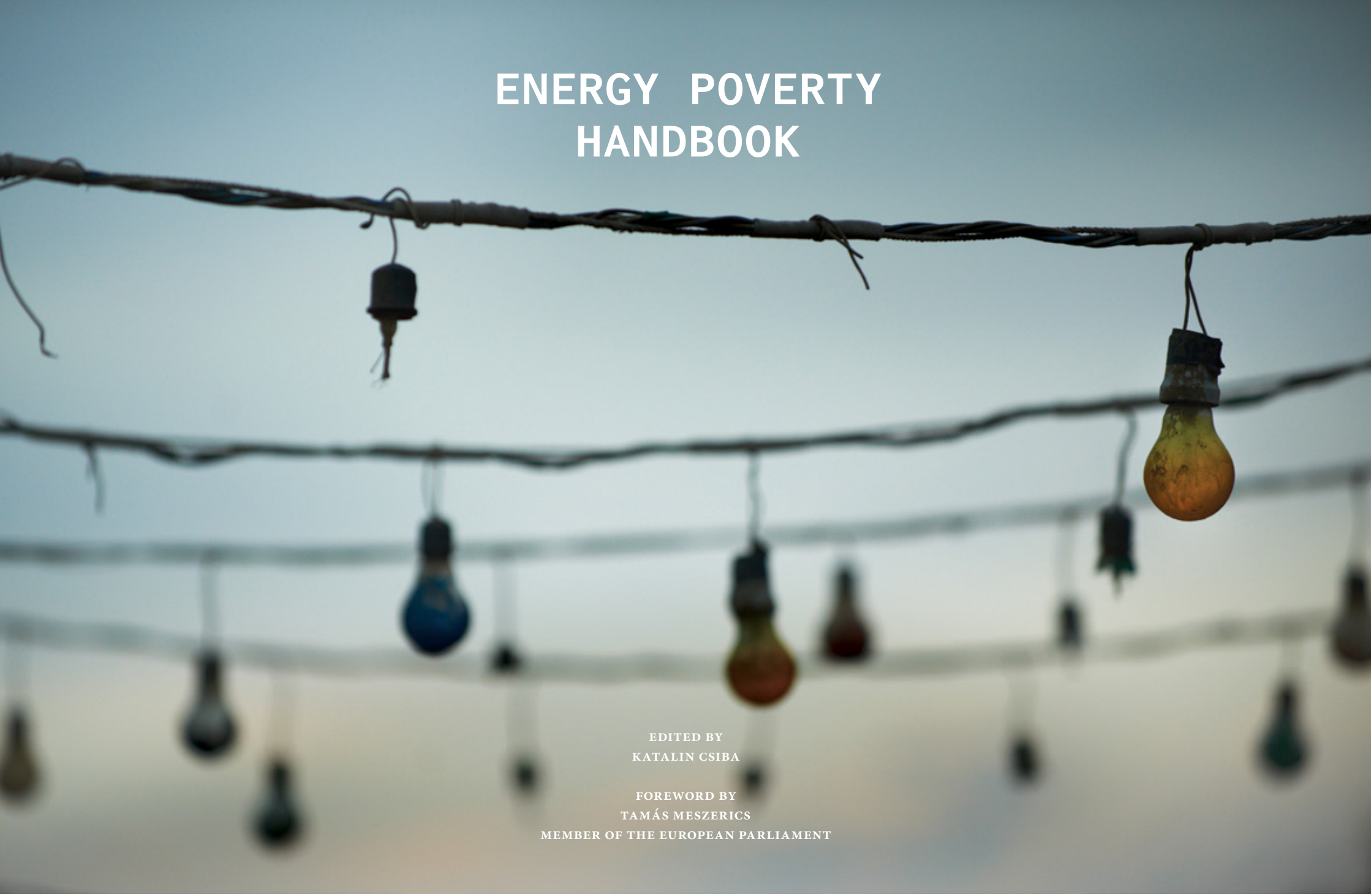
ENERGY POVERTY HANDBOOK



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ABBREVIATIONS

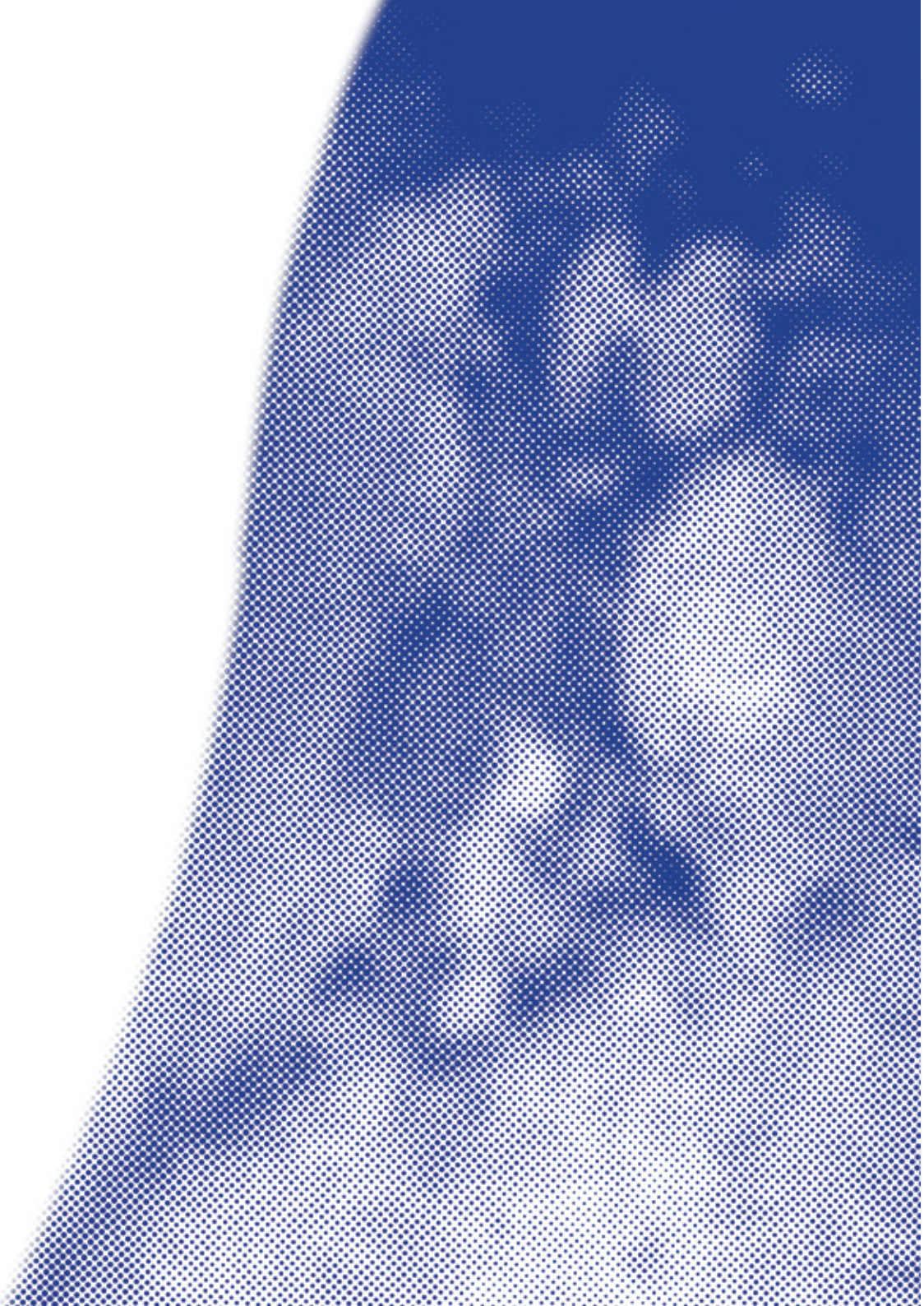
3CSEP	Center for Climate Change and Sustainable Energy Policy
AA	Attendance Allowance
ACER	Agency for the Cooperation of Energy Regulators
ADEME	Agency for the Cooperation of Energy Regulators
BGHM (SLRB)	Brusselse Gewestelijke Huisvestingsmaatschappij (Housing Association of the Brussels-Capital Region)
BPIE	Buildings Performance Institute Europe
CEB	Council of Europe Development Bank
CEE	Central and Eastern European states
CEER	Council of European Energy Regulators
CIS	Commonwealth of Independent States
CORDIS	Community Research and Development Information Service
CPAS	Centre Public d'Action Sociale
CPEC	Civic Consultation of the Consumer Policy Evaluation Consortium
CURE	Centre for Urban Resilience and Energy
DECC	Department of Energy & Climate Change (UK)
DG	Directorate-General
DG ENERGY	Directorate-General for Energy
DG HEALTH AND SAFETY	Directorate-General for Health and Safety
DG JUSTICE AND CONSUMERS	Directorate-General for Justice and Consumers
DG SANCO	Directorate-General for Health and Consumers
DHC NETWORKS	District Heating & Cooling Networks
DLA	Disability Living Allowance
DSDNI	Department for Social Development Northern Ireland
DSO	Distribution System Operators
EAPN	European Anti-Poverty Network
EC	European Commission
ECE	Eastern and Central Europe
ECHP	European Community Household Panel
ECLAC	UN Economic Commission for Latin American and the Caribbean
ECO PROPOSAL	Energy Company Obligation proposal (UK)
EE	Energy Efficiency

EEB PPP	Energy-efficient Buildings Public-Private Partnership
EESC	European Economic and Social Committee
EFSI	European Fund for Strategic Investment
EHCS	English House Condition Survey
EIB	European Investment Bank
ELENA PROGRAMME	European Local ENergy Assistance
ENTSOS	European Network of Transmission System Operators
EP	European Parliament
EPEE	European fuel Poverty and Energy Efficiency
ERC	European Research Council
ERDF	European Regional Development Fund
ERGEG	European Regulators' Group for Electricity and Gas
ESCO	Energy Service Companies
ESF	European Social Fund
ESIF	European Structural & Investment Funds
ESPN	European Social Policy Network
EU	European Union
EU ETS	EU Emissions Trading Scheme
EU-SILC	EU Survey of Income and Living Conditions
EUROMOMO	European Monitoring of Excess Mortality for Public Health Action
EWD	Excessive Winter Deaths
EWM	Excessive Winter Mortality
FILT	The Foundations Independent Living Trust
FSU	Former Soviet Union
HDD	Heating Degree Days
HFHI	Habitat for Humanity International
HH	Household
HIA	Home Improvement Agency
HICP	Harmonized Index of Consumer Prices
IER	Institute of Energy Economics and Rational Energy Use
ILB	Investitionsbank des Landes Brandenburg
INSPIRE	Infrastructure for Spatial information in Europe
ITRE	Committee on Industry, Research and Energy
LEMON PROGRAMME	Less Energy More OpportuNities programme
LIFE PROGRAMME	Programme for the Environment and Climate Action

LIHC	Low Income High Cost
MEP	Member of the European Parliament
MFH	Multi-family houses
MS	Member State of the EU
NGO	Non-governmental organization
NHS	UK National HWealth Service
NICE	National Institute for Health and Care Excellence
NRAS	National Regulatory Authorities
NZEBS	Nearly zero energy buildings
OFGEM	Office of Gas and Electricity Markets (UK)
ONPE	Observatoire National de la Précarité Energétique
OPS	Operational Programmes
PDA	Project Development Assistance
PF4EE	Private Financing for Energy Efficiency
PHE	Public Health England
PPP	Purchasing Power Parity
PPS	Purchasing Power Units
PROJECT ACHIEVE	ACtions in low income Households to Improve energy efficiency through Visits and Energy diagnosis
REELIH	Residental Energy Efficiency for Low-Income Household
SFH	Single Family Houses
SLRB (BGHM)	Société du Logement de la Région de Bruxelles-Capitale (Housing Association of the Brussels-Capital Region)
STORM PROGRAMME	Self-Organising Thermal Operational Resource Management programme
SWS	Social Welfare Services
THFC	The Housing Finance Corporation Ltd.
UN	United Nations
UNAN-LEÓN	National Autonomous University of Nicaragua
UNECE	United Nations Economic Commission for Europe
UNGE	National University of Equatorial Guinea
USAID	United States Agency for International Development
USH	l'Union Social pour l'Habitat
VCWG	Vulnerable Consumer Working Group
WHO	World Health Organization
WHS	Warm Home Scheme
WUN	Warm Up North (UK)

COUNTRY ABBREVIATIONS

AT	Austria	IT	Italy
BE	Belgium	LT	Lithuania
BG	Bulgaria	LU	Luxembourg
CY	Cyprus	LV	Latvia
CZ	Czech Republic	MT	Malta
DE	Germany	NL	The Netherlands
DK	Denmark	PL	Poland
EE	Estonia	PT	Portugal
ES	Spain	RO	Romania
FI	Finland	SE	Sweden
FR	France	SI	Slovenia
GR	Greece	SK	Slovakia
HR	Croatia	UK	United Kingdom
HU	Hungary	US	United States
IE	Ireland		



FOREWORD

TAMÁS MESZERICS
MEMBER OF THE EUROPEAN PARLIAMENT

"Having heard all of this you may choose to look the other way but you can never again say that you did not know."

William Wilberforce
"Abolition Speech"
12th of May, 1789
House of Commons

Energy poverty is a serious concern in our societies which receives more and more attention these days. We slowly realised that energy is no longer a luxury service that provides a higher standard of living but an essential commodity the absence of which might exclude people from participating in the life of a society. During the Great Recession of 2008 and its aftermath we also realised that we do not have sufficient protection mechanisms in our society to maintain a minimum necessary energy supply for all citizens during economic hardships. As Europeans we tend to think about ourselves as ones who care for their fellow citizens and support the less fortunate members of society. This is what we learn and nurture in our hearts and minds as humanists of various creeds. Yet we are too slow to support those families who live in cold and damp dwellings risking their health through no choice of their own. We fail to assist those who slide into an irresolvable debt cycle just because energy prices are too high in relation to their income. Only when the most vulnerable people are permanently lifted out of their desperate circumstances can we honestly say that we live in a society of which we can be proud.

My goal and hope with this handbook is to reach out to concerned citizens and enable them to stand up for their community. I would be delighted to see energy poverty expert working groups being formed to provide better research, community advisory groups starting new energy advocacy projects, lobby groups launching energy poverty campaigns. I would be more than happy to see these groups connecting to each other sharing experiences and successes as they see the progress of their neighbourhoods. I would like to see my fellow politicians taking the initiative all across the EU to eliminate energy poverty from our Union once and for all.

I would like to thank the authors and the editors for their hard work on this project. Their dedication to the subject in the academic and non-governmental sector was the real engine of this project. This strong commit-

ment gives me the hope that Europe can succeed in the challenge of abolishing energy poverty in the coming decade. To reach this goal we need more policy makers, more academics and advisors on board to support smart strategies tackling both the poverty and the energy concerns of our century at the same time. I strongly believe that this handbook will convince you that eliminating energy poverty is not only desirable but also possible.

OVERVIEW

KATALIN CSIBA

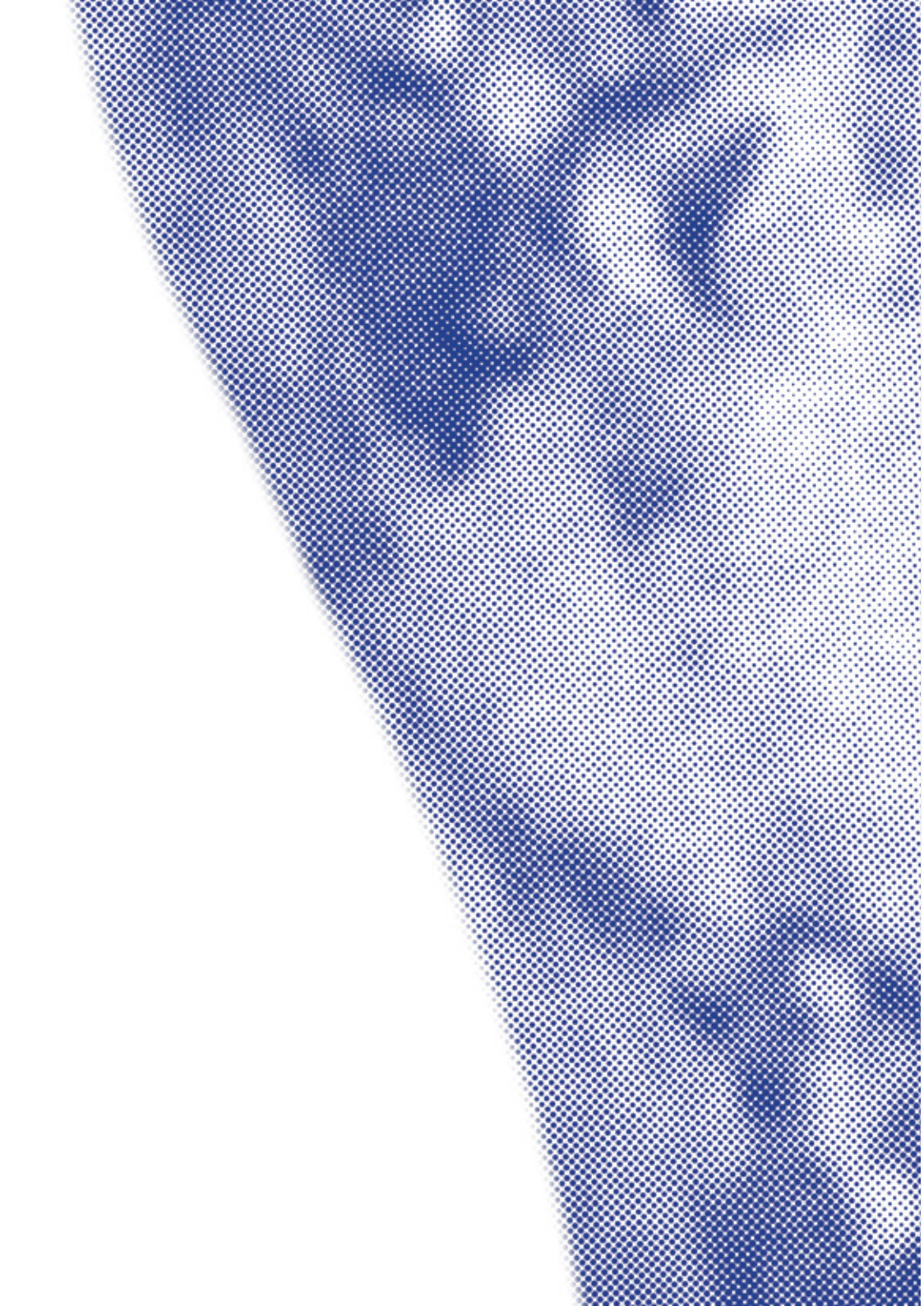
You are holding a handbook about energy poverty or fuel poverty, as it's called in the UK, in your hand. This handbook was inspired by the struggle we faced during our policy work in the European Parliament to push energy poverty higher up on the political agenda. During our work we realised that energy poverty is falling between at least two major policy fields therefore finding a comprehensive as well as up to date descriptive work on the subject is almost impossible. We understood that this lack of available information often might be the greatest obstacle to action or gathering political will.

It is our aim to serve policy makers and their staff to find new ways of tackling this complex issue. We also address this handbook to non-governmental actors, activists, journalists, business professionals, academics, students in social sciences and any concerned individual who feel the need to face this problem and need the tools to begin their work.
Energy poverty is a complex phenomenon. Healthcare experts and politicians often understand the effect and the social costs of inadequate housing but they have no political tool to tackle the causes of the situation. Energy experts and politicians often see the problem of arrears on utility bills and the struggle of vulnerable consumers but they have limited power to influence household income. Social policy makers likewise see the gap between energy prices, income and quality of housing and they also realise that the usual measures might not be sufficient anymore. It is also a fact that energy poverty appears at all levels of our political system. Households in small villages of all Member States are just as affected as households in London or Paris, while most of the funding comes from the European budget.

We invited some of the best-known scholars and organisations to guide us through this field. Each article sets out to present one aspect of energy poverty in a descriptive and easily digestible fashion. At the end of each paper the reader will find an excessive and recent bibliography for further research. The articles express the latest findings of the authors and they also collect their recommendations based on their experience and knowledge.

The handbook begins with an introduction of the social consequences of energy poverty on the life of a household and its members. It is followed by an article explaining the health implications of cold and damp dwellings. The third paper explores the quality of European housing stock in general while the fourth piece analyses the macro-regional differences of energy poverty and its causes. The second part of the handbook focuses on the existing policies and regulations by explaining the importance of an adequate legal definition, comparing the national regulations protecting vulnerable consumers and energy poor households. Finally we explore the financial resources that are available and a list of best practices across Europe already operating and sufficiently helping people in energy poverty.

We hope you will find this handbook informative and useful and inspiring at the same time.



SOCIAL CAUSES AND CONSEQUENCES OF ENERGY POVERTY

SIAN JONES
EUROPEAN ANTIPOVERTY NETWORK

INTRODUCTION

Over the last decade, Energy or Fuel Poverty has become a growing priority for EAPN members, as energy poverty increases systematically across the EU. The causes seem obvious: rising energy prices, shrinking income and poor housing. But does the evidence support these developments? What role has EU and national policy played, particularly with the liberalization and privatisation of services? What are the consequences for people who experience energy poverty daily and the NGOs that support them? What can be done?

> ***"Access to energy for all will be guaranteed when the public social welfare and energy authorities start working together." (EU Meeting of People Experiencing Poverty, 2014)***

This statement come from people who face energy poverty, from the EU meetings of People experiencing poverty, organized by the European Commission and EU Presidencies with EAPN since 2000 (EAPN, 2010-2016). They highlight the clear understanding that people on the front line have of the complex causes of energy poverty, and their belief that it is not evitable. Developing effective solutions depends on gaining a detailed understanding of the real drivers, and consequences to people's lives, as well as to the overall society and economy. This article sets out the main causes and consequences of Energy Poverty based on members' inputs underpinned by a review of relevant research findings.

CAUSES OF ENERGY POVERTY

Energy Poverty is commonly understood to be when a person or household is not able to heat or fuel their home to an acceptable standard at an

affordable cost. In reality, it covers a very wide set of essential activities. It can occur if people cannot afford to heat their homes adequately, but also to cool them in hot climates. It may mean they cannot afford to cook hot meals, or have reliable hot water for baths and washing clothes or run essential domestic appliances (washing machines, irons, televisions, computers, etc.).

The UK has been one of the first countries to develop a common definition. However, whilst England has now developed a separate definition (using a low income, high costs indicator), Scotland, Wales and Northern Ireland continue to use the well-known 10% definition. This definition has clear advantages in making a clear assessment of what proportion of a person's income should be spent on basic energy costs as well as defining adequate levels of heating.

> ***"A household is in fuel poverty if in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use. If over 20% of income is required, then this termed as being in extreme poverty. According to WHO standards, a satisfactory heating regime is for vulnerable households (23 C in the living room, 18 C in other rooms). For other households it is 21 C in the living room and 18 C in other rooms)." (Energy Action Scotland, 2016)***

Despite difficulties caused by the lack of a common EU definition or complex comparable data, it is clear that energy poverty is an extensive and increasing problem that is impacting negatively on people's living standards and rights. The EU Survey of Income and Living Conditions (EU-SILC) estimates that from 2010 and 2011 across the EU, nearly 10% of the population are unable to keep their home adequately warm, almost 16% live in homes that are damp, rotting or leaking, and around 9% are behind on payments for utility bills (Pye, May 2015). 2013 Eurostat figures show 52 million people across the EU cannot keep their home adequately warm, with 161 million facing disproportionate housing expenditure, 87 million in poor quality dwellings and 41 million facing arrears in utility bills. Shocking as these figures are, they are likely to be an underestimate. Other studies indicate between 50 and 125 million people at risk of energy poverty (EPEE, 2009).

1. Main drivers of energy poverty

Most studies agree that there are three main drivers or causes that work in combination as highlighted by the INSIGHT_E study (Pye, May 2015) and the EAPN presentation to the Energy Poverty Workshop organized by DG Energy in the 2014 Annual Convention on Poverty (Jeliazkova, 2014).

1. Low incomes
2. Poor thermal efficiency and housing
3. High energy costs

> ***"Energy poverty is a growing phenomenon everywhere in the EU since 2008 (...) it is caused by an alarming mix of poorly insulated homes, rise in energy prices paid by the final consumers, and the stagnation of disposable income due to the general economic situation." (Jeliazkova, 2014)***

However, it is usually the interplay between these multiple factors, including personal factors that make a difference. Stefan Bouzarovski in a recent review article highlighted specific household energy needs as a 4th significant factor (Bouzarovski, 2014). This is confirmed by the European Fuel Poverty and Energy Efficiency study: *"Households most susceptible to fuel poverty combine low income with an additional degree of vulnerability, such as the elderly, disabled and sick and single parent families"* (EPEE, 2009). The King Baudouin Energy Precarity Barometer also highlighted that single parent families (80% being women), single households and particularly older single households were particularly at risk. Unemployed people are also more vulnerable, 25.9% compared to 8.9% in work (King Baudouin Foundation, 2015).

Other factors are also highlighted. For example, in the INSIGHT_E Study: rate of energy price rises versus income growth, ability to access cheaper energy prices, household energy needs, efficiency of energy use and importantly specific policy interventions are additional factors (Preston, White, Blacklaws and Hirsch, 2014).

2. Declining household income and increasing poverty

In EAPN member's day to day work, there is little doubt that low household income is a crucial factor, whether due to low paid or insecure jobs, or low income support or social protection, or a combination of both. Fuel poverty arises when the costs of heating and other energy costs take too big a proportion out of the weekly income. The EPEE study showed low income as the main factor giving the highest probability of living in fuel poverty (EPEE Project, 2009). The study used three indicators from the EU-SILC dataset to evaluate the extent of fuel poverty in Belgium, Spain, France, Italy and the UK, cross referenced with national surveys. The study emphasized that 1 in 7 households was in or at the margins of fuel poverty.

A key factor is the proportion of household weekly income that is spent on fuel. A study by the US Agency for International Development in Bulgaria, Romania, Armenia and Kazakhstan found that *"energy costs are the highest monthly expense after food for most low-income households in the regions"* (Velody, 2003). It is not only the low overall income, but the dependency on energy as a major essential consumer item, which traps many poor families.

Moreover, with the impact of the crisis and austerity policies, household incomes have declined significantly with wide variations across the EU. The number of people at risk of poverty or social exclusion was decreasing before the start of the crisis, however it grew again, reaching its peak in 2012, with 122.5 million people at risk in the EU-27 (123.9 million people in the EU-28). Between 2012 and 2014 this number decreased again slightly to 121.0 million people in the EU-27 and 122.3 million people in the EU-28, respectively. This still means that 1 in 4 of the EU population are at risk of poverty (EUROSTAT, 2016).

3. High and rising costs of fuel

"We see rises in food prices, in electricity prices, rises in general in the cost of living, but no substantial adjustment in social benefits or pensions." (EAPN, 2010-2016)

High prices reduce the affordability of fuel. It can mean that low income families become less able to heat their homes to an adequate level. The cost of fuel for each household will also depend on household characteristics and their specific needs i.e. for a family with children, or an older person, or person with disabilities or long-term sickness that may need to heat their home for longer in the day, or to higher levels. In reality, most low income families often have very limited choices over the type of fuels they can use, because they are trapped in poor housing.

"They should lower the price of fuel because if people cannot afford it they could die of cold and this would be because of the people who set the prices." (EAPN, 2010-2016)

Several studies have highlighted trends of rising prices. Prices of oil and gas reached unprecedented levels in the period 1991 to 2012. Only between 2005 and 2007, the price of EU domestic gas increased on average by 18% and household electricity by 14%. (EPEE, 2009). Since 2004, fuel prices have increased by over 70% in real terms. (Walker, Thomson and Liddell, 2013). However, there are wide variations globally. Between 2005 and 2011, average electricity prices in the EU have increased by 29%, in the USA only by 5%, and in Japan by 1% (Milton Catelin, World Coal Association quoted by Maria Jeliazkova/EAPN Bulgaria; Jeliazkova, 2014).

Price rises in EU post-soviet countries have been strongly connected to the impact of deregulation and privatisation, according to some studies. As Stefan Bouzarovski highlights in his overview of several major studies, including the European Bank for Reconstruction and Development study (Fankhauser, 2005) *"the studies confirm that one of the key driving forces of energy poverty in the Eastern and Central European (ECE) and Former Soviet Union (FSU) context has been the energy price increases undertaken after the fall of communism, so as to bring electricity and gas tariffs – formerly subject to indirect subsidies by the state – up to cost recovery levels".*

The period of price rises across Europe has also coincided with the accelerated trend to liberalize and privatise energy services, underpinned by the expansion of the EU internal market in energy services.
Climate change policy interventions also run the risk of increasing prices.

"The cost of energy has been increasing for domestic and business users since the beginning of the century, however now the better climate protection policies are also having an impact. In Germany,

the Commissions of Inquiry are supposed to be investigating the impact of increasing energy costs at national as well as federal level." (EAPN Germany)

Effective social impact assessment is essential to ensure that important measures to reduce resource use and invest in alternative energies, do not proportionately hit the poor worst.

4. Lack of energy efficiency and low quality housing

The thermal quality of the housing and the efficiency of the heating source will determine how much energy and fuel is needed to effectively heat houses to adequate levels.

A lot of academic research in UK and Ireland has focussed particularly on the interaction between low household incomes and thermally inefficient homes. People living in inefficient accommodation are forced to consume and pay more, because their homes are so expensive to heat. The high consumption levels are often outside their control, particularly in private rented accommodation. In relative terms, is also less affordable for low income households. This is highly related to patterns of housing stock and access – particularly patterns of household tenure and type of heating systems which can undermine otherwise positive energy efficiency interventions and fuel switching measures that might reduce energy costs (Bouzarovski, 2014).

There is a strong link between bad housing, energy demand and energy poverty. Many studies have shown that poor maintenance in housing is a key factor in increasing energy demand, which impacts on energy poverty and with negative health impacts (Healy, 2004). The EPEE study found that more than 60% of homes in UK, Belgium, Italy and Spain and France were built before any regulations for thermal insulation were applied (EPEE, 2009).

Upgrading insulation in poor housing, however, is costly and not always effective. The impact on low income households of the cost of improvements can be a concern. Many low income households live in private rented accommodation and rarely have enough money to buy energy-saving interventions. In the King Baudouin Foundation report on Energy Precarity in Belgium, tenants were found to have double the risk of energy poverty compared to owner occupiers, with 20% having difficulties in paying their energy bills, compared to 11% of owner occupiers. 10% of tenants had to restrict their energy consumption because of cost, compared to only 2.4 % owners (King Baudouin Foundation, 2015).

"There are lots of renewable energies available – solar power, water power, etc. – but they are very expensive and governments don't want to play their part." (EAPN, 2010-2016)

When energy-efficient conversions are carried out, there is also risk that the cost is passed onto the tenant in the form of higher rents (EPEE Project, 2009). In EU terminology, this is known as a split incentive or misaligned incentive, referring to *"transactions where the benefits do not accrue to the person who pays for the transaction. In the context of building-related energy, it refers to the situation where the building owner pays for energy retrofits efficiency upgrades but cannot recover savings from reduced energy use that accrue to the tenant"* (Joint Research Centre, 2014).

The International Union of Tenants confirmed concerns about the impact of split incentives in a recent meeting of DG Energy's Vulnerable Consumers Working Group (Jan 2016) highlighting that "*in 21 European countries renovation costs may be passed to tenants through rent increases – leading often to welfare losses or renoviction, i.e. displacement".* This may be a win-win for the landlord and even the environment, but poor families may pay the price, unless subsidies are passed directly to the tenant, and legal protection embedded to protect their rights.

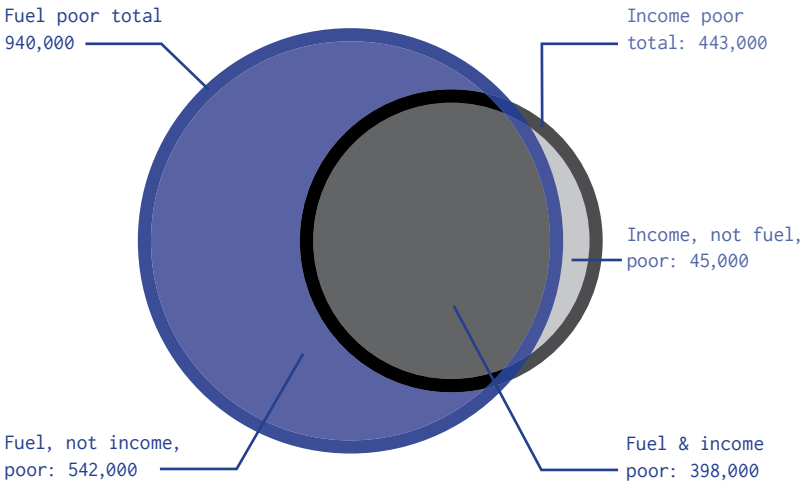
A detailed recent study (2016) on the impact of energy efficiency measures and fuel poverty carried out in Scotland by the Consumers Future Unit, Citizen's Advice Scotland, assessed retrofitting energy efficient measures to existing housing stock. One of their key findings was that "*despite the progress, modelled rates of fuel poverty continued to rise, largely as a result of rising costs, with latest figures suggesting 1/3 of Scottish Households in fuel poverty (…) while increased energy efficiency helps to mitigate fuel poverty, the evidence shows it is not enough to eliminate it.*" (Consumers Future Unit, Citizen's Advice Scotland, 2016)

Some solutions to this dilemma can be seen for example in the Netherlands, where a total housing cost guarantee ensures that social tenants are protected against increase in their total housing costs, in case of an energy renovation (Joint Research Centre, 2014).

UNDERSTANDING THE RELATIONSHIP BETWEEN ENERGY AND INCOME POVERTY

How far is fuel poverty just another name for income poverty? Obviously there is a strong link, however there is not a complete overlap. Some studies highlight that not all people who are income poor are fuel poor (Marmot Review Team, May 2011). However, a survey carried out by the Scottish Fuel Poverty Forum, demonstrated that in Scotland whilst people who were income poor were generally fuel poor (398.000), many more people are fuel poor, but not income poor (542.000). Fuel poverty is therefore seen to exist across income bands. In Belgium, the King Baudouin Barometer on Energy Precarity found a combination of the two positions, with more than half the households at risk of income poverty not suffering from energy poverty, while nearly a half of those in energy poverty were not at risk of income poverty (King Baudouin Foundation, 2015). These conflicting findings demonstrate the need for qualitative as well as quantitative comparative research, based on real cases and involving the people who are most effected through participative research methods. Only then will the complex interaction between poverty and energy poverty be understood and effective, comprehensive solutions to be found.

Figure 1 - Relationship between fuel and income poverty in Scotland (Scottish Fuel Poverty Forum, 2015)



THE CONSEQUENCES OF ENERGY POVERTY

Fuel poverty usually results in a continuous vicious circle. Poverty often forces poor households to live in cheaper, bad quality housing that is hard to heat, increasing their bills and costs. Their personal and household circumstances may mean they need to heat their homes for longer periods and to higher levels (being out of work, or in low paid, precarious jobs; suffering from long-term sickness or disability; being at home with young children). Hikes in prices and cuts in income make it increasingly difficult to manage, driving households into unacceptable choices between energy and other key needs like food or school equipment or trips, and further into debt. Physical and mental health are severely affected which impacts on well-being, but also capacity to work, relate and participate. This in turn has substantial negative impacts on growth and the economy.

1. Cycle of debt

> ***"Energy prices are still high. Energy is a need not an advantage." (EAPN, 2010-2016)***

The immediate impact of energy poverty is often indebtedness, as people on low incomes are faced with bills they can't meet. Not using energy isn't really an option. Reducing consumption is often difficult because of housing and household circumstances. Current practices by many energy companies can also exacerbate these problems, by delaying issuing bills based on real consumption compared to provisional assessment (for example in Belgium), and unrealistic assumptions about how quickly bills can be repaid. Some households get themselves into greater difficulties by trying to use credit or get loans, often from credit sharks. It can also lead to hard choices.

> ***"We have often to choose between heating and eating." (EAPN, 2010-2016)***

Many households end up prioritizing energy costs, also out of fear of the threat of disconnection, and so neglect other important items e.g. on food, rent, social activities, transport or on children's needs or education (EAPN, 2010).

Tackling energy poverty debts in the context of other debts and household budget can benefit from good debt advice. Many EAPN members provide personalized debt advice services to people on low incomes to help them balance them negotiate with energy companies over bills, balance their budgets better, get cheaper loans, as well as looking for ways to reduce their energy consumption. For example, Energy Action Scotland is a charity campaigning for an end to fuel poverty in Scotland. It provides advice to households on heating, insulation and gas connection grants, energy, money and debt advice and concrete help on specific fuel bill problems (Energy Action Scotland, 2016).

However, the main reason for debt is not so much bad financial management, but the impossibility of making ends meets – with rising fuel prices and stagnant or reduced incomes, including from social benefits. Cuts or inadequate uprating of fuel compensation benefits, as part of austerity measures is a major problem. The CPEC study for DG SANCO on Over-indebtedness of European Households, found that utility bills were named as the major cause of debt (68%). This appears to reflect the reality of sharp rises in energy costs in the period 2005-2011, with the Electricity Price Index increasing five times more than Income per Capita. They also highlight the wide variation across Member States with particular risk in Eastern and Central European Countries (CPEC, Civic Consultation of the Consumer Policy Evaluation Consortium, 2013).

> ***"In terms of costs of living - utility costs are the most important. Our consumers complain about the prices, especially for electricity and central heating. They are monopolistic prices. They are not so high, but compared to the average wages they appear to be very high. There are people who pay 60, 70, or 80% of their wages for utility costs. This is a very big problem for families who are over-indebted. Housing costs are important, but not as important as utility costs." (CPEC, Civic Consultation of the Consumer Policy Evaluation Consortium, 2013)***

Worryingly, new initiatives to curb climate change can have a negative social impact on people with low incomes and contribute to rising energy poverty. For example, in Germany:

One reason for the growth in energy poverty debt is that electric prices has almost doubled since 2000, according to the German Federal Office of Statistics. Another reason is climate change energy transformation, which is not cost-neutral. Neither has the standard rate of electricity covered by basic social benefits been properly adjusted to increasing electricity prices. For example, the current standard rate for a single person is only €404 a month. The calculation of energy costs is too low! The Federal Constitutional Law has already responded to this deficiency in a current verdict on 9 September 2014 (Federal Constitutional Court, 2014; EAPN Germany).

2. Cut offs and evictions

In the worst cases, energy bills debt can result in cut offs and evictions. Households lose their right to fuel, as energy companies cut off their supply for non-payment leading to untold hardship, increasing difficulties with their housing and risks of housing exclusion. In some Member States, tenants who have faced problems to pay their energy bills are blacklisted, so that when they want to move to a new flat, they cannot get a new rental contract.

According to ACER (Agency for the Cooperation of Energy Regulators) in its yearly review of the internal market in electricity and natural gas, half of the Member States (MS) still do not provide detailed information on disconnections, despite their monitoring duty in the Electricity and Gas Directives (Art. 37 par. 1 (j) and Art. 41 par. 1 (j)). Of the one's that do, in relation to electricity services, UK has the lowest rate - at less than 0.1%. In 2013, Portugal and Greece produced the most disconnections, at 6.7% and 4% respectively, with most MS reporting under 1% (SK, SI, DE, AT, HU) (ACER, 2013). However, in 2014, although disconnections in Portugal and Greece were reduced, a significant number of other MS have substantially increased their disconnection rates: 4.0% in Italy, 2.8% in Malta, 2.3% in Spain, 2.0% Poland, 1.1% Slovakia, 1.0% in France (ACER, 2014).

Neither is there any consistency in the treatment of disconnection. In Flanders, the disconnection has to allow 200 days, whilst in most MS it is under the month. (AT, BG, CY, UK IT, LT, PT, SK, SI). According to Article 3 of the Directives, Member States are supposed to ensure adequate safeguards by defining vulnerable customers and '*inter alia*' preventing disconnection at critical times'. According to ACER, in 2014, 18 out of 29 authorities defined vulnerable customers, but there is no detailed information about what this means in practice and the relationship with disconnections.

The data and percentage figures, however, do not spell out the reality for the millions of people affected, the unacceptable hardship caused to low income and vulnerable households.

Most EAPN networks, include member organizations who provide face to face debt advice services. In Germany, EAPN member organizations have seen growing incidences of cut offs. The German example below highlights the complexity of factors in play, affecting people's management of their household budgets.

"More and more people come to our non-for-profit advice centres because of letters they have received threatening disconnection from the power supply. In 2014, the Federal Network Agency and the Federal Cartel Office stated that 352 000 cut offs took place. The number of threats of disconnection was 6.3 million. These threatening letters were sent to households who were only in arrears for €100 …" (EAPN Germany)

The level of disconnections, and lack of unified approach to ban cut offs and protect vulnerable people, around the most basic of human rights, is clearly an unacceptable face of the Energy Union.

3. Deteriorating health, including mental health

"My room, and the whole ceiling is damp. If I just look right from the bed the whole entire walls are covered in damp, and I'm there in bed, freezing cold." (EAPN, 2010-2016)

An increasing number of studies demonstrate the severity of the impact of energy poverty on the health for different groups. Most often this is due to living in cold, bad housing. People on low incomes are often forced to cut back on heating because of cost, or to switch to less healthy forms. Poor construction compounds the problems. This results is not only deteriorating health and well-being, but significant indirect impacts.

In the UK, where mortality is measured and the links to bad housing, 25 000 to 40 000 people die each year. The WHO data show that Excessive Winter Mortality (EWM) is not connected with climate – i.e. it is not in the coldest countries. For example, EWM does not exist in St Petersburg, but does reach 10.77% in Paris, 20.28% in London and 30.00% in Glasgow (EPEE Project, 2009). In Scotland, the excessive mortality figures for 2014-15 are 4060 people, the highest level for 15 years (National Records of Scotland, 2016).

The rate of deaths in winter is strongly linked to the quality of the housing and capacity to heat it adequately. The Marmot Review highlights that there is a strong relationship between cold temperatures, humidity and cardio-vascular and respiratory diseases. Around 40% of Excessive Winter Deaths (EWD) are attributable to cardiovascular diseases and around 33% of EWDs to respiratory diseases (Marmot Review Team, May 2011). Many households also resort to 'substitute' cheaper heaters which may increase humidity problems and cause accidents, for example, carbon monoxide poisoning.

Different age and household groups are also affected in different ways. In the EPEE study, a clear finding was that fuel poverty impacts first and hardest on the health of the most vulnerable – children, elderly people and people with chronic conditions (EPEE Project, 2009).

"The children have no heating in winter, they live in unhealthy conditions." (EAPN, 2010-2016)

This is further seen in the Marmot Review: children living in cold homes are more than twice as likely to suffer from a variety of respiratory problems than children living in warm homes. Significant negative effects of cold housing are also evident in terms of infants' weight gain, hospital admission rates, developmental status, and the severity and frequency of asthmatic symptoms. When it comes to older people the effects of cold housing were evident in terms of higher mortality risk, but also worsening of conditions of arthritis and rheumatism (Marmot Review Team, May 2011).

It's not just physical health that is affected. People in fuel poverty are particularly susceptible to mental health problems. Living in cold housing causes anxiety, can lead to social exclusion and isolation, can have a negative impact on self-esteem and the capacity to manage (EPEE Project, 2009). The Marmot Review highlights that more than 1 in 4 adolescents living in cold housing are at risk of multiple mental health problems compared to 1 in 20 adolescents who have always lived in warm housing.

4. Indirect health impacts and on the economy

The indirect impacts are also significant. The Marmot Review highlights that cold housing and fuel poverty negatively affects children's educational attainment at school, but also their emotional well-being and resilience. They find it more difficult to study, and to be motivated, and this can lead to a greater feeling of helplessness.

Energy poverty can also increase social isolation. Worrying about going out and coming back to a cold home. This can also lead to avoiding inviting anybody back home, resulting in a general retreat and exclusion from the world.

> ***"You may be a bit shy to invite your friends over because when they come in they'll be freezing and they might want to leave early." (People Experiencing Poverty Meeting, 2014)***

A further impact can be on employment. Health problems can lead to more days off sick from flu and colds, as well as for more serious illnesses. It can also have an undermining impact on people's self-esteem, particularly if they are not always able to have hot showers or baths, or wash their clothes. All crucial activities when trying to get or stay in a job.

Finally, the social impact has economic costs. In 2009, UK Government policy documents and reports, including the Chief Medical Officer report of 2009 and Public Health White Paper, recognised the tangible impact of cold housing and fuel poverty on people's health and well-being. The Chief Medical Officer Report also went on to underline the enormous economic impact. *"The annual cost to the NHS of treating winter-related disease due to cold private housing is £859 million. This does not include additional spending by social services, or economic losses through missed work. The total costs to the NHS and the country are unknown. A recent study showed that investing £1 in keeping homes warm saved the NHS 42 pence in health costs."* (Chief Medical Officer Report, 2009)

CONCLUSION: THE RIGHT TO AFFORDABLE AND SUSTAINABLE ENERGY FOR ALL

Understanding the complexity and interconnectedness of the causes and consequences of energy poverty is crucial to build effective solutions. But this depends on taking account of structural causes. Problems of energy poverty arise because of a fundamental mismatch between income, expenditure and services. Having an adequate income throughout the life cycle, from decent jobs or adequate social protection, combined with affordable goods and services, can provide the basis for a dignified life. Ensuring that people's income is adequate enough for their needs, depends on the price of the goods and services they need to buy. Making sure that there is a fair match between incomes and expenditure on essential services, cannot be left to the market alone. Only governments can promote fair distribution and redistribution policies that can ensure that basic rights are guaranteed, no one gets left behind, and close the inequality gap.

Tackling energy poverty is fundamentally linked to what kind of economic development and society we want. This is a choice between an economy aiming to reduce inequality, promote social justice and sustainable development or prioritizing only market-led growth, without concerns about winners and losers. In a situation where the continual deepening of the internal market for energy services is the main driver of policy, through liberalization and privatisation, public service obligations to ensure accessible, affordable, quality services as fundamental rights, are easily trampled on. The right to affordable energy, as a basic human entitlement, where no person can be deprived of a minimum service, must be asserted together with integrated solutions which tackle low incomes, promote fair prices and affordable, quality, energy- efficient housing, particularly through social housing. This is essential to ensure everybody a life in dignity, and a fundamental pre-requisite for a more inclusive and sustainable economy and society.

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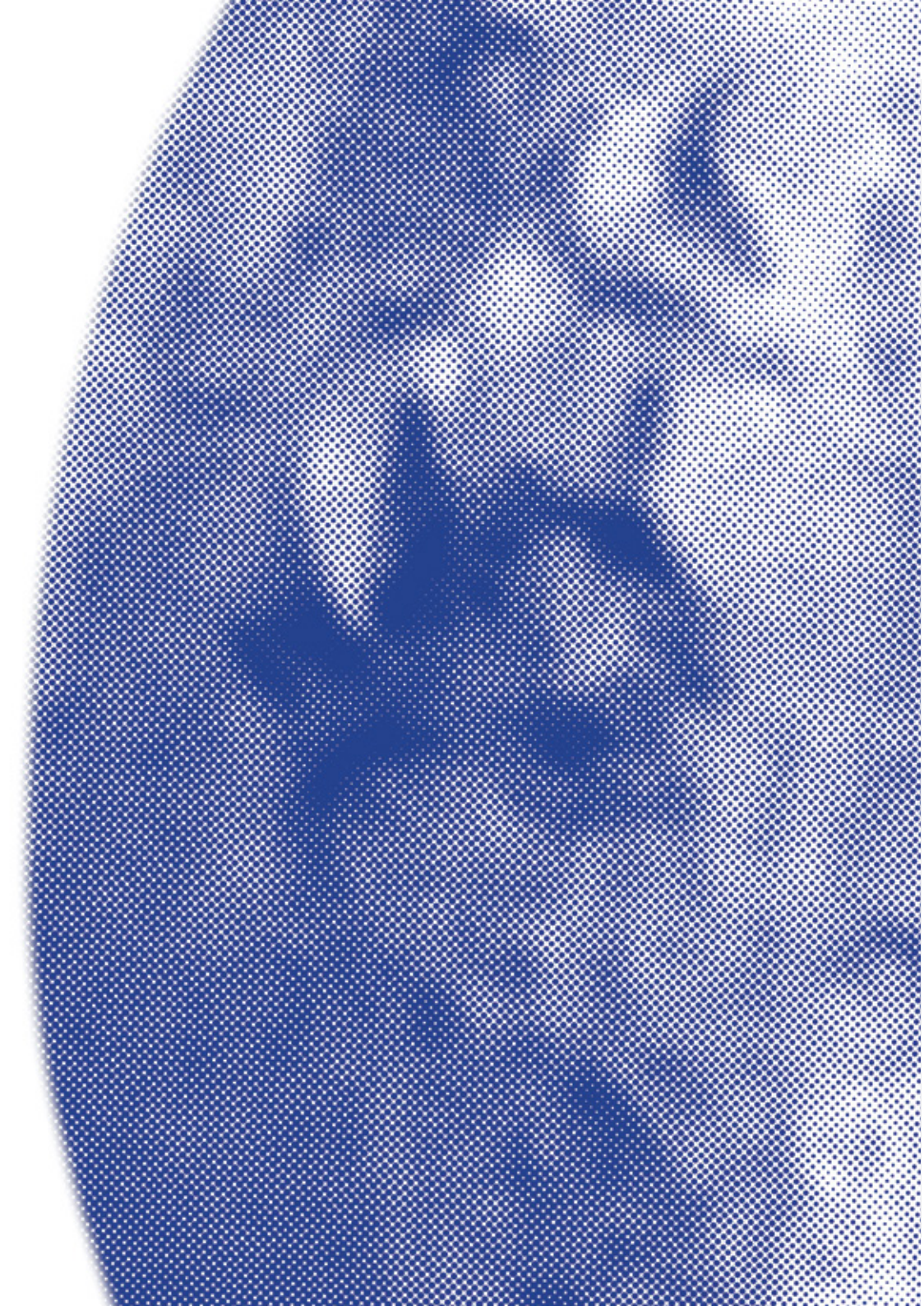

HEALTH IMPACTS OF COLD HOUSING AND ENERGY POVERTY[1]

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INTRODUCTION

A range of adverse health and well-being outcomes are caused or worsened by cold weather and living in under-heated homes, resulting in extensive costs to society. Furthermore, mortality and morbidity is most commonly experienced by those in energy poverty and/or with an additional vulnerability (Marmot Review Team, 2011). This chapter seeks to provide an overview of the known outcomes associated with cold homes, by way of case studies, and references to scientific and policy literature. We start with the issue of cold-related mortality, which is often talked about in terms of excess winter deaths. It has been estimated that energy poverty causes almost 40,000 excess winter deaths in 11 European countries each year (Braubach et al., 2011). Our attention then turns to cold-related morbidity, in terms of impacts to physical health, psychological health and mental wellbeing, and social health and isolation. Here we outline the cumulative nature of the health impacts associated with living in cold housing. Subsequently, we consider some of the present and future challenges relating to research, policy and practice on the health impacts of cold housing and energy poverty, before offering a number of conclusions and policy recommendations.

COLD-RELATED MORTALITY

Population vulnerability to both high and low outdoor temperatures has long been recognised within peer-reviewed scientific journal articles, as well as in policy guidance from influential public bodies such as The National Institute for Health and Care Excellence (NICE, 2015), leading to the funding of projects such as EuroMOMO (European Monitoring of Excess Mortality for Public Health Action).

There are a variety of ways in which heat and cold stress, emanating internally from a dwelling and/or externally, can cause death. Cold stress can cause arterial thrombosis due to blood becoming more concentrated during exposure to cold and liable to clot (Ekamper et al., 2009: 389), as well as a suppression of immune responses to infections (ibid.). Excessive heat, on the other hand, can cause death in two ways: firstly, coronary and cerebral thrombosis can occur due to a loss of salt and water during sweating and a subsequent increase in red blood cells (ibid.), and secondly, the process of providing additional blood flow to the skin to expel heat can cause strain on failing hearts (ibid.).

Within this chapter we are focusing on cold-related mortality only, given the wider range of knowledge and data on this topic compared to heat-related mortality. The most commonly used indicator of cold-related mortality is the index of Excess Winter Mortality (EWM, sometimes also referred to as Excess Winter Deaths, EWD). For more than a decade the accepted EU-wide definition of EWM has been: "the surplus number of deaths occurring during the winter season (December to March inclusive) compared with the average of the non-winter seasons" (Healy, 2003: 785). National, regional and local governments across Europe use this EWM metric, aided by the production of EWM statistics by Eurostat.

However, in spite of its popularity in public policy and research there has been very little critical consideration for the validity and appropriateness of the EWM measure. An article in the Journal of Public Health last year (Liddell et al., 2015) is one of a few to critically review the methodology, using historical data on cold-related deaths in Europe (1980–2013). Overall Liddell and colleagues found that the classic EWM methodology was a generic estimation method that only provides relatively accurate estimates of the actual public health impacts of cold temperatures in 2 of 30 European countries, partly due to the use a fixed four month winter season. To counteract this, a new EWM index was proposed, based on heating degree days (HDD). HDDs express the severity of the cold in a specific time period, taking into consideration the amount of time when the outside temperature falls below a pre-specified base temperature. For buildings research, the base temperature is the outdoor temperature at which supplementary heating is not required in order to maintain a comfortable internal environment, usually 15°C or 15.5°C.

In Table 1 below, a comparison of EWM figures is made for the classic EWM index and the new EWM index proposed by Liddell et al. (2015). As can be seen, there is a significant difference in values, with the new EWM index producing much lower estimates for all EU27 countries. That said, some of the trends associated with the prevailing EWM metric still persist, for instance, the highest levels of EWM are found in Malta (12.3%) and Cyprus (13.4%), partially confirming the 'paradox of excess winter mortality' first discussed in the scientific literature by Healy (2003), whereby higher EWM rates are found in less severe, milder winter climates in Southern Europe than in colder Northern European countries. It is thought that poorer thermal efficiency and housing standards are the main cause for high levels of EWM in some Southern European countries, meaning that households find it hard to keep their dwelling warm when cold weather does arrive (Healy, 2003).

Table 1 - Comparison of EWM figures for EU27 (1980-2013) (Liddell et al., 2015: 5)

COUNTRY	CLASSIC EWM INDEX (%)	NEW EWM INDEX (%)
IRELAND	19.7	2.0
UK	18.6	2.1
SWEDEN	13.3	2.3
PORTUGAL	28.0	4.9
SPAIN	20.6	4.1
DENMARK	12.2	2.5
BELGIUM	13.6	2.9
FRANCE	13.8	3.3
AUSTRIA	13.2	3.1
ROMANIA	17.5	4.3

NETHERLANDS	11.8	2.9
FINLAND	9.5	2.3
LATVIA	11.5	2.9
ESTONIA	10.9	2.8
GERMANY	11.7	3.0
LUXEMBOURG	11.2	2.9
LITHUANIA	11.5	3.0
BULGARIA	17.8	4.7
POLAND	11.7	3.1
ITALY	16.0	4.5
SLOVENIA	13.2	3.7
CZECH REPUBLIC	10.8	3.1
GREECE	17.9	6.0
HUNGARY	12.3	4.3
MALTA	29.4	12.3
SLOVAKIA	8.2	3.6
CYPRUS	23.6	13.4

EWM metrics are often used in discussions about energy poverty, and as outlined earlier, research by the World Health Organisation (WHO) estimates that energy poverty causes almost 40,000 excess winter deaths in 11 European countries each year (Braubach et al., 2011). Whilst there is no accepted methodology for attributing the share of EWD directly caused by indoor cold and energy poverty, several expert estimates have been made that range from a conservative estimate of 10% right through to 50% (Mzavanadze, 2016). The issue is other determinants, such as social class and healthcare provision, play an important role for EWM rates.

COLD-RELATED MORBIDITY

Aside from the primary risk of death, there is a growing evidence base related to the direct adverse impacts on morbidity of living in cold housing, and the profound and fundamental impacts on people's lives (for a review see Liddell and Morris, 2010). As outside temperatures fall, home temperatures also drop, causing illness, increased demand on health services and a rise in hospital admissions (PHE, 2015a). Cold related illness is estimated to cost the UK National health Service (NHS) more than £1 billion per annum (UK Health Forum, 2013). This health threat is experienced in many European countries (International Energy Agency, 2014). It is important to note that the negative health effects of cold start at relatively moderate outdoor mean temperatures of 4-8°C (PHE, 2015b). Many European countries experience a prevalence of days at this moderate temperature in winter, and year round.

People from vulnerable households are at higher risk than the general population of unsafe home temperatures, and also more susceptible to health-related harm and consequent negative health impacts. These include older people, households with young families, pregnant women, people with mental health problems, those with severe or chronic ill health, people with physical or learning disabilities, low income households and the homeless. Reasons include, first, the higher prevalence of mental and physical co-morbidities, and sensory or cognitive problems in some groups, for example older people and people with learning disabilities. Second, they may be more likely to experience environmental adversity (material and social hazards) across the life course (Rudnick et al., 2014). Thirdly vulnerability is further enhanced for those with a poorer household income and lower socioeconomic position (MacInnes

et al., 2014). Recent welfare reforms in many European countries may have increased financial vulnerability for some, for example those with a disability (Snell et al., 2014). Fourth, these socioeconomic disadvantages impact on emotional wellbeing. Self-esteem and psychological morbidity are exacerbated by experiences of bullying, hate crime and abuse, social isolation and poor living conditions. This cumulative effect can in turn impact on someone's resilience or capability to ask for or access help (Emerson et al., 2014). Fifth, people experiencing financial hardship are more vulnerable to the poverty premium, that is, the likelihood of having to pay more for basic household goods because of poverty, such as heating (e.g. having to pay more for fuel by a meter rather than direct debit). Finally people with pre-existing illness or disability may experience physical, cognitive or sensory barriers and obstacles to detecting or communicating thermal comfort and being able to adjust home heating accordingly. The complexity of influences extends beyond this summary but the factors listed here serve to illustrate possible scenarios supported by existing evidence.

Recent research in this field has aimed to examine and understand householder decisions, abilities and behaviours regarding cold and home temperature. It is clear these decisions operate in complex home and social situations and are influenced by diverse cultural, structural and psychosocial factors as well as a broad policy environment (Tod et al., 2012; Nelson et al., 2014; Gilbertson et al., 2012). This research has used behavioural insights to segment those subgroups of older people and households with children and understand why households with certain characteristics may be more at risk and behave in certain ways. Pen portraits and case studies have been generated from this research to illustrate who is at risk of a cold home, the health impacts, the complexity of the influences and behaviours of households at risk of health impacts of cold homes, and why those at risk struggle to access help. We have summarised some case studies from one research study (Gilbertson et al., 2014) and included them in this chapter to illustrate the points made. Further information about other illustrations of health impact are available from the Keeping Warm in Later Life Project[2] and the Winter Warmth England Website[3]. We will now examine in more detail the health implications of those in cold, under-heated homes with an emphasis on physical health, psychological health and wellbeing, and then finally social health.

1. Physical health

The Cold Weather Plan for England (PHE, 2015b) clearly states that the main direct health impacts of cold weather and a cold home are as follows:

Heart attack
Stroke
Respiratory disease
Influenza
Falls and injuries
Hypothermia

The physical health impacts of cold homes are often experienced long after exposure, with a time lag of two weeks and more (NICE, 2015). There are also indirect negative health impacts including the risk of carbon monoxide poisoning if boilers, cooking, and heating appliances are poorly maintained or poorly ventilated (PHE, 2015b).

A NICE review of cold-related mortality/morbidity established that many disease outcomes show seasonal increases during winter and have clear exposure-response relationships with low outdoor temperatures. Those unable to heat their homes in periods of cold weather, therefore experience a health risk. The strongest direct associations with cold are for cardio-respiratory. However, interestingly NICE indicate that pathophysiological pathways can be adversely affected by cold for people with other conditions such as malignancies resulting in poorer health outcomes. People with respiratory conditions, especially chronic obstructive pulmonary disease, appear to fare worse in cold temperatures and because of their greater underlying prevalence they are more at risk of cardiovascular outcomes such as stroke and heart attack (NICE, 2015). Thomson et al. (2013) concluded that energy efficiency improvements are likely to impact on health, particularly when targeted at those with inadequate warmth and those with chronic respiratory disease.

It is important to note that for those living in a cold home, negative health impact may be experienced in a cumulative fashion. This may be due to physiological mechanisms e.g. the combination of a respiratory complaint and a cold home, making someone more at risk of a flu infection. However, a cold home environment may also make it difficult, if not impossible for someone to manage a pre-existing long-term condition. People will be more liable to exacerbations or deterioration of chronic

respiratory conditions in a cold damp home. Case study 1 provides an example of this. Katie experiences worsening diabetes and respiratory conditions. Also managing her husband's dementia and her diabetes becomes increasingly difficult, as cooking and maintaining a routine regarding food is challenging in a cold home environment. Both have experienced weight loss. The pressure of maintaining such basic tasks is all consuming leaving no energy or ability to look for, locate or ask for help. She is also at risk of falls and injuries because of carrying hot water from the kitchen to the bathroom for hygiene needs, and wires from supplementary heating.

CASE STUDY OF KATIE

ADAPTED FROM ON-GOING WORK BY GILBERTSON ET AL. (2013)

Katie is a 77 year old widow with multiple health problems including osteoporosis, diabetes, chronic respiratory problems, high blood pressure and heart failure. She is also partially sighted. Her husband died five week prior to interview. He had mitral valve disease, was partially sighted and Alzheimer's disease for 7 years prior to his death. She lives in a detached house. She received a home improvement delivered by a voluntary sector organisation called a Home Improvement Agency (HIA).

Katie had been extremely stressed due to her husband's condition and problems with the house. She was also increasingly worried about money and the deterioration of the house.

"There's things going wrong in this house that it's just falling around a bit, because I wasn't able to get (...) the roof was leaking horrendously and that took all our savings (...) we used to be running about with buckets and the electric lights were dicey because there are some in the roof but they didn't work (...) I didn't have the money to have it [the heating] fixed and it would have taken a few hundred pounds." (Katie)

"[My husband] was so cold, he was so cold. He was sat and he was so cold because there's no radiator (…) it's just like being in an ice house (...) For example that, that's been so cold out there you could see your breath, because that was the outside wall." (Katie)

The lack of heating meant there was no hot water to allow them to have a bath or wash properly. They couldn't cook much or use the kitchen as it

was so cold. They sometimes ate in bed to try and keep warm. Mrs KL had lost nine stone through worry and not eating properly.

"I thought, I'll put another jumper on Les, put another jumper on him and then put a cardigan on him and we were wearing jumpers and cardigans and vests and all sorts of weird and wonderful things." (Katie)

Mrs KL's initial contact with the HIA was made through Social Service. Interventions included under floor heating being mended, an extra light (this was helpful because the respondent is partially sighted, so wasn't banging into things anymore), a hand rail. This work would've cost £450 privately - which the respondent didn't have.

There was immediate impact on their life in terms of comfort, wellbeing, warmth, safety, hygiene and nutrition.

"Well, we were cold and the warmth, the difference, we could sit in the kitchen and have a meal instead of sitting in bed and having it; how much of an impact is that? [My husband] could have a shower and a bath. [My husband] only liked to eat at the table so he wasn't eating very well in the chair. Once we sat at the table he was different, There was less mess. We just sat down and ate, which was much better for us, but he was losing weight (...) I would say that it improved our lives tremendously. It's got to do. If you're warm it improves your life (...) certainly being cold affects your health. My diabetes wasn't settled because I wasn't eating properly and now I eat properly because it's warm because I'll sit in the kitchen and eat." (Katie)

Katie was grateful for all the help in getting her heating working before her husband died.

"It changed things quite a lot for the family, because I wasn't having to force my Alzheimic husband into clothes that he didn't want to wear. Because it was warm she felt it was comfortable for him I said you're going to be sat in the kitchen, have your breakfast, give you your tablets and then I think maybe a little snooze and then we can watch telly together because it's going to be warm in the front room for the first time for bloody ever, because we can get the radiator on." (Katie)

2. Psychological health and mental wellbeing

The relationship between a cold home and mental health operates two ways. Having a mental illness, like other vulnerable groups, can make people more vulnerable to cold related harm for the reasons outlined earlier. However, energy poverty and being cold at home can also increase your risk of having a diagnosable clinical mental health condition such as anxiety and depression, and can also lead to impaired mental well-being through increased stress and worry about debt and balancing household finances (Liddell and Guiney, 2015; PHE, 2015b). On-going pan-European analysis of the 2012 European Quality of Life Survey by Thomson et al. (2016) confirms that the prevalence of poor well-being and likely depression (based on the WHO-5 Well-being index) is statistically higher within EU28 households that state they cannot afford to heat their homes adequately, compared to those that say they can. In addition, both of the case studies in this chapter illustrate the psychological impacts of living in a cold home, to different extents and for different reasons. For example case study 1 in the previous section illustrates how over time Katie's resilience and ability to cope was diminished due to fatigue, poor nutrition, and accumulated stress about her husband's health and the deterioration of their home. Whilst in case study 2 below, stress and loneliness is evident for Nigel.

CASE STUDY OF NIGEL

ADAPTED FROM ON-GOING WORK BY GILBERTSON ET AL. (2013)

Nigel is a middle aged man who lived alone in a semi-detached ex Council house. He is a private man and didn't want anyone to know he was struggling.

Nigel has an oil fired boiler that doesn't work and needs repairing. He has no functioning water heating system. He hadn't got any hot water and was trying to use a wood burning stove to heat water to wash.

He wasn't seeing people because he was embarrassed about struggling to keep clean. He was also ashamed that he didn't have the money fix the heating and he worried about making his money cover household costs. He says he stopped inviting people round to his home so the fact he was struggling was invisible to others.

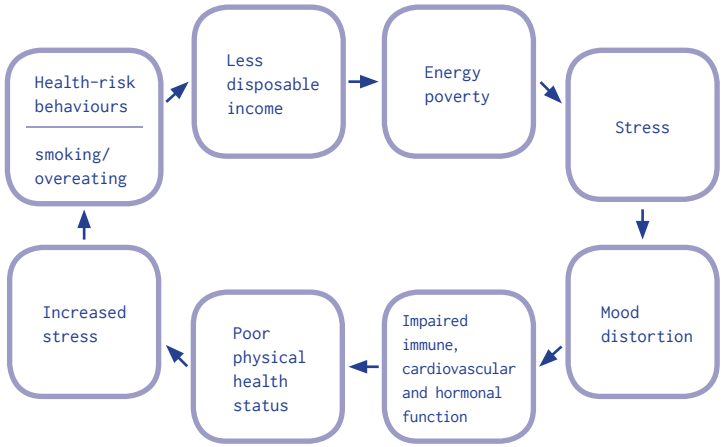
"I become a little bit of a recluse because you get used to being able to turn the hot water on to have a shower, but if you've got to heat water in a kettle on top of a fire (…) then wash out of a bowl, you don't sort of feel fresh and clean."

He is on a low income and has no money for repairs. He expects the repair to be expensive and was trying to save for the work when, by luck, he came across a Warm Homes Scheme run by a Home Improvement Agency (HIA) charity.
Nigel thought it was complete chance he found out about the WHS and was concerned *"there are many people who are struggling who don't know it's there"* especially as many vulnerable people aren't on the Internet.

Nigel had been embarrassed about asking for help but he feels less isolated now.
He thought there were many more like him who were vulnerable but embarrassed to ask for help.
"There's loads of people like me, we won't speak up and ask for help."

The cumulative impact of energy poverty on mental wellbeing has been clearly articulated in the work of Liddell (2014), Liddell and Guiney (2015), and in the Warm Well families study (Tod et al., 2016), which developed a 'trade-off model' to illustrate the various pressures and influences on households with young families, focusing on children with asthma. The model illustrates the trade-offs and choices people are forced to make regarding the allocation of household income, and the psychological impact of that burden. The cumulative nature of energy poverty impacts on health and wellbeing is illustrated diagrammatically in the 'Circle of risk' model below in Figure 1.

Figure 1 - The 'Circle of Risk' Model
(PHE, 2015b: 24; Liddell and Guiney, 2015)



3. Social health and isolation

From the information and evidence presented so far, it is easy to understand how important social relations and networks are to ameliorating the negative health impacts of a cold home. Someone who is well integrated in society, but energy vulnerable, is more likely to be supported practically, financially and in terms of advice, information and signposting to help. Again the case studies illustrate how someone can incrementally become lost to society because of the burden of living in a cold home, or because of shame and embarrassment of the consequences. Nigel was ashamed of both his own hygiene but also the condition of his home, and so gradually cut himself off from social contact.

For people who are ill, mentally and/or physically, the effort of surviving day-to-day means they lose the ability to socialise. The consequent loneliness further compromises health. It also means others will not notice if someone slips from struggling to crisis.

In the recent work of Middlemiss and Gillard (2015) characterising energy vulnerability, the quality of social relations emerge as one of six challenges linked to energy vulnerability of a household. They indicate that social relations within the household and outside, alongside ill health play a mediating role in households' ability to cope with rising costs and low incomes. The presence of social networks may have an impact on what was considered negotiable in terms of energy use, for example *"adult household members would regularly adjust their own consumption and daily practices in order to secure that of their dependents"* (Middlemiss and Gillard, 2015: 151).

The Warm Well Families study (Tod et al., 2016) also illustrated how different households in the same family or network would help one another out in terms of advice, loaning or borrowing money for fuel, or inviting people into their home for part of the day to avoid heating two households. It is possible to see the negative synergy between mental ill-health, stress and social isolation; the combined effect of these interactions leading to cold related harm. In the Keeping Warm in Later Life project (Tod et al., 2012), this cumulative picture is depicted in some of the pen portraits generated from the findings. In addition, for children, there is some suggestion that provision of adequate, affordable warmth may reduce absences from school or work (Thomson et al., 2013), and may contribute to bullying at school, thus increasing social isolation at a young age.

PRESENT AND FUTURE CHALLENGES

There are a number of on-going and future challenges that undermine our ability to reduce the impact of energy poverty and cold homes on human health. Among the key issues are:

- The tendency for government departments to look at energy policy and health in silos, from an inter-department perspective. There is a need for but lack of cross policy analysis to understand the nature of the combined impacts of policy on energy poverty and health, either positive or negative. However, the source of the negative health impact of cold homes is linked to additional policy areas including welfare, environment and neighbourhoods. As such it is a complex milieu, which demands cross policy analysis and responses, especially if the vulnerabilities and needs of those most at risk are to be addressed, and policy intervention-generated inequalities avoided. Without more sophisticated inter-department working there is a risk that policy interventions may not reach those most vulnerable and intervention generated health inequalities will ensure.

- Research on the health impact of cold homes and energy poverty has also tended to focus upon discrete disciplines such as epidemiology, housing, energy efficiency and energy provision. Research often adopts a single discipline approach rather than examining the inter-relationship between these factors. There has also been a tendency to ignore the role of human behaviour in keeping warm at home. Fundamental to understanding the health impact of cold homes and fuel poverty is a need to understand how various factors influence householders' behaviour and choices in terms of risks, experiences and responses, especially those from vulnerable groups.

- The lack of in-depth behavioural insight of all at risk groups. There is a lack of granularity and a tendency towards generalisations e.g. policy references to disability without breaking down and understanding different types and severity of disability. Future research needs to acknowledge that variation and examine energy poverty experience and behaviour across different groups, across the life course.

- Excessive heat impacts on health are very under-researched and poorly understood. There is a corresponding gap in knowledge about summertime energy poverty issues, relating to access and affordability of air conditioning, everyday practices and coping strategies, and the flexibility of the built environment.

- More generally, there is an overall lack of evidence, which in part can be attributed to the complexity of the topic, as well as the absence of appropriate data.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Over the course of this chapter we have identified population vulnerability to both high and low outdoor temperatures, and the existence of seasonal mortality rate increases. We have discussed the widely used EWM metric, and considered a new method for quantifying cold-related mortality. From the existing scientific literature, we have established that living in a cold home and experiencing energy poverty is associated with a broad range of physical, psychological, and social health morbidity impacts, although the precise nature of these relationships is dependent on individual circumstances, and will vary in intensity depending on pre-existing conditions and levels of social support. Via the two case studies for Katie and Nigel we have provided some insight into the everyday lived experience for people in energy poverty and highlighted the cumulative effect of stress and anxiety. Beyond this, we have also considered some of the key challenges for understanding and addressing the impact of energy poverty on human health.

On the basis of evidence and information presented, a number of policy recommendations can be made:

1. There is a need for long-term strategic planning for winter preparedness via national and regional Cold Weather Plans. See for example Public Health England (2015a; 2015b).

2. Investment in energy efficiency and housing improvements should be prioritised for energy poor households, in order to potentially realise significant reductions to public expenditure on health care, and decrease the number of preventable deaths and illnesses.

3. Greater funding should be allocated for multi-disciplinary scientific research to establish the precise interaction of cold housing and energy poverty with health and well-being, the extent to which EWM can be attributed to energy poverty, and to assess which interventions are most effective.

NOTES

1 Acknowledgments: This chapter was supported with funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007–2013)/ERC grant agreement number 313478.
2 *http://kwillt.org/*
3 *http://www.winterwarmthengland.co.uk/*

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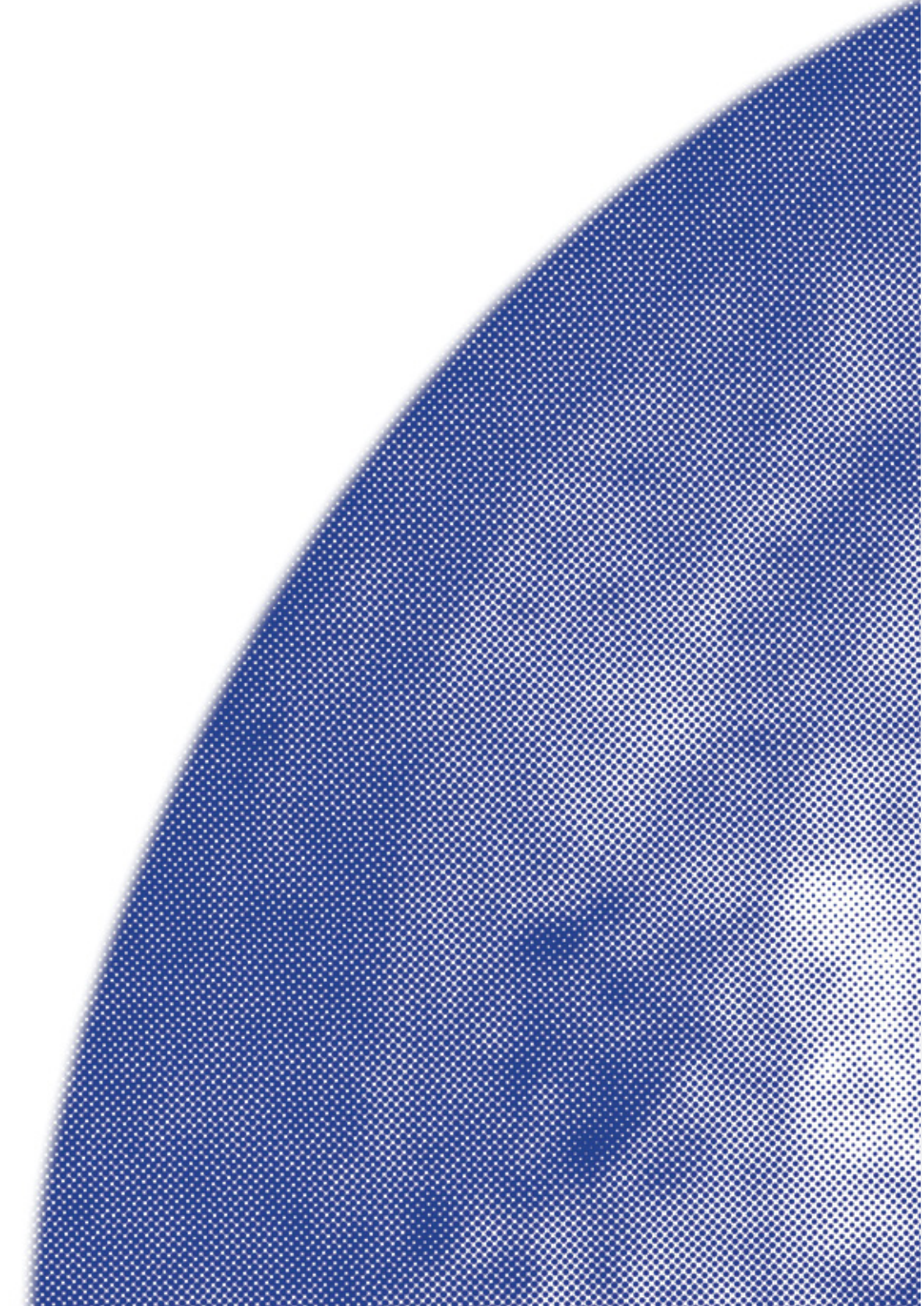


ENERGY PERFORMANCE OF THE HOUSING STOCK

FILIPPOS ANAGNOSTOPOULOS AND MAARTEN DE GROOTE
BUILDINGS PERFORMANCE INSTITUTE EUROPE

INTRODUCTION

The European building stock presents a considerable diversity in terms of size, age, energy performance, tenure size, heating & cooling needs and choice of energy carriers. The present chapter offers a comprehensive overview of the European building stock by providing the latest available relevant statistical data. It has to be noted that there is a lack of data on European buildings and their energy consumption, exemplified clearly by the absence of renovation statistics.

Europe's population of 508 million inhabitants is occupying over 117 million1 (Buildings Performance Institute Europe, 2015). Of those buildings, 92 million are Single Family Houses (SFH – a single dwelling unit within its own building, for example a detached, semi-detached or terrace house) and 25 million are Multi Family Houses (MFH – a multi-occupancy building comprising of many dwellings, for example an apartment within a block of flats). The EU building stock is comprised of about 240 million dwellings[2], which collectively have a useful floor area[3] of 22,022 km² (almost the size of Sardinia) while the average dwelling floor area[4] ranges from 70m² to 130m² depending on the country.

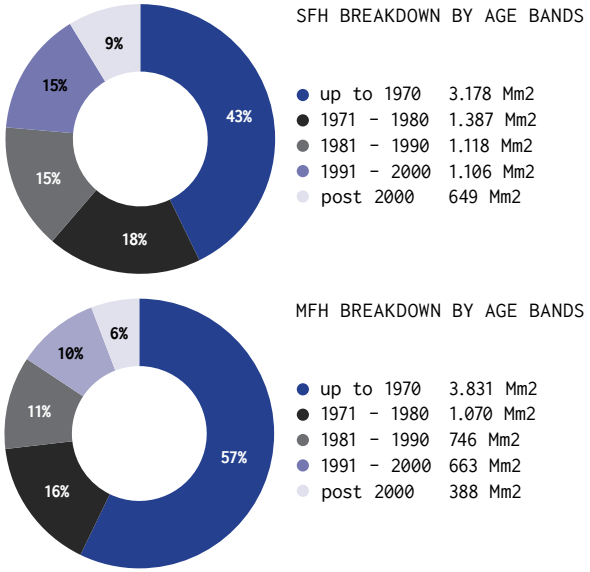
The 28 EU Member States cover seven climate regions (i.e. Mediterranean, Nordic, Continental, etc.[5]) that have affected the historical energy performance requirements of their building stock. Nordic countries, for example, adopted stricter energy performance standards ahead of Western European countries. Building standards have been improving since the 1970s across Europe and as of 2020 all new buildings will have to be nearly Zero Energy Buildings (nZEBs). While new construction will deliver high performing buildings, the existing building stock will need to be renovated to high standards, thus offering occupants multiple benefits, including the avoidance of energy poverty.

1. Size and age of the EU building stock by country

The EU is characterised by a rather old building stock, since most of it was built before the 1970s. Following the destruction of the Second World War, Europe rebuilt quickly and inefficiently a large share of the currently standing buildings. The UK is an example of that effort, with 4 million buildings raised between 1945 and 1965. Standardised methods and prefabricated solutions entered the construction market in the 1950s and 1960s, thus reducing the overall cost of construction.

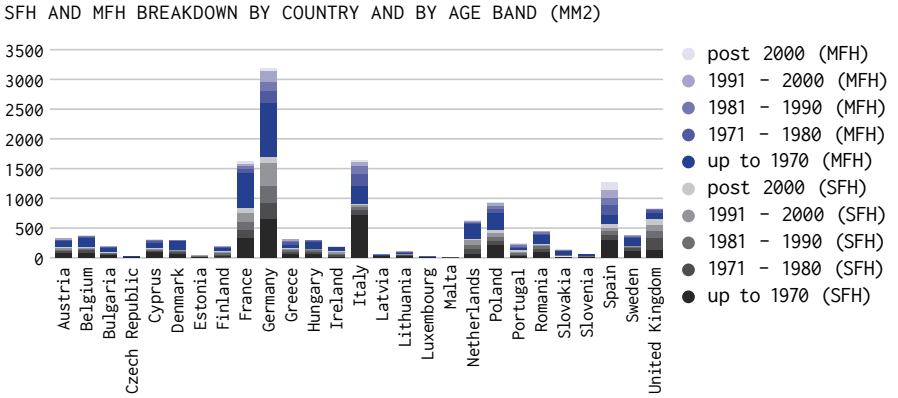
The following two charts offer the EU-wide age breakdown of the residential building stock, grouped in Multi Family Houses (MFH) and Single Family Houses (SFH). Evidently, most of the stock is built before 1970, with every year since showing an overall decrease in construction. The construction of MFH has decreased faster than SFH, the latter of which seems to become the preferred construction type over the decades: while there are more MFH then SFH built until 1970, this trend reverses with the number in construction of MFH falling to about half of SFH after 2000.

Figure 1 - Building stock breakdown by age (iNSPiRe, 2014)



Construction has slowed down consistently across the EU, even though national variations exist: in the three decades between 1970 and 1990, construction peaked in France, Greece, Finland, Malta and Estonia. Spain has two construction peaks, one in the 1970s and one post 2000 and until the 2008 financial crisis. Cyprus also increased its rate of construction after 2000. Denmark, which built a large share of its stock before the 1930s, decreased its rate of new construction after 1980, while a large number of countries (Slovenia, Czech Republic, Hungary, Lithuania, Romania) increased this trend. The countries with the most residential properties are Germany, France, Italy, Spain and the UK, followed by Poland and the Netherlands.

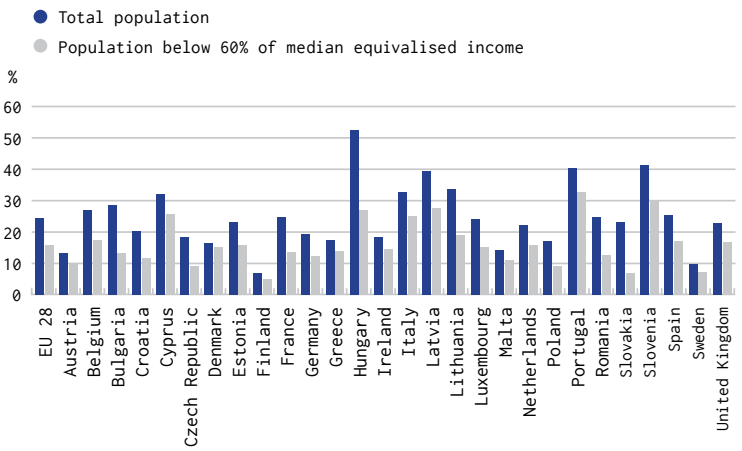
Figure 2 - Building stock breakdown by age and country (iNSPiRe, 2014)



2. A deteriorating building stock

While the energy performance of new units is improving (read further: The building envelope), there is a large housing stock that was built using older and outdated standards. Keeping in mind that 50% of the standing stock was built up to 1970s, it is easy to realise that most of the currently standing buildings are highly inefficient compared to modern requirements. Moreover, the passage of time has caused a number of problems or has exposed oversights in the construction process, plaguing the current occupiers. The following graph presents the percentages of the total population and the less-well-off members of our societies living in very low quality dwellings.

Figure 3 - Share of population by country living in poor housing conditions (Eurostat, 2014)



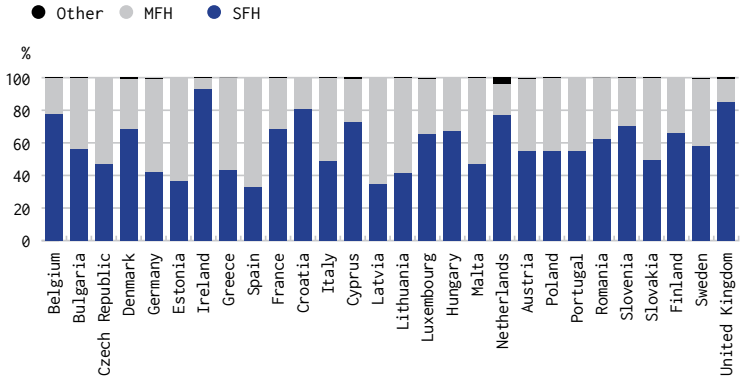
It is striking that over 20% of the total population in Italy, Cyprus, Latvia, Hungary, Portugal and Slovenia live in very poor conditions. The share of population that earn less than 60% of median equivalised income face worse conditions in almost all Member States, with Hungary, Bulgaria, Slovakia, Romania, Lithuania and Croatia presenting the highest inequalities. On the contrary, in Austria, Finland and Sweden there is a relevant balance between the shares of less-well-off people living in low quality households and the total population of energy poor people.

3. Type of tenure by country

On the European level, there are about as many people living in Single Family Houses (58%) as in Multi Family Houses (42%). This figure varies significantly across the EU, with residents in the UK and Ireland preferring, by a staggering 84% and 93% rate, to live in Single Family Houses. On the contrary, in Estonia, Spain and Latvia, over 60% of the population live in Multi-Family Housing. Multi-Family Housing is better suited to undergo renovations aiming to eliminate energy poverty because their standardised construction techniques allow for the industrialised roll out

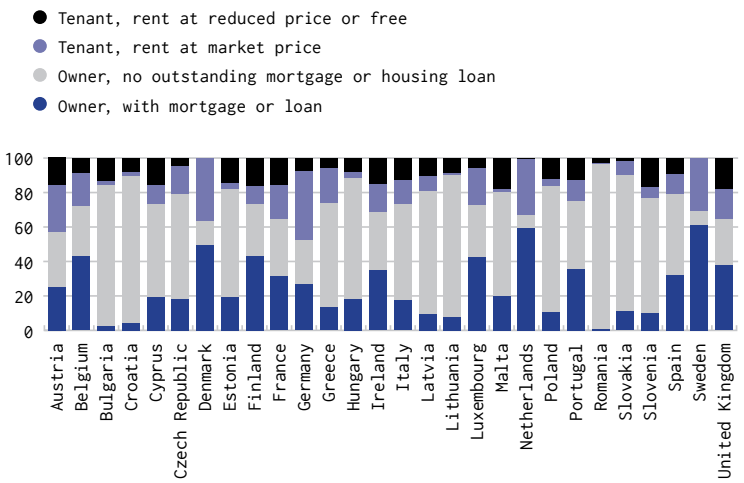
of renovations. Single Family Houses, on the other hand, if not identically constructed, increase renovation costs, since tailored design and techniques need to be implemented for each individual building.

Figure 4: Shares of population living in SFH and MFH by country (Eurostat, 2014)



Most Europeans own the property they occupy. Owner-occupancy varies between 52% and 96%, with Germany and Romania defining the lower and higher percentages respectively. The remaining stock is rented either at market prices or at reduced rates (i.e. social housing). Owner-occupied buildings are the most appropriate for retrofit programmes reducing energy poverty because they do not present the issue of split incentives. However, in several countries people in risk of fuel poverty do not own their dwelling and are obliged to rent (see Figure 5). Split incentives are present when the agent paying for renovations is not the one receiving the benefits. Rented properties therefore suffer in this regard, with the biggest share of market price rented properties potentially presenting some conflicts in split incentives. Social housing, on the other hand, with their mandate for providing affordable housing to vulnerable groups, should be the target of renovation programmes that tackle energy poverty and be supported through adequate financing mechanisms.

Figure 5: Tenure status by country (Eurostat, 2014)



4. The building envelope

The quality of the new housing stock has been improving continuously after the big reconstruction that followed the Second World War. A very important quality indicator leading to alleviating energy poverty is the level of insulation. Decent insulation for walls, windows, floors and roofs allows the building to be heated or cooled with an efficient use of energy. Improved energy requirements translate to reduced energy costs, improved indoor air quality, higher comfort and to a reduction of energy poverty. These requirements vary widely across Europe, to a large extent due to the climate of each region. Nordic countries, for example, developed high efficiency standards as a response to extreme cold temperatures, while continental countries benefited from the reduced range of extreme temperatures. The following table categorises the 28 Member States into seven climate regions that are used to exemplify the improvements in energy efficiency over the past century.

Table 1 - Climate regions

SOUTHERN DRY	MEDITERRANEAN	SOUTHERN CONTINENTAL	OCEANIC	CONTINENTAL	NORTHERN CONTINENTAL	NORDIC
PT	CY	BG	BE	AT	DK	EE
ES	GR	FR	IE	CZ	LT	FI
	IT	SI	UK	DE	PL	LV
	MT			HU	RO	SE
				LU	SK	
				NL		

Over the past seven decades many countries made significant improvements in the energy efficiency of their housing stock by adopting mandatory standards for new construction. The choice of the building materials determines the exchange of heat between the interior and exterior of the building and is commonly measured by U-values. Lower U-values indicate better levels of insulation. The following graphs offer a historical evolution of residential U-values for walls, windows, floors and roofs by climate region, weighted averaged over total floor area (iNSPiRe, 2014).

Figure 6 - Residential weighted average U-values for walls

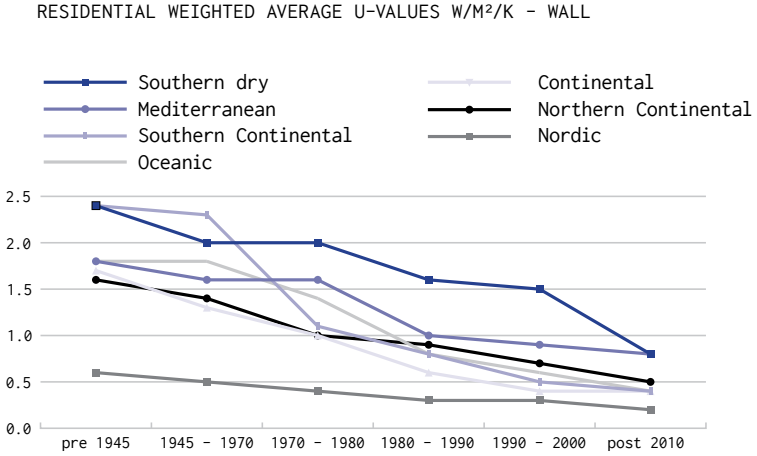


Figure 7 - Residential weighted average U-values for windows

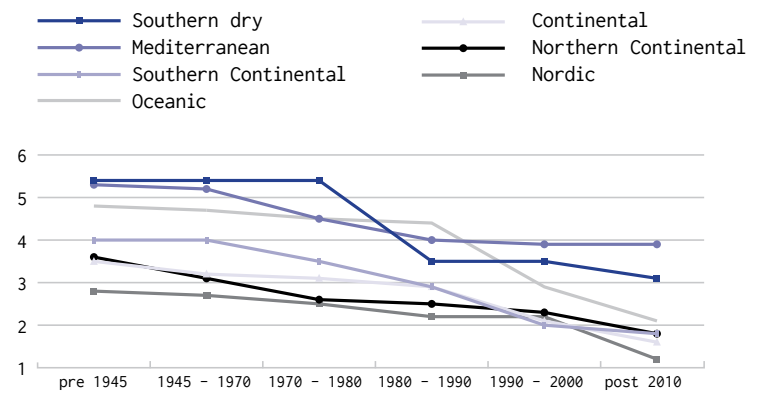


Figure 8 - Residential weighted average U-values for floors

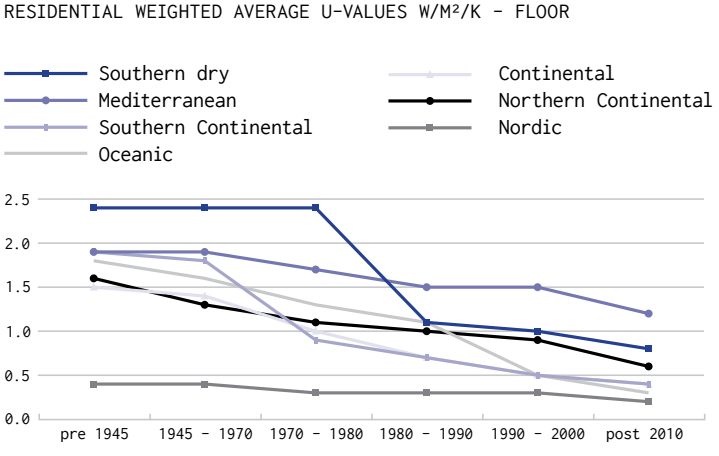
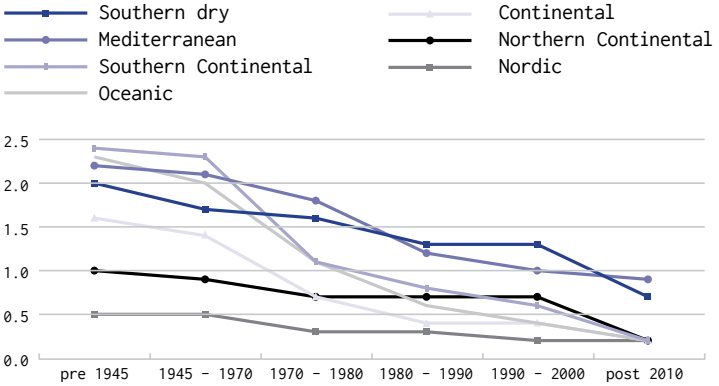


Figure 9 - Residential weighted average U-values for roofs



The progressively stricter efficiency standards in new construction for all climate regions are evident. Room insulation in particular has been given increased attention and thus U-values decreased in Member States with colder temperatures from around 2 to 0.3 W/m²/K. Dramatic

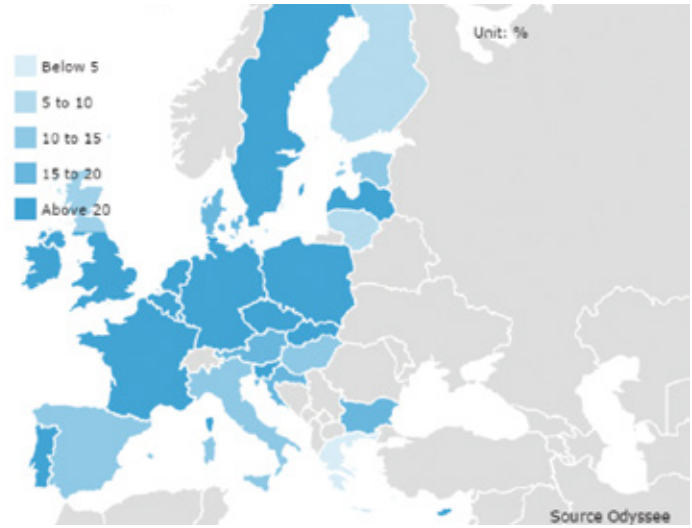
improvements have been observed in the UK, Slovenia, the Netherlands, Germany, France, Denmark and Austria.

Nordic countries have had a head start in building energy efficiency due to the historically extreme cold temperatures. The improvement therefore has been less pronounced, even though they still have the lowest U-values of all climate regions.

Contrary to Nordic countries, Mediterranean and Southern Member States such as Spain, Malta, Cyprus and Greece have had less need for thermal retention due to their more temperate climate. Instead, their focus has been on providing adequate cooling during summer months. The relatively low levels of insulation, however, increase heating bills during winter and electricity bills in the summertime from the use of air conditioning units. A sustained effort to improve the thermal performance of the building stock would provide benefits to warm countries via reduced heating and thus lower energy bills.

Recent EU-wide commitments for energy efficiency and greenhouse gas emission reductions have also caused Member States to tighten their building codes for new constructions. The following map depicts gains in household energy efficiency in 2014 compared to 2000. Not all Member States have advanced with the same speed, but noticeable progress is recorded across the EU.

Figure 10 - Energy efficiency gains in households in 2014 compared to 2000 (Odyssee database, n.d.)



5. Compliance with building standards

Building codes do not necessarily reflect the quality of construction. The transfer of legal requirements to delivered buildings is a process that requires a framework which ensures quality by setting up training programmes, guidelines, certification schemes, contractual obligations and more. These frameworks are devised to different degrees of effectiveness and significant non-compliance issues are present across the EU according to a recent sampling in 10 Member States (QUALICHeCK project, 2016). In Cyprus over 1/3 of buildings do not comply with the applicable decree and over half of Greek buildings also do not comply with U values set in national legislation. In Estonia, it estimated that over half the building stock does not comply with requirements on summer comfort. In Austria, Belgium, Spain, Romania and Sweden, on average half of building's Energy Performance Certificates where non-compliant with existing regulations. Additionally, over half of the examined buildings in France and the Netherlands are not compliant with ventilation provisions, and numerous problems exist in Austria, France, Germany and Sweden in regards to renewable and multi energy systems.

6. Renovation rates

While new constructions have become more energy efficient, the issues present in the existing building stock should not be overlooked. Housing units of poor quality, most of them built before 1970, are demanding high energy expenses to be kept warm, while they can be often leaking, developing mould and causing negative health effects to their occupants. Some building owners are renovating their homes shouldering the full costs or being supported to varying degrees by state-sponsored renovation programmes or, less often, by Energy Service Companies' (ESCO) business models. However, these works most often go unaccounted.

There are no adequate metrics to track renovation activities on the EU level, nor on the national level. Therefore, there is high uncertainty on the number of buildings or dwellings or on the floor area that is renovated annually. There is furthermore very little information on the level of energy efficiency improvements after renovations.

Renovation rates for the EU range between 0.4% and 1.2%[6]. These figures are best estimates based on expert knowledge and improvements are needed towards a comprehensive system to account for renovations.

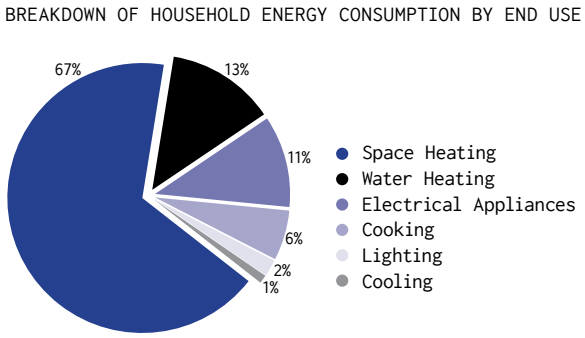
The information provided by more systematic data collection on renovations would improve the planning of measures included in the Building Renovation Strategies of all Member States (Joint Research Center, 2016).

ENERGY CONSUMPTION PATTERNS

1. Heating, cooling, hot water and lighting

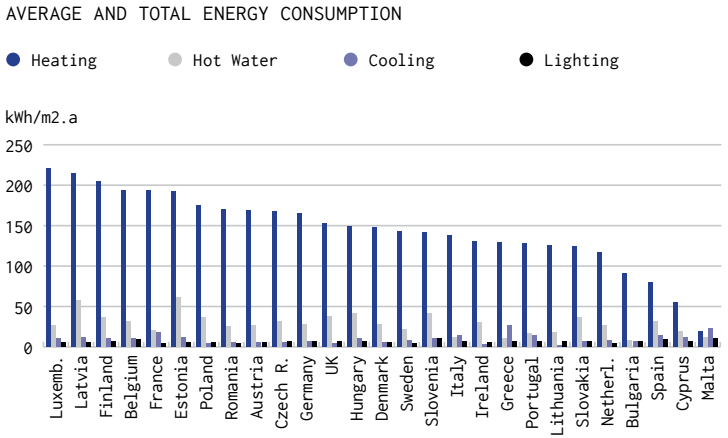
Heating is the most significant energy–related expense of residential buildings in the EU. On average across Member States, space and water heating account for 80% of a households energy use. The rest is shared between the various electrical appliances, cooking, lighting and cooling.

Figure 11 - Breakdown of household energy consumption by end use in the EU for 2012 (Odyssee database, 2012)



Heating consumption is a combination of climate conditions, living standards and building energy efficiency. The following graph ranks Member States according to their average heating consumption. While certain countries are influenced by broadly similar climate conditions, i.e. the Netherlands and Belgium, their average consumption varies significantly due to building standards or comfort requirements. Cooling makes up for a small share of the energy consumption that can nevertheless be significant in southern countries such as Malta and Greece, or in the southernmost regions of Italy and Spain.

Figure 12 - Average residential energy consumption per use per country (iNSPiRe, 2014)



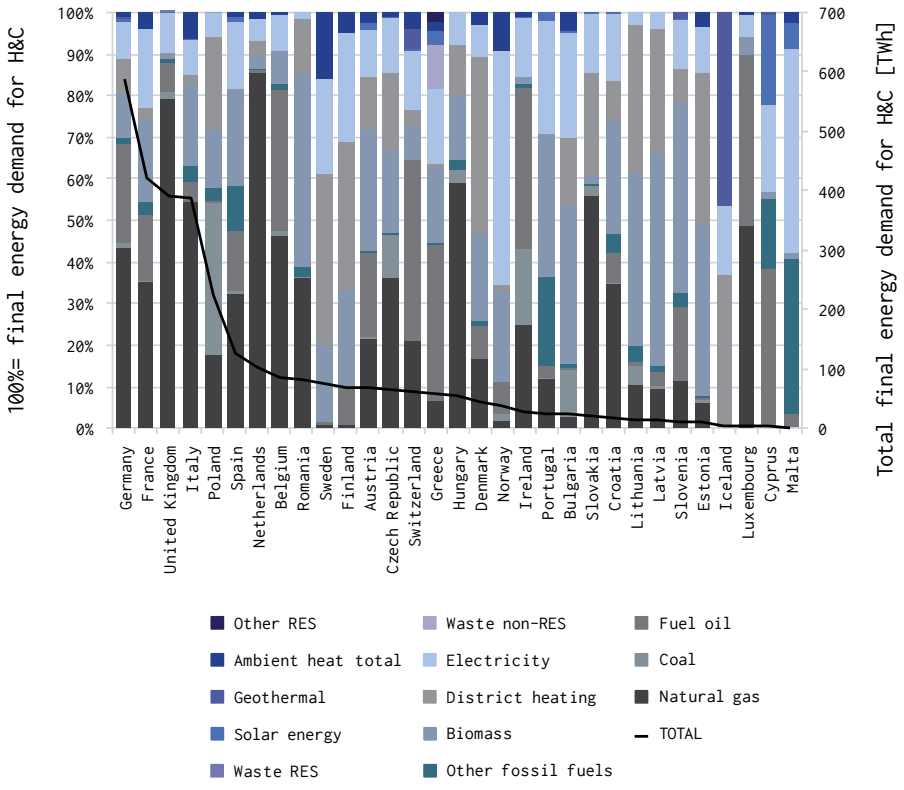
Heating requirements are very often met using old, outdated and inefficient boilers. A large number of buildings in the EU have boilers installed before 1992 with energy efficiency of 60%, while modern boilers have an efficiency of over 95%. Moreover, a large share of these boilers are way past their technical lifetime: 58% of coal fired boilers, 47% of oil boilers, 37% of direct electric heaters and 22% of individual gas boilers. Heating systems are usually replaced when they break down. The decision to replace the heating system is dominated by a lack of information on the side of the consumer regarding their options and incentives for the installer to promote specific technologies and brands. As a result, the use of older and inefficient technologies is propagated.

Air quality is significantly impacted by the choice of heating systems. Buildings heated with solid fuels (such as coal and biomass) worsen air pollution, often contributing up to 75% to outdoor fine particulate matter. For the vast populations living in cities, deteriorating air quality is a striking health hazard. Health impacts of solid fuels can be mitigated through heating solutions with strict emission standards which are also more efficient and cheaper in the long run.

2. Fuel mix and energy demand

In order to meet their heating and cooling demand, energy consumers in the 28 Member States use a variety of heating fuels. The following graph presents the residential total final energy demand for heating and cooling in all EU Member States. Four countries, namely Germany, France, the UK and Italy, are responsible for the lion's share of energy demand, which is plotted using the black continued line.

Figure 13 - Share of energy carriers for heating and cooling demand in residential buildings by country (European Commission Directorate-General for Energy, 2016)



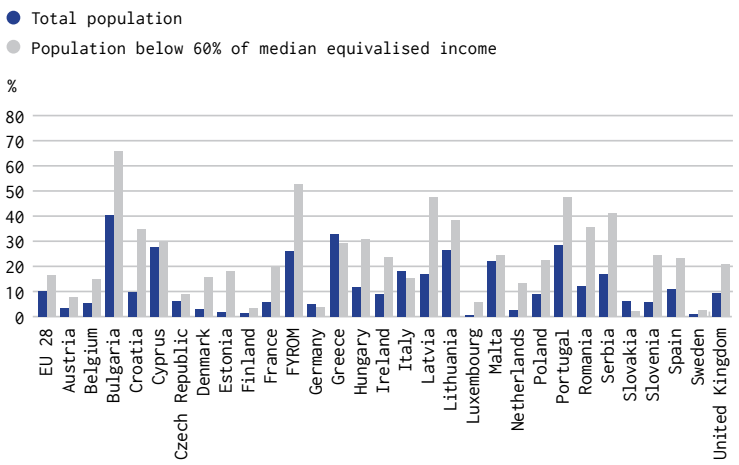
As seen from Figure 13, there is a high variation between Member States in regards to their fuels of choice:

- Natural Gas is the fuel of choice of many countries, such as the UK, Slovakia, the Netherlands, Luxembourg, Italy, Hungary, Germany, France, Czech Republic and Belgium;
- Fuel Oil is used in high shares in Luxembourg, Ireland, Greece, Cyprus and Belgium;
- District heating is also used in high shares in Sweden, Lithuania, Finland, Estonia and Denmark;
- Biomass, mainly wood, is still in significant use in Romania, Lithuania, Latvia, Estonia and Bulgaria. Biomass is often unaccounted and therefore the real shares might differ significantly;
- Electricity is also used to a large extent for heating in Sweden, Portugal, Malta, Finland Cyprus and Bulgaria. New technologies (e.g. heat pumps) are bringing the electrification of heat to increasingly more markets;
- Coal occupies a significant share of heating energy carriers in Poland, and is still used in small shares as a heating fuel in a number of countries.

3. Inability of citizens to heat their buildings and pay their bills

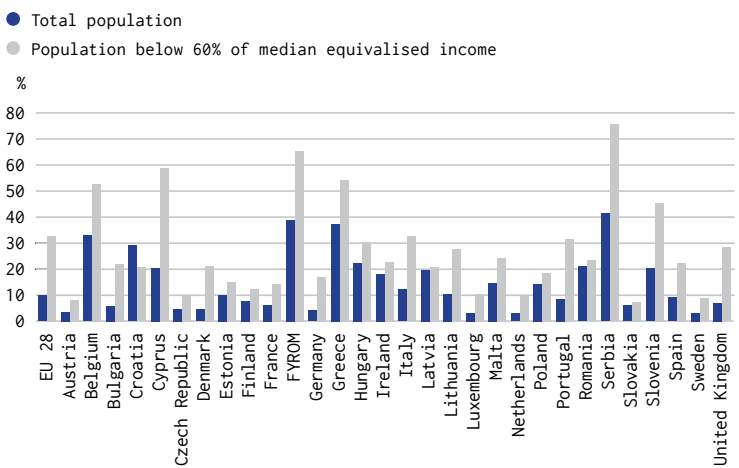
Despite the range of options available to households to heat their dwellings, it is observed that a large share of the population is unable to keep their homes adequately warm. This issue is so severe that over 20% of citizens earning less than 60% of the median equivalised income are being forced to withstand cold temperatures in 13 out of 28 Member States. The countries most affected by cold homes are Bulgaria, Cyprus, Greece, Latvia, Lithuania and Portugal. Lastly, the UK, as a highly advanced economy, is suffering by disproportionately high rates of energy consumers who cannot keep their homes warm.

Figure 14 - Inability to keep home warm (Eurostat, 2014)



As a result of their inability to heat their homes adequately, many energy consumers are reducing their heating demand by heating only one room in their house. Others are even resorting to highly unhealthy practices of burning inappropriate material, namely old furniture and dry garbage, in unsuitable devises such as fireplaces and old stoves.
Another important aspect that needs to be taken into account is the financial ability to heat dwellings. Across the EU, 10% of the total population are having trouble paying their utility bills on time. This figure rises above 30% for populations earning below 60% of the median equivalised income. It has to be highlighted that significant shares of those arrears are already cutting back on adequate heating needs. As seen from the following graph, residents in Bulgaria, Cyprus, Greece and Slovenia are impacted the most.

Figure 15 - Arrears on utility bills (Eurostat, 2014)



The inability of significant shares of the European population to adequately heat their homes and the fact that many are lagging behind on utility bills, are signs of energy poverty. An important cause of energy poverty and a factor that hinders efforts to overcome it, are poor quality dwellings that impact the health of their occupants and require high energy expenditure. The renovation of the existing building stock needs to be accelerated, and policies supporting the shares of the European population living under conditions of energy poverty need to be set in place.

OUTLOOK FOR THE EU FUTURE BUILDING STOCK

Buildings, once erected, will be standing for many decades. Member States are required under the Energy Performance of Buildings Directive to ensure that, after 2020, all new buildings should be nearly Zero-Energy Buildings, or nZEB for short. This will limit the excess emissions of greenhouse gases, will shrink energy expenditure and will bring standards up to speed with existing, tested and applied construction techniques. Historical buildings and the vast number of post-war developments will

still be standing in 30 years. Their inefficient construction and the volatility of energy prices offer incentives to direct more government and investor supported action towards the renovation of the existing stock. One of the multiple benefits of building energy efficiency is the alleviation of energy poverty, provided that the dwellings undergo deep renovations.

A long term vision is required to meet a number of challenges related to the building stock. The extension of its current lifetime, the minimisation of greenhouse gas emissions (currently the EU building stock accounts for about 38% of all EU emissions), the elimination of fuel poverty, the integration of buildings into the energy system, the challenges of a further urbanisation and so on. A long term vision needs to be combined with accurate monitoring tools, implementing instruments such as an individual building renovation roadmap[7]. As with the car maintenance logging booklet, so with buildings, it is possible to set periodical benchmarks for the upgrade of buildings. Appropriate staged renovations improve the building's performance avoiding lock-in effect. Renewable energy systems can make use of the upgrades implemented during renovations and heating system replacements in regular periods allow for a more efficient use of energy, which will increasingly be provided by renewable energy.

Buildings have the potential to become small energy hubs offering a number of benefits to the energy system such as generation of electricity, thermal storage, load balancing and peak load shaving through demand response. Buildings can help the EU move from centralised fossil-fuel based systems towards a more decentralised, renewable, interconnected and variable system.

CONCLUSIONS

Energy poverty is in part due to the low energy efficiency of the old building stock. The post-war needs for rapid construction gave secondary importance to the quality and energy efficiency of buildings, thus leaving behind as inheritance to younger generations a faulty building stock. Over 10% of Europeans are unable to keep their house warm and 15% live in unhealthy conditions, where their dwelling has a leaking roof, damp walls, floors or foundation, or rot in window frames. These conditions are deteriorating as the building stock gets older and does not undergo proper maintenance.

The state of the building stock and heating systems needs improvement. Embedded within a long term strategy, buildings' energy characteristics should be adequately registered and their aggregated information be used to design measures that will facilitate a holistic or stepwise energy upgrading. Window, wall, roof and floor insulation increases the thermal retention of a building, while mending issues caused by poor construction (i.e. leaking roofs), thus improving the health of residents. Insulation also reduces the energy demand for heating. Replacing the heating system, with modern condensing boilers or more advanced technologies such as renewable energy powered heat pumps, offers significant energy savings. Lastly, waste heat from industrial or other facilities can be reused via the district heating network.

NOTES

No data is available in BPIE's DataHub for the number of buildings in Belgium, Croatia, Cyprus, Finland, Latvia, Lithuania, Malta, Netherlands and UK

2 Sources: Odyssee and BPIE Data Hub for the stock of 2013

3 No data is available in BPIE's DataHub for useful floor area in Belgium, Flanders, Croatia and Luxembourg. Note that iNSPiRe (2014) estimates the useful floor area to be 14,000km²a

4 Average floor area of dwellings is taken from the Odyssee database

5 See Table 1 on Climate regions

6 BPIE (2015) has estimated the EU-wide rate of renovation to be around 1%, while Ecofys (2016) puts it at 0.6% and the European Commission (2015) at 0.4% to 1.2%.

7 Example of an individual building renovation roadmap being implemented in the German state Baden-Württemberg: *https://um.baden-wuerttemberg.de/de/energie/beratung-und-foerderung/sanierungsfahrplan-bw/*

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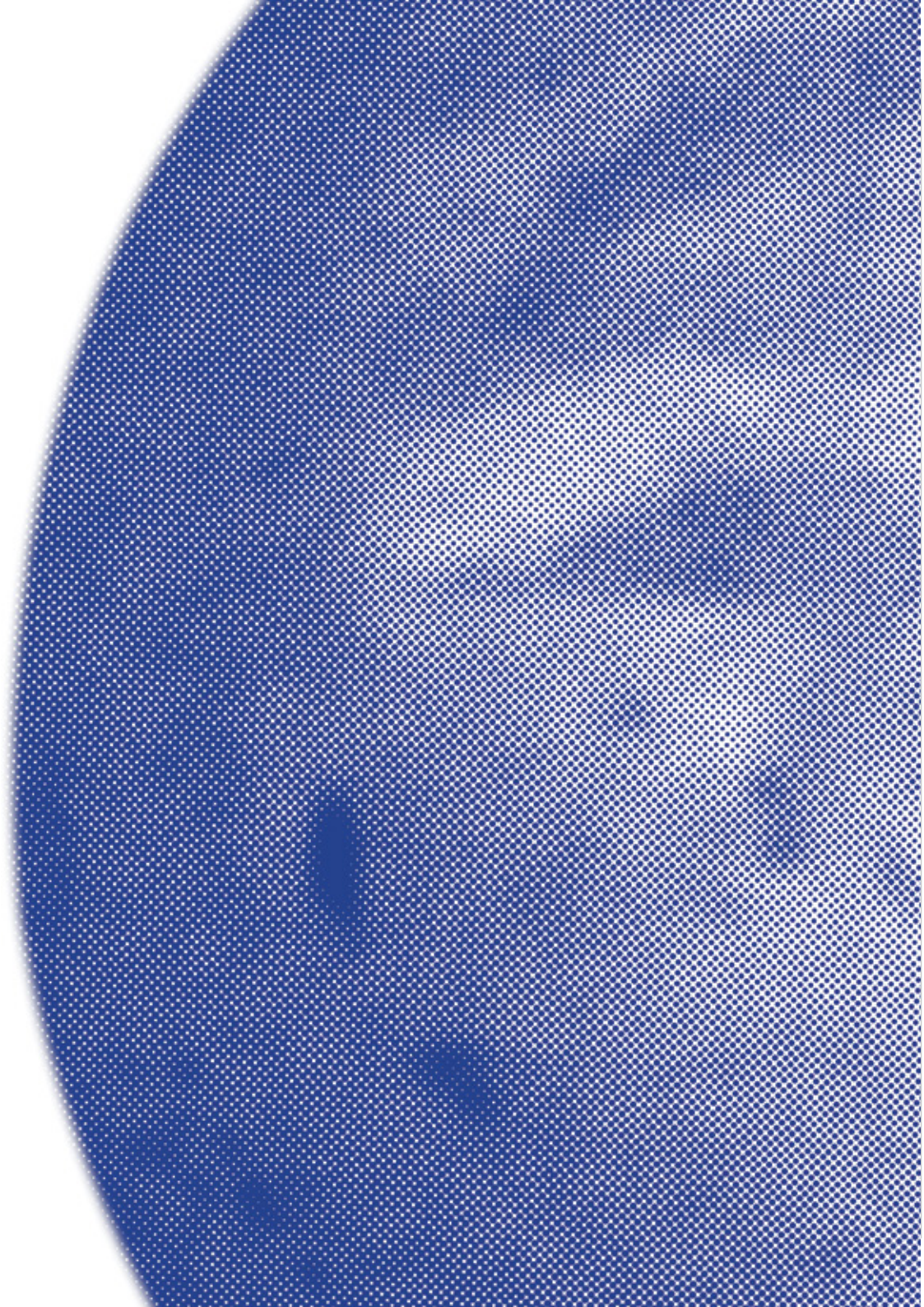

UNDERSTANDING THE CORE-PERIPHERY DIVIDE IN THE GEOGRAPHIES OF EUROPEAN ENERGY POVERTY[1]

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The inability of many European households to access or afford an adequate level of energy services in the home is gaining increasing academic and policy attention across the continent (Bouzarovski, 2014). This condition, described as either energy or fuel poverty (Boardman, 2009; Bouzarovski et al., 2012; Li et al., 2014) is now being identified as a policy priority by a number of European Union (EU) institutions, including the Energy Union Framework. In particular, there has been growing integration of energy poverty analysis and policy in the activities of the European Commission in the recent period (Bouzarovski and Petrova, 2015; Pye et al., 2015; Rademaekers et al., 2016).

Efforts to study the dynamics of energy poverty at the scale of the EU have been making an important contribution to such debates (Bouzarovski, 2014; Braubach and Ferrand, 2013; Healy, 2004; Healy and Clinch, 2004; Thomson and Snell, 2013). Work in this vein has identified a number of household level factors that influence the likelihood of experiencing domestic energy deprivation, including income, sociodemographic characteristics, dwelling typology and age, tenure status and rural vs. urban location.

Policy debates and scientific research on energy poverty have indicated that Southern and Eastern European generally report a higher incidence of energy poverty. This points to the existence of a social and geographical 'energy divide' across the European Union, thanks to which a greater proportion of households in less-developed Member States are unable to meet their basic energy needs. They are particularly penalized by high and increasing energy costs due to the combination of rising prices and inefficient properties (Bouzarovski, 2015; National Energy Action, 2014). These findings have been enabled by the Eurostat agency's compilation of a rich body of statistics on poverty and social exclusion, including data on the inability to keep one's home adequately warm, arrears in utility bills, and other objective housing indicators of domestic energy deprivation. Data gathering in this domain 1994 with the European Community

Household Panel (ECHP), and has been developed further since 2003 via the Survey on Income and Living Conditions (EU-SILC).

This paper explores the relationship spatial and temporal variations in the incidence of energy poverty across Europe. We argue that European energy transitions – understood as processes of systemic change in the energy sector (Bridge et al., 2013) – have deepened existing regional inequalities at the macro-scale as they relate to energy poverty and similar forms of deprivation, due to the embeddedness of such processes in incumbent spatial and institutional systems.

The paper has two specific objectives within these overarching aims. First, we explore macro-regional differences across the EU as they relate to existing regional inequalities. The paper formulates an 'energy poverty index' that incorporates various material deprivation dimensions. These are subsequently cross-referenced with monetary deprivation measures. Second, the paper examines the relationship between the evolution of domestic energy prices, on the one hand, and income and energy poverty rates, on the other, with the aim of shedding light on the impact of the post-2008 economic crisis on households' well-being from domestic energy deprivation perspective, while investigating some of the complexities that underpin the expansion of inadequate residential energy serviced in Southern and Eastern European states in particular.

The evidence presented in this paper is based on a comprehensive review of Eurostat datasets. We undertook the work in order to produce a descriptive statistical analysis of the spatial disparities and temporal patterns of indicators that have conventionally been seen as indicators of energy poverty, including domestic energy prices, welfare and deprivation in monetary and material terms. Descriptive statistics were complemented with a bivariate analysis aimed at identifying factors that exhibit a linear correlation with energy poverty incidence rates across the EU.

A few weaknesses in this data source need to be taken in consideration. Unlike other similar studies that have relied on household-level microdata for the quantification of energy poverty levels in the EU (Thomson and Snell, 2013), our descriptive and correlation analyses have been conducted using individual Member States as a sampling unit, and thus the maximum yearly sample size is 28. This approach is nevertheless consistent with the scale of our analysis, which is aimed at establishing patterns across Member States as a whole. Also, the EU-SILC consensual energy poverty indicators rely on households' self-reported assessments of their domestic energy affordability strain, which has received some criticism (Healy, 2004; Petrova et al., 2013; Thomson and Snell, 2013).

At the same time, our analysis is limited to electricity and gas prices because Eurostat statistical information is not widely available with respect to less conventional energy carriers such as district heating, firewood or coal. Nevertheless, gas and electricity were jointly responsible for more than two thirds of household energy consumption in the EU-28 as measured by the weights that constituted the Harmonized Index of Consumer Prices (HICP) in 2012 (European Commission, 2014). With the exception of Greece, Lithuania and Latvia, electricity and gas accounted for more than half of the HICP in all EU countries (ibid.).

ENERGY POVERTY 'REGIONS' IN THE EU

Previous research has established significant differences in the incidence and characteristics of energy poverty across the EU. Higher levels of self-reported indoor thermal discomfort were found for Southern Member States in the 1990s (Healy, 2004) and in the 2000s (Thomson and Snell, 2013), as a result of the poor efficiency and lack of adequate heating systems in the housing stock of these countries. Later work has confirmed the paradox involving EU members in the Mediterranean basin: even though winters are milder in countries like Portugal, Spain, Italy, Malta, Greece and Cyprus, these countries recurrently report high percentages of people who are unable to keep the home warm. Such states have consistently found themselves above the EU average when it comes to the value of key domestic energy deprivation indicators. The Euro crisis, with its rapid increase in unemployment and income inequality has further exacerbated this situation.

Central and Eastern European (CEE) states have recorded Europe's highest energy poverty levels. The vulnerability of citizens in countries such as Estonia, Lithuania, Latvia, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania and Bulgaria can be attributed to the legacies of the centrally planned economy, such as the poor thermal insulation properties of the housing stock, the presence of historically low energy prices and the predominance of an unsustainable supply mix (Bouzarovski et al., 2015). The transition to a market economy in the 1990s added to these issues by bringing about the upward rebalancing

of energy tariffs without the development of adequate social welfare and energy efficiency mechanisms. Institutional inertia exacerbated antecedent difficulties, alongside the dependence on Russian energy imports and associated infrastructural lock-ins (Bouzarovski, 2010; 2014; Hiteva, 2013; Kovačević, 2004; Ürge-Vorsatz et al., 2006).

Energy poverty is also present in Western and Northern European Member States: Ireland, UK, France, Belgium, Germany, Austria; as well as the Netherlands, Luxembourg, Denmark, Sweden and Finland to a much lesser extent. In such countries, the issue tends to be restricted to specific demographic groups or types of housing. It is thus principally linked to the inability to purchase 'affordable warmth' (Boardman, 2010) among low income households living in energy-inefficient homes. While energy poverty rates have been shown to be significant in the UK, Ireland, France and Belgium, the problem is less pervasive in other countries within this geographic grouping.

Existing knowledge thus suggests a macro-regionalization of the EU in three clusters of countries with different energy poverty levels and dynamics. In order to explore the consistency of this categorization with the respect to correlation analysis presented in the previous section, we plotted the average value of Eurostat's monetary deprivation indicator 'at-risk-of-poverty' rate (percentage of the population with an income below 60 per cent of the national median, after social transfers) against an *ad hoc* composite energy poverty index for each member state. The energy poverty index took into account the EU-SILC population percentages of people who have reported *i)* being unable to keep their homes adequately warm *(Inability); ii)* having arrears in utility bills (*Arrears*); and *iii*) living in a home with a leaking roof, or the presence of damp and rot *(Housing faults)*:

Energy poverty index = (0.5 x % Inability + 0.25 x % Arrears + 0.25 x % Housing faults) x 100

In the index, the indicator *Inability* receives a higher weight on order to reflect the greater importance that our assessment gives to self-reported thermal discomfort levels in comparison with the indicator *Arrears*, which keeps track of late payment levels in energy and other utility bills. At the same time, *Housing faults* is closely related to, but not necessarily a direct indicator of, energy poverty. Our weighted values approach is based on previously developed energy poverty indices and weight values[2] (Healy, 2004; Thomson and Snell, 2013). It is based upon the premise that consensual measures (such as the self-reported inability to keep warm) are insufficient to capture the complex economic and material underpinnings of energy poverty, and should be combined with indicators describing the housing and financial conditions of the population in order to obtain a fuller picture (Bouzarovski, 2014; Dubois, 2012).

The results of the bivariate comparison (Table 1) show a low degree of positive linear correlation between the energy poverty index and the at-risk-of-poverty rate, even though relatively high levels of positive and statistically significant linear correlations exist on an indicator-by-indicator basis. In terms of three regions identified for the spatial analysis of energy poverty trends in the EU (Figure 1), Western and Northern countries (noted in black diamonds) belong to a compact cluster reporting low energy poverty levels in relation to the at-risk-of-poverty rate. At the same time, Southern (crosses) and CEE Member States (circles) form a more heterogeneous group. They are characterized by energy poverty index values that are higher in relation to their at-risk-of-poverty-rates. With respect to the measurement of poverty and social exclusion, these results highlight the importance of material and housing deprivation dimensions, such as the inability to keep the home adequately warm. They emphasize the need for moving beyond purely monetary indicators, such as the at-risk-of-poverty rate.

Figure 1

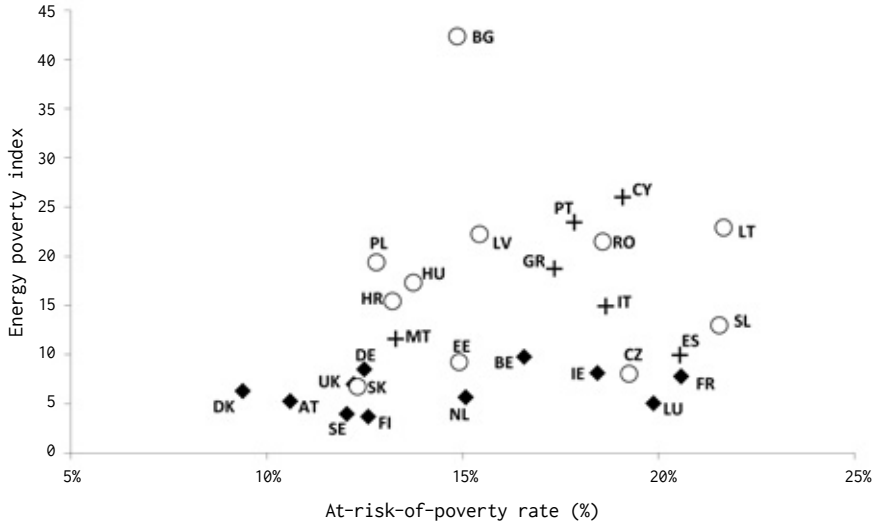


Table 1 - Correlation matrix: Pearson's r coefficients of linear correlation between SILC energy poverty indicators and index (columns) and the at-risk-of-poverty rate (rows), calculated upon average values of EU28 Member States for the period 2003-2013

** P < 0.01; * P< 0.05 LEVEL

	INABILITY	ARREARS	HOUSING FAULTS	ENERGY POVERTY INDEX
At-risk-of-poverty rate (after social transfers)	.523**	.574**	.480**	.264

Thus, it can be argued that a core *versus* periphery distribution is a better descriptor of the spatial disparities in energy poverty rates across the EU than the traditional three-region model. Western and Northern Member States have generally fared far better than Southern and CEE Member States in terms of domestic energy deprivation. This can principally be attributed to the higher macroeconomic performance and income levels among the latter group of states, as well as their higher quality housing stock and more effective targeting of vulnerable groups. Overall, the principal differences between core and periphery countries are reflected in the degree of public recognition received by energy poverty, its socio-demographic extent, as well as the structural drivers of the condition (see Table 2).

Table 2 - A typology of energy poverty factors and implications as they vary along the core-periphery axis in the EU

MACRO REGION	Core countries in Western and Nothern Europe	Periphery in CEE and the Mediterranean
PUBLIC RECOGNITION	Well-established in the UK and Ireland, officially and widely acknowledged in France. Less visibility in other countries.	Historically limited public recognition, recently rising to the top of the social agenda in austerity-hit countries.
PRINCIPAL DRIVERS	Low incomes, high energy prices, inefficient homes, disproportionately high energy needs.	Variable by country. Largely same as core countries but also involving questions of housing tenure and infrastructural access to adequate energy sources.
SOCIO-DEMOGRAPHIC EXTENT	Typically concentrated within a limited section of the population with energy affordability problems.	A systemic condition, affecting both low- and middle-income strata.
RELATIONSHIP WITH ENERGY TRANSITIONS	Energy poor households have been adversely affected by price increases associated with low-carbon energy transitions, but are benefiting from energy efficiency improvements associated with the process.	Dynamics of crisis-induced austerity and post-communist transformation are adding new levels of complexity to the energy poverty implications of low-carbon transitions, which are themselves less pronounced in this region.

At this point, it should be emphasized that the core-periphery distinction should not be seen in binary terms: substantial differences can be found among individual Member States of the periphery, suggesting that national, regional and local conditions matter more in this more disadvantaged cluster of EU countries. But the relatively high degree of systemic similarities in the underpinnings and driving forces of energy poverty in the periphery also justifies the treatment of ECE and Southern European states as part of a unified geographical category in this context.

DOMESTIC ENERGY PRICES: DRIVERS AND DESCRIPTORS OF ENERGY POVERTY

Increases in domestic energy prices have long been regarded as the crucial underpinning of energy poverty. As the EU is a world region highly dependent on imports of primary energy sources and, as such, has been subject to wider trends in global and regional commodity markets, increasing energy prices are an issue of significant concern among EU institutions. The far-reaching impact of energy tariffs on household well-being and the competitiveness of EU economies is now widely recognized (European Commission, 2014).

From the perspective of final residential energy users, evidence indicates that the price of domestic energy in the EU has consistently increased at faster-than-inflation rates at least since the mid-1990s, progressively reducing the purchasing power of households unless compensated by deflation in other domestic consumption categories. The observed evolution of energy prices needs to be seen not only as a con-

sequence of international commodity market trends and national conditions, but also within the context of multiple reconfigurations in the energy sector.

The first of such processes is the transformation of the energy sector, a process that started in the 1990s and has consisted of the privatization of publicly-owned utility companies, the 'horizontal' and 'vertical' unbundling or vertical disintegration of network activities, as well as the liberalization and opening of markets for competition (Florio, 2013). Even though these measures were meant to deliver increased levels of competition and a reduction in end-use prices, evidence suggests that regulatory reforms have not always achieved the desired results, especially when it comes to domestic energy tariffs, consumer welfare and satisfaction levels, as well as households' ability to pay bills on time (Fiorio and Florio, 2008; Poggi and Florio, 2010; Pollitt, 2012).

In the post-socialist states of CEE, ambitious policy packages based on the privatization of utilities were introduced in the 1990s by international financial institutions. Such steps were put in motion with the declarative aim of preventing the collapse of the energy supply infrastructure following the downfall of central economic planning, and addressing the structural inefficiencies inherited from the previous system. Failures in the successful execution of this process have been attributed to the emergence of substantial legal and policy obstacles, as well as fierce resistance from consumers facing rising energy costs and rapidly declining incomes (Lampietti et al., 2007; Ruggeri Laderchi et al., 2013).

A second relevant trend is the decarbonisation of energy systems – a large-scale policy effort driven, *inter alia*, by EU institutions. The process has been motivated not only by environmental concerns and climate commitments but also by the substantial energy import dependency levels of many Member States. However, low-carbon policies have not been neutral in energy poverty terms, mainly because they have entailed the development of mechanisms for internalizing the social costs of carbon emissions.

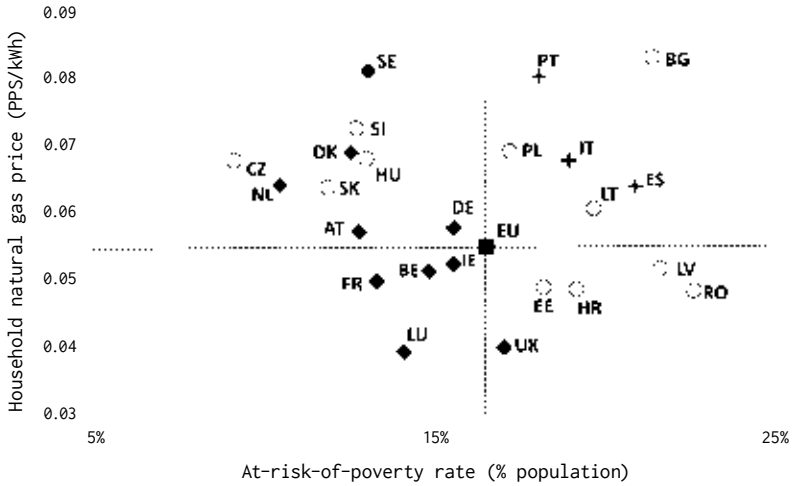
With carbon prices generated via the EU Emissions Trading Scheme (EU ETS) being passed onto final consumers (Aatola et al., 2013; Kim et al., 2010), such policy mechanisms are affecting not only the price of domestic energy but are also influencing a range of other goods and services for which energy is a production input. Low-carbon policies in the EU are also resulting in substantial investment in the renewable energy sector, especially in solar and wind electricity (European Commission, 2014).

The costs of these undertakings have also been borne by final consumers through energy bills.

In macro-regional terms, energy prices in the CEE space generally lie below the EU average and the values recorded for Northern, Western and Mediterranean Europe (European Commission, 2014). However, Euro energy prices fail to incorporate the differences between Member States' price levels and 'real' household incomes. Eurostat addresses this shortcoming by expressing prices in Purchasing Power Units (PPS): an artificial reference currency that eliminates price-income differences by correcting prices denominated in national currencies through a Purchasing Power Parity (PPP) factor, calculated on the basis of the price of a hypothetical basket of goods and services that is deemed representative of consumption patterns in individual Member States (European Communities, 2009; Eurostat, 2013). Such an approach offers a more realistic picture of the efforts that average households in different Member States need to make in order to pay for each unit of energy used at home. Prices in PPS are plotted against the percentage of people at risk of poverty (Figures 2 and 3), in order to explore the spatial variation in the exposure to these two different energy poverty factors.

Figure 2

Figure 3

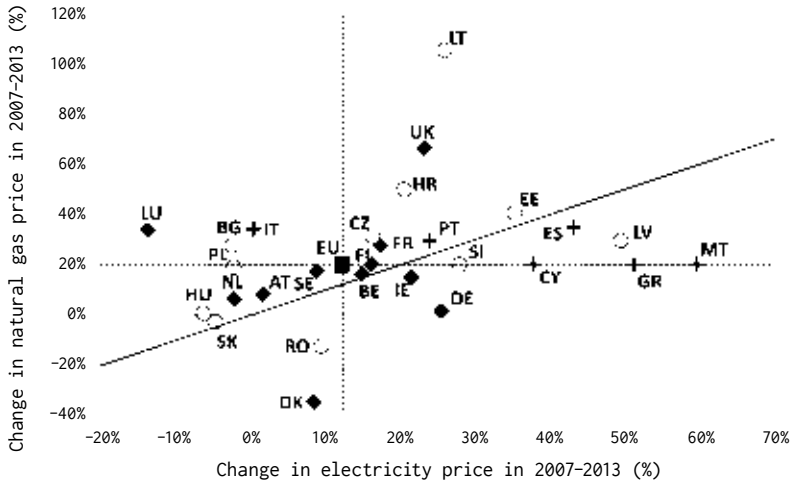


The picture that arises when household prices are expressed in PPS radically alters the initial perception of cheap energy prices in worse-off countries. Thus, states with higher domestic energy prices (in PPS) are mainly located in CEE and Southern Europe, where poverty rates are also well above the EU average in most cases (see Figures 2 and 3). This imbalance is particularly visible in the case of Poland, Bulgaria, Lithuania, Romania, Croatia, Spain, Italy and Portugal: countries with above-average domestic energy prices and at-risk-of-poverty-rates for the period between 2007 and 2013.

Having identified a general upward trend in domestic energy prices in the EU, we also assessed the evolution of household energy prices across the EU by directly estimating the rates of increase (in percentage points) in natural gas and electricity prices that occurred between the second semester of 2007 and the second semester of 2013. These figures were calculated on the basis of real prices denominated in national currencies, in order to avoid fluctuations associated with exchange rates. In the case of Member States that adopted the Euro between 2007 and 2013 (Malta, Slovakia, Cyprus and Estonia), a currency conversion was necessary prior to calculating rates of increase.

The percentages of increase (see Figure 4) indicate that natural gas prices in the EU rose faster (20 per cent on average) than electricity prices (12 per cent) during the assessed period. This result is relevant from an energy poverty perspective, given the central role of natural gas in fuelling domestic energy services relevant to human health and well-being in many European countries (Fouquet, 2011). It also further highlights the distinction between an energy poverty core and periphery in the EU: the citizens of Southern and post-socialist CEE member were forced to put up with increases in domestic energy prices that were above the EU average (with the notable exceptions of Slovakia and Hungary, due to local energy and price policies). Particularly steep was the rise in the three Baltic republics, as well as four Mediterranean states: Malta, Cyprus, Greece and Spain. Southeastern European states (Croatia and Slovenia) as well as Portugal also registered significant price increases.

Figure 4



We also assessed the evolution of domestic energy prices in PPS terms. Natural gas and electricity prices in PPS were plotted separately against the at-risk-of-poverty rate. For the purpose of this analysis, we selected the eight EU countries with the largest aggregated variation (in absolute value, calculated on the percentage of change) of both energy price and poverty rates between 2007 and 2013 (Figures 5 and 6). Such comparisons allow for a synchronous visualization of the increases in energy prices and poverty levels that have occurred, in part, as a result of the Euro crisis. The outcomes of our analyses for the case of domestic electricity indicate that Member States in Southern Europe and the CEE region have been

adversely affected to the greatest extent, while Northern and Western EU members have even benefitted from the transformations seen between 2007 and 2013.

Within the eight Member States selected for the purposes of the analysis, the citizens of Croatia, Greece and Spain are among the most vulnerable: as of 2013 over 20 per cent of the population in these countries was at risk of poverty, and had seen a substantial rise in electricity prices during the previous six years. In the case of natural gas, the former socialist states of CEE have recorded the highest changes in both the price of this domestic fuel and the monetary deprivation rate. But unlike electricity prices, the adjustment is not one-directional: for example, Romania has reported a significant drop in the poverty rate and in the price of natural gas alike.

Figure 5

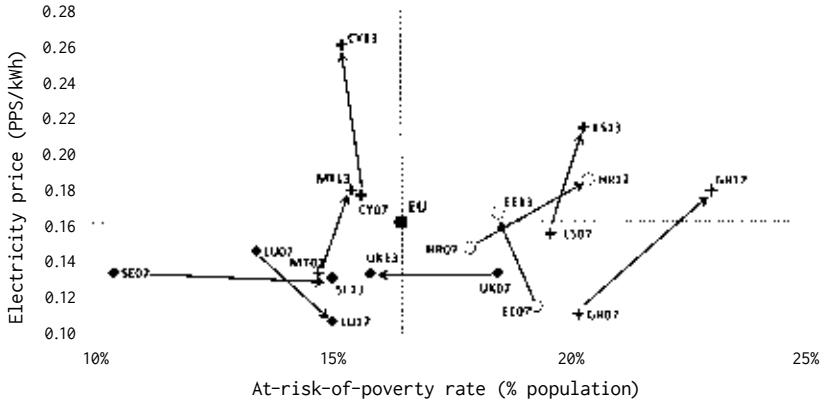
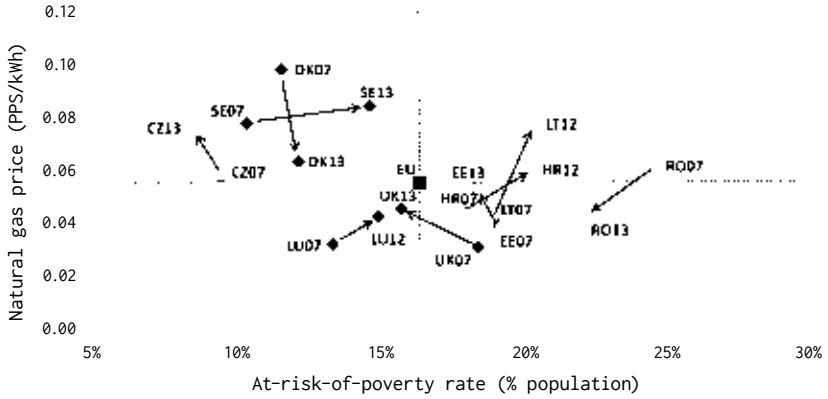


Figure 6



The predominance of 'periphery' countries within the correlation between energy price changes and at-risk-of poverty rates indicates that the systemic forces that drive energy poverty need to be seen within the context of deeper regional disparities within the EU. While such an analysis cannot in itself demonstrate a causal link between increases of energy prices and monetary poverty levels, there is a clear clustering of countries at nexus of these two dimensions.

Even more striking results were obtained when we mapped gas and electricity prices in 2013 against the composite energy poverty index, which incorporates material deprivation dimensions (Figures 7 and 8). These analyses signal that the disproportionately high presence of domestic energy deprivation in peripheral Member States is also underpinned by wider technical and infrastructural factors. Systemically-embedded economic and spatial inequalities are interacting with the diverse dynamics of energy transition to produce regionally-embedded inequalities.

Figure 7

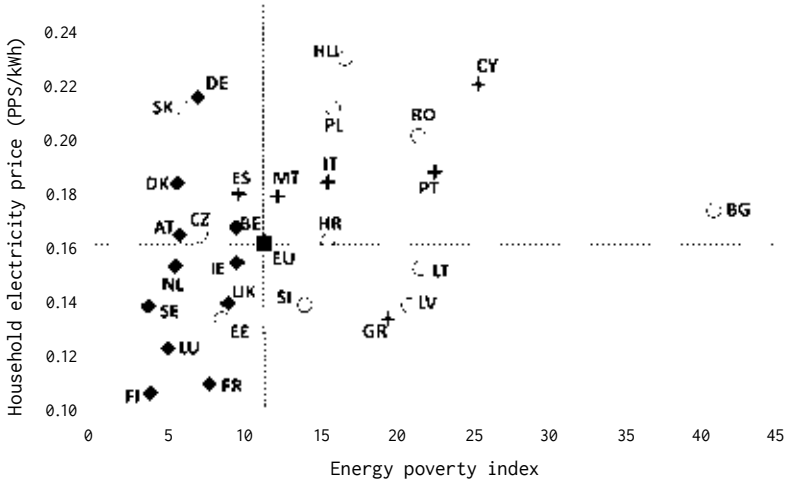
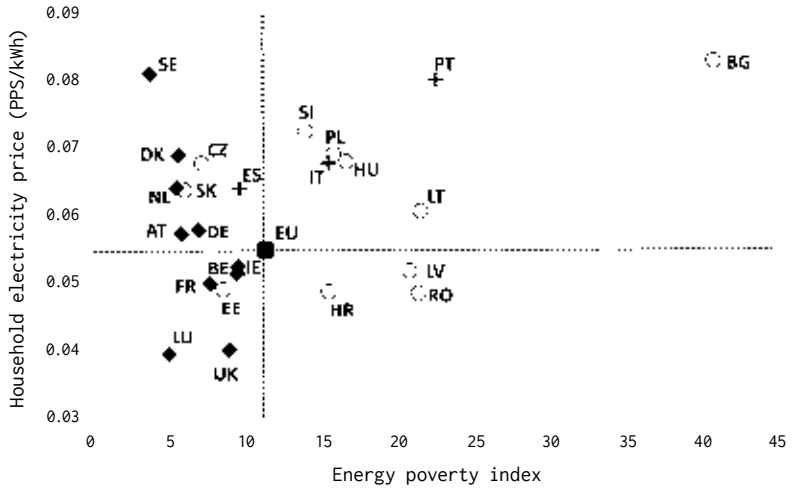


Figure 8



CONCLUSIONS

This paper has provided a comprehensive assessment of the relationship between domestic energy prices and monetary deprivation rates over time and space so as to establish *i)* degrees of national-scale geographic variation in energy poverty rates and *ii)* the role of gas and electricity prices in shaping the temporal and spatial distribution of monetary deprivation and energy poverty.

A cross-country and time series analysis of Eurostat data showed that there are substantial regional disparities in the exposure of various countries to the drivers of energy poverty. Our results thus challenge the findings of previous studies by suggesting that the traditional division of EU states into three clusters is increasingly replaced by a relatively well-off 'core' group of countries in Northern and Western Europe, and a heterogeneous energy poverty 'periphery' in the South and East. In the former, domestic energy deprivation is limited to specific demographic and housing groups, while the latter exhibits a more pervasive presence of the problem across a range of social strata. Thus, the notion of the 'energy divide' can be expanded from its original predominantly socially-orientated meaning (as described in National Energy Action, 2014) to encapsulate existing inequalities in access to infrastructure services at the scale of cities, regions, and countries.

Developing further our exploration of the drivers of energy poverty across Europe – and in relation to the second aim of the paper – we can conclude that domestic energy prices have consistently increased at faster-than-inflation rates for the EU as a whole since the mid-1990s. This pattern can be found throughout individual Member States, as domestic energy prices have outpaced inflation throughout the EU since 2004. Thus, state-level gas and electricity tariffs are acting on top of a more systemic piece of the energy poverty puzzle: monetary deprivation measured as the at-risk-of-poverty rate.

The energy poverty 'periphery' itself is highly heterogeneous, as a result of the different underlying factors involved in driving the condition – particularly when it comes to the inflationary character of domestic energy prices. In particular, the post-socialist Member States of CEE often report above average at-risk-of-poverty rates. These have resulted in the expansion of energy poverty to a considerable degree in most countries within the region, with the notable exceptions of the Czech Republic, Slovakia and Estonia.

Paradoxically, countries in the CEE cluster have the EU's lowest nominal energy prices (in Euro terms) but are characterized by higher-than-average energy prices when measured in PPS. Even though their real energy tariffs have not increased faster than the rest of Europe, such states are more exposed to the price factor because households spend relatively more on domestic energy than in the rest of the EU. The CEE region contains several worst case scenarios (Bulgaria, Latvia, Lithuania, Croatia and Romania) where conditions are significantly more difficult than the rest of the EU in terms of the two driving factors of energy poverty assessed in this paper: high and increasing poverty rates, and high and increasing domestic gas and electricity prices.

At the same time, Southern European Member States are also part of the energy poverty 'periphery' due to containing higher-than-average energy poverty and monetary deprivation levels, albeit below the numbers seen in CEE. Certain trends identified in this cluster of countries stand out, however, as some countries have experienced very substantial increases in energy prices – especially for electricity – while seeing poverty levels grow after the Euro crisis and the implementation of austerity packages (especially in Cyprus, Greece, Malta and Spain).

Northern and Western Member States can be situated within the 'core' region identified above. They have fared better than both CEE and Southern Europe, with relatively low levels of monetary deprivation and energy poverty seen throughout. Very low degrees of exposure to domestic

energy deprivation are notable in Austria, Finland, Denmark, the Netherlands and Sweden. But energy prices have been increasing at faster-than-inflation rates throughout the core region as well, especially in the UK.

These findings evidence the diverse geography of energy poverty in the EU, which is characterized by substantial differences among the analysed countries in terms of their exposure to the two factors analysed in the paper (monetary deprivation rates and energy prices) and their evolution. While our results do not indicate that the energy transition is leading to a radical reconfiguration of existing regional inequalities, there is evidence to suggest that the EU as a whole has experienced an increase in the levels of energy poverty as measured by EU-SILC since 2007. This highlights the need for considering – among research and policy communities alike – the differential impact that the post-2008 financial crisis is exerting on welfare levels and deprivation rates across the EU. Energy operations in countries affected by austerity and fiscal consolidation measures are of particular relevance here. There is also a necessity for considering of the price and energy poverty risks posed by wider energy transition processes: the liberalization and privatization of the energy sector, and the long-term transition to a low-carbon future.

NOTES

1 This paper is a modified version of an earlier paper by Bouzarovski and Tirado Herrero (2015). The research leading to its results has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007–2013)/ERC grant agreement number 313478. Stefan Bouzarovski is also a Visiting Professor at the Department of Economic Geography, University of Gdansk, Poland; and the Department of Geography at the University of Bergen, Norway.

2 This bivariate comparison was not conducted for Eurostat's central measure of monetary and material deprivation ('people at risk of poverty or social exclusion') given that that this complex metric is based, among other elements, on the indicators *Inability* and *Arrears*, and thus issues of colinearity between variables would have arisen in the correlation analysis.

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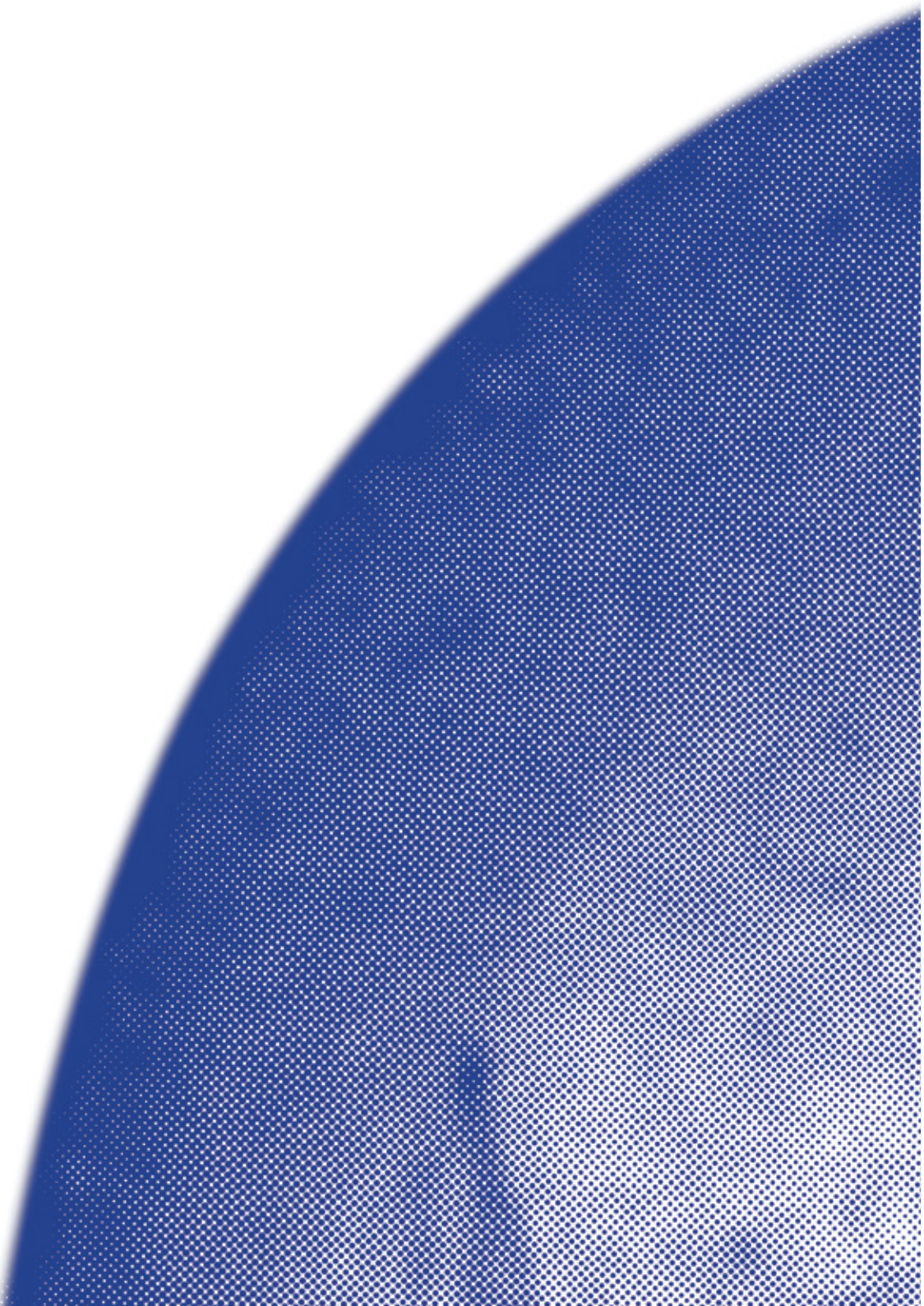

DEFINITIONS AND INDICATORS OF ENERGY POVERTY ACROSS THE EU[1]

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INTRODUCTION

Energy poverty is a multi-dimensional phenomenon that occurs when a household is unable to secure socially- and materially-needed levels of energy services in the home (Bouzarovski and Petrova, 2015). Among the key underpinnings of energy poverty are poor housing quality, cuts to household income, growing income disparities, and the affordability of energy. Issues such as individual energy needs, and energy sector reforms compound this.

To date energy poverty has been conceptualised and measured in a variety of divergent ways across the countries of the EU, with the availability of data often driving definition and measurement. This chapter serves several functions, firstly, it outlines the main definitions of energy poverty that exist across Europe, and secondly it considers the main approaches that have been used to measure the issue, as well as to identify households at the local-level for policy interventions. Finally the chapter reflects on the overall state of play for definitions and indicators of energy poverty across the EU.

CONCEPTUALISING AND DEFINING ENERGY POVERTY

Conceptualising and defining energy poverty is a necessary first step prior to creating measurement indicators. Indeed as Boardman remarks, "who is fuel poor depends on the definition; but the definition depends on who you want to focus on and this involves political judgement" (Boardman, 2010: 21). Before introducing the range of definitions that exist, it is important to comment on terminology; namely that at the European scale the terms 'energy poverty' and 'fuel poverty' are both used interchangeably in policy and academic literature. The terms can be treated as

distinct, with energy poverty referring to a lack of access to modern energy services in developing countries, and fuel poverty referring to a problem of affordability in the world's most developed countries. However, in recent years the terms have typically been used to mean the same thing (Boardman, 2010), with authors such as Bouzarovski and Petrova (2015) rejecting the developing/developed country binary. In this regard, it should be noted that it is an incorrect assumption that fuel poverty only refers to difficulty in heating the home – both terms refer to *all energy services* in the home.

At the EU-level there is no official definition of energy poverty, nor is there a specific legislative programme to address the issue, as the analysis of the EU's discourse on energy poverty by Thomson et al. (2016a) documents. The limited formal policy interest in energy poverty is also reflected at the Member State level, since at the time of writing only 5 countries have some form of definition, as Table 1 summarises.

Table 1 - Summary of official definitions of energy poverty. (Thomson et al., 2016a)

ENGLAND (2013-): "*A household is considered to be fuel poor where:* • *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"* [60% median income] (Department of Energy and Climate Change, 2013: 3)	
FRANCE (2009-): Officially 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*" (Translation of De Quero and Lapostolet, 2009: 16). In practice, this is complemented by an unofficial definition of spending more than 10% of income on energy costs (Dubois, 2012a).	IRELAND (2016-): "*…a household that spends more than 10% of their income on energy is considered to be in energy poverty.*" (Department of Communications, Energy and Natural Resources, 2016: 8)
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.*" (Strakova, 2014: 3)	UK-WIDE (2001-2013) AND NORTHERN IRELAND, SCOTLAND, WALES (2013-): "*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.*" (Department of Energy and Climate Change, 2010: 1)

There are a number of explanations for the limited number of formal energy poverty definitions. It may be due to the multidimensionality of the phenomenon, which means that it requires joint multi-agency policy solutions (Thomson et al., 2016a). Alternatively, on the basis of decision-maker interviews, Bouzarovski et al. (2012: 78) suggest that it may be due to a lack of a strong institutional centre within political initiatives to address the problem, a limited scientific evidence base, and the unwillingness of some Member States to recognise a new form of deprivation.

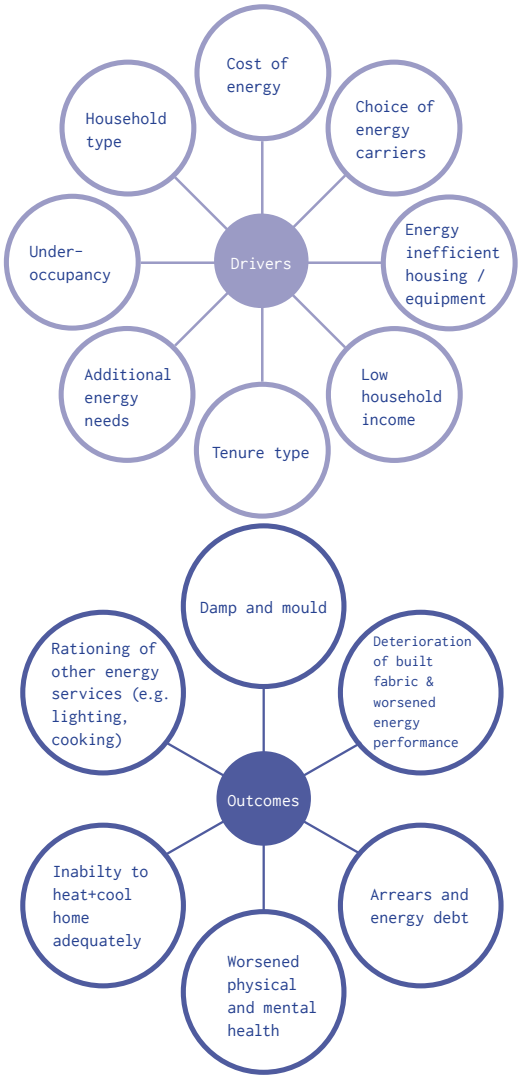
APPROACHES FOR MEASURING AND IDENTIFYING ENERGY POVERTY

Measuring energy poverty is a difficult task. It is a private condition, being confined to the home, it varies over time and by place, and it is a multidimensional concept that is culturally sensitive. The choice of measurement approach is contingent on whether energy poverty incidence is to be measured at the pan-European, national or regional level for monitoring and benchmarking purposes, or whether a finer grained analysis is needed to identify energy poor households at the local scale for policy delivery. It is further shaped by the availability of data and resources to undertake additional empirical research, and policy priorities in terms of social groups considered most vulnerable and in need of support.

In general terms, there are a variety of approaches to measuring energy poverty - Figure 1 provides an illustrative diagram of some of the measurable drivers and outcomes, but is certainly not exhaustive. One approach might be to capture the causes. For example, measuring the energy efficiency of a house and the equipment contained within to see if a household would have to pay more than average energy costs to achieve adequate energy services. Alternatively, the outcomes of energy poverty

could be captured, for example, if a household is unable to keep warm during winter, or if they have poor health. However, as energy poverty is multi-dimensional, an ideal approach would use a combination of these indicators of drivers and outcomes to build a detailed picture of the situation, rather than relying on just one indicator.

Figure 1 - An illustrative diagram of measurable drivers and outcomes



These general approaches translate into three main methods of measurement:

1. Direct measurement – where the level of energy services (such as heating) chieved in the home is compared to a set standard;
2. Expenditure approach - which explores the ratio of household income to energy expenditure, in comparison to certain absolute and relative thresholds;
3. Subjective or Consensual approach – based on self-reported assessments of ability to attain certain basic necessities.

For specific policy delivery at the local level, these approaches are also supplemented by:

4. Indicators for household identification.

The subsequent sections will now examine each of these approaches in more detail.

1. Direct measurement

The direct approach attempts to measure if sufficient levels of energy services are being achieved in the home, such as heating and lighting. To date, this has mainly involved taking internal temperature readings to determine if households are attaining 'adequate' levels of warmth that promote good health and well-being. However, this approach is rarely used to measure energy poverty and has never been employed at the European scale (Thomson, 2013). This is due to the technical issues involved with measuring energy services, determining adequate standards, and ethical concerns about entering homes and monitoring households.

Large scale empirical temperature data is scarce at the national level, for example, in England the English House Condition Survey (EHCS) stopped taking living room temperatures in 1996 (Boardman, 2010); since then only a limited number of studies have been conducted. For example, Oreszczyn et al. (2006) conducted a comprehensive study of internal living room and bedroom temperatures in 1,604 English houses, taking half-hourly readings for two to four weeks across two winters (Oreszczyn et al., 2006: 246). These measurements were collected from low-income households that were receiving energy efficiency improvements to their property through the Warm Front scheme. Healy and Clinch (2002a) have also conducted research into internal room

temperatures via their national household survey of energy poverty and thermal comfort in the Republic of Ireland. In total, 1,500 households were recruited by random probability-based sampling, and were questioned about their ability to heat their home adequately and had their living-room temperature measurements taken. Healy found that 29.4% of energy poor households had a living-room temperature of 18°C or less, compared with just 8.8% of other households (Healy, 2004: 134).

However, Healy is critical of using living room temperatures as an indicator of thermal comfort and energy poverty, arguing that social desirability bias may cause households to heat the living room to a higher level than normal in anticipation of the interview (Healy, 2004: 134). Furthermore, in countries where many dwellings are served by district heating systems that do not allow individuals to control their heat consumption, such as in Central and Eastern Europe, temperatures are not a good indicator of energy poverty as the internal temperatures are "typically adequate, or in cases even too high" (Tirado Herrero and Ürge-Vorsatz, 2012). However, the move towards 'smart homes', as well as the smart meter rollout across the EU, hints at future potential for utilising the direct measurement approach in a more widespread manner.

2. Expenditure approach

One of the most commonly used energy poverty measures for national assessments is the expenditure approach, which explores the ratio of household income to energy expenditure. Broadly speaking, a household is considered energy poor if they exceed a set threshold, such as 10%, or twice the national median. A commonly used data source is national Household Budget Surveys, which collect actual household expenditure across a variety of categories.

Within this approach, there are a number of important considerations to be made, which can be summarised according to three overarching themes: whether to use an absolute or relative expenditure threshold; how to quantify energy needs and spending; and how to measure household income. There are advantages and limitations associated with each of these themes and these are described below.

2.1 Absolute versus relative measures: Under an absolute measure of energy poverty, a household is considered to be energy poor if they spend more than a fixed X per cent of their income on energy (Healy, 2004), for instance, in the UK the threshold was previously 10 per cent. Given their construction they make the eradication of energy poverty a possibility (Boardman, 2012).

By comparison, energy costs under a relative threshold are typically calculated on a median cost to income ratio (Moore, 2012: 21). Given that unlike incomes, energy prices do not remain static, relative measures may be subject to substantial fluctuations (Moore, 2012: 21), providing a more complex account of energy poverty and the difficulty of a 'moving target' (Boardman, 2012), but potentially one that represents relative hardship more accurately (Boardman, 2010: 231). It is important to note that the use of median figures is preferable to mean figures, as energy expenditure is asymmetrically distributed, thus the mean value can be misleading as it gives weight to 'atypically' high values (Moore, 2012).

As indicated by Table 1 both approaches have been used by different EU countries, with England recently moving from an absolute to relative mode of measurement, with the new Low Income High Cost (LIHC) definition of energy poverty referring to both the national median required energy bill and the 60 per cent of median income poverty line.

2.2 Energy needs and spending: for an expenditure based measure of energy poverty some quantification of energy costs is required. Two main approaches exist, required theoretical spend and actual spend. In the UK, modelled required energy consumption takes into account the energy required for space heating, water heating, lights and appliances, and cooking (DECC, 2010). The model takes into consideration required internal temperatures based on World Health Organisation standards (1987), occupancy rates (hours spent in the home and under occupancy), energy efficiency, and types of energy available to the household (DECC, 2010). The approach used in the United Kingdom relies on detailed information to be collected about all aspects of the dwelling (DECC, 2010).

Required energy expenditure is considered to be more meaningful than actual spend, particularly as it is unaffected by the priorities and decisions households actually make (Hirsch et al., 2011), but the housing data required to do so is almost unique to the UK (Moore, 2012) and subsequently no other European country conducts in depth modelling. As such, the majority of non-UK based studies have used actual expenditure.

Actual energy expenditure is easier to calculate, but is widely regarded as a poor indication of energy poverty (Moore, 2012; Liddell et al., 2012), especially as low income households often spend significantly less on energy than would be required to maintain a warm home (Moore, 2012).

Indeed, a comprehensive study of household energy expenditure in the UK by Hirsch et al. (2011: 4) found that on average, households consume only around two thirds of their theoretical 'need', with people on low incomes most likely to be under-consumers of energy.

2.3 Household Income: The final consideration necessary for both required and actual energy expenditure models is how to accurately assess household income. However, the definition of income is contentious in three key ways: firstly, whether to use a before housing costs or after housing costs measure, secondly, what welfare payments or benefits should be included within this calculation, and lastly, whether income should be equivalised to reflect household size (see Boardman, 2010; Hills, 2012; Thomson, 2013).

2.4 Limitations of expenditure based approaches: The expenditure approach is one of the most widely used methods for measuring energy poverty, in part due to the objective and quantifiable nature of the approach. However, in some instances there has been an incorrect or uncritical application of methodologies from the UK in other countries, suggesting that the underlying methodology is complex and not easily, and that perhaps there is a need to build technical and scientific capacity within this field. Indeed, the confusing nature of the expenditure approach has been highlighted by Healy and Clinch who state *"it can be misleading, as several formulae now exist for calculating fuel poverty, some with housing costs included in net household income (…) while other calculations analyse gross household income as opposed to net"* (Healy and Clinch, 2002a: 5). In addition to this, data requirements/availability, assumptions around energy needs and definitions of income all give rise to criticism. Case Study Box 1 indicates some of the problems of using an expenditure based approach in England with reference to disabled people.

CASE STUDY

There is sufficient data on the English housing stock to base energy poverty indicators on required energy spend rather than actual energy spend, housing conditions to be accounted for, and, under the LIHC measure, to adjust for household size. However, a recent study conducted by Snell, Bevan and Thomson (2014) highlights how both the 10 per cent and LIHC measures of energy poverty used in England is likely to under estimate both energy poverty rates and the lived experience of disabled people, one of the groups considered by the government to be most vulnerable to it.

Measuring energy needs sufficiently: Whilst the English measure of energy poverty is based on modelled energy requirements, this is essentially a 'one size fits all' approach that is unable to cater for a variety of different energy needs. However evidence suggests that people with particular impairments or conditions may need (amongst other things) higher indoor temperatures; longer periods of warmth; the use of air conditioners and other energy intensive equipment; and additional washing and drying facilities. These needs are not considered within the current measurement of energy poverty in England, and arguably, as a result, this is likely to underestimate the energy needs of a highly vulnerable group.

Measuring income sufficiently: Whilst the energy needs of disabled people may be underestimated under the current English definition, the incomes of some disabled people may be artificially inflated. Under the current measurement of energy poverty disability related benefits such as Disability Living Allowance (DLA) are treated as disposable income that could be spent on energy bills. There is significant criticism regarding the treatment of disability related benefits as income under the existing measure, particularly benefits such as DLA, and the subsequent likely under reporting of energy poverty rates amongst disabled people. Criticisms centre around the idea that benefits such as DLA are disposable income, whereas in actual fact they are specifically there to compensate for the additional costs caused by a disability. Furthermore a measure that compares the income of two households (one containing a disabled person, the other not) is problematic, as in reality a household containing a disabled person may have less disposable income to pay for fuel costs, given the additional costs that disabled people often face. Table 2 produced by Snell et al. (2014) highlights the difference in energy poverty rates when disability related benefits are removed from the calculation of income.

Table 2 - Energy poverty rates, disabled people and household income (Snell et al., 2014)

	10% FULL INCOME		LIHC	
	DISABLED PERSON PRESENT IN HH	DISABLED PERSON NOT PRESENT IN HH	DISABLED PERSON PRESENT IN HH	DISABLED PERSON NOT PRESENT IN HH
% OF POPULATION IN ENERGY POVERTY (PERCENTAGE)	20.4	14.6	13.2	10.5
NUMBER OF HOUSEHOLDS IN ENERGY POVERTY (MILLIONS)	1.29	2.21	0.84	1.60
INCREASE IN ENERGY POVERTY AFTER REMOVING DLA & AA (PERCENTAGE)	+ 2.0	-	+ 1.2	-
INCREASE IN NUMBER OF ENERGY POOR HOUSEHOLDS AFTER REMOVING DLA & AA (THOUSANDS)	+ 413	-	+ 72	-

Given the rigid treatment of energy needs and inclusion of disability related benefits as disposable income, it is likely that the existing English definition under estimates energy poverty rates amongst one of the groups considered by policy makers most vulnerable to its effects.

3. Subjective/Consensual approach

Given the criticisms and difficulties associated with the expenditure approach, some researchers (most notably Healy, 2004; Thomson and Snell, 2013; Petrova et al., 2013) have proposed the use of self-reported subjective indicators to quantify energy poverty. This method is grounded in the consensual poverty approach and is based on the inability *"to afford items that the majority of the general public considered to be basic necessities of life"* (Gordon et al., 2000: 7). This approach typically involves asking individuals and households a combination of the indicators listed in Table 3

Table 3 - Summary of available subjective indicators. (Thomson et al., 2016b)

INDICATOR	DATA SOURCES
Ability to pay to keep home adequately warm	EU-SILC main survey; Eurobarometer 72.1 (2009) and 74.1 (2010); European Quality of Life Survey 2007 and 2012
Arrears on utility bills within the last 12 months	EU-SILC main survey; European Quality of Life Survey 2007 and 2012
Risk of falling behind on paying utility bills over next 12 months	Eurobarometer 72.1 (2009) and 74.1 (2010)
Leaking roof, damp walls/floors/foundation, or rot in window frames or floor	EU-SILC main survey; Eurobarometer 73.2 + 73.3 (2010); European Quality of Life Survey 2007 and 2012
Dwelling comfortably warm during winter time	EU-SILC ad-hoc housing conditions module 2007 and 2012
Dwelling equipped with heating facilities	EU-SILC ad-hoc housing conditions module 2007 and 2012
Dwelling comfortably cool during summer time	EU-SILC ad-hoc housing conditions module 2007 and 2012
Dwelling equipped with air conditioning facilities	EU-SIL ad-hoc housing conditions module 2007

The consensual approach has tended to be used to measure pan-European rather than national energy poverty. Recent comparative analyses of EU-wide energy poverty have been undertaken by researchers such as Bouzarovski and Tirado Herrero (2015), Dubois and Meier (2016), Thomson and Snell (2013), and Thomson et al. (2016b).

The consensual approach has numerous strengths. Firstly, it can be less complex to collect consensual data than expenditure data, particularly required modelled expenditure data, thus it may be suitable as an interim measure of energy poverty in countries that lack a comprehensive house condition survey. Secondly, at the European level there are no standardised microdata concerning household energy expenditure or house conditions (Thomson and Snell, 2013), and so by using consensual indi-

cators researchers have been able to circumvent data issues and quantify EU energy poverty. A third strength, and arguably the most important, is that a consensual approach to energy poverty has the potential to "*capture the wider elements of fuel poverty, such as social exclusion and material deprivation*" (Healy and Clinch, 2002b: 10).

Conversely, the subjective indicators used in the consensual approach have been criticised for their error of exclusion, whereby households may not identify themselves as energy poor even though they may be characterised as energy poor under other measures (Dubois, 2012b). Furthermore, the degree to which subjective measures overlap with expenditure measures is a concern, although research on this is limited. McKay is also critical of consensual deprivation indicators, stating they "*assume that there is a broad consensus on what goods/services families should be able to afford, and that an inability to afford those items can measure deprivation*" (2004: 201). Consequently, if the underlying assumptions are incorrect, a person may appear poor due to their consumption preferences rather than lacking resources (McKay, 2004).

4. Indicators for household identification

Accurately and efficiently locating energy poor households can be a major obstacle to the delivery of energy poverty alleviation policies, particularly as "most monitoring proposals do not translate successfully into appropriate criteria at the level of the individual household" (Boardman, 2012: 144). Given this, most policy makers targeting the energy poor tend to use:

- 'Passport' benefits - such as being in receipt of unemployment related welfare payments);
- Area based approaches that draw on local statistics around housing conditions and poverty (see for example Walker et al., 2012; Morrison and Shortt, 2008);
- Or base support on demographic criteria such as age.
- Equally, in recognition of the heightened vulnerability of certain groups, a suite of qualifying criteria are sometimes set in order to protect the most vulnerable groups (e.g. a mix of area based, demographic and economic criteria).

However, there is evidence to suggest that targeting is problematic. For example, of 'Warm Front' (a programme of state funded housing improvements in the UK) recipients in 2001 only one fifth were in energy poverty prior to receiving their grant (Sefton, 2004). Similarly, there has been substantial criticism of the non-means tested winter energy payments made to the over 65s (Brinkley and Less 2010) in the UK. Specific criteria used to target support such as using 'passport' benefits or age thresholds can also be problematic, and indeed, as argued by Walker and Day (2012) can oversimplify complex and often dynamic circumstances.

Whilst it may be easier to identify households on the basis of actual spend on energy as a proportion of income, as described above this is a crude measure and does not take into account the fact that households vulnerable to energy poverty are likely to under heat their homes in an attempt to balance finances. Consensual measures can be equally problematic, especially as the energy poor may deny the reality of their situation, perhaps due to the stigma attached to the energy poverty label. Given all of this there is often a gap between national estimates of energy poverty and the implementation of policy measures at the local level.

SUMMARY

This chapter set out to outline the main definitions of energy poverty that exist across Europe. In doing so, it has clarified the terminological confusion that exists around 'fuel poverty' and 'energy poverty', pointing out that both terms are concerned with all energy services in the home, not just heating. It has highlighted the lack of a common EU definition, summarized the five existing national definitions of energy poverty, and offered some explanations as to why so few Member States formally recognise the issue.

The second aim of this chapter has been to consider the main approaches available for measuring energy poverty. Here, we have introduced the main measureable drivers and outcomes of energy poverty, and gone into more detail about the main prevailing approaches: direct measurement, the expenditure approach, and the consensual/subjective approach. We have also discussed the mismatch that exists between measuring the incidence of energy poverty, on the one hand, and identifying households at the local level for policy interventions, on the other.

It is clear that much work remains to be done to comprehensively address energy poverty. A key issue is the paucity of suitable data at the EU and national level, which is preventing rigorous assessment of energy poverty. There is no dedicated survey of energy poverty, and no standardised household micro data on energy expenditure, energy consumption or energy efficiency. As a result, researchers are often reliant on subjective data concerning the consequences of energy poverty rather than data on the causes of energy poverty. However, researchers are beginning to offer solutions to this, indeed a report by Thomson and Snell (2014) provides a number of detailed recommendations for improving data at the EU and national scale, based on a review of energy poverty indicators and datasets.

NOTES

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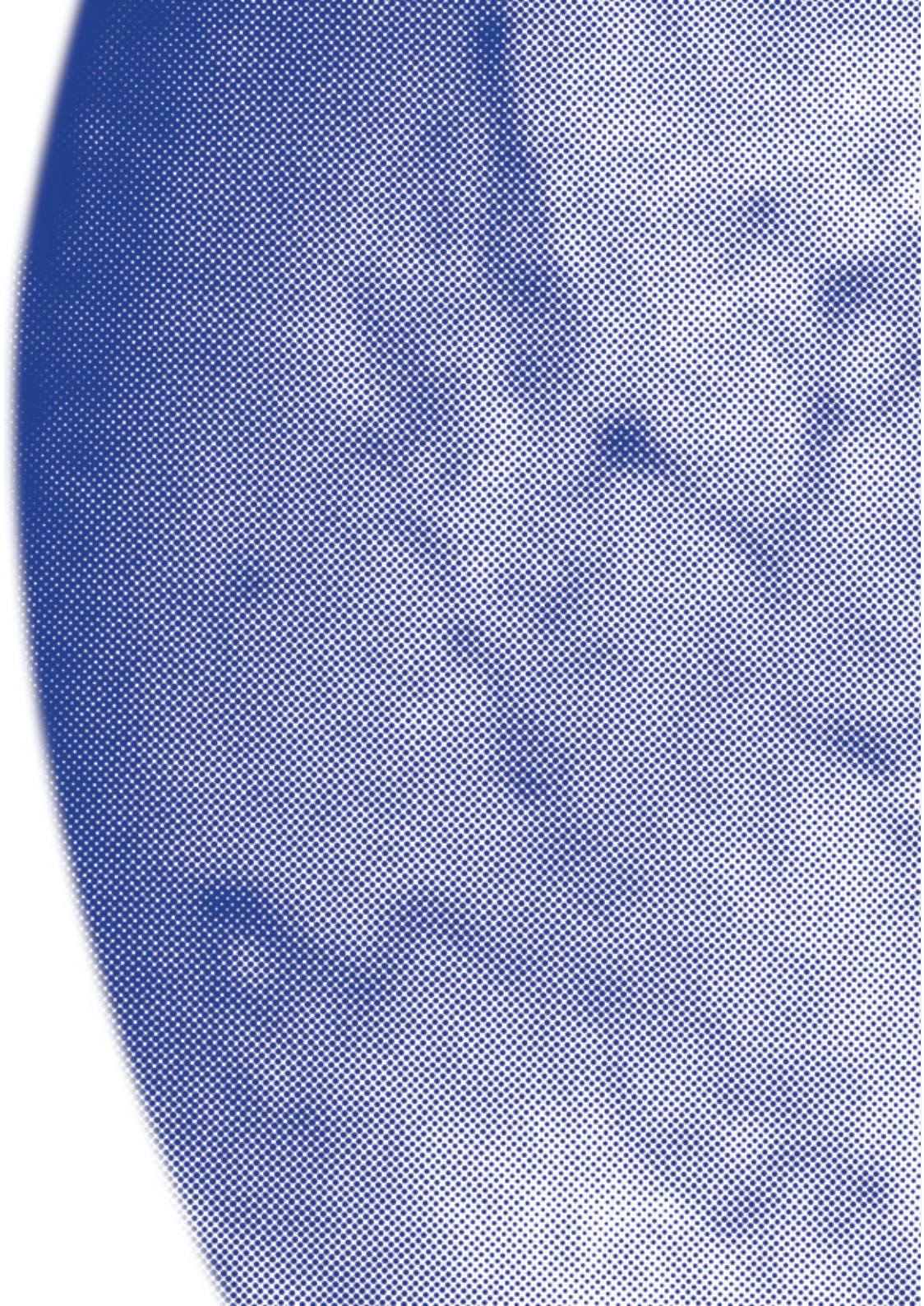

MEMBER STATE LEVEL REGULATION RELATED TO ENERGY POVERTY AND VULNERABLE CONSUMERS[1]

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INTRODUCTION

Energy poverty, commonly understood to describe a situation where individuals are not able to adequately heat their homes or meet other required household energy services at affordable cost, is an increasingly recognised problem across Member States, due to rising energy prices, recessionary impacts on national and regional economies, and poor energy efficient homes. Using data from the EU Survey on Income and Living Conditions (EU-SILC), researchers have estimated that 54 million European citizens (10.8% of the EU population) are unable to keep their home adequately warm in 2012, with similar numbers being reported with regard to the late payment of utility bills or presence of poor housing conditions.[2] The European Commission acknowledges the need for Member States to address energy poverty – for example in its Communication on the Energy Union[3], with its primary focus on the protection of vulnerable consumers in the energy markets.

However, while the problem of energy poverty is on the agenda, limited co-ordinated actions at the European level are in place, for three key reasons – 1) the problem is not yet fully understood due to shortcomings in existing indicators; 2) action to date has been guided by the principle of subsidiarity, and 3) the EC competency is focused on vulnerable consumers in regulated markets, not on households in energy poverty across the wider energy system. As a result, its recognition and understanding is limited to few Member States.

This chapter considers, through assessing the experiences of Member States, how the three problems above can start to be addressed, through a more co-ordinated and comprehensive European response. This is by establishing indicators that allow for an improved understanding and help target action, by strengthening requirements in European law, and by a broader view of vulnerability, not restricted to energy markets but

the wider system. The approaches to defining energy poverty and vulnerable consumers, and the types of actions being undertaken in response across Member States have been reviewed. Based on this review, a set of recommendations are proposed to move the European policy agenda forward.

EUROPEAN LEGISLATION

The main European legislation that has provision for addressing energy poverty is the Third Energy Package relating to common rules for the internal electricity and gas markets, under Directives 2009/72/EC and 2009/73/EC (European Parliament, 2009a; 2009b). These Directives state that energy poverty is a problem and that Member States should take action. To do this, there is an explicit requirement for Member States to adopt vulnerable consumer definitions and protective measures (Article 3 (8) of 2009/72/EC). Subsidiarity is a key principle in the current approach, where the specific definition of what constitutes a vulnerable consumer and the resulting actions need to be considered in view of a given country context.

The European Commission's current perspective on energy poverty is through a focus on vulnerable consumers in the regulated markets, reflecting their policy area of competency. Other European bodies have called for a more direct and explicit recognition of energy poverty. In their opinion *For coordinated European measures to prevent and combat energy poverty*, the European Economic and Social Committee (EESC, 2013), a consultative body of the EU, argue for common definitions and indicators. They suggest that this could be co-ordinated by an observatory, and help develop a European strategy on energy poverty, recommendations echoed by European-focused research studies (EPEE, 2009; Thomson and Snell, 2014).

The development of a broader strategy is gaining some traction at the European Commission. This is reflected in the mainstreaming of the concept of energy poverty in policy documents, such as the Energy Union, and an increase in research activities. Following the publication of research on this issue, including the INSIGHT_E report (Pye et al., 2015), the Commission are taking forward further research to improve the understanding of energy poverty at the European level, through development of indicators, and to further assess actions that can be undertaken.

A recently published Commission-funded study has set out some of the options for EU wide metrics and the establishment of an observatory (Rademaekers et al., 2016).

Given the above research programme being formulated, and discussion in forums such as the VCWG, it is apparent that there is a real interest from the Commission in exploring additional legislative or other types of measures that could be implemented, the extent to which definitions should be consistent to allow for harmonised protection, and how monitoring of the problem can be improved.

MEMBER STATE APPROACHES TO ADDRESSING THE ISSUES

In this section, how Member States are defining the issue of energy poverty, and vulnerable consumers, and the actions being undertaken are described. Having established the state of play, the role the European Commission can play can then be considered, either through further research efforts, strengthening legislation, and disseminating awareness of the issues and good practice.

1. Vulnerable consumers and energy poverty: linked yet distinct issues

It is important to recognise that the energy poverty challenge and the protection of vulnerable consumers are linked yet distinct issues. They are linked in that the extent and / or severity of energy poverty could be exacerbated if vulnerable consumers are not afforded adequate protection. However, they are distinct; in the European context, vulnerable consumers relate to gas and electricity consumers who may not have full access to competitive tariffs or need additional protection and support, for a range of reasons (income, disability, age, welfare recipient). This regulated market focus means that regulators, ombudsmen and energy utilities are often viewed as the key actors. The types of measures would typically be more short term in nature, and curative, addressing acute access issues, and limited to electricity and gas.

While there are different ways of defining the issue, characteristics of energy poverty typically vary; it goes beyond energy markets to consider affordability issues for energy services, whether they be provided through

regulated markets or not. The focus on affordability for energy services means that there is a focus on low income households – and the multiple drivers, relating to energy efficiency, energy costs and disposable income. This results in measures focused on more structural issues that require longer term solutions, and require the expertise of multiple stakeholders, in the energy industry but also civic society and government.

This distinction means that different approaches and actions are required – and that an expanded role from the Commission beyond vulnerable consumers is necessary to help address the energy poverty challenge. The linked nature of the two issues however merits that any emerging strategies are synergistic and do not conflict. In the following sections, how these issues are defined by Member States is described.

2. Defining vulnerable consumers in energy markets

Provisions under the Third Energy Package require Member States to adopt definitions of vulnerable consumers and to take action to protect such consumers. A Council of European Energy Regulators (CEER) review found that in most member countries vulnerable consumers were protected through a combination of energy specific protection measures and social security benefits. Furthermore, 17 out of 26 Member States stated that a concept of vulnerable consumers existed in energy law, other law, or a combination of both (CEER, 2012)[4]. An Agency for the Cooperation of Energy Regulators-led review assessed that 13 out of 26 Member States explicitly define the concept of vulnerable consumers, and in another 12 it is implicitly defined (ACER/CEER, 2014).

In this paper, vulnerable consumer definitions are categorised as per Table 1. The most common type of definition is based on *receipt of social welfare,* reflecting vulnerability due to social circumstances. Definitions explicitly referencing issues of difficulty with energy cost payments or households incurring high expenditure are categorised under *energy affordability*. Four countries specifically refer to *health and disability* concerns as the main characteristic of vulnerability, although such issues are also often considered under *social welfare* and *socio-economic group* categories. Finally, some definitions refer to a broad range of *socio-economic groups*, which may include income, age or health characteristics. At the time of our review, only Latvia was yet to finalise their definition. A full listing of the definitions used for each Member State is listed in Appendix 2.

Table 1 - Categorisation of Member States' definitions of vulnerable consumers

DEFINITION TYPE	MEMBER STATE (MS)	NO. OF MS BY TYPE
Receipt of social welfare	BG, CY, DE, DK, EE, FI[1], HR, HU, LT, LU, MT[4], PL, PT, SI[3],[6]	14
Energy affordability (low income / high expenditure)	FR[2], IT, SE	3
Disability / health	CZ, NL, SK, IE	4
Range of socio-economic groups	AT, BE, ES, GR, RO, UK[5]	6
Not available / Under discussion	LV	1

1 Although term not officially recognised; **2** Under definition of energy poverty; **3** Also includes disabled individuals; **4** Also has health and income categorisations; **5** Based on OFGEM definition, not the national fuel poverty definitions; **6** According to the Concept for the protection of consumers fulfilling conditions of energy poverty, new definition and indicators will be based on social (economic) criteria.

The review highlights a divergent understanding of what is a vulnerable consumer. For some Member States, vulnerability is about disability, or because of social circumstance, or due to age, while in other Member States it is about recognising those that have difficulty in affording energy costs. This matters because actions to protect will be formulated according to the definition. There are two risks; one is that the definition is too broad, capturing too many persons to affect useful action – or that it is too narrow, missing key groups. An emerging question is whether there are specific socio-economic groups in all Member States that should be afforded minimum protection. Such an approach would require additional prescription in the legislation, harmonising levels of protection across the EU, and ensure Member States had to act.

There does of course still need to be a level of subsidiarity that allows Member States to act according to their policy approach and within the prioritisation of their financial budgets. It is evident from the research that Member States consider issues of consumer vulnerability and energy

poverty from different perspectives. They can be categorised according to whether policy and action in this area is 'social' or 'energy' policy-led.

This crude distinction is based on who drives policy, how the problem has been defined, and typically the type of measures undertaken. For those Member States with a social policy-focus, the issue of vulnerability is often viewed as a function of low income, and therefore poverty (and not as a distinctive issue e.g. energy poverty). Scandinavian and Northern European countries (including Netherlands, Germany, and Poland) and some selected Eastern European countries (Bulgaria, Czech Republic, and Croatia) view the challenge via a social policy outlook. Other countries, including those in Western and Southern Europe, tend to view this as a distinctive energy policy issue, of course recognising the important underlying social determinants. For some Member States, the approach is mixed e.g., defined in energy law but based on socio-economic criteria, as in Portugal or France. This distinction may be useful in formulating additional policy action in this area as it highlights the different outlooks on the problem, and approaches to addressing the issue.

In summary, it is evident that vulnerable consumer definitions tend to lead to curative, short term action that affords protection, primarily preventing disconnection, and provide support for welfare recipients in payment of energy costs. These are discussed in more detail in the following section. As discussed in 3.1, the types of action required for addressing energy poverty are characteristically different.

3. Recognition of energy poverty across Member States

The recognition of energy poverty, while mentioned under the Third Energy Package, is not prescribed for Member States. As described in the "Definitions and indicators" chapter only the UK (in its constituent countries), France, Ireland, Slovakia and Cyprus have legislation on this issue, and therefore definitions in place, which point to an issue broader than the regulated markets. A number of other countries (listed in Appendix 1) are considering proposals for defining energy poverty, highlighting a potential increase in recognition. It is also worth noting that in many Member States there is a strong civic voice on energy poverty issues, even if not recognised in policies at national or sub-national levels. Where the purpose of the definition should be to better identify and target households in need, it also serves to increase recognition of the issue and thereby highlight the need for budgetary allocation.

4. Assessing Member State responses: policies and measures

While definitions are critical for orientating action towards the challenges of vulnerable consumers and energy poverty, effective action then needs to be implemented. A review of measures resulting from strategies to protect vulnerable consumers and address energy poverty is provided in Pye et al. (2015).[5]

In this review, measures constitute those that explicitly provide additional consumer protection to vulnerable groups, and have some targeted aspect to improve the energy welfare of consumers through the improvement of the building fabric (thereby reducing energy use), provision of additional information or support, or financial relief in the payment of energy bills. In addition, non-targeted measures also include those supporting vulnerable consumers and the energy poor implicitly, by their nature. Examples include measures improving energy use in social housing, improving access to information on tariffs, social welfare support, and disconnection protection. Without including this broader set, there is a risk of underplaying the role of non-targeted measures, particularly in those countries that do not explicitly recognise the issue of energy poverty.

Measures are categorised as follows:

- *Financial interventions,* introduced to support payment of bills, and primarily focused on short term relief.
- *Additional consumer protection* for consumers using the retail markets.
- *Energy efficiency programmes,* targeting improvements to the efficiency of building stock, or energy using appliances.
- *Information provision & raising awareness*, which improve understanding of consumer rights and information on market tariffs and energy saving measures.

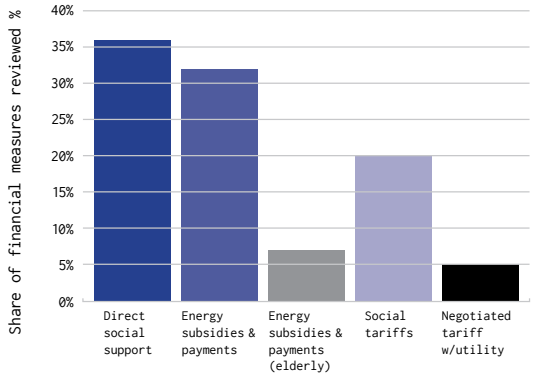
For each measure, information was gathered, including the type of implementation mechanism, delivery institution, extent of targeting, effectiveness (where possible to assess) and time horizon (whether addressing structural or acute problems). Over 280 measures were reviewed; of these, 40% are identified as being specifically targeted on vulnerable consumers or those in or at risk of energy poverty. The other 60% are relevant, as while not targeted, will provide some protection to low income and vulnerable households.

4.1 Financial interventions

Over 40% of Member States use financial interventions as the primary basis for support to vulnerable consumers i.e. this is the stated or implied means (via definition used or measures proposed) of tackling the issue. Such measures are provided in around 75% of Member States. A large amount of the support is fed through the social welfare system, as a proxy for identifying vulnerability and a mechanism by which to provide support. Support is either provided via general social welfare payments or through direct payments to help cover the cost of energy (70% of financial measures reviewed, illustrated in Figure 2).

Social tariffs are another measure in this category, in place across a number of Member States including Cyprus, Spain, France, Greece, Portugal, and Belgium. In Belgium, for example, all electricity and gas suppliers are required to offer a social tariff to protected customers (e.g. elderly, disabled, persons living in particular social dwellings with gas heating).[6] The French social tariff is based on the attribution of medical and health insurances, but large numbers of potential beneficiaries do not take advantage of it (ONPE, 2014). For those consumers that do benefit, its effect is questionable as the average amount of social tariff is 8€/month (ADEME, 2013). Social tariffs are controversial as they are considered to be in opposition to the objectives of achieving a liberalised internal energy market. Therefore, this type of support is expected to be phased out. In the interim, social tariffs are intended to act as additional financial support to provide an affordable energy supply to vulnerable consumers, but are also criticised in terms of the method of targeting and the adequacy his type of support actually provides.

Figure 1 - Share of financial intervention measures reviewed, by category



There are a range of different financial interventions, all designed differently based on national context, and targeted to differing degrees. There is a key tension that arises from much of the discussion around such measures, concerning enhanced targeting of vulnerable or energy poor households versus the administrative complexity that might result. The case of winter fuel payments in the UK, provided to claimants based on age as opposed to other criteria is case in point (Preston et al., 2014). There are also issues around how the measure is implemented, whether the onus is on a household to claim or is automatically provided based on given social security criteria.

What is evident is that financial interventions are crucial for addressing affordability in the short term, and can be used to compliment longer term measures that address the underlying structural issues of energy poverty. For example, in Scandinavian countries and the Netherlands, social support is provided but also significant effort is being put into improved energy efficiency of social housing stock (as described in section 4.3). This integrated approach means that financial support does not become the main policy for ensuring affordability but is rather a transition measure, which remains to ensure a safety net but is not relied upon.

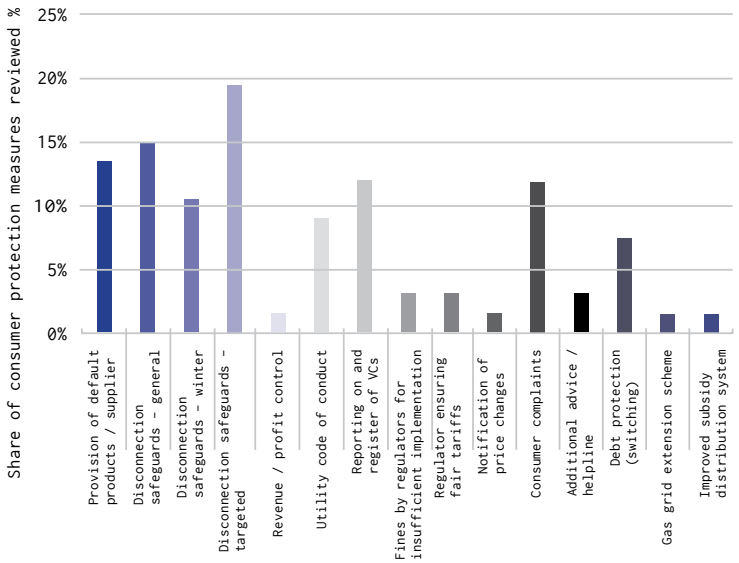
4.2 Consumer protection

Additional consumer protection measures are particularly important for vulnerable consumer protection (and (continued) access) in regulated markets. Therefore, there are strong roles for National Regulatory Authorities (NRAs) and energy companies in the implementation of a range of measures. These protections are critical for ensuring that markets operate in a way that does not disadvantage vulnerable consumers, through guaranteeing supply, establishing codes of conduct for market players, and by companies identifying vulnerable consumers.

This category is dominated by the measures to prevent the disconnection of vulnerable consumers (Figure 3), accounting for 40% of measures reviewed in this category. For approximately 20% of Member States, this constitutes the primary basis and often only explicit measure for affording consumer protection. Approximately 80% of Member States have some form of protection from disconnection due to non-payment, with Bulgaria and Czech Republic noted exceptions. Protection from disconnection of supply to vulnerable consumers is explicitly mentioned in the

Directives for the internal energy markets and includes winter-based or group-targeted disconnection bans (Dobbins et al., 2016).

Figure 2 - Share of consumer protection measures reviewed, by category



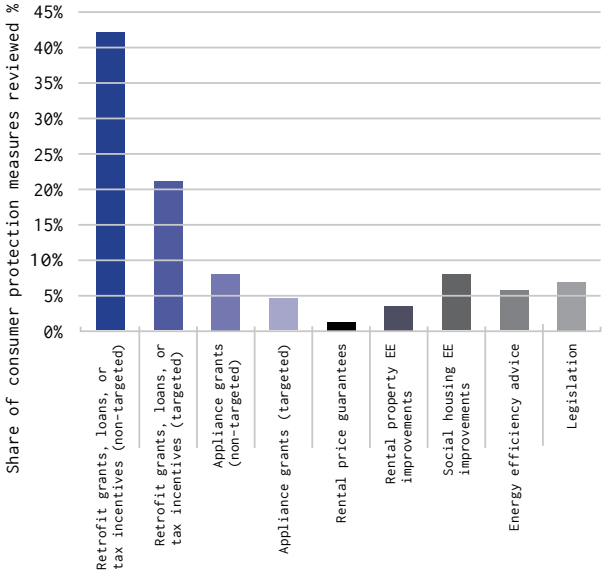
In addition to the disconnection safeguards, a number of Member States have specific measures to protect consumers who are in debt, allowing for switching to other suppliers even if indebted (DK, FR, LU, UK). This type of direct and individualised engagement with consumers tailors the response towards finding long-term solutions to pay for their essential energy supply on a tight household budget. The measures reviewed also highlight the important role of the energy companies, working alongside the regulator ('NRA controls' and 'Information' in Figure 3), in ensuring consumer protection, including the issuing of codes of conduct in dealing with consumers (BE, IE, LU, SE, UK), reporting on and registering vulnerable consumers (FR, GR, UK), and provision of additional consumer assistance. In other Member States, the regulator has the important role of ensuring fair tariffs, monitoring company profits, and fining energy companies for underperforming on specific scheme implementations.

Of all the categories, this is the most heterogeneous (ignoring the role of disconnection protection), with a range of measures specific to given countries. It is also a category of measure most prevalent in open competitive markets, and will become more important in specific Member States as energy markets become increasingly liberalised.

4.3 Energy efficiency interventions

Our review highlights that energy efficiency measures, particularly those focusing on building retrofit, are a key part of a strategy to address energy poverty. Based on the review, 30% of Member States' approach to tackling vulnerable consumers and / or energy poverty focuses on the use of energy efficiency programmes. Of the 90 measures reviewed in this category, 65% relate to building retrofit measures of different types (Figure 4), and of these, approximately 30% are targeted on lower income households.

Figure 3 - Share of energy efficiency measures reviewed, by category
'Grants' categories also include loans and tax incentives



There is therefore considerable scope for increased targeting of such measures, although of course this requires an understanding of which are the energy-poor households. Member State experiences highlight a range of considerations in how such targeted measures should be implemented. These include Energy savers *(Energiesnoeiers)* project in Belgium[7], 'Living Better' *(Habiter mieux)* programme in France (Crémieux, 2014), Stromspar-Check (Energy-savings-check for low-income households) in Germany[8], Better Energy: Warmer Homes in Ireland[9], and Energy Companies Obligation (ECO) in the UK (Platt et al., 2013). As described in Table 3, there are issues to be considered when developing energy efficiency programmes, such as scoping the beneficiaries, approach for delivering and implementing as well as measuring and enforcing, and funding these.

The Netherlands and Scandinavian countries have had strong success in targeting energy efficiency of social housing, which houses a higher share of lower income households.[10] Combined with broader social support measures, this has allowed for less targeting of measures. The transferability of such measures is somewhat contingent on the dwelling stock and nature of tenure, e.g. level of social housing stock in some Member States is much lower, with lower income households catered for by private rental markets.

There are a wide range of approaches to implementation e.g. funding source, extent of targeting, implementing body. Such factors need to be considered in view of national circumstances. There are already well understood barriers to energy efficiency measures. Therefore, strong incentives for take-up in low income households are needed, and designed to promote awareness and key benefits.

Table 2 - Issues to consider in developing targeted energy efficiency programmes

ISSUE FOR CONSIDERATION	DESCRIPTION
Targeting approach	Are proxy indicators e.g. social benefit recipients, good enough to ensure those in energy poverty are reached?
Delivery organisation	Delivery by energy companies may mean retrofits are not provided where most needed, but rather seek 'easier' opportunities to fulfil obligations. There may also be an issue of trust, if indeed an energy supplier is also carrying out retrofit measures. Finally, such programmes have the potential to offer local employment which may not be realised if large utilities are monopolising the market (as under the Stromspar-Check programme in Germany).
Implementation approach	Specific studies suggest that area-based (street-by-street) approaches can deliver significant economies of scale, and ensure low income households are identified and retrofitted (e.g. Platt et al., 2013; Preston et al., 2014).
Measurement & enforcement	Different proposals in the UK have suggested a minimum efficiency standard for low income households. If delivered via the market and / or delivered by energy companies, regulators need to effectively enforce scheme targets to ensure progress is made. However, the definition of these targets is critical as well. For example, should a minimum set of measures be offered in order to ensure that renovations result in a significant improvement of energy performance? How should the energy performance be measured?
Funding	If through energy bills, this could add to the burden of energy prices on lower income households, while through general taxation could be at risk from budget cuts (particularly in times of austerity). If paid for by homeowners / tenants, loan rates need to be attractive and split incentives overcome (between tenants-landlords), while full grants may need to be considered for low income households. Energiesprong ('Energy Leap') is an innovative scheme in the Netherland focused on social housing that aims to fund the investments in retrofit through bill savings, ensuring no net additional cost to tenants. Another interesting example is Croatia, where the proceeds from the sale of EU ETS permits are ring-fenced under an Environmental and Energy Efficiency Fund to fund subsidize more than 80% of total investment in energy efficiency measures.[11]

4.4 Information provision & awareness campaigns

The final category of measures concerns information and awareness, including advice provision, including campaigns, and increased information on bills and tariffs, through price comparison sites and more transparent billing. Member States with strongly liberalised markets tend to be those that have the most measures relating to price comparison and transparent billing. Where there is a strong civic society movement in relation to energy or fuel poverty, the number of awareness campaigns is higher. Greater awareness of energy poverty and how to tackle it could come through the greater use of smart metering through the creation of awareness of energy use patterns in the household and (anonymised) data collection allowing greater understanding of energy use patterns to the providers.

To allow for strong participation in the energy markets, providing adequate information to vulnerable consumers is critical. Awareness raising of how to increase affordability of energy services is also important. In specific Member States, we see that civic society groups and other non-governmental organisation play a critical role, in both assisting energy poor through various measures but also in pushing the agenda with government. Such campaigns are important for wider recognition and understanding of energy poverty issues.

Finally, a potentially important development is the roll out of smart meters in different Member States. This offers, subject to data protection, the opportunity for consumers to better manage their consumption but also energy companies to identify vulnerable consumers. As smart metering becomes more the norm, it will be important to share learning concerning how this technology can help in vulnerable consumer protection and enhancing affordability of energy use.

DEVELOPING A COMPREHENSIVE AND COORDINATED RESPONSE BY EUROPE

This Member State review highlights a number of key features. Firstly, the level of action varies significantly. In most Member States, there are basic protections in place for vulnerable consumers but few other targeted measures. For example, some 20% of Member States have protection for disconnection but few additional measures in place. In others, there are many more targeted actions, including those focused on issues of energy poverty. This is particularly true of specific Member States where the recognition of energy poverty is strongest. Secondly, the types of actions are tailored towards national circumstances, characterised by the policy approach, extent of market liberalization, and physical characteristics of household energy and building stock.

These features make the development of a more coordinated response at the European level challenging. On the one hand, it is critical that all Member States act to address the issues; this could be coordinated by the Commission. On the other, actions need to take account of national circumstance, so being too prescriptive as to the necessary action may not be effective. However, it is imperative that a more comprehensive and coordinated response is developed. This can be achieved through better understanding of the problem, by establishing indicators that can help target action, by strengthening requirements in European law, and by a broader view of vulnerability, not restricted to energy markets but the wider system. To do this, there are a number of recommendations that emerge.

1. Recognising the distinctive issues

The issues of vulnerable consumer protection and energy poverty are distinct. Both are important challenges that are linked but require different solutions. It is important that this distinction is communicated clearly to Member States through legislation, who can then develop effective measures. The European Commission could take the opportunity of the revision of the regulatory framework set-up by the Third Energy Package in 2015-2016 (as announced in the Communication on the Energy Union Package (EC, 2015)) to streamline the dispositions on vulnerable consumers and energy poverty contained in the current Electricity and Gas Directives. In particular, article 3 (paragraphs 7 and 8) and recital 53 of Directive 2009/72/EC could be amended to reflect clearly the specificities of vulnerable consumer protection (along the lines of consumer protection and curative approaches) and energy poverty (requiring a long-term, preventive approach).

Furthermore, the Commission should encourage Member States to develop distinctive yet consistent strategies for both issues. Such documents are important for demonstrating action in these areas, and for ensuring a good understanding across different government departments and agencies, and at different sub-national levels.

2. Guidance on defining vulnerable consumers

Given the variability in definitions, we propose that the Commission is more prescriptive about who constitutes a vulnerable consumer. For example, in some Member States, vulnerability is simply those groups at risk of disconnection. Such narrow definitions do not provide broader support to consumers who may have difficulty accessing and participating in the market. Guidance on defining needs to be developed, through further research and in consultation with key stakeholder groups such as VCWG and ACER/CEER. This research suggests that 'vulnerability' should reflect concerns of affordability, access and participation, and acknowledge both socio-economic circumstance (e.g. elderly, disabled, unemployed) and structural circumstances with regards to energy use (heating system type, on high tariffs, inefficient building fabric, and off-grid location).

In further prescribing what constitutes vulnerability, it is important to move beyond measures relating to ensuring supply i.e., emergency measures. Rather definitions should ensure improved access to markets for groups in society who need additional support. Taken in the round, providing this additional guidance should ensure that vulnerable consumer definitions are more aligned with energy poverty concerns, whilst also covering wider vulnerability issues (not related to affordability). Guidance on definitions could also feature under an implementing act of the revised Gas and Electricity Directives.

The Commission should also state clearly what is required of NRAs in reporting both definitions and measures through a common reporting format. At the occasion of the review of the functioning of ACER and the ENTSOs announced in 2015-2016, a stronger mandate could be given to ACER to ask NRAs to report more fully on vulnerable consumer definitions and measures.

3. Defining the concept of energy poverty

Given the lack of recognition of energy poverty, the Commission should play a strong role in formulating what energy poverty is and urge Member States to act to alleviate it. This could be done without prescribing the metric to be used by Member States. The Commission should develop a communication document or strategy (as is most appropriate) on their understanding of the energy poverty challenge, what is being done at the Member State level, and urge Member States to develop strategies. Their recognition should provide an overview of the key drivers and the extent of the problem, the impacts of energy poverty, and a scope beyond regulated markets, covering all energy use. The Commission should also play a central role in assisting Member States to develop appropriate metrics and to facilitate an exchange of practice between Member States and other relevant stakeholders, such as the VCWG, NRA representatives, civic society groups, academia, data and indicator providers (including Eurostat), as well as relevant DGs (in particular: DG Health and Safety, DG Energy, and DG Justice and Consumers), and other interested and affected parties.

Such a Commission document would provide this issue with the visibility it requires, and the longer term vision needed to address this challenge. It could also provide the impetus for developing indicators at the EU level that help quantify the problem, and allow for progress to be measured (as described next).

4. Develop improved indicators and disseminate good practice

There is an urgent need to develop improved indicators for measuring energy poverty, both at Member State and European levels. In line with the recommendation from other research initiatives, an Energy Poverty Observatory should be established that would help support the development of different indicators, improve current proxy datasets, and hold information on energy poverty research and actions across the EU. This would be to better understand the challenge, and assess effectiveness of strategies to tackle energy poverty. This observatory could also help facilitate best practice between Member States. This recommendation and the method to ensure its fulfilment are described in the conclusions of the chapter of this handbook titled "Definitions and indicators of energy poverty across the EU". A subsequent study is set to be commissioned by the EC to develop a set of metrics for the EU28, and operationalise an observatory.

5. Promote the targeting of energy efficiency measures to address energy poverty

More targeting of energy efficiency measures on low income households should be encouraged. Mechanisms could include the Energy Efficiency Directive mandating a percentage of funding in this area to tackling energy poverty through energy efficiency refurbishments in low income households. The Commission could also ensure it allocates a higher share of EU funds to renovation programmes focused on fuel poor, low-income and vulnerable categories of people. These funds should also be targeted towards Member States in Central and Eastern Europe, and Southern Europe, where the problem is most entrenched.

CONCLUSIONS

This chapter provides an overview of how Member States view issues of vulnerability in energy markets and energy poverty, and the actions put in place to address them. It highlights a quite fragmented European response, both in terms of defining these issues and measures put in place. This is not surprising given the different perspectives on these issues across Member States, the strong position on subsidiarity to date, and the widely differing national circumstances e.g. stage of market liberalisation, types of energy system, building energy efficiency, etc.

The fragmented response suggests a stronger role for the Commission, despite the challenges posed by such different national circumstances.In the preceding section, there are a number of ideas that provide a starting point for discussion across the Commission, and its stakeholders. Without a more comprehensive programme of action, through legislative or other routes, there is a risk that lower income households and other Wvulnerable groups will be further entrenched in situations of energy poverty, and not benefit from broader developments in the European energy markets.

There are three key broad areas of action to be facilitated at the EU level – i) enhancing understanding of the issues through development of improved indicators, and sharing of experiences; ii) greater prescription by the Commission in helping define the issues, and iii) a broader perspective on vulnerability and energy poverty, beyond internal energy markets. Crucially, this review finds there are a range of interesting and effective metrics being used, and measures being undertaken across Member States, and a growing network of researchers helping develop an understanding of the issues. The Commission could play a critical role in bringing this experience together and formulating a comprehensive strategy that fosters effective policy making across all Member States.

APPENDIX 1. CATEGORISATION OF MEMBER STATES' DEFINITIONS OF ENERGY POVERTY

MEMBER STATE	ENERGY / FUEL POVERTY DEFINITION & METRIC	STATUS
OFFICIAL DEFINITIONS		
Cyprus	**Definition:** Energy poverty may relate to the situation of consumers who may be in a difficult position because of their low income as indicated by their tax statements in conjunction with their professional status, marital status and specific health conditions and therefore, are unable to respond to the costs for the reasonable needs of the supply of electricity, as these costs represent a significant proportion of their disposable income. **Metric:** Based on share of income spent on energy.	Official definition transposed as part of Third Energy Package
France	**Definition** according to article 11 of the "Grenelle II" law from 12 July 2010: Is considered in a situation of energy poverty "a person who encounters in his/her accommodation particular difficulties to have enough energy supply to satisfy his/her elementary needs, this being due to the inadequacy of resources or housing conditions." **Metric:** A quantitative threshold is missing.	As a result of no quantitative threshold, the definition is not sufficiently operational.

Ireland	**Definition:** Energy poverty is a situation whereby a household is unable to attain an acceptable level of energy services (including heating, lighting, etc.) in the home due to an inability to meet these requirements at an affordable cost. **Metric:** Spends more than 10% of its disposable income on energy services in the home.	Official national definition
Slovakia	**Definition:** Defined as a condition when average monthly household expenditures for the consumption of electricity, gas and heat, represent a significant share of the average monthly household income. A household can be considered as energy poor if disposable monthly income is lower than the minimum monthly disposable household income threshold. **Metric:** The threshold is published on the website of the Ministry of Labour, Social Affairs and Family of the Slovak Republic, the Regulatory Office for Network Industries and on message boards of labour, social affairs and families, municipalities and municipal authorities.	The threshold is currently a proposal.
UK (England)	**Definition:** A household where i) their income is below the poverty line (taking into account energy costs); and ii) their energy costs are higher than is typical for their household type (DECC, 2013). **Metric:** Low income, high consumption (LIHC). Two criteria include i) fuel costs are above the median level, and ii) residual income net of fuel cost spend is below the official poverty line. This applies in England, while other constituent countries use the 10% threshold metric. *[Note that England continues to report the 10% threshold metric for comparison, which is that 'a fuel poor household is one which needs to spend more than 10% of its income on all fuel use to heat it home to an adequate standard of warmth (21°C in living room, and 18°C in other rooms as recommended by WHO.')]*	Official national definition. Proposed target *to ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency standard of Band C, by 2030* (DECC, 2014b).

UK (Wales)	**Definition / Metric:** Defined as having to spend more than 10% of income (including housing benefit) on all household fuel use to maintain a satisfactory heating regime. Where expenditure on all household fuel exceeds 20 per cent of income, households are defined as being in severe fuel poverty (Welsh Assembly Government, 2010). The definition of a 'satisfactory heating regime' recommended by the World Health Organisation is 23°C in the living room and 18°C in other rooms, to be achieved for 16 hours in every 24 for households with older people or people with disabilities or chronic illness and 21°C in the living room and 18°C in other rooms for a period of nine hours in every 24 (or 16 in 24 over the weekend) for other households.	Official national definition. Target is that as far as reasonably practicable, fuel poverty eradicated amongst vulnerable households by 2010, in social housing by 2012 and by 2018, no-one living in fuel poverty.
UK (Scotland)	**Definition / Metric:** A household where, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use (Scottish Executive, 2002). The definition of a 'satisfactory heating regime' as per for Wales.	Official national definition. Target is that as far as reasonably practicable, fuel poverty will be eradicated by 2016.
UK (Northern Ireland)	**Definition / Metric:** In order to maintain an acceptable level of temperature throughout the home, the occupants would have to spend more than 10% of their income on all household fuel use (DSDNI, 2011). 'Acceptable' level as per WHO 'satisfactory heating regime'	Official national definition.

UNOFFICIAL DEFINITIONS – DEFINITIONS STILL UNDER CONSIDERATION

Austria	**Definition:** Households are considered at risk of energy poverty if their income is below the at-risk-of-poverty threshold and they simultaneously have to spend an above-average percentage of their household income on energy. **Metric:** Proposal to use multiple indicators: household income, housing expenses, energy costs; information about past due bills, disconnections, installations of pre-paid meters, etc.; subjective indicators, such as permanent household financial difficulties.	Unofficial definition under discussion by stakeholders.

Italy	**Definition / metric:** A family is vulnerable when more than 5% of income is spent for electricity and 10% for gas.	Unofficial definition proposed by regulator.
Malta	**Definition:** Inability to achieve a necessary level of energy services in a household. Fuel poverty: mainly linked to inability to achieve the necessary level of fuel use for heating homes (i.e., if the household were to spend on the necessary fuel, then it would fall below the poverty line). **Metric:** Currently only using the EU-SILC indicator for share of population unable to keep the home adequately warm. Proposals to include subjective feedback from consumers through household budgetary surveys and compare energy consumption across sectors.	These are unofficial definitions proposed by NGO.

APPENDIX 2. MEMBER STATES' DEFINITIONS OF VULNERABLE CONSUMERS (AS OF 2013)

MEMBER STATE	CAT.[12]	DEFINITION OF VULNERABLE CONSUMERS[13]
Austria	C	The concept of vulnerable customer is implemented through a series of protection mechanisms for clearly identified groups of people/households according to social security and energy laws.
Belgium	A,B	**Flanders:** Cf. national definition of "sociale maximumprijs". In Flanders, vulnerable customers are those customers that are entitled to get the social tariff. National legislation defines the preconditions to get the social tariff. **Brussels:** The Brussels Region applies the definition of vulnerable customer such as defined in the Directive. The categories recognised by the national Government as vulnerable ones are also recognised in the Brussels Region. The Brussels Region recognises two extra categories of customers as vulnerable: 1) which are recognised as vulnerable customers by local public aid centres and 2) ones that meet certain criteria defined in the regional legislation in terms of revenues and number of persons composing the household and whom are on that basis recognised as vulnerable customers by the Brussels regional regulator. For the two additional categories recognised in the Brussels Region the 'statute' of vulnerable customers is linked to a limitation of power supply and is limited in time and ceases once the customer has paid off his debt to his supplier.
		Federal: The definition of the concept of vulnerable customers is implicitly recognised by the energy law and/or social security system in my country; The energy law/legal framework explicitly states what groups of customers are regarded as "vulnerable" based on personal properties of customers (disability).
Bulgaria	C	Social Assistance Law through Ordinance No. RD-07-5 as of 16 May 2008 for provision of targeted benefits for heating is given once a year to Persons or families whose average monthly income in the last six months is lower or equal to differentiated minimum income; these citizens are eligible for heating benefits according to Art. 10 and 11.[14] From July 2012, vulnerable customers are defined in the Energy Act.*
Croatia	C	In its valid and effective wording, the Energy Act does not define 'vulnerable customer'; for consumers who can be regarded as 'socially disadvantaged', certain measures for their protection and support for their rights are provided for at the level of generally applicable legislation in the domain of social security law.[15]
Cyprus	A,B,C	The definition of vulnerable customers is determined in a Ministerial decree (CEER, 2013). Additional public assistance is provided to recipients to satisfy special needs, including "heating €170 per annum". Recipients include persons with disability and medically confirmed patients treated abroad for a period not exceeding six months; persons with disability studying in an educational institution in Cyprus or abroad (for a period not exceeding by more than one year the normal period of their course) to obtain qualifications that will help them become independent of public assistance; and persons under the care of the director of the Social Welfare Services (SWS) when they become 18 years old and enrol in an educational institution in Cyprus or abroad in order to obtain qualifications that will help them become independent of public assistance.[16]
Czech Republic		There is a legal term "protected customer" such as hospitals and ill people dependant on life-support equipment.
Denmark	C	There are no specific provisions regarding vulnerable consumers in energy law; instead this issue is dealt with in social legislation.* However the principal of universality exists where every citizen has a right to social assistance when affected by a specific event. Various schemes in existence for short and longer-term support to unemployed, social security for the non-working.[17]

Estonia	C	A household customer to whom subsistence benefit has been awarded pursuant to section 22(1) of the Social Welfare Act: A person living alone or a family whose monthly net income, after the deduction of the fixed expenses connected with permanent dwelling calculated under the conditions provided for in sub-sections 22 (5) and (6) of this Act, is below the subsistence level has the right to receive a subsistence benefit. Subsistence level is established based on minimum expenses made on consumption of foodstuffs, clothing, footwear and other goods and services which satisfy the primary needs.[18]
Finland	B,C	In the energy market act there are defined in connection to the disconnection of the electricity. Also in the constitution there is a concept of basic rights and social security legislation defines the target groups.
France	B	Special tariffs are reserved for households with an income below or equal to a threshold of entitlement to supplementary universal health cover. These tariffs are available for both electricity and natural gas consumers. From the end of 2013, these social tariffs were further extended to cover all households with an annual reference fiscal income per unit (revenu fiscal de reference) lower than EUR 2,175. The number of households benefitting from the social tariff is expected to increase from 1.9 million to 4.2 million, equivalent to 8 million people.*
Germany	C	Vulnerable customers eligible for support are in line with the social security system (CEER, 2013). Additional support is provided in terms of consumer protection in line with the Third Energy Package.*
Greece	A,B	Groups of customers defined under the Energy law: (a) The financially weak customers suffering from energy poverty. (b) Customers who themselves or their spouses or persons who live together, rely heavily on continuous and uninterrupted power supply, due to mechanical support. (c) Elderly who are over seventy years old, provided they do not live together with another person who is younger than the above age limit. (d) Customers with serious health problems, especially those with severe physical or mental disability with intellectual disabilities, severe audio-visual or locomotor problems, or with multiple disabilities or chronic illness who cannot manage their contractual relationship with their Supplier. (e) Customers in remote areas, especially those living at the Non Interconnected Islands.
Hungary	A,B,C	Vulnerable customers' shall mean those household customers who require special attention due to their social disposition defined in legal regulation, or some other particular reason, in terms of supplying them with electricity.

Ireland	A	A vulnerable customer is defined in legislation as a household customer who is: a) critically dependent on electrically powered equipment, which shall include but is not limited to life protecting devices, assistive technologies to support independent living and medical equipment, or b) particularly vulnerable to disconnection during winter months for reasons of advanced age or physical, sensory, intellectual or mental health.
Italy	A	Several measures aim to protect customers (vulnerable household customers, utilities, activities relating to 'public service', including hospitals, nursing homes and rest, prisons, schools and other public and private facilities that perform an activity recognised of public service as well as household customers that require electricity-powered life-support equipment with severe health problems). Italian decrees establish the "social bonus" (a social support program) defined by the Government for the benefit of electricity customers whose annual income does not exceed a certain threshold (set up by the law and certified by equivalent economic situation indicator, that takes into account income, assets, the characteristics of a family by number and type). The "social bonus" is a discount (annual amount fixed the same in the free market or in the enhanced protection regime) of the electricity bill each year, dependent upon the use, number of people in the family, and climate zone.
Latvia	D	There is no clear definition of vulnerable consumers yet, but plans exist to introduce several measures to inform and support vulnerable consumers.*
Lithuania	D	The persons to whom according to the procedure established by the Laws of the Republic of Lithuania social support is granted and/or social services are provided can be defined as socially vulnerable customers. The list of socially vulnerable customers and the groups thereof and/or additional social guarantees, related to supply of electricity, which are applied to such customers or their groups, are set by the Government or its authorised institution. Developing the definition (list) of vulnerable consumers is currently under discussion.
Luxembourg	C	All customers are de facto considered as potentially vulnerable in Luxembourg.*
Malta	C	Vulnerable consumers are supported through social policy. Recipients of social security are eligible for support.

Netherlands	A	Legislation states that a household consumer for whom ending the transport or the supply of electricity or gas would result in very serious health risks for the domestic consumer or a member of the same household of the household customer is regarded as vulnerable, and thus disconnection is not permitted, unless a case of fraud has been proved.
Poland	C	The energy law states that vulnerable customer of electricity is a person who is eligible to housing allowance (income support) because the level of its income is lower than a certain degree. That means that the concept of vulnerable customers is based on poverty.
Portugal	C	The concept is defined in the energy sector law and corresponds to that of economically vulnerable customers which correspond to people receiving certain social welfare subsidies (social security system) with some contract limitations (e.g. contracted power). These customers have access to a social tariff.
Romania	A,C	Vulnerable customers are defined as household consumers with low income within the limits laid down in the Ordinance 27/2013.*
Slovakia	D	The concept for the protection of consumers fulfilling conditions of the energy poverty was in preparation in 2013. Act on Energy Industry defines vulnerable household electricity customer as a strongly disabled person and whose vital functions are depending upon the offtake of electricity and uses electricity for heating. The DSO keeps records of vulnerable customers and can disrupt electricity distribution only after previous direct communication of these electricity customers with the DSO.
Slovenia	C	Social support is provided to households through a minimum income to households/individuals without an income or an income below the official level.[19]
Spain	A,B	The concept of vulnerable costumers has only been defined so far for electricity customers. Vulnerable customers should fulfil at least one of the following criteria: a large family or a family where all members are unemployed; be low voltage consumers (less than 1 kV) with contracted demand lower than or equal to 3 kW; or a pensioner older than 60 years with a minimum level pension. Vulnerable customers' electricity tariffs are reduced by means of a "social bonus", which sets their tariffs at the July 2009 level. As of December 2012, 2,544,170 customers were defined as vulnerable.
Sweden	E	Vulnerable customers are defined as persons who permanently lack ability to pay for the electricity or natural gas that is transferred or delivered to them for non-Commercial purposes.
United Kingdom	A,B	Ofgem have defined vulnerability as when a consumer's personal circumstances and characteristics combine with aspects of the market to create situations where he or she is: -significantly less able than a typical consumer to protect or represent his or her interests in the energy market; and/or -significantly more likely than a typical consumer to suffer detriment, or that detriment is likely to be more substantial.

NOTES

1 This chapter is based largely on the INSIGHT_E research report referenced as Pye et al., 2015, which contains more detail.
2 Energy Vulnerability Trends and Patterns in Europe: EVALUATE project policy brief no .1. Retrieved from: *https://energyvulnerability.files.wordpress.com/2014/06/1brief.pdf Accessed: 10-10-2016.*
3 "Energy poverty negatively affects living conditions and health. It has many causes, mostly resulting from a combination of low income and general poverty conditions, inefficient homes and a housing tenure system that fails to encourage energy efficiency. Energy poverty can only be tackled by a combination of measures, mainly in the social field and within the competence of authorities on the national, regional or local levels" (EC, 2015).
4 An earlier review by ERGEG (2009) suggested that the term vulnerable consumers was not widely used, in fact only in eight Member States, namely Belgium, Bulgaria, Great Britain, Greece, Hungary, Ireland, Italy and Slovenia.
5 Country reports can be accessed at *http://insightenergy.org/static_pages/publications#?publication=15*
6 Further information can be found at *http://www.ademe.fr/sites/default/files/assets/documents/rapport-audit-sur-tarifs-sociaux-energie-2013.pdf* Accessed: 12-10-2015.
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12 A) The legal framework explicitly states what groups of customers are regarded as "vulnerable" based on personal properties of customers, e.g. their age, disability, health, etc.
B) The legal framework explicitly states in what situations customers are regarded as "vulnerable" based on non-personal or situational circumstances e.g. unemployment, single parenthood, etc.
C) The definition of the concept of vulnerable customers is implicitly recognised by the energy law and/or social security system in my country;
D) A definition of the concept of vulnerable customers does not exist in my country;
E) Other, please specify.

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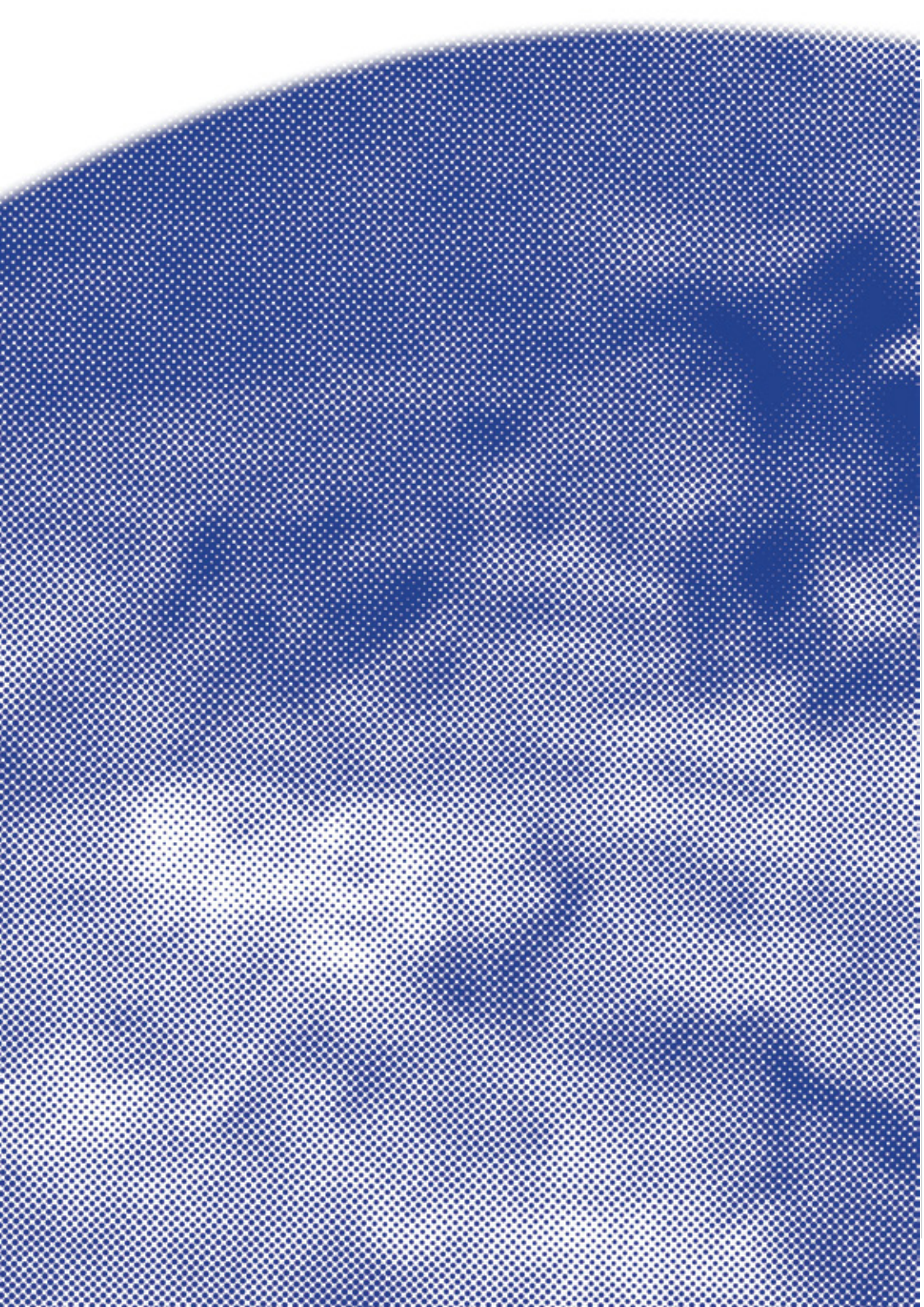

WARM HOMES FOR ALL – TOOLS TO TACKLE THE ENERGY POVERTY CHALLENGE

EDIT LAKATOS
HOUSING EUROPE

INTRODUCTION

This article aims to offer a better understanding of the current financial support mechanisms at an EU level to tackle energy poverty. The increasing number of people living in poor quality dwellings have urged the decision makers to make a step towards further investments. In the period 2014-2020, the opportunities arise from the Structural and Investment Funds, through the Juncker Plan, to bank loans from CEB or National Promotion Banks. Learning from each other should be the first step, and the best practices showcase that investing in energy efficiency is a cost-effective way to combat energy poverty.

Indeed, this is one of the most alarming phenomena of our times, affecting around 11% of Europeans. Despite being considered one of the most developed parts of the world, the European Union is struggling to tackle energy poverty. Although there is no single indicator for energy poverty in the EU, available figures illustrate the increase of energy costs and growing inability for low income households to cope with them.
The data shows how concerning energy poverty is in the Union (UNECE, 2014):

- 87 million people live in poor quality dwellings;
- 42 million face arrears on their utility bills;
- 54 million people cannot keep their home adequately warm;
- 161 million face disproportionate housing expenditure.

On top of that, the number of people with complex housing needs in Europe is increasing, especially in those countries hit hardest by the financial crisis. In Greece, for instance, according to the latest European Parliament survey, 36% of households suffer from energy poverty, which includes the cases where the household has no access to electricity and/or heating at all (ITRE, 2015).

Looking at the situation on renovation, it is already a fact that more than 80% of the EU's existing building stock in the housing sector is highly inefficient and buildings are responsible for 40% of the EU's energy consumption (Cañete, 2016). Those emissions could be cut drastically if we renovated 3% of the building stock every year. Unfortunately, the EU renovation rate is only 1.2% per year (H2020 Work Programme 2016-2017, 2015) and a further problem is that there are no common standards of what constitutes renovation.

In order to achieve the targets and leave no one behind, more effective solutions should put in place to motivate Member States into seeing the energy efficient renovation as an opportunity and not a burden. Finally, the Paris COP21 Agreement should also be key in shaping the EU energy policy-making and strategy to this direction.

The EU funding tools are crucial to contribute to the achievement and to tackle the multifaceted energy poverty challenge characterised by poor energy efficient homes, rising energy prices and low income. Grants and financial instruments under the Structural Funds and other tools, such as Horizon 2020 and EFSI, represent a real financial help to the housing sector to tackle energy poverty. The substantial extension of the funding also highlights an important challenge in terms of the readiness within the Member States.

STRUCTURAL AND INVESTMENT FUNDS (ESIF) IN 2014-2020

1. Previous and current ESIF spending

Comparing the previous and the current ESIF we see that in the current programming period, ESIF is provided with several new opportunities for housing. This is notably the case for activities related to promoting energy efficiency and renewable and potential opportunities to finance housing related activities aimed at increasing social inclusion.

In terms of allocation, a potentially larger budget is available in the new period since the allocation structure has changed. In 2007-2013, the total expenditure for housing related projects was around €2bn and this was focused on the energy refurbishment of housing for low-income families (Lakatos, 2015).

Concerning the current period, it is not possible at this stage of the implementation to have a precise view on how ESIF have been allocated to housing related programmes, however we can already see a significant improvement compared to the last programming period in terms of planned expenditure. In 2014-2020, the foreseen total expenditure of the whole ESIF is €960bn. The Member States will actually focus on two main priorities as far as social housing is concerned:

- Energy efficiency in housing: €6.1bn (this figure combines ERDF and the Cohesion fund for Central and Eastern European countries);
- Investing in social infrastructures (urban regeneration, promoting social inclusion through improved access to social, cultural and recreational services) for the less developed eight EU countries: €626m.

Overall, according to the European Commission (Sefcovic, 2015), the resources for ESIF go beyond the minimum allocations required by the new regulatory framework, approaching almost 50% more than needed. As per the Commission data, around €16-18bn is dedicated to energy efficient solutions in housing, public buildings and industrial buildings. This shows an increase of funds from the last period, in particular in Central and Eastern Europe. As 50% of the EU housing stock is not energy efficient and the energy dependence on imported energy is now 100%, the Commission would like to spend the largest amount on housing (Sefcovic, 2015).

2. How are Member States targeting the elimination of energy poverty?

Several Member States, for example Portugal and Spain, put a great emphasis on combating poverty and 'Sustainable urban development'. Estonia set a target of 15% until 2020 to reduce the rate of people at risk of poverty and to improve welfare and social services (11%) (Lakatos, 2015). Lithuania, Italy and France plan significant housing investments in public infrastructures and multi-family apartment houses to adhere to this priority. In this context Belgium, Luxemburg and Sweden have strong policies, and the latter also links social inclusion and the energy efficient solutions under one of the Operational Programmes (hereinafter OPs): "Promoting the use of high-efficiency co-generation of heat and power" and "Providing support for physical, economic and social regeneration of deprived communities" (ibid., 2015).

The EU support rate per project is expected to be a minimum of 50%, but it can vary from country to country depending on the market and

economic situation, as well as on the region category. For example, in Austria, the EU support rate is expected to be 25% due to significant national sources of support and the high level economic development; however, for example in Hungary, the EU support rate per project can achieve 80% in the case of energy efficiency related projects.

In addition, the OPs became "multi-fund" (DG REGIO, 2015a), meaning that Member States may use financial instruments in relation to all thematic objectives covered by OPs, and for all funds. To give an example of the combination, the ESF and ERDF can be combined to achieve "low-carbon and resource-efficient economy, through the improvement of education and training systems necessary for the adaptation of skills and qualifications, the up-skilling of the labour force, as well as the creation of new jobs in sectors related to the environment and energy" (Housing Europe, 2015). This could be also used for instance to train unemployed tenants. Financial instruments should now be designed on the basis of an ex-ante assessment identifying market failures or sub-optimal investment situations, investment needs, possible private sector participation and the resulting added value of the financial instrument in question.

3. The share of grants and financial instruments

A total of 88% of ESIF consists of grants (for deep renovation and social housing); the remaining 12% is loans. The ESIF finance is coming from both the public (Cohesion Policy) and private sector (banks, long time investors other financial intermediaries). Grants should be used, for instance, to support deep renovations of buildings going beyond minimum energy performance requirements, to help develop innovative technologies or to address social issues exacerbated by the crisis in many regions, such as fuel poverty. According to the Commission, in order to decide if grants or other financial instruments (loans, guarantees and equity) are necessary, the market should initially be analysed on the national and regional level. The allocation situation differs from country to country, reflecting the differences in terms of total volume of funds available, national needs and priorities.

BEST PRACTICES

In the Netherlands and in the UK

Energiesprong has made Net Zero Energy Refurbishments a market reality that is financed by energy cost savings, as a house does not consume more energy than it produces (E=0); plus, it only takes ten days for thermal comfort to increase and comes with a 30-year energy performance warranty from the builder, while energy bills for the residents stay the same (Energiesprong, 2015).

In Nantes, France

No less than 194 dwellings were refurbished by LogiOuest, a French member of Housing Europe, l'Union Social pour l'Habitat (USH). With overall annual energy savings of €59,000 and an upgrade to energy class B, a block of social apartments that housed more than 700 tenants was turned into warmer and more affordable homes within less than three years. The project was carried out within the framework of the Power House Nearly Zero Energy Challenge (Power House Europe, 2012).

HORIZON 2020

Horizon 2020 is the financial instrument implementing the EU Innovation Union objective to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring our economy growth and jobs.

Running from 2014 with a budget of just over €70bn, besides the industry and science, Horizon 2020 is also addressing the housing sector. Through the implemented projects it will:

"Provide €30,956m to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population." (Horizon 2020, 2013)

More specifically, funds are available to support energy efficient buildings, industry and heating and cooling. Current calls for proposals include 'Promoting deep renovation of buildings', 'energy management in buildings', 'Construction skills' and 'Cost reduction of new Nearly Zero-Energy buildings'.

In terms of complementarities with other programmes, €2,7bn of Horizon 2020 (3.5 %) will serve as seed capital for the EFSI to generate additional investments. That money will be used for investment in innovative projects with a higher leverage effect. As an example, Horizon 2020 could be used for projects to support local energy communities financing an installation of local energy production capacities related to social housing providers.

BEST PRACTICES

In Sweden and the Netherlands

A recent Swedish-Dutch project called STORM can give some inspiration to those working in the housing sector. The innovative district heating and cooling network controller project gets nearly €2m from H2020 aimed at boosting energy efficiency at a district level by increasing the use of waste heat and renewable energy sources. The controller will be demonstrated in two sites: Mijnwater at Heerlen in the Netherlands and Växjö in Sweden. The project intends to develop, demonstrate and deploy advanced self-learning controllers for DHC networks (CORDIS, 2015).

In Italy

The LEMON project is led by two social housing associations who are members of Housing Europe Italian member, Federcasa (ACER Reggio Emilia and ACER Parma- in the Emilia Romagna Region). LEMON launched over €15m of energy investments in 622 private and public social housing dwellings to achieve 40% energy savings guaranteed by ESCOs. The envisaged financing structure involves a combination of national and ERDF funds (Housing Europe, 2015b).

EUROPEAN FUND FOR STRATEGIC INVESTMENT (EFSI)

Presented in 2015, the European Fund for Strategic Investments (EFSI), commonly referred to as the 'Investment Plan', is an opportunity to finance quick and cost-effective construction of new accommodation properties and long-term investment schemes. The EIB co-operates with national public banks or other agencies. Up to now, the EFSI has reached 37% of its €315bn target (EIB, 2016a). At least half of it should be allocated by July 2018, while the final deadline is summer 2020.

Recently, a €120m loan has been granted to Investitionsbank des Landes Brandenburg (ILB) for the refurbishment and construction of refugee accommodation in different parts of the federal state. Overall, the project is expected to deliver housing for many of the asylum seekers who will be arriving in Brandenburg, Germany, until 2018 (EIB, 2014).

As another example, in 2015, France was supported by a €400m EIB loan, ensured by local intermediaries such as public and public-privat entities as well as commercial banks. The project's goal is energy efficiency refurbishment in residential buildings and runs until 2019. In more detail, more than 40,000 flats and houses will benefit from energy efficiency increases across France by improving their insulation, as well as renovating the heating and ventilation systems (EIB, 2015).

Beyond the stable, although low, return on investment that social housing provides for investors like the EIB, a key positive element is the stable and regulated governance structures in the housing sector whether it is for renovation or new construction, the assurance of management, as well as the ongoing maintenance of the properties, along with the added value of community outreach. All these elements ensure that EIB funds will be channelled to high quality projects.

1. Doubts about the effectiveness of EFSI in the sector

Investing in new build for social housing is not 'risky' but rather long-term and with low return on investment. The social housing sector needs low-cost capital funding and can generate multiple socio-economic benefits but the small scale of the projects as well as the general economic context in some EU countries, especially in southern Europe, are still on the way to a more extended involvement of the EIB, also through EFSI. While it is clear that the EIB prioritises the maintenance of its AAA rating, what is the EU Investment Bank doing to provide capital to sectors and geographical areas where access to capital through existing channels is problematic?

2. Relation with ESIF

Striving towards economic growth, the EFSI can be considered as part of the Cohesion Policy framework, and complementary to ESIF. ESIF and the Investment Plan are two separate funds, with different pur-

poses. While the Investment Plan focuses on attracting private investors in economically viable projects, the bulk of the ESIF consists of grants. Nevertheless, in practice they can overlap, because the EIB can freely provide loans to support actions which could potentially be financed through structural funds. In terms of the funds' focus, the Commission communication on the Investment Plan sets a target of 20% of the ESIF allocations to low-carbon-economy (DG REGIO, 2015b). At the same time, Cohesion Policy is playing a key role in delivering the Energy Union on the ground, with significant opportunities for sustainable energy.

Structural funds are to be used for regional and local projects contributing to social and economic cohesion. On the contrary, the Investment Plan will not have funds earmarked for certain sectors or regions (European Commission, 2015). However, viability criteria will differ depending on the sector and societal return which will be taken into account in this context. The Investment Plan's aim is to at least double the use of innovative financial instruments (rather than grants) in the ESIF in 2014-2020 (European Commission, 2014).

EUROPEAN ENERGY EFFICIENCY FUND

This €265m fund provides debt and equity instruments to local, regional and (if justified) national public authorities or public or private entities acting on their behalf. The fund contributes with a layered risk/return structure to enhance energy efficiency and foster renewable energy in the form of a targeted private-public partnership. Investments should contribute significantly towards energy savings and the reduction of greenhouse gas emissions to promote the environmentally-friendly use of energy (Energy Efficiency Fund, 2016).

PRIVATE FINANCING FOR ENERGY EFFICIENCY (PF4EE)

This programme is a new instrument under the LIFE programme (a funding instrument for environment and climate action) which co-funds energy efficiency programmes. The programme is an initiative of the EIB and the European Commission which aims to address the limited access to adequate and affordable commercial financing for energy efficiency investments. The €480m instrument is managed by the EIB and funded by LIFE which can provide long-term financing (EIB, 2016b).

PROJECT DEVELOPMENT ASSISTANCE (PDA)

This programme helps public and private project promoters to develop sustainable energy investment projects ranging from €6m to €50m. PDA is structured around three main areas which can relate to housing: energy efficiency, low-carbon technologies and smart cities and communities. Under energy efficiency, research and demonstration activities will focus mainly on buildings, industry, and heating and cooling. Under the focus of buildings, the following calls can be considered: "Supporting accelerated and cost-effective deep renovation of buildings through Public Private Partnership (EeB PPP)" and "Integration of Demand Response in Energy Management Systems while ensuring interoperability through Public Private Partnership (EeB PPP)" (H2020 Work Programme 2016-2017, 2015).

The two other areas in energy efficiency are set in a broader way, targeting affordable, cost-effective and resource-efficient technology solutions to decarbonise the energy system.

ELENA

Lastly, it is important to mention the technical assistance programme called ELENA, managed by the European Investment Bank (application is possible through EIB), which provides grants to help local and regional authorities develop and launch large-scale sustainable energy investments. ELENA covers up to 90% of the technical support costs needed to prepare the investment programme for implementation and financing. This could include feasibility and market studies, programme structuring, energy audits and tendering procedure preparation (ELENA, 2016). The eligible projects include retrofitting or integrating renewable energy in public and private buildings, energy-efficient district heating and cooling networks.

EIB LOAN

The bank contributes to the sector as social and affordable housing is key to integrated urban development, which is an EIB priority. The housing sector is a new market segment for the EIB, which is why the bank encourages project proposals.

The European Investment Bank has been supporting construction and renovation of social housing for many years in several countries such as the UK, Ireland, France, Belgium and the Netherlands. A very ambitious agreement was signed in 2012 which supports The Housing Finance Corporation Ltd (THFC) with €480m EIB loan for retrofitting measures and the construction of highly energy-efficient new homes across the UK. THFC is an independent, specialised organisation that provides loans to regulated housing providers across the UK. The funding from the EIB for this social housing scheme will be complemented by investment from the London Green Fund, which is managed by the bank, and will target retrofitting schemes in the London area.

Further, the EIB recently started investing in new countries as well, such as Malta, Poland, Spain, Portugal and Ireland, and noted that other countries should follow (Muscat, 2016).

Apart from the traditional loan, the new strategic investment loan (EFSI) is also available during this programming period.

CEB LOAN

The Council of Europe Development Bank (CEB) is a multilateral development bank with an exclusively social mandate (CEB, 2016a) and social housing is one of the eligible sectors for its loan. The bank often finances sustainable and affordable housing for vulnerable populations (including large families, the young, those on low-incomes, refugees, etc.) as defined by national authorities that have difficulty in accessing housing, or can only do so under unfavourable conditions.

Concerning the application for funding, the CEB applies its own eligibility criteria such as income, floor area, ownership and residence. Eligible activities involve the construction or refurbishment of housing and the conversion of existing buildings for residential use in order to provide decent and affordable housing.

Eligible projects may target access to property ownership, rented accommodation and associated infrastructure, provided under national or local government assisted schemes or regulated commercial programmes. It is important to know that grant resources can be made available through the CEB's fiduciary accounts in order to subsidise interest rates and/or to finance technical assistance and/or part of the investment costs (CEB, 2016b).

Recent examples include loans supporting Poland and Portugal. In 2016, the bank agreed to support the construction and renovation of affordable rental housing by social housing providers with a €186m loan in Poland. The programme, co-financed by the CEB and the EIB, will enable the construction and renovation of affordable rental housing by social housing providers and municipal corporations. The programme will deliver some 30,000 homes over a timeframe of ten years (CEB, 2016c).

In Portugal, a similar project also started this year, aiming at rehabilitating run-down neighbourhoods and ensuring affordable housing is available. The €15m loan agreement was signed with the Government's Institute for Housing and Urban Rehabilitation. The refurbishment will happen in housing units built more than 30 years ago, located in urban rehabilitation areas and predominantly intended for residential use (CEB, 2016d).

SUPPORT FROM NATIONAL PROMOTION BANKS

Apart from the available support of international banks, the sector can benefit from the financial support of National Promotion Banks. This is the case, for example in Austria, where a new agreement was just signed to establish a housing investment bank. Following a nationwide campaign to promote affordable housing space in Austria, a legislative proposal was submitted by the Federal Ministry of Science, Research and Economy in November 2015 (Lakatos and Dijol, 2016). This proposal contains the establishment of a housing investment bank that takes over an assumption of liabilities against minimal payment by the Austrian Federation amounting to €500m. The bank will provide financial means to non-profit making and commercial developers. With this housing incentive package it is estimated that a total amount of 30,000 housing units will be built and 20,000 jobs will be created by 2020.

As another example, we can take Belgium, where the region Bruxelles-Capitale got a €200m loan for the construction of 500 new homes in Brussels. Public procurement is a real opportunity for any business to provide goods and services to public institutions. Approximately 15% of the national GDP is invested annually. The Brussels housing sector is not left out, both through regional and communal land boards, the CPAS, CITYDEV and the Housing Association of the Brussels-Capital Region (SLRB), a member of Housing Europe. The BGHM announced the project for the creation of 500 new social homes (ibid., 2016).

CONCLUSIONS

Investing in energy efficiency of housing is a clearly beneficial way to combat energy poverty as it has many positive effects not only on growth, but also on social cohesion and environment quality, and helps to save costs in other policy areas as well (Housing Europe, 2015).

However, mobilising the necessary funding and channelling the investment remains a challenge to projects. Several EU communications highlight that we would need to invest at least €100bn per year for energy efficiency, but the reality is that we have only half that amount of money available.

For a smart use of the funds, we need a better understanding of the project management and financial support. We need to ensure that the renovation of housing will be among the eligible projects. Indeed, an obstacle is the long term payback time on investment, reducing the interest of private investors.

Of course, the EU should, and could do more when investing in energy efficiency in buildings. Investing more in cost-effective renovation of buildings would significantly ease not only the issue of energy dependence and energy poverty, but help improve the living circumstances of its citizens, as well as creating jobs. In fact, the added value of the aforementioned new projects and practices towards this direction is clear. Of course, the combination of Cohesion Policy funds with other financing will require learning and creative thinking. Together with the contribution of EU Regional and Cohesion Policy and effective capacity building exercises, housing associations at national and regional levels will be encouraged to get closer to the policy objectives.

However, the added value of the Cohesion Policy lies in the integrated approach to local development. Social inclusion should also be considered when looking at the different regional priorities. Social housing is a great example of social infrastructure that needs to be supported by the EU due to its contribution to social cohesion and sustainable development.

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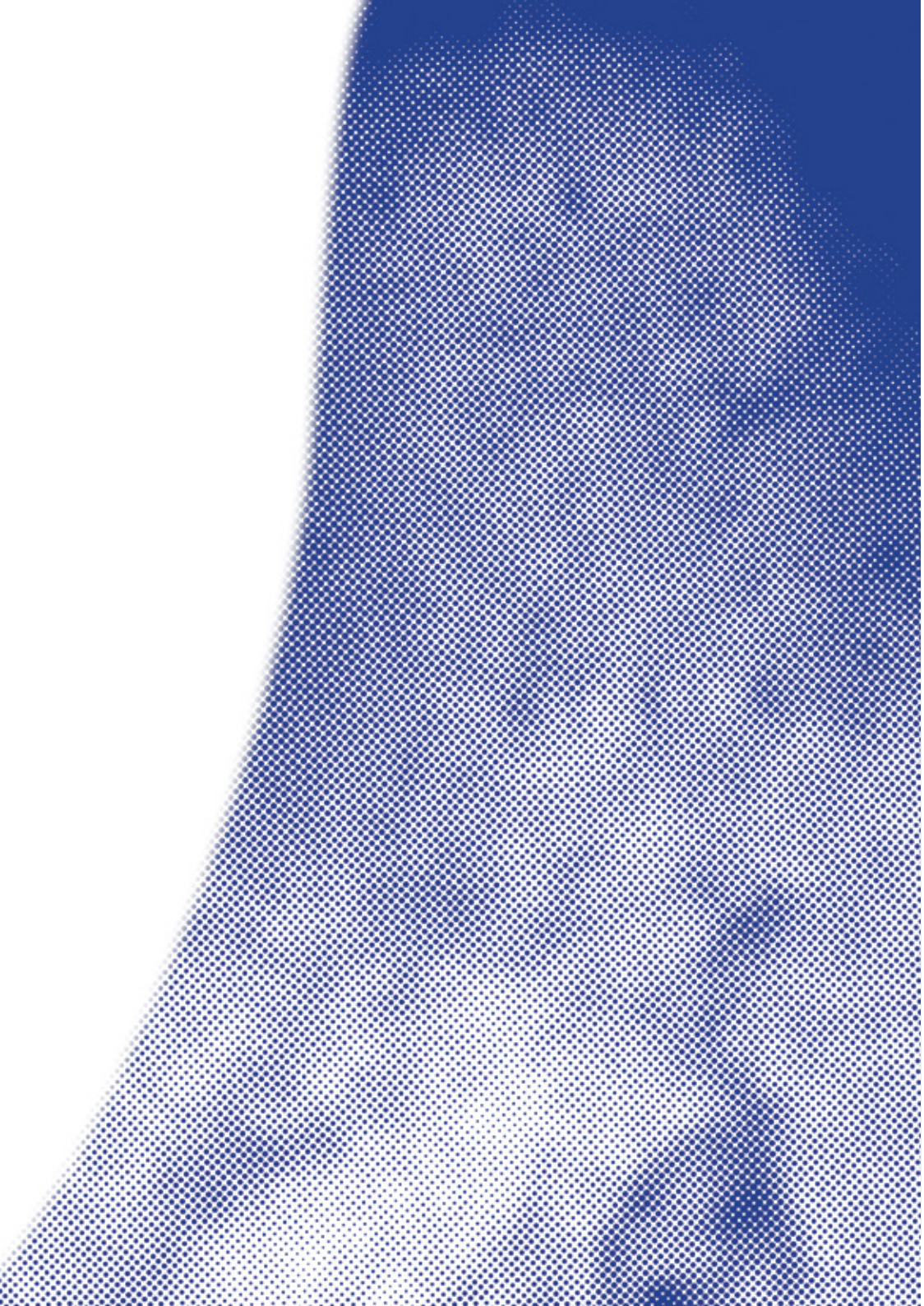

HOW TO TACKLE ENERGY POVERTY – GOOD PRACTICES AT A LOCAL LEVEL

ANNA BAJOMI

INTRODUCTION

This chapter focuses on the view that local interventions, if they are well planned, can offer long-term solutions for households dealing with energy poverty. By presenting good practices that effectively decrease energy poverty, we would like to provide inspiration for decision makers and practitioners. The following pages are based on the collection of projects which aim to tackle energy poverty by using diverse and suitable responses - delivered by different actors - to the multiple causes of the problem.

The cases were implemented in different regions of Europe, so they cover both diverse climatic and political environments and situations. The described cases include: EU-funded international co-operations managed by organisations, programmes that were part of national anti-energy-poverty schemes and projects managed by NGOs.

We provide examples for four main types of interventions:

1. Physical interventions that improve the energy performance of the housing stock;
2. Soft and/or small scale interventions that offer energy advice and low-cost energy-efficiency measures, with advocacy programs for vulnerable consumers also presented;
3. Subsidies for vulnerable consumers;
4. Bottom-up interventions of NGOs offering complex solutions for energy poverty and ensuring to actively involve the affected individuals themselves.

Each sub-chapter briefly summarises the main characteristics of each intervention, with one or more case-studies being presented in each section. Lessons learnt from the projects are also listed, with the aim to help future project managers have even better designed projects. In its closing statements this chapter suggests a set of recommendations for optimal project planning.

Here, we would like to thank all the organisations who provided their case studies, especially the European Antipoverty Network, which collected cases from its members.[1]

ENERGY EFFICIENT RENOVATIONS

Physical interventions on the housing block, from deep energy-efficient retrofits to partial interventions, such as the application of renewable energy or modern heating systems, have a very effective role to play in reducing energy poverty by improving the energy performance and the comfort of the housing stocks. Indeed, general national and/or EU schemes do exist in the majority of the EU countries for financing such projects. However, subsidies may only partially cover the costs and can usually be only transferred once work is completed, with administrative work and technical capacities needed throughout the application and planning. Such factors can result in vulnerable groups having no access to funding, which is why regional or local programmes were established to direct a higher level of funds to struggling households.

CASE STUDY 1: WARM UP NORTH

The 'Warm Up North' (WUN) project began as a pioneering initiative to implement a large scale housing retrofit scheme, taking advantage of the UK Government's Green Deal and ECO proposals under The Energy Act 2011. WUN is a public-private partnership of nine local authorities in the North East of England (UK) and British Gas (the procured delivery partner).

"In 2015 the UK Government announced (…) no further funding to the Green Deal Finance Company so the Green Deal scheme to insulate homes was effectively axed and closed with immediate effect" (Warm Up North). Even though this had a serious effect on the achievement of the WUN project's primary goals, as of July 2015, more than 4,000 homes with fuel poor residents have had new boiler systems installed and seen improvements, 25,000 tonnes of CO_2 is saved annually and €21m has been invested. The presence of a strong partnership with such a delivery partner and the flexible contracting have been major advantages to the region and this is likely to continue as the WUN project is in contract with British Gas for at least a further three years (June 2018) with the option to extend beyond to June 2021. Additionally, in July 2015, WUN was successful with a competitive bid to DECC for its 'Central Heating Fund' designed to deliver first time central heating systems to fuel poor households. (Warm Up North)

CASE STUDY 2: RESIDENTIAL ENERGY EFFICIENCY FOR LOW-INCOME HOUSEHOLDS (REELIH)

REELIH is a five-year initiative launched in 2012 by Habitat for Humanity International (HFHI). Regionally, REELIH works to improve the environment for residential energy efficiency investments across Eastern Europe and the Commonwealth of Independent States (CIS). Nationally, REELIH works in Armenia and Bosnia and Herzegovina to develop and test replicable financial models to facilitate these investments.

REELIH forges partnerships between a wide range of stakeholders, including homeowners' associations, governments and financial institutions. Through pilot projects, REELIH demonstrates why and how all these actors should work together to retrofit apartment buildings for energy efficiency. The project also stimulates the development of financial services and products for low-income households in markets where the renovation of residential units is considered to be nearly impossible. REELIH is promoting viable and sustainable financial models, such as loan products, rebate schemes, and guarantee funds which will outlast this project.

Results: To date, REELIH has completed retrofits in four buildings in Bosnia, and eight in Armenia, directly benefiting over 2,300 people with up to 50% in energy savings. Results from these pilot projects fuel advocacy activities to influence public policy and the energy efficiency sector.
Costs: $1.5m from USAID for five years. Habitat is shouldering a cost share of over $500,000 and has already leveraged around $100,000 of private and public capital from private financial institutions and governments (REELIH).

CASE STUDY 3: SUPPORTING ENERGY EFFICIENCY IN SAINT-JOSSE, BRUSSELS

The project Guichet Primes promotes the renovation of private buildings (predominantly apartments) through subsidies or loans with low rates (using regional and municipal public aids) in order to allow low income families to improve their comfort and the energy performance of their homes.

The main elements of the project are:
To motivate the locals to renovate their properties;
To inform local citizens about public aids available for building renovations;
To assist the candidates, for no fee and in a personal and friendly manner, throughout the renovation process, from project conception until the payments of the subsidies;
To establish a municipal service of personal support in the renovation sector;
To introduce attractive municipal subsidies (complementing the already existing regional ones);
To introduce pre-payment of subsidies at the municipal level.

Costs: The project's budget for three years (2015-2017) is €800,000 (to which regional subsidies given to the citizens need to be added. Contribution of the Bruxelles-Capitale region: €400,000.

Results: The Guichet Primes was consulted 460 times throughout the 15 months, with an average of 4.3 interventions per property (out of 2,000 interventions) with 84 properties affected so far. A total of 332 regional and municipal subsidies were given at a cost of €395,000 (of which €170,000 were municipal subsidies).

Lessons learnt from previous projects and recommendations

- National, regional and local energy efficiency grants have to be available for energy poor households, with pre-paid subsidies, interest-free loans, advice for grant-applicants all contributing to successful outcomes. Such programmes should fit in comprehensive anti-energy poverty strategies.

- When retrofitting housing blocks the lock-in effect has been avoided: deep retrofit is the most recoverable in the long term. Partial retrofit means that the household cannot benefit from the full cost reduction, whilst further retrofit and expenses will be needed in the future. These can easily lock-in the low income household in a non-sufficient situation.

- Policy environments can change so that external financial resources can be restricted or conditions altered. It is necessary to be adaptive, and flexibility (e.g. in the wording of tender documents that allow changes in the direction of delivery) has to be built into the project to "deliver energy efficiency measures at large scale through other avenues". (Warm Up North, 2016)

When installing new systems in an apartment (such as cooling, heating, airing or smart metering devices) owners or tenants should receive training in how to use them in the most efficient way.

SOFT PROJECTS PROVIDING TRAINING, INFORMATION AND ADVOCACY

Energy advice projects aim is to achieve savings on energy bills through visiting energy poor households. Trained advisers will visit the household and, after evaluating the house or apartment's energy situation together with the owner/tenant, the adviser will offer them low cost devices which help to reduce energy usage and personalised advice on changing energy use patterns or on the usage of smart metering tools.

CASE STUDY 4: PROJECT ACHIEVE

Project ACHIEVE's goals in five European countries were:

To understand vulnerable consumers' energy consumption, bills and habits, and to check their appliances with a set of reporting/analysing tools;
To distribute and install a set of free energy and water saving devices, and give advice to the households on how to implement further practical measures for saving energy;
To analyse which long-term solutions can be brought in to improve the households' situation, by linking local organisations into a concerted local action plan.

Results:
42 people participated in the 50-hour energy adviser training (89 students and 49 unemployed people).
1,920 households were visited, and an average of €44 of various free energy-

and water-saving devices were distributed in each one. One household was visited twice and each visit lasted on average 60-90 minutes.
Savings generated: €150 and 320kg of CO_2 per year and per household.

Costs: €1,467,611. Main elements: staff costs (of which 50% went on home visits) purchase of free devices given to the household, travel costs for visits, and various tasks subcontracted (evaluation activities and organisation of events, translation of documents, etc.) The project was financed by the Intelligent Energy for Europe (67%) and by the contribution of partners (37%) (ACHIEVE).

Energy advisers can be social workers, long-term unemployed people or vocational school students and households are visited two or three times. Energy savings vary from country to country, and from project to project, but are between €35 and €150 per year/household. In Germany, Stromspar-Check Energy Advices project (Caritas Germany) not only saved money for the households, but public institutions saved €246 per home due to the smaller amount of energy bill subsidies for the unemployed. The value of distributed small devices is generally less than €50. The German experience shows that if unemployed people are trained to be advisers, they are very likely to find a job before the closure of the projects or go back into other training. Another benefit of such projects is that co-operation of local/regional stakeholders is developed, and also between sectors which did not have any connection before (such as energy providers and social workers) and municipalities' local networks with stakeholders (NGOs, social services, energy providers, citizens) also become stronger.

Lessons learnt throughout completed projects:

Training of advisers may have to be repeated if unemployed/volunteer advisers get job offers (ACHIEVE). The long-term unemployed might be more easily accepted by the households as they may share a similar history, and therefore this could help with trust issues, training should put a strong emphasis on communication and social skills next to technical knowledge;

"If energy checks are done on a large scale (e.g. country-wide), it is important that structural/legal solutions are found regarding the ability to share and use the contact data (e.g. address lists) of the target group, in respect of the privacy regulation. These structural/legal solutions are a necessary condition to fully use and benefit from the efforts that are made on the local level to build out strong local networks." (ACHIEVE)
Data-protection is also important when using energy companies' data, such as arrears or when government entities are working with tenants' private data. "Government entities simply cannot share private data of vulnerable households with third parties (…) Any data collated was only presented in aggregate with third parties in order to ensure no private data is recognizable." (SMART- UP)

The Offer of energy saving devices and advice together is attractive and appreciated, although a personalised approach is crucial for both elements.

The risk of delays in public policy delivery is always present and may lead to the adoption of mitigating strategies (SMART-UP).
In conclusion, energy advice projects can easily bring relief for energy poor households by reducing their energy bills in a sustainable way through training and low-cost devices. Local networks also get stronger, and energy poverty can be put on the policy agenda.

In the cases when the energy poor household is facing severe financial issues, Energy Advocacy can help people to get out of debt. Energy advocacy programmes usually focus on the most vulnerable groups in society and offer help and solutions where general energy advice might be useful, but does not provide comprehensive help.

CASE STUDY 5: ENERGY ADVOCACY RENFREWSHIRE

The team at Energy Advocacy Renfrewshire offers face to face support to resolve the complex energy issues of the most vulnerable, socially excluded individuals, which are not addressed in national service provision, such as debts, disputes with suppliers, meter issues and applications for Warmer Homes Scotland. It also offers energy issue resolution functions as a gateway to wider support services. The team receives referrals through partner service providers (a cross referral mechanism has been developed with medical services, among others) but can be contacted directly by individuals.

Results: in 12 months 998 households were visited. Savings totalled £252,654 (361,333 kg CO_2) of savings: £127,757 of annual/ongoing savings for households and £124,897 capital savings through energy debt being written off and capital investments in energy improvements. The team of advocates is engaging with the most vulnerable and supporting children through better childhoods to better futures, as well as mitigating stress factors for those with poor mental health.

Costs: An expenditure of £124,800 on staff (four advocates + one manager) and transport (100% funded by Renfrewshire Council) (Energy Advocacy Renfrewshire).

Lessons learnt:
As in the case of many social services, "funding is the biggest challenge and remains ongoing" for the team at Energy Advocacy Renfrewshire, but for now, they secured the funding required. Integration of such programmes "into national and local service provision is important but has to be designed at a local level to most ably fit the local issues" (Energy Advocacy Renfrewshire).

SUBSIDIES FOR VULNERABLE CONSUMERS

Financial support for low income families such as social tariffs, subsidies or benefits, reveal that in the short-term bill payments can create a burden. Generally, such subsidies are not well targeted, due to the lack of definition and data-collection of energy poverty and the large scale of such programmes. Also such financial transfers can create a long-term burden on the national budget without offering sustainable solutions for energy poor households. However, well-targeted subsidies do exist, generally at a local level, which provide financial help for households facing the risk of disconnection or loss of housing due to the accumulated debts. Such well-designed programmes not only reduce family debt, but also prevent more severe social situations, especially when social work is also provided.

CASE STUDY 6: SUPPORT TO FAMILIES AT RISK OF SOCIAL EXCLUSION BY THE REGIONAL AND LOCAL AUTHORITIES OF LA RIOJA, SPAIN

"La Rioja is an autonomous community and a province in Spain, located in the north of the Iberian Peninsula, and has an estimated population of 322,415 inhabitants. EAPN La Rioja has been very involved in working with the regional government in creating measures to tackle energy poverty. This process finally succeeded in the Regional Act 6/2014 of 30 May, for awarding grants to local organisations in order to avoid cutting the supply of electricity and gas to families at risk of social exclusion.

Gas: maximum €100 monthly bill and €300/consumer/year. With dependent children: €250 – 350;

Electricity: maximum €50/monthly bill and €150/consumer/year. With dependent children: €100 - 200.

These transfers go to those households who still hold a contract for the supply of electricity or gas, and have an outstanding debt due to be repaid, providing any household member has a non-contributory pension (65 years-old and over) and/or any household member receives minimum income or similar resources from the Social Security.

Since 2014 onwards, the city of Logroño (Resolution No. 941 of June 2, 2014), grants subsidies to local organisations to avoid cutting the supply of electricity and gas to families at risk of social exclusion. In 2016, the amounts are the following:

Gas: maximum €500/consumer/year. With dependent children: €600
Electricity: between €250 – €340/consumer/ year." (EAPN Spain)

Bottom-up projects offering a mixture of soft and hard elements

Bottom-up projects in the field of housing and energy poverty bring innovative solutions that can directly respond to the specific problems of the local communities. Projects tackling energy poverty, especially those which include retrofitting elements, can bring better results and tend to be more sustainable if they are offering a range of soft interventions such as community development and energy advice etc. Bottom-up projects also help raise awareness of energy poverty on the local and national policy agenda where it is not yet present, and move forward public actors to co-operate and offer solutions for broader groups of citizens, based on already delivered, successful local projects.

CASE STUDY 7: SOCIAL HOUSING RECONSTRUCTION CAMP

The Social Housing Reconstruction Camp aimed to provide help for tenants living in run-down social housing, who have fallen into a debt spiral, and to change the policy and practice of social housing management in Hungary. The concept proposed the renovation of the households by the indebted tenants. The increase in the value of the buildings brought by the renovations was to be credited to the tenants, thus reducing their arrears of rent. The project was carried out with the co-operation of volunteers and local tenants, based on an agreement with local government. The energy-efficient renovation decreased the living costs in the long term.

Results: In 2010, 52 local residents and more than 100 volunteers participated. In 2012, 31 local residents were able to reduce their debt and 38 volunteers were involved from all over the country. As a result of this work, the energy performance of 33 people's homes was improved. Thanks to the media presence and the involvement of many volunteers, the issue of social housing became visible and important.

Cost and funding: Camp in 2010: €11,000 from Norway Grant and private donations, in-kind corporate donations and additional construction works financed by the local government. Arrears were reduced by HUF 1.6 million (more than €5,000). HUF 5,600 (€18 - approximately the daily wage of an unskilled worker) was written-off from the residents' rent arrears for a day's work.

Camp in 2012: $22,000 funding from Open Society. Private donations collected especially for the insulation of additional houses: (HUF 675,000, approximately €2,100). This time the local government's management company took a higher share in the renovation costs. Rent arrears were reduced by HUF 1.33m (approximately €4,200) (Social Housing Reconstruction Camp).

CASE STUDY 8: FROM SHACKS TO HOMES

In Budapest, Hungary, homeless people are normally not entitled to city rentals. To strive for change, the 'From Streets to Homes!' Association provides the possibility for homeless families to move from self-built shacks to city rentals. These rundown rentals, which were previously empty, are renovated by volunteers and the future tenants.

The project was evolved as a solution to a crisis: in a post-industrial reforested area called Terebes in the tenth district of Budapest, numerous homeless families built shacks. One small part of the area was going to be involved in local road-building so these shacks were to be demolished. The affected homeless people and families had lived there for between five and 15 years. The negotiations, initiated with the city by the activists of the "City for All!" group led to the formulation of an association, and the swift renovation of the flats. The shacks in Terebes had no electricity or running water, and people used batteries and mobile wood-heating devices. In the new homes, pre-pay electric boxes are provided as well as pre-pay gas and wood-heating possibility. Buildings also got insulation, so they gained a better energy-performance.

Results: Since 2012 14 households (33 people) now have homes in safe rentals. Ten flats were renovated with the help of more than 100 volunteers. Various other forms of help is provided for homeless and housing-poverty affected people.

The project creates savings for the homeless care system since the homeless normative won't be paid by the city. Previously, the city paid for maintenance of the vacant flats, now the tenants are paying for it (which is less than it was due to the renovations, especially the insulation). Also, long term prejudices against homeless people can be fought on a local and national level.

Costs: an average of HUF 750,000 per flat. The implementation of works is based on voluntary labour. Since 2015 two part time social workers have been employed to work for the benefit of the clients, their wages are HUF 100,000 HUF per month. The first grant, which the Association has received so far, provides the salary of one social worker for ten months from September 2016. Funding is mostly based on crowd funding campaigns and important donations from companies and private donors. In-kind donations are also incoming as construction materials or as donations for the tenants (From shacks to homes).

Lessons learnt

The difficulties have to be taken into consideration regarding bottom-up projects. In the case of Hungary, because of their counter-interest, it is hard to involve local governments, especially with financial contribution in such projects, even though they are key stakeholders. Funding of such

projects may be difficult, especially at the beginning. When working with extremely vulnerable people it is highly recommended to involve professional social workers. Additionally, bottom-up projects, like the ones presented in this chapter, can only provide local solutions without a supportive and comprehensive national housing strategy. A focus is needed to reconcile the financial interests of local governments in social housing and the social aspects toward low-income groups, and to solve the issues of the housing crises from the ground up (Social Housing Reconstruction Camp).

CONCLUSION AND RECOMMENDATIONS

Analyse the situation. Who are the energy poor households you want to offer solutions to? What are their exact problems? What local and structural causes are lying behind their situation? Look up available databases (national, regional, local statistics, data from energy providers, social services, etc.).

Put your project in wider context. Be familiar with the current place of energy poverty in national and regional policies. To understand the wider framework of energy policies is also important: the funding system of energy efficient retrofit, renewable energies, energy prices subsidies, etc.
Build strong partnerships. Involving all sectors related to the causes and solutions of energy poverty provides a strong basis for the project-management. Energy providers, social workers, construction industry, NGOs and governmental bodies, experts and vulnerable households affected by energy poverty are all stakeholders whose participation (depending on the profile of the projects) is vital for a successful project.

Fund! Look for EU or national funds available for energy efficiency, social innovations and read the article in our handbook about EU funding. Providing funding locally to complement wider programmes and making them available for energy poor households can save money in the long term (on other social and health services). Some market solutions can also be available, such as ESCO funding for renovations or sponsorships of building and energy companies. There are many instances when energy companies are also motivated to educate clients or make dwellings more efficient in order to have more "regular" payers.

Mix interventions but choose wisely. When the main interventions are chosen, it is always useful to consider, especially in the case of retrofitting projects, what other elements can be used to complete the projects. Set up well-defined aims and measure your impact. Data is a necessity from the very beginning of all projects; to assess the state of the housing stock and to identify the target group. If goals are well defined (e.g. level of energy savings, etc.) and then are evaluated, the success of the project can be proved and stakeholders can be satisfied.

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The European Antipoverty Network is the largest antipoverty network in the EU, dedicated to the fight against poverty and exclusion. It is a membership-based organization, with 31 national networks (in all EU Member States except Slovenia) and 16 European Thematic Networks, committed to the active participation of people with direct experience of poverty. EAPN grew out of the EU Poverty Programmes and has become a key partner in EU policy processes, for example, the Social Open Method of Coordination and currently the Europe 2020 Strategy and the European Semester. EAPN's work on energy poverty has included joint campaigns with the European Parliament and other stakeholders on the Energy Directives, mainstreaming energy poverty through the EU processes, including coordinating a workshop with DG Energy in the Annual Convention of the European Platform against Poverty (2014) and joint practical projects with members through national and EU funds.

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Nobody should be choosing between food and fuel during wintertime or feeling cold in their own living room, yet in 2016 this is the case in many households across the EU. Energy poverty hits the most vulnerable, excludes them from integrating into society, takes away the opportunity from young people to reach up to their potential and cost lives that otherwise could be saved. We are constantly in need of informative studies to plan, to develop and to act. The handbook you are holding in your hand proposes to fill a part of this gap by discovering several aspects of energy poverty.

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