ERDF) regulation was amended to allow for up to 4 % of national ERDF resources to be invested in energy efficiency improvements in existing housing in all Member States. Therefore, France committed €320 million from ERDF to renovate 800,000 social housing dwellings with low energy performance by 2020 (Grenelle Law). In order to better support the goals of the Grenelle Law, the government also established a favourable

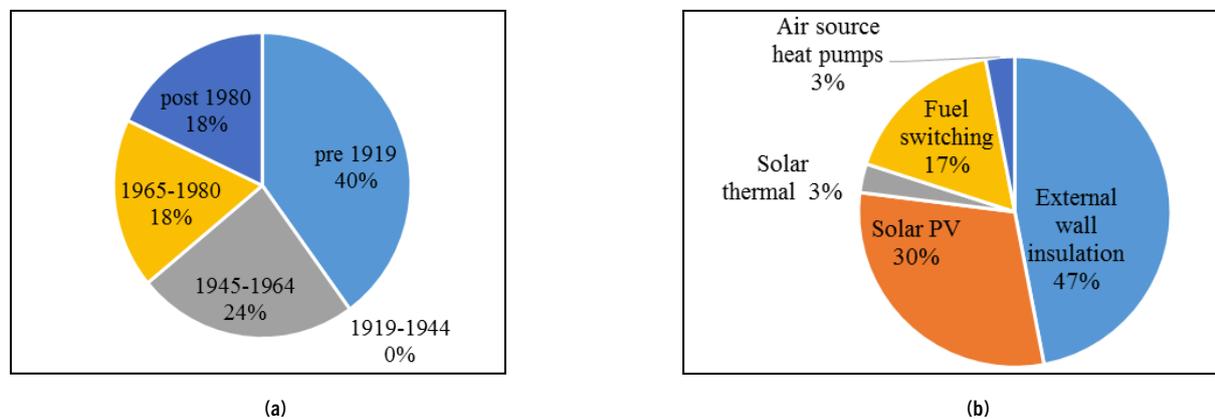
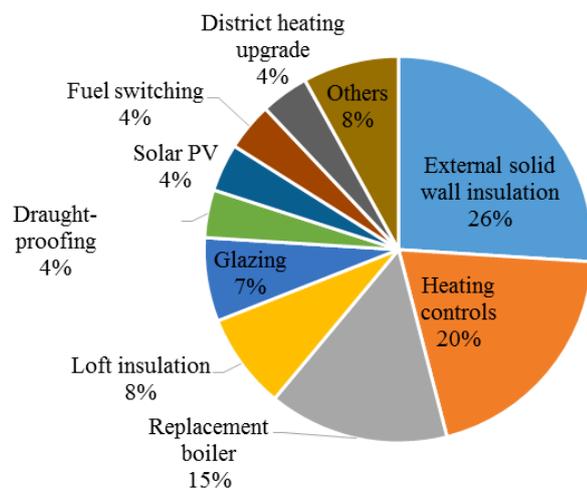


Figure 7. Age of properties improved (a) and type of measures installed (b) within the Arbed 1 Programme. [21]

**Table 3. Carbon savings by measure type and recipient group. [28]**

Measure	Priority group	Of which super priority	Non-priority group
Carryover	4.2 %	0 %	8.5 %
Insulation	26.6 %	5.3 %	30.9 %
Heating	1.8 %	0.2 %	4.9 %
Lighting	5.8 %	0 %	8.9 %
Appliance	2.2 %	0 %	3.7 %
Micro-generation	0.2 %	0 %	0.6 %
Demonstration actions	0 %	0 %	0.1 %
Behavioural	0.4 %	0 %	1.1 %
<b>Total</b>	<b>41.3 %</b>	<b>5.6 %</b>	<b>58.7 %</b>

**Figure 8. CESP measures by type. [29]**

framework. Through this framework, the refurbishment of social housing benefits from different measures such as:

- Low fixed interest loan for social housing (éco-prêt logement social or éco-PLS);
- Grants from national public organisations (e.g. subsidy from the national energy agency ADEME for feasibility studies and energy audits, respectively covering up to 80 % and 70 % of the costs);
- Possibility for the owners to share the investment cost with the tenants, who may contribute based on the energy savings;
- Rebate (tax relief) up to 25 % of the energy efficiency investment cost; and
- Valuation of energy measures through the French White Certificate scheme.

Based on the evaluation of the renovation programme [26], from February 2009 to April 2013, 58,800 vulnerable households received €233.7 million from the ERDF. The implemented measures reduced the household energy consumption by an average of 40 %, saving in each one of them from €360 to €1,000 annually. Moreover, the €233.7 million from the ERDF generated a total investment of €1.22 billion in the local economy, providing 17,225 additional jobs (mainly local jobs in SMEs).

#### ENERGY SAVING OBLIGATIONS (UK – ENGLAND, SCOTLAND & WALES)

British energy and gas suppliers serving customers in England, Scotland & Wales are obliged to meet CO<sub>2</sub> reduction targets through supporting households to implement energy saving measures. From 2008/09 to 2012, such obligations were fulfilled mainly through the Community Energy Saving Programme (CESP) and Carbon Emission Reduction Target (CERT) programme. Although CESP was more focused on vulnerable consumers, both schemes targeted this category of people to a significant extent. The cost of both programmes was passed on by the energy companies to all of their customers through their energy bills.

The CERT programme started in April 2008 and ended in December 2012. Under the Gas and Electricity Order 2008 (Carbon Emission Reduction), the suppliers were obliged to reduce carbon emissions by 293 million lifetime tonnes CO<sub>2</sub>, while providing almost 40 % of these savings in Priority Groups (e.g. people over 70 years old) and promoting at least 16.2 million tonnes worth of carbon saving to vulnerable consumers (“Super Priority Group”, e.g. low income households receiving tax credit) [27].

Through CERT 3.9 million households received professionally-installed loft insulation and 2.6 million households received cavity wall insulation. Fuel switching, replacement of boilers, hot water tank jackets and replacement of windows were also part of the installed measures (Table 3). By the end of the programme 296.9 MTCO<sub>2</sub> were saved (1.3 % above the target) and out of these 41 % (i.e. 123 MTCO<sub>2</sub>) resulted from measures installed in Priority Groups [28].

The CESP obligation period ran from October 2009 to December 2012 and it was administered, like CERT, by the energy regulator Ofgem, under the direction of the Department of Energy and Climate Change (DECC), which set the overall policy framework. DECC set an overall reduction target of 19.25 MTCO<sub>2</sub> to be achieved by the energy suppliers and generators through delivering energy saving measures to households in low income areas in Britain. By the end of the programme, energy companies achieved a reduction of 16.31 MTCO<sub>2</sub> (84.7 % of the target), supporting the government’s Fuel Poverty Strategy. The cost of the programme to October 2011 was about £200 million (i.e. £8 per household) and 293,922 measures were installed in 154,364 properties in low income areas, which couldn’t have benefited from the CERT scheme [29].

### Budget allocation to fuel poverty measures

As shown in the previous chapter, energy efficiency measures that radically improve the energy performance of buildings require significant investments. Homeowners in fuel poverty are less likely to have the capital available, whereas those in private rented accommodation are reliant on landlords who may not have sufficient incentive to invest in improving the property (known as the split-incentive barrier). Therefore, energy efficiency measures for fuel poor people are largely depending on the availability of public financial schemes and regulatory measures able to provide effective answers to the above-mentioned problems.

The current chapter we will present how two European countries (the United Kingdom and Greece) are allocating their budget to fuel poverty measures.

#### THE UNITED KINGDOM

In the UK the government allocates every year specific budget for fuel poverty alleviation [30]. From 2008 to 2014 the overall fuel poverty budget exhibited a significant drop (-20 %). Regarding the distribution of the funds to the different measures (Figure 9), the income support programmes receive the highest portion (70 %) while on the contrary, energy efficiency measures received only a small percentage.

The main income support programme is the “winter fuel payments”, which accounts for two-thirds (66 %) of the total budget (2013–2014). Despite the fact that this scheme spends the highest portion of the fuel poverty budget, only 12 % of the recipients are thought to be fuel poor and it is even paid to seniors living abroad [30]. Regarding the energy efficiency measures, after 2011 the reduced budget for the Warm Front Scheme combined with the tighter eligibility criteria meant that fewer households could be assisted. Furthermore, from 1 January 2013 the Carbon Emissions Reduction Target (CERT) and Community Energy Savings Programme (CESP) were replaced from the Energy Company Obligation (ECO) which was designed to provide funding to improve energy efficiency in difficult to treat housing. However, due to the limited budget in 2013–2014, not more than 180,000 households were expected to benefit from the programme [30].

#### GREECE

In Greece, between 2012 and 2014 €650 million [31] were committed for oil subsidies, while the main programme supporting energy efficiency improvements in households, “Energy Efficiency in Household Buildings”, received only €548 million (fund: €241 million; grant: €207 million) [32]. Oil subsidies were given based on income criteria, which were loosen after

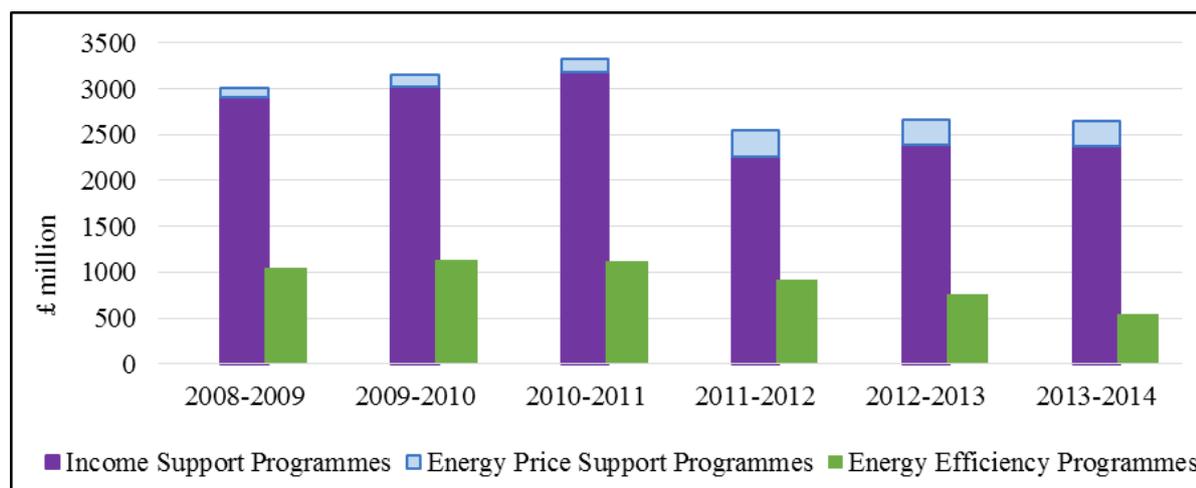


Figure 9. Total fuel poverty public expenditure in the United Kingdom.

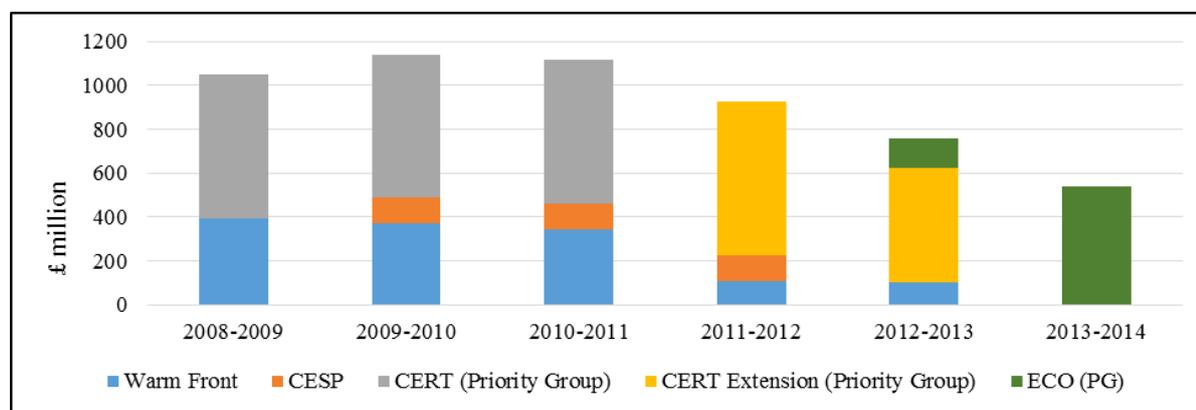


Figure 10. Funding of energy efficiency measures in fuel poor households in the United Kingdom.

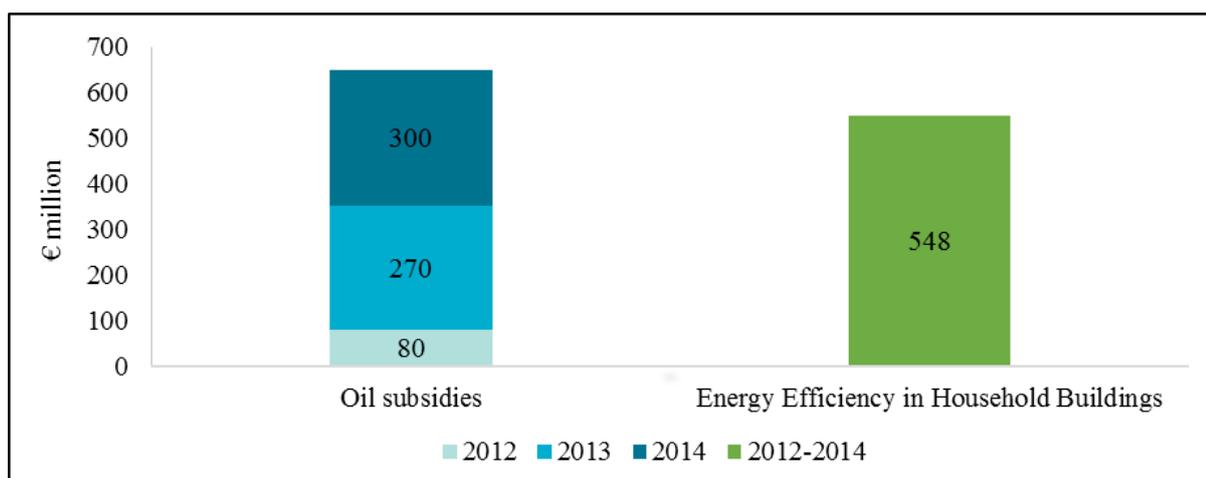


Figure 11. Budget allocation of oil and energy efficiency subsidies in Greece.

2013 (approximately 580,000 beneficiaries for 2014). Furthermore, the subsidised amount increased from €0.28 per oil litre before 2013 to €0.35/lit.

“Energy Efficiency in Household Buildings” offers incentives to citizens that meet specific income-related criteria to implement energy efficiency measures in their homes. Specifically, the highest incentives are given to participants whose family income is less than €20,000 or whose individual income is less than €12,000. In these cases, the beneficiaries can receive an interest-free loan for 30 % and a grant for up to 70 % of the final eligible budget. However, even the limited budget from the programme cannot be used to support low-income people, as the programme involves the banks’ cooperation and for that reason, prior to the programme implementation, citizens must have their creditworthiness checked. Consequently, low-income people considered as uncreditworthy borrowers by the banks, are excluded from the programme [33].

The results of the two case studies show that even though energy efficiency measures have proven [16] to be the most sustainable solution to fuel poverty, Governments are mainly investing in other measures, such as income support schemes and fuel subsidies, which may not event target fuel poor people [30].

## Conclusions

Up to a quarter of the EU population, between 50 and 125 million people, cannot afford having a comfortable indoor environment. Most countries recognise this social problem, even though, there is no common definition of fuel poverty in the EU. Social energy tariffs and heating subsidies, as well as more complex programmes aiming to improve the energy performance of dwellings, have been introduced to tackle the problem.

Nevertheless, the above-mentioned measures are not equally effective in alleviating the fuel poverty problem. Social tariffs and heating subsidies are indeed measures with potentially lower annual costs than investing immediately in deep renovation of fuel poor dwellings. However, they are passive investments from public budgets without generating added value or

economic growth. Moreover, they have to be allocated every year and address only partially the problem. On the contrary, measures aiming to improve the energy performance of fuel poor homes, can create or maintain jobs, reduce illness and death incidents caused by cold homes, rehabilitate poor districts and therefore contribute to social inclusion. Additionally, renovation programs in fuel poor households, result not only in reduced energy bills, but also in a better indoor environment.

Despite the multiple benefits of energy retrofits, the analysis of the “fuel poverty” budget in the United Kingdom and Greece, showed that energy efficiency measures receive the lowest share compared with income and fuel support schemes.

## Policy recommendations

Based on the results of this study, the following recommendations are proposed towards more effective policies addressing drastically the fuel poverty problem:

- **A more accurate definition of the fuel poverty** would facilitate the determination of the extent of the problem while enabling programmes and policies to reach the people that need them most.
- **Improved statistical data will provide more evidence on the scale and impact of fuel poverty in the EU.** Moreover, it will be easier to define the link among housing conditions, fuel poverty and other indicators of vulnerability and therefore shape a detailed view on the subject.
- **Shifting gradually the public budgets from price control mechanisms and fuel subsidies to effective renovation measures should be top priority at national levels.** As presented in this paper, there are European countries in which the level of subsidies allocated to fuel poor people is much higher than budgets allocated to energy renovation programmes. Heating and income subsidies cannot provide a sustainable solution to fuel poverty as they are passive public expenditure and only maintain the status quo in fuel poor households. On the contrary, renovation programmes in fuel poor households can significantly im-

prove living standards of the occupants, by resulting in a range of economical, societal and environmental benefits. The results of renovation projects in fuel poor households provide concrete evidence for the effectiveness of energy efficiency measures. However, there are cases in which such measures cannot be easily implemented, particularly when referring to multi-ownership buildings with only few fuel poor living in them. Even though, the energy renovation of the building will positively affect all residents and not only the fuel poor, it is sometimes difficult for them to agree on the implementation of the measures. In these cases subsidies maybe still used as means of relief for fuel poor people.

- **Higher allocation of EU funds should target the implementation of energy efficiency measures in vulnerable households.** Such measures could be funded through the EU Cohesion Funds 2014–2020 as not only the budget allocation for energy renovation of buildings is higher compared to the previous period (2007–2013), but also because there is a significant correlation between countries suffering more from fuel poverty and countries receiving higher budget from the EU Funds.
- **The EU needs a long term strategy for fuel poverty alleviation.** Due to the extent of the problem and its importance in achieving certain socio-economic, energy and climate goals, Europe should plan a long term strategy to address fuel poverty. A pan-European energy saving target for 2030 with binding measures on improving the energy performance of the EU building stock will not only trigger predictable and coherent actions but also release investments addressing fuel poverty.
- **At national level, dedicated programmes that address fuel poverty, should be designed and implemented.** Such measures should be part of each country's plan to stimulate building renovation (Art 4, Energy Efficiency Directive, 2012/27/EU). Additionally, as part of the energy efficiency obligation schemes (Art 7, Energy Efficiency Directive, 2012/27/EU) dedicated components addressing fuel poor and vulnerable consumers could be introduced.

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