

FUEL POVERTY

1991 – 2012

Commemorating 21 years of action, policy and research



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Contents

Foreword by Dr Nick Eyre	4
Introduction by Christine Liddell	5
1991 to 2012: Personal Recollections Brenda Boardman.	6
Section 1: What is fuel poverty?	7
1.1 Coal fires, fresh air and the hardy British: A historical view of domestic energy efficiency and thermal comfort in Britain - Janet Rudge	7
1.2 Health and thermal comfort: From WHO guidance to housing strategies - David Ormandy and Véronique Ezratty	8
1.3. Measuring and monitoring fuel poverty in the UK: The 10% threshold - Christine Liddell, Chris Morris, Paul McKenzie & Gordon Rae	9
1.4. Objective and subjective measures of fuel poverty - Catherine Waddams Price, Karl Brazier and Wenjia Wang	10
1.5. Definitions of fuel poverty: Implications for policy - Richard Moore	11
Section 2. Living with fuel poverty	13
2.1. Coping with low incomes and cold homes - Will Anderson, Vicki White, Andrea Finney	13
2.2. Experiencing fuel poverty: Coping strategies of low-income households in Vienna, Austria - Karl-Michael Brunner, Markus Spitzer, Anja Christanell	14
2.3. Trapped in the heat: A post-communist type of fuel poverty - Sergio Tirado Herrero and Diana Ürge-Vorsatz	15

Section 3. Why tackle fuel poverty? 17

3.1. Fuel poverty as injustice: Integrating distribution, recognition and procedure in the struggle for affordable warmth - Gordon Walker and Rosie Day 17

3.2. Psychosocial routes from housing investment to health: Evidence from England's home energy efficiency scheme - Jan Gilbertson, Michael Grimsley, Geoff Green & the Warm Front Study Group 18

3.3. Tackling cold housing and fuel poverty in New Zealand: A review of policies, research and health impacts - Philippa Howden-Chapman, Helen Viggers, Ralph Chapman, Kimberley O'Sullivan, Lucy Telfar Barnard and Bob Lloyd 19

Section 4: How is fuel poverty being tackled? 21

4.1. Building synergies between climate change mitigation and energy poverty alleviation - Diana Ürge-Vorsatz and Sergio Tirado Herrero 21

4.2. Energy poverty policies in the EU: A critical perspective - Stefan Bouzarovski, Saska Petrova and Robert Sarlamanov 22

4.3. Can the Green Deal be fair too? Exploring new possibilities for alleviating fuel poverty - Pedro Guertler 23

4.4. From targeting to implementation: The role of identification of fuel poor households - Ute Dubois 24

4.5. Metering: EU Policy and implications for fuel poor households - Sarah Darby 25

Concluding Remarks – Brenda Boardman 27

Afterword by William Baker 29

About the postgraduate authors of this booklet 31

Foreword by Dr Nick Eyre

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I am delighted that Christine Liddell has asked me to provide a foreword to this brochure celebrating 21 years of fuel poverty research. On behalf of all the contributors, I would like to thank her for the huge effort she has put into it bringing together such an excellent Special Issue.

I suspect many younger readers will be surprised to learn that fuel poverty has only been a “recognised” research topic for such a short period of time. Of course, the costs of keeping warm, and the impacts of not being able to, have been issues for as long as humans have inhabited the colder parts of our planet. But our understanding of how those issues play out in the modern world has been transformed since the publication of Brenda Boardman’s seminal book in 1991.

As the following contributions make clear, fuel poverty now attracts serious attention from researchers in many disciplines, as well as policymakers in housing, energy and social policy. It has escaped being seen as a ‘UK problem’ to gain recognition as a major issue in Europe and around the world. And 21 years of research and campaigning have had an impact. In most developed countries, the energy standards of new buildings should ensure affordable warmth for their occupants; and some big steps forward have been made in refurbishment.

Yet in many countries the number of people living in fuel poverty is rising. Fuel prices will continue to rise as we deploy the energy supply technologies needed to address climate change. And, sadly, progress in addressing income and wealth inequalities seems to be off the political agenda. So Brenda Boardman’s key insight, that home energy efficiency is critical, remains as true as ever. Within that context, much will continue to change. For example in many places, climate change will generate new challenges for keeping cool; new generations will have new energy service needs; and policy and programme design will need to adapt to the pressures on public finances. So fuel poverty research agendas will continue to change, but the need for such research will be as great as ever.

Introduction by Christine Liddell

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In order to provide safe and healthy shelter, homes need to be kept at a steady and comfortable temperature. People in fuel poverty are unable to afford what it would cost them to attain this. As a consequence, many of them live in homes that fail to meet WHO criteria for decent living standards. These are people who experience fuel poverty.

Brenda Boardman published the first book on fuel poverty in 1991, just over 21 years ago. Although one or two social scientists had used the term before her, Boardman's book, entitled *Fuel Poverty*, is a masterclass. Without it, the concept might have remained little more than a fond interest shared by a few demographers. Because of it, and the legacy which grew from it, the book lies in the foundations of housing and domestic energy policies worldwide.

A Special Issue of the journal *Energy Policy* was published in the winter of 2012, commemorating the book and the 21 years of research into fuel poverty that arose from it. This booklet provides a short summary of the 17 specially commissioned papers that appeared in the commemorative issue.

As with the winter 2012 Special Issue, this summary booklet begins with some personal reflections from Boardman herself. Her lucid account traces the evolution of fuel poverty research and action, from a time when her earliest writings were filed in libraries alongside books about fireplaces, to a time when the concept of fuel poverty has attained worldwide recognition.

Section 1 starts with a review of the history of fuel poverty, focusing on the UK. The British Isles have been at the epicentre of fuel poverty action and research so far, largely because of the combination of a cold and wet climate and poor housing quality. As many papers in the Special Issue make clear, the epicentre is likely to change in the foreseeable future. Sadly, this will not be as a result of fuel poverty having been effectively tackled in the UK, but rather as a result of fuel poverty in many other regions of Europe, particularly in Eastern Europe, having deepened under post-Communist governments.

Section 2 offers new insights into the wide variety of impacts fuel poverty has on people's ways of life and wellbeing. People's real choices, in terms of finding their own solutions to fuel poverty, are usually already long exhausted. Evenings spent in the meagre light of a TV screen, and winter nights increasingly given over to early nights in bed, are often the only solutions left open.

Section 3 provides a multi-dimensional perspective on the many good reasons that fuel poverty merits investment to find long-lasting solutions. The issue is more than a matter of millions of cold and damp homes – fuel poverty embraces issues of environmental and social justice, health and wellbeing, and the overall quality of life that governments are able to provide for their citizens.

Section 4 illustrates the diversity of solutions to fuel poverty that are being pursued in Europe, with technological synergies becoming increasingly more abundant. Smart meters, innovations for tackling climate change, as well as partnerships between government and home-owners are all making inroads into finding new solutions.

Looking back at the Special Issue of winter 2012, it aimed to document and better understand the past. It concluded that the evidence base for tackling fuel poverty is becoming difficult to ignore. Even more positively, the knowledge and skills needed to solve energy inefficiencies are now sufficiently available to us. Over the past 21 years, fuel poverty has been on slow burn; this has given time to comprehensively understand how fuel poverty can be measured, monitored, tackled, and prevented. The legacy of *Fuel Poverty* (1991) is that we have come of age, equipped to deliver solutions. They will not be simple or cheap, but – as these 17 chapters illustrate - they will be expertly informed.

1991 to 2012: Personal Recollections Brenda Boardman.

Environmental Change Institute, University of Oxford

In the summer of 2012, a morning of conversation was recorded with Brenda Boardman (BB). What follows is a summary of the transcription. In the Special Issue, the full transcription is presented, under the title "The Missed Exam". The reason for this title becomes apparent here. BB first worked on housing at the Society for Cooperative Dwellings (SCD) between 1973 and 1976. This cooperative helped the so-called *young and mobile* to develop shared housing, often 10 people to a house. During that time, she started an Open University (OU) degree, by which time she was in her '30's. She took a module in Technology at the start, and thrived on it. Technology courses at the Open University included energy very early on. Hence BB discovered housing through work, and energy through the Open University. She struggled to choose between them on graduating, but then realised that there was no need to. BB started her doctorate in 1983 at the University of Sussex, and her thesis covered the full breadth of fuel poverty. It was conceived as a book from the start.

Her social conscience seems to her more difficult to provide a history for. It wasn't learned as a child at home, but she travelled widely across the world as a young woman, leaving the UK the daughter of conservative parents, and returning a socialist: "I had just met so many lovely people, and just liked the way so many people lived their lives. I couldn't continue to be afraid of them, I couldn't continue to be suspicious of them. So if you like, it was that travelling experience that gave me a social conscience. And then I brought that together with the housing and the energy efficiency to move into fuel poverty. The other possible factor is that I hate being cold."

During her academic studies, BB was also involved in the National Right to Fuel Campaign, as a member from 1984 and Chair from 1987 to 1991. She has a strong campaigning background, and believes that the combination of being an academic and a campaigner is fundamental. Academia allows you to use facts properly, and campaigning keeps you grounded and feisty. Her move to the Environmental Change Institute at Oxford came at a time when the Institute was being set up. It has suited her well, having always been a grounded Institute interested in applied issues. On starting at ECI, she switched to working on electrical appliances and did very little on fuel poverty for some considerable time, with the exception of *The 40% House* and *Home Truths*. She returned more fully with her 2010 book, *Fixing Fuel Poverty*. She recalls realising during the writing of it just how inadequate policy had been for so long. She considers that her boundaries are continuing to flow outwards, which was reflected at that time in a piece she was preparing for Greenpeace on the future of the building stock. This begs many questions, challenging – for example- the idea that countries must have new generating capacity because there is going to be increased demand: "are we certain we are going to have so much new demand? Isn't there an alternative route? The idea

that we are all going in for electric heating has got to be challenged - it isn't at all where I think we should be going, at least not for the next 15 or 20 years. The energy security debate is also coming into the frame. And not forgetting everything to do with Europe. So again, what I think I'm doing if anything is widening my boundaries." She retains an unwavering admiration for campaigners, who she believes have "a wonderful grasp of what's happening out there in the world, with a questioning approach as to why and what we can do about it. I would never underestimate how important many of the campaigners are, especially as many of them have long commitments and memories: they know the history". BB believes that one of the problems with "everything to do with energy", is that the history of the subject, particularly the human side, is quite sparse. "We haven't had much of a debate about why our housing is the way it is, why we have given warmth such a low priority. The field remains very narrow. When 'Cost of Warmth' was published and I got a copy into the University of Sussex library, they didn't know where to catalogue 'warmth'. I think it joined the books about fireplaces." On being asked what has been the most important event in her professional career so far, BB replied: "Not going to University at age 18. I had the wrong date for an exam in my last year at school. My form mistress had said the exam was on the Friday and I thought she meant one Friday but she actually meant an earlier Friday. That two minute conversion made an awful lot of difference to my life. I didn't absolutely miss the exam, but I missed the first hour of three and I hadn't done the revision. I didn't get the grades that I needed to go to the university that I wanted to, and I wouldn't resit the exams. But I wouldn't have changed that conversation, heartbroken though I was at the time. But I do regret that a late start means my influence has been limited to so few years. What if I had been doing my doctorate 10 years earlier or 15 years earlier? But, it would have been on a different subject. I was a different person. I would have probably ended up in the City, or advertising".

BB concluded by reflecting on the challenges ahead. She advises optimism: tackling fuel poverty, is a "fantastic job creation scheme, a great way to revitalise the whole economy, because when you do work on a building virtually none of the money is exported. You are not importing loft insulation or anything, it's all here, and at least half of the funding is labour costs and that's taking people off benefits, its providing some income tax for government, and so on." This would require the right political framing, since most people have yet to realise how satisfying it can be to live in an energy efficient house. She sees this as our contribution to future generations. "The Victorians built us sewers and underground tube lines. Our ancestors have given us wonderful legacies with their transformations of infrastructure. What infrastructure should we be changing? The housing stock, the building fabric, to ensure that it is fit for another century would be a good choice. Up to two-thirds of the benefits from energy inefficiency improvements are non-energy related: they are benefits to health and the calibre of the housing stock. So I don't think that fuel poverty as a problem is going away, and I don't think fuel poverty as an academic subject is going to go away. Not just yet."

Section 1: What is fuel poverty?

Whilst the concept of fuel poverty first came to public attention with Boardman's 1991 book, the experience of fuel poverty has a long history. Janet Rudge gives an account of this in the opening paper of this Section. The UK Fuel Poverty Strategy was the first policy document to offer a formal definition of fuel poverty, based on Boardman's 1991 book. Since then, the term itself has undergone rigorous scrutiny and critique, and is more contested today than ever before. Issues of definition and measurement are also discussed in this section.

Authors in this Section

Janet Rudge taught Environmental and Energy Studies at the University of East London and then at the Low Energy Architecture Research Unit at London Metropolitan University. She was lead expert on cold homes for a WHO European publication assessing the health impact of inadequate housing. She currently works for a London Borough where she leads on affordable warmth and renewable energy projects in housing.

David Ormandy is head of the Safe and Healthy Housing Unit, University of Warwick. He specialises in the formulation of standards, the relationship between the environment (particularly the housing environment) and health, and the health-based assessment of conditions.

Christine Liddell is a Professor of Psychology and Distinguished Community Fellow at the University of Ulster. As a psychologist, her interests lie primarily in the impacts of fuel poverty on mental wellbeing. She led Northern Ireland's area-based approach to tackling fuel poverty in 2012, as well as the region's first Customer Trial of Smart Meters.

Catherine Waddams (formerly Price) is Professor of Regulation in Norwich Business School and member of the ESRC Centre for Competition Policy (CCP) at the University of East Anglia. An economist, Catherine is particularly interested in the distributional impact of regulatory reform, both in the UK and elsewhere, and the role of consumer choice in market outcomes.

Richard Moore is an independent housing consultant with a particular interest in the definition of fuel poverty. His latest research, undertaken with ACE and CSE for Consumer Focus, provides an in depth analysis of the Hills review of the measurement of fuel poverty. He is a member of the Government's Fuel Poverty Methodology Group and of the steering group of the National Right to Fuel Campaign.

1.1 Coal fires, fresh air and the hardy British: A historical view of domestic energy efficiency and thermal comfort in Britain - Janet Rudge

This article examines the history of housing developments in Britain over the past 200 years and explores how different factors (e.g. economic priorities, lack of building regulations) have contributed to the poor quality housing conditions that we see in many areas of the UK today. Unlike many other parts of Europe, cool temperatures may occur unpredictably at any time of the year in the UK, so heating is needed throughout the year in most parts of the country. However homes are largely unable to provide this heat efficiently as a result of inadequate heating systems and poor quality insulation.

Housing quality

Before the industrial revolution, local building traditions made use of several features to maximise indoor comfort and warmth, for example:

- thick stone walls to keep indoor temperatures stable
- keeping homes small with a central fireplace
- inserting mainly south facing windows
- thatched roofs for insulation

However, these building practices were replaced by mass building of mainly terraced housing during the industrial revolution. Economy was the builders' priority, not the comfort of the occupants. Poor workmanship and the use of low quality building materials meant housing was poorly constructed and draughty. Buildings from this period are still inhabited to this day in many of Britain's towns and cities and now comprise the majority of homes which are recognized as being "hard to heat".

Building regulations have also contributed to inefficient housing stock. Regulations in the 1850s recommended that ventilation be increased in homes to let in more fresh air for health and hygiene purposes. More effective building regulations did not come into force in Britain as quickly as in other countries. For example, cavity wall insulation did not become common until the 1930s/1940s and double-glazing was not brought into national building standards until the second half of the 20th century, even though it has been a recognised efficiency measure since 1857.

Heating Systems

The quality of heating systems is the other key aspect of home energy efficiency. There has been a much slower uptake of both central heating and of more efficient heating appliances in Britain, compared to other EU countries. Most homes now have central heating, although many British homes continued to use *open fires* as their only source of heat until relatively recently (burning coal, wood, turf, etc.). This method of heating is highly inefficient (almost 90% of heat disperses up the chimney); however it was *preferred* as a quick source of heat, providing warmth at short notice. This suited the UK climate, where

temperatures are highly changeable from day to day. The wide availability of locally sourced coal also encouraged the use of open fires for many years.

Other European countries tended to heat their homes using enclosed stoves. These took longer to heat up, but once warm provided a steady flow of heat, and warmth is dispersed more evenly through the rooms of the house. This method of heating was suited to the climate of continental Europe, where winter temperatures are cold for

prolonged periods and homes knew that heating would be required every day. In this way, *climate* is partly responsible for how people choose to heat their homes in different parts of the EU.

Personal and behavioural factors

How warm someone feels in their home depends on several *physical* factors, e.g. air temperature, humidity, air movement, etc. Indoor warmth is also influenced by *personal* factors, e.g. wearing layers of clothing or the occupant's mobility. Preferred levels of thermal comfort have increased substantially over the past century or so. The World Health Organisation deems an indoor temperatures range between 18 and 21°C to be safe for human health. This is much higher than temperature standards in the 19th century, which were as low as 4°C in bedrooms. Occupants at that time could feel warm if they built heat up in a single room, or if they remained in front of an open fire; wearing extra layers of clothes was a common way of compensating for low indoor temperatures.

Over time, householders have sought to increase indoor temperatures and heat more rooms. Central heating means that it is easier to reach higher temperatures, and residents now expect these higher temperatures throughout the house. However, new central heating systems (using radiators) are not well-suited to work effectively in old, draughty, 'hard to heat' homes. Consequently, most British households do not heat their homes to recommended standards, even though they value warmth and want to be warm. Studies have shown that households who received energy efficiency retrofits tended to use the improved energy efficiency as a way of increasing warmth and comfort rather than reducing their fuel bills.

The history of housing development in Britain teaches important lessons. Countries with newly industrializing economies could learn from the British experience over the past 150-200 years, so as to avoid producing poor quality mass housing with low priorities for energy efficiency.

1.2 Health and thermal comfort: From WHO guidance to housing strategies - David Ormandy and Véronique Ezratty

The World Health Organization (WHO) provides guidance on what temperatures should be achieved in homes, to ensure that occupants feel comfortable and remain healthy. Temperatures between 18 and 24°C are generally agreed to be the 'comfort zone' and pose little risk to health. Over the past 40 years, evidence has accumulated that suggests indoor temperatures which are either too cold (below 18°C) or too hot (above 24°C) can have damaging effects on the physical and mental health of occupants.

Thermal discomfort and health impacts

Cold temperatures affect certain groups more than others, like the elderly, young children and those with a disability. For example, it has been recommended that older people need a minimum temperature of 20°C, and older people with certain health conditions (e.g. hypothyroidism) may still feel cold at 24°C. Similar effects are found with extremely high temperatures. Evidence from Holland shows that increases in heat-related deaths were most common amongst people over the age of 65. Excess heat also impairs the health of people suffering from certain conditions (e.g. cardiovascular diseases, diabetes, Parkinson's, Alzheimer's and epilepsy). Evidence suggests that the health of young children is negatively affected in conditions of thermal discomfort – particularly cold. Their educational attainment and emotional well-being are indirectly effected and their diet can also be affected if households reduce spending on food to afford fuel to keep warm.

Measuring indoor temperatures

In order to design policies which encourage households to heat their homes to warm and comfortable temperatures, it is vital that indoor temperatures are accurately monitored to provide baseline data. Measuring indoor temperature is problematic since they tend to vary in different parts of a room, different parts of a house and at different times of the day. However, there are alternative ways of assessing temperatures. A commonly used approach is to find out the occupant's *perception of thermal* comfort in their home (i.e. ask them if they *feel* warm enough in their home). A limitation of this approach is that vulnerable people (e.g. the elderly) may feel comfortable at temperatures which are in fact too cold or too hot.

The WHO used this 'perception' approach in a large-scale study to determine the impacts that different housing factors had on occupant health. It was conducted amongst 3,300 households (containing 8,500 people) in 8 cities across Europe. Occupants who said they had a problem keeping warm in winter (or cool in summer) were more likely to report poor general health. Specific health conditions also seem to be negatively correlated with various housing factors. Asthma was more likely in cold, damp homes with poor ventilation. High blood pressure, colds, sore throats, headaches and migraine were all more likely to occur in damp, draughty houses. Other diseases like gastric and duodenal ulcers were also more likely to

occur in cold homes.

Another method for assessing temperature is to *predict* how satisfied occupants would be with the temperatures. This approach uses a formula based on building design and calculates how much energy is needed to produce comfortable conditions for the majority of occupants. The approach is intended for application in working environments (e.g. offices) where occupants are both relatively healthy and rather sedentary. It applies less satisfactorily in homes, particularly those containing people who are more susceptible to illness (e.g. the elderly, young children, the disabled).

Practical identification methods

Assessing indoor temperatures is necessary for health studies and for designing healthy housing. Additionally, policy-makers need tools to help *identify* homes which lack thermal comfort and to prevent other homes from falling into this state. Some of these tools focus on the *energy efficiency* of the house, since maintaining thermal comfort is known to be more difficult in less efficient housing. *Energy performance certificates* (EPCs) can identify homes with higher running costs, which may be more difficult to heat in the winter. These are now a legal requirement in all EU countries whenever a house is sold or put up for rent. *Fuel poverty indicators* have been produced and can be used to predict the likelihood of fuel poverty amongst different household types. Other tools have a clear *health* focus. The *Housing Health and Safety Rating System* (HHSRS) assesses a dwelling according to the presence of different health hazards (including exposure to excess cold or excess heat). The discovery of any hazards is used to trigger action to improve house conditions and the health of the occupant(s).

Health benefits of tackling fuel poverty

In order to improve the living conditions of those living in fuel poverty, both short-term and long-term strategies are needed. Supplementing the income of households and reducing their energy bills will help in the short-term, but housing improvement (e.g. upgrading heating systems, installing effective insulation) is the only long-term solution to fuel poverty and its health effects. More efficient housing has benefits, not only for the health of occupants, but also for wider society. Upgrading all the inefficient housing in England would save the National Health Service £750 million every year through reduced demand. Studies from New Zealand have shown that the cost-benefits of improving inefficient housing outweigh the cost of the upgrades by a factor of 2 to 1.

1.3. Measuring and monitoring fuel poverty in the UK: The 10% threshold - Christine Liddell, Chris Morris, Paul McKenzie & Gordon Rae

This paper traces the earliest formulations of fuel poverty as a concept, focusing particularly on the *10% needs to spend threshold* which was adopted in 1991 and remains in place some 20 years later. The paper argues that understanding more about the origins of this threshold yields a more critical understanding of why fuel poverty targets in the UK have not been reached, and enables a more informed approach to setting realistic targets for the future.

Isherwood and Hancock were among the first to define “*victims of fuel poverty*” in a 1979 publication. They defined “*households with high fuel expenditure as those spending more than twice the median (i.e. 12%) on fuel, light and power*”. The median quoted by Isherwood and Hancock was based on the 1977 Family Expenditure Survey.

Fuel poverty as a twice-median concept

From its earliest origins, fuel poverty has been construed as a twice-median concept. The choice of median expenditure (rather than mean expenditure, for example) reflected interest in the concept of relative poverty (e.g. Townsend, 1979) which was popular at the time Isherwood and Hancock first introduced the term. Since a median score divides a sample or population into 2 equal halves, medians also smooth out the effects of extreme scores. For this reason, medians are internationally favoured for representing distributions related to income and expenditure, since these are seldom normally distributed. They are also particularly useful for measuring and monitoring aspects of deprivation, where achieving equity within a society may be a desired outcome. Over time, conceptualizing fuel poverty in median terms has also proved valuable for comparing prevalence across countries worldwide, since it absorbs real variations in the amounts which residents of very diverse countries customarily pay for heat, power and light.

Boardman’s 1991 definition

Twelve years after Isherwood and Hancock first discussed the term, Boardman published elements of a more formal definition in her book *Fuel Poverty* (1991). This was the first occasion in which a 10% threshold is mentioned: “[*Fuel poor households*] are unable to obtain an adequate level of energy services, particularly warmth, for 10 per cent of its income” (p. 207). Boardman’s choice of 10% was based on the 1988 Family Expenditure Survey for UK households.

The UK Fuel Poverty Strategy 2001

The UK Fuel Poverty Strategy adopted the 10% threshold directly from Boardman’s definition of 10 years earlier. It is unclear why current data were not used to set a twice-median threshold in 2001. At that time, twice the average was 7% , and remained so until 2006. The adoption of

an outdated threshold in the 2001 Strategy resulted in fuel poverty prevalence being significantly under-estimated. Using 2004 English data, a 10% threshold yields 1.2 million English households in fuel poverty (which was the official prevalence quoted for that year) (FPAG, 2006). If the actual twice-median for 2004 had been applied (it was 7%) then fuel poverty would have almost trebled, exceeding 3 million. The 1.2 million quoted as being “in fuel poverty” in 2004 consisted almost entirely of households who were in either severe (3-4 times median) or extreme (+4 times median) fuel poverty. This may have had some profound consequences for fuel poverty agencies, who are charged with delivering free and subsidized heating and insulation schemes as part of the UK’s Fuel Poverty Strategy. These schemes were in fact required to target homes in severe and extreme fuel poverty. For almost all of these homes, little short of deep retrofit (i.e. cavity wall and loft insulation, high performance double-glazing, boiler replacement, and full central heating installation or upgrade) would have sufficed. Budget restrictions meant that relatively few Warm Front installations were as comprehensive as this (NAO, 2009). Even without rising fuel prices and falling incomes, the 10% threshold made the Strategy’s declared intent to eradicate *fuel poverty by 2016 as far as reasonably practical* one which was nigh impossible to achieve, given the distribution of the fuel poor and the level of financial investment that was made in supporting fuel poverty eradication programmes. This helps account for the fact that schemes appeared to make little substantive impact on fuel poverty prevalence despite massive government investment i.e. over £1,811M between June 2005 and March 2011 (NAO, 2009). Whilst schemes were frequently criticised for failing to target the fuel poor (e.g. NAO, 2009) their capacity to do so was severely curtailed by the setting of such a high threshold. The fuel poor of 2001-2005 were, in fact, those suffering severe or extreme fuel poverty – by definition, they were relatively few and far between, and they required much more comprehensive assistance than Warm Front could usually provide. Evaluations of the retrofit schemes which the Strategy supported have since noted that “the available solutions do not match the scale of the problem” (Jenkins, Middlemiss & Pharoah, 2011); it could be argued that the failure does not lie so much with the available solutions as with the underestimated scale of the problem. Had the 2001 Strategy applied a twice-median threshold based on circumstances that prevailed in 2001, then rates of fuel poverty in England would have been at least twice as high as the published figures between 2001 and 2005.

Conclusions

The 10% threshold has thwarted opportunities for implementation teams to demonstrate efficacy and value for money in delivering schemes that are intended to reduce fuel poverty. Effective schemes will have appeared to be ineffective. A threshold should never be construed as an arbitrary boundary, and nor should it remain immune from critical review. Thresholds have fundamental impacts on estimates of prevalence and on the ability to monitor progress in reducing prevalence over time. They merit periodic scrutiny. Perpetuating the shortcomings of a 10% threshold is neither necessary nor rational, given empirical evidence of the difficulties this will continue to create.

1.4. Objective and subjective measures of fuel poverty - Catherine Waddams Price, Karl Brazier and Wenjia Wang

Measuring fuel poverty

Fuel poverty rates are usually measured by *objective* methods, by calculating the proportion of a household’s *income* which needs to be spent on fuel in order that safe thermal standards are attained. If this “need to spend” figure is over 10%, the household is classified as fuel poor. Fuel poverty can also be measured using *subjective* assessments, i.e. by asking householders whether they *feel* able to afford to heat their home. This self-reported measure could be argued to be more meaningful, as it more closely assesses the pressure and stress of affording sufficient fuel, as well as reflecting some elements of satisfaction and personal happiness at home. This article describes a study that compares objective ‘*expenditure*’ measures with subjective measures of people’s *experiences* of fuel poverty. This is important for understanding the impact that meeting official targets (which are expenditure-based) might have on people’s actual experience of fuel poverty.

Low-income survey

The study focuses on low-income households who pay for their energy using prepayment meters and standard credit. A questionnaire survey was carried out in the summer of 2000 in about 2,500 homes across England, Scotland and Wales. Respondents provided their household income and estimated the annual amount they spent on energy. This information made it possible to calculate ‘*expenditure fuel poverty*’, i.e. a household that spends more than 10% of their income on energy is fuel poor (objective measure of fuel poverty). The survey also collected a wide range of other

information including: personal and household characteristics; types of heating systems; fuel suppliers and payment types; and receipt of welfare benefits. Households were also asked to state if they felt able to afford to heat their home adequately. Any households who said they had difficulty in heating their home were classed as ‘*feeling fuel poor*’ (*subjective* measure of fuel poverty).

Results

28% of low-income households spent more than 10% of their income on fuel and were classed as ‘*expenditure fuel poor*’, a much higher fuel poverty rate than the population as a whole. This reflects the depth of fuel poverty experienced by households with the lowest incomes (who were the focus of this study). Meanwhile, only 16% of low-income households said they were unable to afford sufficient energy to keep their house warm (‘*feeling fuel poor*’). Hence:

- many households who spend more than 10% of their income on income on energy *do not feel fuel poor*

whilst at the same time

- *not everyone* who feels fuel poor spends more than 10% of their income on energy.

Key drivers of objective and subjective fuel poverty

Through a complex statistical procedure, this study explored the drivers of fuel poverty. From the information collected in the survey (e.g. income, payment type, household composition, etc) key factors that affect the probability of a household being 'expenditure fuel poor' or 'feeling fuel poor' were identified. Unsurprisingly, income was the key driver of fuel poverty. Households with lower incomes and those that received income support were more likely to be fuel poor (by either the objective or subjective measure). However, households who were classed as 'feeling fuel poor' tended to have substantially higher incomes than the 'expenditure fuel poor'.

Large households (e.g. 2 adults and 2 children) were more likely to spend more than 10% of their income on fuel, compared to smaller households. Those who paid for their electricity by standard credit or prepayment were more likely to feel fuel poor than households who paid by direct debit. Households who paid for gas by prepayment were more likely to be expenditure fuel poor. The study also finds that households headed by an unemployed or retired person were less likely to spend over 10% of their income on fuel.

The findings for 'expenditure fuel poverty' were compared to the corresponding information in the Family Expenditure Survey (FES). The results were broadly comparable, although the FES had used a larger, more representative sample. This suggests that the results from the present study offer a reliable estimate of fuel poverty rates amongst low-income households.

Conclusions

Focusing on reducing 'expenditure fuel poverty' by increasing incomes and decreasing energy expenditure will reduce the number of households that spend more than 10% of income on fuel. But these policies may not necessarily reduce the number of households who feel unable to afford adequate home heating. There are relatively well-off households (within the low income sample) who *feel* fuel poor, even though they spend less than 10% of their incomes on fuel. There are no policies in place to bring them out of the fuel poverty they perceive themselves to be in. The UK government aims to eliminate fuel poverty, as measured by the objective 10% expenditure method. Many households who do not spend more than 10% of income on fuel, but who *feel* fuel poor will not be targeted by this approach. Focusing on ensuring that no household spends more than 10% of income on fuel will still leave many households who feel unable to afford to heat their homes adequately. The government should consider reintroducing this alternative self-reported measure of feeling fuel poor because it is a valuable way of developing more effective anti-fuel poverty policies.

1.5. Definitions of fuel poverty: Implications for policy - Richard Moore

This paper critiques current UK fuel poverty policy and the implications of adopting alternative definitions. The UK's current method for estimating fuel poverty has introduced an inherent bias through which fuel poverty appears to be more prominent among small elderly households. Using data from the English Housing Survey (EHS) and its predecessor, the English House Condition Survey (EHCS), it demonstrates the profound differences in fuel poverty trends when using absolute and relative fuel poverty definitions. It also considers the measurement of fuel poverty on a broader European scale, and concludes that a fuel poverty measurement strategy grounded in the minimum income standards approach would provide the most accurate and consistent measure of the affordability of fuel.

Measurement of income

EHS data illustrate that substantial changes in the severity and distribution of fuel poverty occur when changes are made to the way income is measured.

For general poverty, there are arguments for and against calculating net household income

- before housing costs are deducted (BHC)

and

- after housing costs are deducted (AHC).

However, an AHC measurement of income is needed for fuel poverty, particularly as the ability to afford fuel costs will be dependent on the household's disposable income AHC.

Fuel costs

As with the measurement of income, the current system of estimating required fuel costs is not without criticism. The method for calculating non-space heating costs is too generalised, whilst the use of average fuel prices is likely to under-estimate fuel poverty in the UK (where those at risk are usually on higher than average tariffs). Using actual fuel costs has been proposed by the European Commission. The Commission has also suggested a revision of the definition of fuel poverty, with a fuel poor household being one that spends more than double the national average ratio on fuel. This will not, however, solve many of the intractable problems of definition, including the fact that actual fuel spending is a poor indicator of fuel poverty: low income households often spend less on fuel than is required for a safe and healthy living environment.

Relative and absolute measures of fuel poverty

A relative definition is, in principle, a more preferred option by many, particularly as general poverty is usually defined as a relative concept. However, there are also strong arguments to be made for moving away from precedent and towards an absolute definition.

Based on EHCS and EHS data from 2003 to 2008, it is possible to contrast the fuel poverty trends that emerge when applying the two opposing definitions. Using a relative definition, the levels of fuel poverty remain moderately static across the five year period, whilst levels of absolute fuel poverty rise continuously. Whilst a relative measure may be appropriate for determining the degree of exclusion caused by fuel poverty, it masks the extent to which households are struggling to meet their fuel costs. Indeed, although median fuel costs rose by 55% in real terms between 2003 and 2008, a relative definition would be unable to reflect this: there would be no change in the number of fuel poor households.

Minimum Income Standards approach

An alternative fuel poverty measure is grounded in a minimum income standards approach (MIS). This calculates the minimum income required by different household types to enable participation in society; a household would be in MIS based fuel poverty if, after housing costs, they have insufficient residual income to meet their required fuel costs after covering all other minimum living costs.

An MIS based definition of fuel poverty would provide a consistent and accurate measure of the affordability of fuel, whilst also being readily adaptable to the differing incomes and minimum living costs found across Europe. A fuel poverty scale, similar to Energy Performance Certificate ratings, could be used as a means of assessing the extent to which households need to cut their MIS living costs in order to afford fuel costs. However, an MIS based definition would require fuel costs to be determined, which would in turn necessitate a detailed national housing stock survey. Using an MIS measure and based on 2008 data, nearly 5.5 million UK households could only afford their fuel costs by cutting back on their minimum living costs.

UK fuel poverty policy and Hills Review

The proposed 'low income/high costs' (LIHC) definition from the Interim Report of the Hills Review has advantages over the existing UK definition,. However, it also has severe shortcomings including:

- The use of total fuel costs, which excludes many low income households living in smaller homes with poor energy efficiency
- Masking of the impact of rising fuel prices on the affordability of fuel
- Failure to adequately reflect improvements in energy efficiency
- Extreme difficulty of fully eradicating fuel poverty using this metric

It is likely that the current Government will favour the proposed Hills definition of fuel poverty, not least of all because it reduces 2009 levels of fuel poverty by almost a third.

Section 2. Living with fuel poverty

In her Personal Recollection, Boardman notes that very little is understood about the reality of fuel poverty for people who live with it. Much more effort has been invested in documenting and measuring the causes of fuel poverty, and what can be done to tackle it. The human experience remains relatively uncharted territory. To help redress the balance, the three papers in this Section provide qualitative accounts from different parts of Europe. These illustrate the wide-ranging variety of living conditions that constitute fuel poverty and how people find ways of coping with it.

Authors in this Section

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2.1. Coping with low incomes and cold homes - Will Anderson, Vicki White, Andrea Finney

This paper examines how low-income households cope with the challenges of home heating, especially during the winter months when heating costs can be a major burden. It explores:

- how households decide to budget when faced with high heating costs
- what happens when they are 'forced' to choose between heating needs and other essential goods and services.

The study took place in 2009, amongst 699 low-income households across Great Britain. Information was collected using a questionnaire survey. In-depth interviews were also conducted with 50 households.

Coping with a low income

Most low-income households were able to keep up with their fuel bills, but with some difficulties. They were able to alter their spending patterns to make ends meet by using a number of practical responses, perhaps by simply cutting spending on non-essential items. But when money became even tighter, households managed their spending by beginning to budget on essential items (especially food and fuel) on a day-to-day basis. 65% of households who cut back on heating also cut back on food and 59% of those that cut back on food also cut back on fuel.

Households saw fuel bills as something which had to be paid, come what may, but did what they could to keep these bills low. They saw their food costs as being more flexible. For instance, cutting back on food did not necessarily mean that residents went hungry. They may have shopped around for bargains, or purchased a lower quality of food (e.g. buying tinned items instead of fresh food). However, there was a limit to how far essential spending could be comfortably adjusted. Once this limit was crossed, the quality of life of the individual(s) became severely diminished.

Coping with cold homes

63% of low-income households deliberately reduced their spending on fuel. These households were most likely to be made up of a single person or lone parent/couple with children., fuel rationing was also likely in homes that were occupied all day. In other words, those who had more need of heat (e.g. pensioners, those with a disability or limited mobility) were more likely to ration their fuel. Households chose to ration their fuel in a number of ways, e.g. by only heating one room, or by turning off the heat entirely for part of the day. Other responses included wearing more clothes, keeping curtains closed, or getting out of the house by going out for a walk or visiting friends/family. Interestingly, the welfare of children was found to be paramount for many of the households surveyed. In some cases, parents would personally endure cold temperatures during the day and only turn the heat on when the children came home from school, to make sure

they could be warm and that money could be saved to keep them well fed.

Impacts of cold homes on health

Unsurprisingly, when fuel was rationed, homes were likely to be cold. Many low-income households had problems with substandard housing and 'hard to heat' conditions (e.g. draughts, damp or problems with the heating system). Cold homes had a damaging effect on the mental health of occupants. 55% said that the cold made them feel miserable and 26% suffered social isolation, i.e. they were unwilling or embarrassed to invite family or friends into such a cold house. Living in relatively new housing, which may have been fitted with insulation or heating improvements, reduced the risk of being cold. But even in better quality housing, not all households managed to stay warm. This shows that any heating cost, no matter how small, could be a burden to households on the lowest incomes. This is also reflected in the fact that where homes were improved, occupants might choose to use the better energy efficiency to reduce the amount of fuel purchased, instead of using it to make their homes warmer.

Living in a cold home is inescapable for many low-income households during the winter. But the study also draws attention to *psychological* factors which can help individuals cope with poor living conditions and the uncertainty that comes with the pressures of daily budgeting. Some households showed *positive* attitudes towards living in such conditions, expressing a determination to maintain their dignity, self-esteem and independence through personal resourcefulness.

2.2. Experiencing fuel poverty: Coping strategies of low-income households in Vienna, Austria - Karl-Michael Brunner, Markus Spitzer, Anja Christanell

Whilst much of the research on coping with fuel poverty has taken place in the UK, this paper highlights the growing recognition of fuel poverty as a social issue in a very different geographical area – Austria.

This study took place in 2009/10 in the capital, Vienna. In-home interviews were conducted with 50 "poor" households. Households were classified as "poor" if they earned less than €912 (roughly £800) per month (this is an official measure of the "poverty line" used by the European Union). 10 better-off households were also included for comparison. A questionnaire survey was carried out with each household to collect information on household characteristics (e.g. number of persons, employment status, etc.) as well as the characteristics of the dwelling (e.g. size, number of rooms, etc). In an attempt to estimate fuel poverty rates, energy bills were obtained for 37 of the 50 poor households. By taking the fuel bills and the income of these 37 households, fuel poverty rates were calculated. It was found that 16 of them (43%) spent over 10% of their income on fuel. Some households spent up to 19% of their income on fuel.

Low-income households have to cope with multiple energy burdens. They may be forced to adapt to poor living conditions by sacrificing energy services which many would consider a basic necessity (e.g. heating every room in the house or having a full bath). Their hardship occurs mainly due to the energy inefficient council flats in which they live (which are expensive to heat) and their tendency to use less efficient, second-hand appliances (which are costly to run).

Low-income households employed several low-cost methods to cope with poor living conditions, e.g. sealing leaky windows or fitting thick curtains as a form of insulation. Other common coping strategies included reducing energy use (e.g. by heating only 1 room), putting on warm clothes or by going to bed during the day. A growing number of low-income households see energy saving light bulbs as an effective way of reducing energy use. 20% of households have already changed all their lights to energy saving bulbs. The better off households used fewer energy saving light bulbs. Energy bills remained a considerable financial and emotional burden to low-income households. Some homes managed by clearing their fixed costs first (e.g. rent and energy) and then attempting to save on other essential items (e.g. food). Others struggled, often going into arrears and facing disconnections.

4 types of household were identified from the survey and are described under the following headings:

1. The fuel poor (16 out of 37 households)

A. The “overcharged”

Fuel poverty in this group resulted from a variety of factors: permanently low incomes combined with energy inefficient housing and expensive heating systems (e.g. electric heating). High energy costs occurred despite the occupants' widespread attempts to reduce energy use.

B. The “modest fuel poor”

These households tended to live in better quality housing and were more likely to be working and earning a regular income. They were still classed as fuel poor but were more determined to find solutions to their situation and could usually reduce their energy expenditure.

2. The non-fuel poor (21 out of 37 households)

A. The “modest non-fuel poor”

Quite similar to the “modest fuel poor” only they pay less than 10% of their income on energy. This is mainly due to living in more efficient housing and/or more developed coping strategies. However, in order to cope, they are still under financial strain and many of them may still feel fuel poor. There is always a chance that they could fall back into fuel poverty.

B. Those simply “on a low-income”

These households are not in fuel poverty (as they spend less than 10% of their income on energy costs), but they are still classified as “poor”. They are less likely to adopt coping strategies, but they are still at risk: a small loss of income could mean that they become fuel poor like the groups above.

This makes fuel poverty an urgent issue, but the Austrian government does not yet officially recognize it as so. There is a need for an integrated national policy that can:

improve the energy efficiency of the housing stock

- target support with energy payments more effectively
- encourage the use of more efficient appliances
- advise households on other energy saving methods
- legislate for a more consumer-friendly energy market.

2.3. Trapped in the heat: A post-communist type of fuel poverty - Sergio Tirado Herrero and Diana Ürge-Vorsatz

The dismantling of the Soviet Union in the early 1990s caused sudden social and economic changes (reduced incomes, increased energy prices) and left behind an inefficient housing stock with outdated heating systems. This means that fuel poverty is a growing problem amongst households in Central and Eastern Europe. This article presents a case study of prefabricated housing blocks in Hungary to illustrate the processes which contribute to a unique type of fuel poverty, which has seen little investigation to date.

District heating (DH) is a common source of domestic heat and hot water in the prefabricated residential blocks that were built in Hungary between the 1960s and 1980s (these are known as *DH-panel* housing). If operated efficiently, DH is a highly sustainable form of heating. But DH systems in Hungary have become obsolete due to a lack of investment and modernization. *DH-panel* housing operates inefficiently and has become a burden for consumers, causing many to suffer fuel poverty.

Fuel poverty in DH-panel housing

Government statistics on household expenditure were used to calculate the proportion of the total household budget that went towards energy. This allowed fuel poverty rates to be calculated for *DH-panel* housing. 3 methods were used to calculate fuel poverty rates. A household is fuel poor if their energy costs are:

- (1) more than double the average energy expenditure of all households or
- (2) above the average energy expenditure of households on the lowest incomes or
- (3) greater than what the household spends on food and drink.

DH-panel households spend more on energy than the average household, but they also tend to spend more on all household goods and services. This means that fuel poverty rates in these dwellings are slightly below than the national average, when calculated by methods (1) and (2) above. However, comparing energy costs to food costs (3) shows that *DH-panel* households were more likely than the average household to spend more on energy than on food. 30% of *DH-panel* households spent more on energy than food, compared to 25% of all Hungarian households.

Even though *DH-panel* dwellings are the smallest dwelling type in Hungary and are quite energy efficient, their heating costs are up to 50% higher than the average home. So the DH system must be the main reason behind high heating costs and fuel poverty in these homes. They are well heated and rarely cold, but the lack of individual energy consumption meters means that households cannot reduce their energy consumption to deal with expenditure (e.g. by turning down the heat or heating some rooms only).

It is difficult to be disconnected from the DH system and installation of energy efficiency measures (e.g. insulation) is complicated because it requires agreement amongst neighbours. Fuel poverty occurs in DH-panel households because they are effectively “trapped” in houses which are warm but which incur high costs.

In order to cope, households may choose to reduce their spending on other necessities (like food and drink) or to go into debt. The structure of DH systems makes disconnection technically impossible so failing to pay energy bills does not jeopardise the household in the short-term. But utility companies have few options to recover outstanding debts (which are substantial in many cases) and this impacts negatively on their financial performance. Reduced revenues for the utilities make price rises more likely. It also prevents investment in the much-needed upgrading of these outdated heating systems, so fuel poverty is likely to persist.

Policies to tackle fuel poverty

Hungary does not have a dedicated fuel poverty strategy, although aspects of other government policies do have some positive outcomes for affected households. There are

price support schemes where low-income households living in DH properties can avail of reduced energy prices. However, this scheme is poorly targeted and offers temporary benefits at best, as it does not provide an incentive for the household to improve energy efficiency (which would reduce energy needs in the long-term). Another policy, which eases the burden of high-energy costs, is a *reduced VAT rate* of 5% on district heating (compared to 25% for other goods and services). However, this policy creates conflict with utilities as it reduces their revenues.

Policies to improve the energy efficiency of *panel* dwellings have been in operation in Hungary for several years. Typically, these schemes involve the replacement of old windows, facades, roof insulation and heating systems. These improvements have been shown to reduce demand for energy by up to 45%, although this is unlikely to be enough to eradicate fuel poverty for *panel* residents or to reduce carbon emissions for climate change goals. More ambitious home improvement schemes have been piloted and have shown that energy use in DH-panel dwellings can be reduced by 80-90%, making energy costs affordable, even for households on the lowest incomes. However, the high capital costs of these schemes make them difficult to implement. There is also potential to reform the supply side of energy use by increasing competition between DH suppliers, establishing effective mechanisms for consumers to repay debts and installing individual consumption meters, so that households can manage their energy usage more effectively.

The experience of the households described in this study is likely to be the same across other former Soviet countries, where over 170 million people live in similar prefabricated housing blocks, served by inefficient and inflexible heating systems.

Section 3. Why tackle fuel poverty?

The rationales for tackling fuel poverty are both abundant and compelling. Fuel poverty can be construed as a social and environmental injustice, which leads to measurable impacts on human wellbeing, yet an injustice for which solutions are readily available. In past generations, housing hazards included lack of sanitation, overcrowding, deadly fumes, and lead piping. As these toxins become risks of the past, so fuel poverty rises in prominence as the next soluble housing risk for human health.

Authors in this Section

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3.1. Fuel poverty as injustice: Integrating distribution, recognition and procedure in the struggle for affordable warmth - Gordon Walker and Rosie Day

Fuel poverty is a distinct form of social inequality and is seen as unacceptable in 21st century society. It has become recognized as a matter of *justice*, in that households should have the basic *right* to live in a warm and healthy home. This paper explores 3 interconnected theories of justice. It describes how they relate to the causes of fuel poverty, how various advocacy groups have highlighted fuel poverty injustices using them, and how they have been addressed by various government policies.

Distributional injustice

Some households are able to afford a warm, healthy indoor living environment and others are not. Therefore, the injustice of fuel poverty can be seen mainly as *unequal access to energy services*. Warm, healthy homes are not evenly distributed amongst the population; hence this form of injustice is known as **distributional injustice**. The ability to obtain adequate indoor warmth is linked to 3 factors: incomes, energy costs and the energy efficiency of housing. These are also unevenly distributed across the population. In reality, these factors may combine: low-income households tend to live in the worst housing and are least capable of investing in improvements to the energy efficiency of their homes. As a result, they are either unable to afford enough energy to keep their homes warm (causing cold-related health impacts), or they may be forced to sacrifice spending on other necessities (e.g. food) to make ends meet.

Each of these three inequalities have been highlighted by advocacy groups and have been addressed by various government policies. General social and economic policies aim to reduce the income gap between the richest and the poorest. Policies relating more specifically to fuel poverty, e.g. the Winter Fuel Payment, have attempted to make energy more affordable for those on low incomes (e.g. the elderly). Campaigners have drawn attention to uneven energy prices, where low-income consumers pay higher prices, due to unfair practices by utility companies, e.g. households with poor credit ratings are often put onto prepayment meters which carry higher charges. Switching suppliers is a method by which consumers can reduce their bills, but not everyone is equally able to switch. Further, low-income households in remote areas off the gas grid may have no choice but to use more expensive fuels for heating, e.g. oil.

Housing inequalities in the UK have been reduced through schemes like *Warm Front*, which help vulnerable households who are least able to afford housing renovations on their own. There is also access to good quality subsidised social housing among those who need it most, as these properties must meet certain efficiency standards. However, there are long waiting lists for social housing so many low-income households have to live in the private rented sector, where energy efficiency

improvements are more difficult to carry out due to unwilling landlords.

Injustice due to lack of recognition

The injustice of fuel poverty can also be seen as failing to **recognize** the *needs* of certain groups and a lack of equal respect for their well-being. The effects of fuel poverty are not the same across all social groups. Older people need to spend more on heat, because they require higher temperatures to feel comfortable and remain healthy. They also spend more time at home than those who work. Households containing young children or occupants who are disabled or ill (including cancer sufferers) face similar burdens, but their needs go unrecognised and are neglected by policy. Advocacy groups for the elderly have had some success in raising awareness of the needs of older people. The Winter Fuel Payment recognizes that elderly people are not only likely to be on low incomes but also have a greater *need* for heat to remain healthy.

Procedural injustice

Tackling fuel poverty must also provide equal access to information and decision-making **processes**. All groups with an interest in fuel poverty should be *informed* about the scale of fuel poverty, to make it 'visible' and to keep it on the political agenda. Households should be provided with all the information they need to avail of fuel poverty assistance (e.g. entitlement to additional benefits/income or home improvement schemes). New systems like price comparison websites allow consumers to compare prices and reduce their energy costs more efficiently. Processes need to be in place to ensure that all parties can participate in meaningful *decision-making* on matters relating to fuel poverty (e.g. energy pricing policy, housing policy, energy efficiency policy, etc). Fuel Poverty Advisory Groups in England, Scotland, Wales and Northern Ireland bring together a wide range of organizations including energy suppliers, housing professionals and support organizations (e.g. Age UK and Citizens Advice). These groups collaborate to provide guidance and recommendations for policy and seek to bring about fair outcomes for the organizations they represent, including households. A third aspect of procedural justice is equal access to *legal recourse*. Such legal action may be against the unfair practices of energy suppliers or other policies which negatively impact vulnerable households. However, this aspect of procedural justice remains relatively undeveloped in matters relating to fuel poverty.

The injustice of fuel poverty is mainly a case of unequal access to the resources needed for a comfortable, healthy home. But policymakers must also be mindful of *recognizing* the different needs of households and the inclusion of their viewpoints in decision-making *processes*. Efforts of various advocacy groups have raised awareness of these two types of injustice (recognition and procedural). Fuel poverty and carbon reduction objectives can be tackled effectively only when all 3 injustices – distributional, recognition and procedural – are acknowledged and addressed.

3.2. Psychosocial routes from housing investment to health: Evidence from England's home energy efficiency scheme - Jan Gilbertson, Michael Grimsley, Geoff Green & the Warm Front Study Group

The *Warm Front* scheme provided home heating and insulation measures to eligible households in England for over a decade. It aimed to increase indoor temperatures to reduce cold-related illnesses and improve occupant health. But evidence on how tackling fuel poverty actually improves health was unclear. This article presents a detailed study of the processes by which occupant health might be improved through fuel poverty interventions. Householders may experience better health, not only because they are warmer, but because they also benefit from a more comfortable, less stressful living environment. Specifically, housing renovations may improve health in 2 ways:

- By improving living conditions and thermal comfort within the home
- By reducing fuel poverty and the stress associated with paying fuel bills

Survey of households

Data collected for the Warm Front health impact evaluation was utilised to clarify whether these two routes to health impacts could be validated, and, which route predominated. The Warm Front survey was conducted amongst 2,685 households and collected information before and after homes had been improved. Data were collected on the occupant's *living conditions*, their opinions on *thermal comfort*, the *depth of fuel poverty*, and the *stress* levels of the occupants. A qualified surveyor measured the energy efficiency of the property using the Standard Assessment Procedure (SAP) both before and after improvements had been made to the homes. Electronic temperature meters recorded indoor temperatures in each house every 30 minutes for 2-4 weeks before and after. If the average temperature was below 18oC in living rooms (or 16oC in bedrooms), the house was classified as a 'cold home'. Occupants also kept a diary on their own opinions of *thermal comfort* rated on a 7 point scale (from much too cool to much too warm). Occupants were also asked how satisfied they were with their home and their heating system. Personal details including income, education, etc were also gathered, as was information on whether occupants had difficulty paying their fuel bills. The questionnaire also included measures which assessed *physical and mental health* status and how often people visited their doctor before and after home energy improvements. allowing health impacts associated with the interventions to be identified. Using statistical modelling techniques the strength of each of the main factors (living conditions, thermal comfort, fuel poverty and stress) could also be judged.

Impacts of improved living conditions

Occupants of cold, draughty homes (with condensation

and damp) not only reported poorer mental health, but also poorer general health. Improved insulation and/or heating were associated with direct mental health impacts, with a lower prevalence of common mental disorders at follow-up. There were also a number of indirect impacts that could have affected physical health in the longer term. For example, houses were more energy efficient after work had been completed, and were less likely to be cold. Occupants were much more satisfied with their heating and their general living environment. This was associated with occupants feeling healthier, both mentally and physically. Financial difficulties were another major source of stress, anxiety and depression: those who had the greatest problems paying fuel bills were around 4 times more likely to have poorer mental health. Households that received home improvements were less likely to have difficulty paying fuel bills afterwards, which was associated with lower levels of stress.

“Pathways” to health from energy efficiency improvements

The results suggested that recipients of *Warm Front* interventions felt healthier because:

- They felt more comfortable as their living conditions had improved
- They felt less stressed because it was now easier to afford fuel for heating (reduced fuel poverty)

Thermal comfort, living conditions, stress, and fuel poverty all had an impact on occupant health. However, statistical tests showed that stress had the single greatest impact on mental health – stressed individuals were more than 20 times more likely to have poorer mental health. Highly stressed individuals also suffered poorer general health. Hence, energy efficiency measures appear to be most likely to improve health by reducing the financial stress associated with the struggle to afford adequate indoor heating. Improved indoor temperatures also improve health but seem to have smaller impacts. Taken overall, the results of the survey support the likelihood that housing improvements can reduce stress and have positive knock-on effects for health service provision.

UK fuel poverty policies focus on cold living conditions as the root cause of ill health and give less emphasis to ‘psychosocial’ contributors to health. This study has shown that these impacts, particularly the stress associated with the struggle to afford fuel bills, have a much stronger effect on health than cold temperatures per se. In reality, some households live in a warm home but are at the same time fuel poor; they suffer no health effects due to cold conditions, but may still suffer negative impacts arising from the stress of high fuel bills. Policy makers need to recognize that programmes which aim to increase indoor temperature might yield only limited health improvements. Policies must also focus on making fuel bills more affordable as this has been shown to yield greater mental (and physical) health gains. The greatest health improvements will occur when fuel poverty is tackled using this combined approach.

3.3. Tackling cold housing and fuel poverty in New Zealand: A review of policies, research and health impacts - Philippa Howden-Chapman, Helen Viggers, Ralph Chapman, Kimberley O’Sullivan, Lucy Telfar Barnard and Bob Lloyd

About 25% of households in New Zealand (NZ) are in fuel poverty, although in some areas nearly half of households are fuel poor. NZ’s high rate of fuel poverty is caused by a number of factors including:

- low incomes
- dependence on inefficient heating systems (most households use electric resistance heaters)
- rising energy costs
- a housing stock that is generally poorly constructed and inefficient.

The poorest households need to spend a greater proportion of their income on energy than those on higher incomes. In 2010, the lowest income households spent 13.1% of their income on fuel, compared to 1.6% for those on the highest incomes. In order to cover the cost of other household goods and services (e.g. food and rent), low-income households may consume relatively little energy, living in homes which are both cold and damp.

Fuel poverty and health

These cold indoor temperatures are likely to impair the health and well-being of low-income occupants, since cold temperatures have direct biological impacts on the body’s cardiovascular and respiratory systems. Furthermore, there are indirect effects, e.g. damp conditions promote the growth of mould, with particularly damaging effects on conditions like asthma or chronic obstructive pulmonary disorder. Worryingly, studies show that individuals who are more susceptible to cold-related health impacts (especially the elderly and those with a chronic health condition) feel cold in their home on a day-to-day basis. Cold temperatures are also likely to be involved in the 1,600 excess winter deaths that occur in New Zealand each year. Studies have shown that there is also an increase in winter hospital admissions from people living in old, substandard housing.

Unregulated construction and inefficient housing stock

A poorly regulated construction sector and a disregard for the health impacts of cold homes has meant that much of NZ’s housing stock is cold and damp. The fact that electricity has been relatively cheap in NZ for many years has given little incentive for residents to improve the energy efficiency of their homes. However, as energy prices are now rising, and homes are becoming more and more expensive to heat, improving efficiency is becoming more of a priority for home-owners and government alike.

In recent years a number of schemes have been set up by the NZ government that provide improvements to home insulation and heating systems. Energy efficiency is more

difficult to improve in the private rental sector. There is minimal regulation and landlords are given little incentive to invest in home improvements. This is a particular issue because fuel poverty rates are highest in private rental accommodation: these homes are more likely to be old (and expensive to heat) and more likely to be occupied by low-income households.

Affording sufficient energy in inefficient dwellings is made more difficult when energy prices rise. Rapid increases in the cost of electricity (used for heating by most NZ households) have occurred since 1996, when the residential electricity market was deregulated. There is no regulation that requires utilities to charge lower rates for low-income and vulnerable customers. There is also no legislation to prevent companies from disconnecting customers during the winter. Low-income households (or those that have fallen into debt) are encouraged to use pre-payment meters to help them budget for their energy use, but these often carry higher charges than other payment methods. It appears that the main focus of NZ energy policy is economic efficiency, rather than fairness. These broader political and economic factors make it difficult for residents to afford sufficient home heating, increasing the likelihood of impaired health and well-being.

Research findings

The *Housing and Health Research Programme* has carried out a number of studies in NZ to determine the impacts of home improvements on occupant health. The *Housing, Insulation & Health Study* found that fitting insulation in houses led to improved living conditions (made them warmer and drier) and improved occupant health and well-being. People reported less wheezing, fewer days off school or work and fewer visits to their doctor. The *Housing, Heating & Health Study* was carried out in households that were already insulated, and involved replacing old heaters (e.g. bar heaters, unflued gas heaters) with more efficient heating systems (e.g. air-source heat pumps, wood pellet burners). These improvements made homes warmer and improved occupant health. These two studies also illustrated the extent to which retrofitting homes can lead to a number of other, besides health. Energy consumption in homes fell, e.g. insulated houses were warmer, whilst at the same time using 19% less energy. This is likely to contribute to carbon reduction and climate change objectives. Reduced use of health services also yielded savings for health authorities. In the case of the *Housing, Insulation & Health Study*, it is estimated that the total savings caused by these benefits would be *double* the total cost of installing the insulation. These research findings have informed the development of effective government fuel poverty policies. For example, the *Warm Up New Zealand: Heat Smart* programme began in 2009 and provides financial assistance to homeowners to install insulation and effective heating systems. So far it has assisted 100,000 households. The New Zealand experience demonstrates that policies which improve dwelling energy efficiency, and the research findings on which they are based, are vital to tackling fuel poverty and its health impacts, particularly for low-income households in a time of rising energy prices.

Section 4: How is fuel poverty being tackled?

Despite fuel poverty being an enduring concept, contributors to the previous sections of this report have illustrated the extent to which the field remains contested. There is no consensus as to what fuel poverty is, who is vulnerable, nor how it should be measured and monitored. There is also no common European strategy for tackling fuel poverty, and Europe-wide perspectives remain immature and disjointed. This extent of this disjoint is manifest in Section 4, which outlines the scope for policies that cross national boundaries, and why coherence is so urgently needed. Examples of policies from the UK and France highlight the complexities embedded in good policy, while the final paper illustrates the extent to which different nations can interpret the same mandate in very different ways.

Authors in this section

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4.1. Building synergies between climate change mitigation and energy poverty alleviation - Diana Ürge-Vorsatz and Sergio Tirado Herrero

Neither climate change nor fuel poverty is likely to be solved in isolation. Integrating the two in terms of policy goals may enable the mobilisation of wide-scale resources and commitments. This paper presents an in-depth taxonomy of interactions between fuel poverty and climate change, identifying key synergies and trade-offs between the two.

Conceptual background – energy poverty

Existing and proposed definitions of fuel/energy poverty have all emphasised the affordability of heating as a key energy service, at the expense of other domestic end-uses of energy. The terms could be construed in a much wider context, to encompass the broader aspects of affordability-related challenges related to energy services in the domestic space.

The paper focuses on the transition- and developed-economies of Eurasia, the Pacific and America, where the existing infrastructure practically guarantees universal access to energy services, but where certain segments of the population cannot comfortably satisfy their energy service needs due to a combination of high energy prices, low household incomes and poor energy efficiency. It notes that a broader form of energy poverty exists in developing countries, with complex issues of access to modern energy services; however, these issues are beyond the scope of the present paper.

Energy poverty and climate change policy synergies

Both climate change and energy poverty are often rooted in the inefficient use of energy in buildings. As a consequence, when considering the 3 causal factors of energy poverty - high energy prices, low household incomes and poor energy efficiency – it is energy efficiency which is the best entry point for policymaking. Examples of policy synergies do exist, and these have strong policy leverage potential. One such policy synergy is climate (heat) resilient architecture which can simultaneously decrease summer cooling and winter heating needs.

Potential conflicts and trade-offs

Conversely, potential conflicts and trade-offs need to be considered. For example, whilst the use of subsidised social energy tariffs can temporarily reduce energy poverty levels, lower-than-real energy prices provide the wrong economic signals and remove incentives to invest in energy efficiency. The most important trade-off is the potential increase in energy poverty levels as a result of carbon pricing, which will exert increasing pressure as countries move towards a carbon-constrained economy.

A further conflict arises in the form of the rebound (or takeback) effect, in which consumption of energy-consuming goods and services increases following energy

efficiency improvements. In the case of energy poor households, efficiency gains may be realised as comfort improvements, such as increased indoor temperatures. Since climate change should not be mitigated at the expense of energy poverty priorities, rebound effect poses a significant challenge that is not always sufficiently factored into modelling exercises.

Avoiding the lock-in effect

Based on Global Energy Assessment estimates, between 66% and 75% of the 2005 energy expenditure of North America, Europe and Asia could be eliminated by 2050, through wide scale adoption of start-of-the-art standards in new and existing buildings. Furthermore, high efficiency buildings can ensure the satisfaction of thermal comfort needs at a low cost, mitigating the impacts of rebound.

However, in many of these countries energy efficiency policy efforts have not been ambitious enough, leading to a lock-in effect or lock-in risk. This is defined as “the unrealised energy and carbon saving potentials that result of the installation of below state-of-the-art energy efficiency technologies in buildings”. Lock-in effect has many consequences, including the need to revisit sub-optimally retrofitted buildings at a later date in order to capture the remaining potential.

Acknowledging that substantial investment costs and policy efforts are required to implement a deep efficiency of new and existing buildings, several key recommendations can be made. Among these, strong integration between several policy goals is necessary in order to tip the expenditure-benefit balance in favour of action; beyond the often-stated integration of energy poverty alleviation and climate change mitigation, the authors suggest further synergies could be forged with energy security and job creation goals. In this context, current cost-benefit assessments remain inadequate; they need to quantify and monetise co-benefits and co-costs in a manner which accounts for all synergies and trade-offs.

4.2. Energy poverty policies in the EU: A critical perspective - Stefan Bouzarovski, Saska Petrova and Robert Sarlamanov

Using the results of interviews with key informants, a specialist workshop and analysis of written regulatory documents, this paper presents an overview of the processes that led to the adoption of energy poverty policies in the EU as a whole, but with particular focus on Bulgaria. It offers a critique of policy, and identifies the gaps in scientific knowledge which are hindering the design of targeted policy solutions.

Energy poverty

A definition of energy poverty was provided in an earlier monograph (Buzar, 2007), and is adopted here too: “a condition wherein a household is unable to access energy services at the home up to a socially- and materially-necessitated level”. It has been more commonplace to draw attention to energy poverty in less industrialised countries, where its contexts and origins tend to be rather similar. There is much less attention paid to energy poverty in industrialised countries, where it has much less theoretical and empirical coherence.

EU energy poverty policies

The most recent policy initiatives have failed to provide any direct energy poverty frameworks, and there has been little progress on energy poverty at the EU level during 2011. EU policy efforts to date have lacked clarity on even the most basic issues, such as how to define energy poverty and who should be classified as ‘vulnerable consumers’. This inaction extends to agreeing what causes energy poverty, with the European Commission unable to reach a consensus on the constituent elements of energy poverty.

By contrast, the European Economic and Social Committee have identified low incomes, high energy prices and inadequate building quality as causal factors.

Whilst decision makers, experts and advocacy activists agree that the EU has become increasingly committed to tackling energy poverty through regulation, they identify numerous weaknesses, including:

- The lack of a strong institutional centre for political initiatives to address energy poverty
- The deficiency of scientific knowledge concerning energy poverty
- The assumptions underpinning energy poverty alleviation policies
- Policy recommendations that are too general and lacking in practical impact

Energy poverty in South Eastern Europe

South Eastern Europe (SEE) is one of Europe’s least economically developed regions, and suffers from the legacies of a communist-era centrally planned economy, including indirect price subsidies, inefficient housing stocks and reliance on polluting sources of energy.

Despite this context, numerous energy reforms have been made, particularly as a result of the Energy Community initiative. Such reforms include progressive tariff structures, upward price rebalancing and targeted social support. However, energy affordability is a growing concern across the SEE region, and social support measures remain largely 'residual', with broader policies failing to address structural problems.

Energy poverty in Bulgaria

Bulgaria is a newer EU member state that has experienced significant difficulties in providing affordable and sustainable energy services, particularly to low-income households, over the past two decades. Post-transition reforms have led to significant increases in the price of energy for residential consumers. Data from the Bulgarian National Statistical Institute highlight the effects of energy price increases on households in terms of welfare loss and energy degradation (due to a shift towards using fuel wood instead of more sophisticated and technologically advanced fuel sources).

The policy framework in Bulgaria is fragmented, although in the context of energy poverty, the relevant government ministries work in close co-ordination to devise alleviation policies. They have a broad understanding of structural challenges and barriers, although few are aware of direct EU-level policies to target energy poverty. Energy poverty policies also fail to address the causal factors of energy poverty, instead focussing on providing short-term household budget support.

Conclusion

Energy poverty has gradually entered the European political mainstream, with a move from indirect policies to direct action; however, progress has been slow, in part due to a lack of scientific knowledge, limited concerted political will, and a resistance at the member state level to EU-led policy initiatives.

With regard to Bulgaria, the country is experiencing serious problems with the affordability of energy amongst low-income households, a problem which current policy is unable to resolve due to its focus on short-term income support measures, rather than long-term energy efficiency measures.

For the road ahead, acquiring detailed information concerning the socio-demographic groups affected by energy poverty is vital, as is increased participation by local government actors in formulating and distributing state assistance. Furthermore, the gap between social welfare support and energy efficiency support needs to be addressed. If these conditions are not met, a new energy underclass could be set to emerge in Europe.

4.3. Can the Green Deal be fair too? Exploring new possibilities for alleviating fuel poverty - Pedro Guertler

The UK's main energy efficiency improvement scheme (*Warm Front*) is being phased out and in its place the government is introducing the "Green Deal" initiative. Like *Warm Front*, this scheme will provide a package of energy efficiency improvements to reduce household energy consumption. However, it will be the energy companies who pay the upfront costs of these improvements. Households then pay back these costs (with interest) through a service charge on their energy bills – a method known as Green Deal Finance (GDF). The critical requirement for GDF to work (the '*Golden Rule*') is that the money saved through reduced consumption must be greater than the payback charges on their energy bills. This way, households begin to save money as soon as measures are installed. GDF is targeted at relatively well-off, 'able to pay' households, who are unlikely to be fuel poor. Low-income and fuel poor households are unlikely to take-up the assistance. But given its focus on reducing energy bills, the principle of GDF also has the potential to reduce fuel poverty significantly. This article outlines how this might be achieved.

Modelling housing improvements under GDF

Households from the 2005/06 English House Conditions Survey were used to model the impacts of different types of GDF packages. These packages vary in terms of:

- the interest rate on payback charges
- the total number of measures allowed
- the maximum cost of these measures.

Modelling identifies the combination of measures that could be installed in each house, to achieve the greatest reduction in energy bills, whilst meeting the '*Golden Rule*'. To meet the rule, the package of improvements must produce at least a 10% margin, i.e. energy bills after improvement (including the payback charge) must be at least 10% lower than before, so the household is saving money straight away. If the program cannot find any solution which meets this requirement, the household does not receive any assistance. Two separate scenarios were explored, whether the calculation was based on (1) the amount of energy *needed* for adequate warmth or (2) *actual* energy use.

Impacts on energy bills and fuel poverty

The computer simulation found that GDF reduces energy bills by £179 to £340 per year, depending the package's interest rate and the number and cost of measures installed. Energy savings are greater and the number of households that pass the '*Golden Rule*' is higher when GDF is more *flexible*, i.e. there are fewer limits on both expenditure and the number of measures. Lower interest rates have the single greatest impact on whether a household meets the '*Golden Rule*', i.e. many more households benefit when a 3% interest rate is used, compared to a 9% rate. However, energy companies are likely to favour charging higher interest rates so as to balance their books more

easily. This decision may make the scheme less attractive to households.

Actual energy use is usually lower than what is needed for adequate warmth. This limits the potential savings on bills and the interest which households can pay back whilst still meeting the 'Golden Rule'. Hence, fewer households receive measures when calculated by actual energy use, compared to energy need. But working out the GDF package using actual energy use yields a greater reduction in fuel poverty rates. This is because fewer measures would need to be installed and lower repayment charges could be applied, making it is 'easier' to bring energy bills below 10% of the household's income (in effect, removing more households from fuel poverty).

Hard to treat homes

Solid-walled ('hard to treat') properties cost much more to improve. GDF is unlikely to help many of these homes: it would only be able to provide external wall insulation to 7% of them. The Energy Company Obligation (ECO) is better designed to support these homes, and so modelling was used to explore what would happen if the ECO was used to *subsidize* GDF for external and internal wall insulation (the measures required for solid-walled housing). It found that, with an ECO subsidy of £5,000 for external and £2,000 for internal wall insulation, 90% of hard to treat properties could be improved. However, this would cost energy companies £41.6 billion, which would be passed on to consumers in the form of higher bills. Whilst it would reduce energy consumption, bills would increase at the same time, so the real impact on fuel poverty is limited.

'Assisted Green Deal Finance'

Some households are not consuming enough energy to achieve warm, healthy indoor temperatures. When measures are installed, they may no longer under-consume, but spend more on energy to take the benefits as extra warmth. So they incur increased bills and are not removed from fuel poverty. In order to help these households pay back higher bills, an '*assisted Green Deal Finance*' scheme is suggested. Basically, these types of households would make contributions to repayments for the part of the package which would reduce their energy bill to below 10% of income. The government would pay for the amount left outstanding. This way, households do not incur higher energy bills. This approach would eliminate fuel poverty for 72% of fuel poor households. The remaining 28% would require extra income as well as energy efficiency improvements, in order to lift them out of fuel poverty. They would require about £360 subsidy per annum, which would cost the government about £460 million per year.

All in all, the "Green Deal" has the potential to reduce fuel poverty, but it will require careful planning and a combined approach, led by the energy companies and facilitated by government.

4.4. From targeting to implementation: The role of identification of fuel poor households - Ute Dubois

This article describes designing fuel poverty policies as a 3-stage process: (1) deciding *who to target*, (2) *identifying households* and (3) *implementing measures* to alleviate fuel poverty. These 3 steps affect one another, e.g. the group chosen to target affects how easy households are to identify, and the way the policy is implemented is affected by the types of households that are selected. Obstacles, costs and feasibility issues occur at each stage affecting the efficiency of fuel poverty policy. Therefore, designing feasible and efficient policies requires considering these possible difficulties in advance.

Deciding on a target group

Ideally, choosing precise target groups allows to deliver as much help as possible to fuel poor households. But, political and economic factors often make precise targeting unfeasible. Firstly, precise targeting lacks political support as only a very specific subset of the population would benefit. Political support is greater for policies aimed at broader, easier to identify groups. Secondly, as fuel poverty is multidimensional, choosing a target group involves simplifications, i.e. using *proxy* information (e.g. targeting households on social welfare benefits). This can result in errors of inclusion – non fuel poor households benefiting from policy – and in errors of exclusion (some households like working fuel poor who are not on benefits being excluded from assistance). At the stage of "deciding who to target", the impact on the other policy steps should be taken into account. For example, using very specific targeting has the effect of 'singling out' individual households and risks making them feel stigmatised. They may reject help if it is offered to them.

Identifying fuel poor households

Finding the fuel poor is a difficult process. As fuel poverty is linked to both incomes and energy efficiency of equipments, it is multidimensional. Therefore the fuel poor cannot be detected by using one pre-existing database. One group that is particularly difficult to find are those that spend less than 10% of their income on fuel (not classed as fuel poor), but who under-consume and live in a cold home as a result (living in *conditions* of fuel poverty, though not fulfilling the technical criteria for this term). There are three main methods of identifying target groups: *Direct identification* of fuel poor households is difficult, as there is normally no central database containing all the different types of information required to identify fuel poor households in any one EU country. Some information may not exist (e.g. energy efficiency of homes) and would require costly surveying processes to generate. Direct identification also requires the use of personal information, which raises issues of data protection and privacy. Fuel poor households may be found by identifying *areas* where households are more likely to be fuel poor (*geographic identification*). This is a more feasible approach as it uses information that has already been collected (e.g. information on incomes and housing quality collected by the government). But individual households cannot be

identified this way and many non-fuel poor households will be included in the target. Consequently, additional methods need to be used to identify individual households in the area who are actually fuel poor.

Decentralized identification transfers the responsibility of identifying target households from central government to local authorities/organizations. Fuel poor households are more likely to be identified by groups who have good knowledge of local areas and households.

Implementing measures in fuel poor households

There are also feasibility issues when delivering assistance in households. Home renovation schemes usually require technical surveys to work out the areas/equipment in the house that need upgrading. But every house is different and will require different kinds of measures to reduce fuel poverty. This increases the time and money required, both to survey the house and to complete the subsequent renovation. Complications also occur regarding how renovations are financed, as some vulnerable households may be unable to pay for some/all of the project. In addition, some householders may reject assistance because it carries a stigma or because the improvement process is noisy and intrusive. Installing measures in tenanted homes is complicated because the occupant needs permission from his/her landlord.

Fuel poverty policy in France

French fuel poverty policy illustrates the real-world experience of targeting, identification and implementation. In addition to several local initiatives to combat fuel poverty, there is one country-wide programme ("*Habiter Mieux*") that began in 2010 and involves improving the building fabric/heating system of the homes of low-income homeowners. It is managed by a national agency, but adapted locally, in cooperation with local government. Low-income homeowners living in houses were chosen as the target group for this policy, mainly because they make up the largest number of fuel poor households. This choice of targeting excludes other groups, like fuel poor tenants or people living in collective housing. However, contracts with local authorities allow them to adapt targeting according to local circumstances. So, in Paris for instance, where most people live in collective housing and where there are many fuel poor tenants, there are clauses to allow these households to access help under the scheme.

Because the programme is still in its infancy, there is no officially agreed way of identifying those households that are in fuel poverty. Local authorities are given flexibility as to how they identify the fuel poor, using local knowledge of areas and households. They may use geographic identification to locate areas where fuel poverty is more likely, and then rely on a network of different support organizations working in these local communities (e.g. home help services). Support services for example at the municipal level can also refer the households onto the scheme managers, who then co-ordinate the process of delivering the home improvements, including how the project will be financed.

4.5. Metering: EU Policy and implications for fuel poor households - Sarah Darby

Despite the introduction of 'smart' and 'advanced' meters across Europe, there is no universally agreed definition of what a smart meter is. For example, both the European Regulators' Group for Electricity and Gas, and the European Commission have adopted different definitions. A tentative generic definition is that a smart meter is "a meter offering two-way communications that measures consumption at regular intervals". The paper provides a comprehensive overview of relevant EU policy documents, namely the Energy Services Directive of 2006, Directives 2009/72/EC and 2009/73/EC, the recast Energy Performance of Buildings Directive 2010 and the European Commission Communication on smart grids 2011. Whilst EU legislation has introduced a consensual mandate for rolling out smart meters, there remains wide variation in how this roll out is taking place across Europe. For example, early smart meter rollouts in Italy, Sweden and Norway excluded in-home displays offering real time feedback to customers, whereas the UK Trial rollouts have included this feature.

Metering and fuel poverty

A meter is neutral and independent of the state of the house in which it sits. At this early stage, it is unclear what direct and indirect impacts EU smart metering policy may have on fuel poor households. However, in terms of cost, new metering infrastructure expenditure is likely to be passed onto customers in the EU, and is likely to spread evenly across the customer base on the assumption that everyone gains an equal benefit. This may be regressive. Three features of smart systems are likely to affect the ability of energy users to harness these devices in a manner that increases their opportunities for achieving affordable warmth: customer feedback, tariffing, and supplier-customer relationships.

Customer feedback

There are two ways in which smart meters can provide improved feedback on consumption. First, even the simplest smart meters can enable frequent and accurate billing, with the European Commission stating that monthly billing is sufficient. This is likely to be a major improvement for several member states, where mandatory meter readings can occur as infrequently as every two years. The introduction of smart meters will be of particular significance for those who have previously been master-metered and/or had the cost of heating and power included in their rent. Improved billing data can also lead to better written feedback to customers by means of graphics and home energy reports.

Second, feedback can be improved by connecting smart meters to in-home displays, which can be used to raise awareness of consumption, improve energy literacy, and allow customers to manage their expenditure in a more informed manner. In terms of the fuel poor, improved customer feedback can enable households to evaluate the effectiveness of new energy-saving strategies.

Tariffs for smart metering

Smart meters offer the potential to match supply (generation of energy) with demand (what energy customers want and when). A central element of this 'demand response' feature is the introduction of time-varying tariffs, through which consumption during periods of high demand or low supply is made more costly. There are three basic forms of time-varying: static time-of-use (TOU), real-time pricing (RTP) and critical peak pricing (CPP). Time varying tariffs offer fuel poor households useful opportunities for saving, including the potential for households with storage heaters and hot water tanks to provide heat storage during off-peak times, and in doing so, perhaps receive favourable tariffs. However, low-income households can also lose out under time-of-use tariffs as they may be unable to shift enough consumption to benefit financially. More refined forms of time-varying tariffs could help protect the fuel poor, especially if free basic allowances were to be combined with hybrid time-of-use and rising block tariff systems.

Smart meters also permit Utility companies to use remote activation and deactivation of supply, so that customers can be disconnected and re-connected without any need to enter their property. Here, benefits include the ability for suppliers to reconnect electricity remotely after blackouts, and in allowing easy switching between credit payment and prepayment (or pay-as-you-go) for both gas and electricity. The latter issue is particularly pertinent to fuel poor households, especially as research from the UK found that prepayment is the preferred method for low-income households. However, remote disconnection carries significant risks for fuel poor households, and legislation which ensures customer protection, especially for those most vulnerable, is becoming increasingly essential.

In terms of customer-utility relations, smart metering can alter these relations in four ways:

- New safeguards are required for data protection and privacy
- Smart meters permit utilities to activate and deactivate supply remotely, so that customers can be disconnected; safeguards are needed to protect vulnerable customers in this regard
- Direct load control can be enabled, using the meter as a communications hub through which appliances can be switched off and on for short periods of time to fit with available supply. Here too safeguards are needed
- There can be more transparent two-way traffic between utilities and prosumers (customers who produce electricity as well as using it).

Whilst the introduction of smart meters has been uncontroversial in early-adopting countries such as Italy and the Scandinavian nations, there has been legal action in the Netherlands, with concerns raised over utilities collecting detailed information about consumption. Arguments for and against utility access to detailed data, but it is unclear whether data privacy provisions will have any differential impact on the fuel poor.

Concluding Remarks – Brenda Boardman

Boardman concludes the Special Issue by considering what has been learnt, where the continuing and new challenges lie, and what policy must and must not do.

Lessons learnt

In the first instance, she considers what has been learnt regarding fuel poverty since the term first came into use in the mid-1970s. As she explains, the present UK definition of fuel poverty uses required expenditure rather than actual expenditure and covers all energy use in the home, not just space heating.

Whilst acknowledging that fuel prices and low incomes are constituent factors, Boardman stresses the importance of energy inefficiency as the real cause of fuel poverty. She argues that energy is an unusual commodity as it can only be consumed in a piece of capital equipment, such as a boiler or refrigerator, and modifying the energy efficiency of a home requires capital expenditure which, by definition, the poor do not have.

Fuel price increases will not tip the fuel poor into greater energy efficiency investments, only into negative behavioural change. Raising incomes are an important short-term policy for alleviating the worst symptoms of fuel poverty, but the best approach is ensuring a household receives all the state benefits to which it is entitled, rather than creating new subsidies. In terms of energy efficiency, a shift towards whole house standards that will fuel-poverty-proof the home, in addition to a greater focus on the electricity consumption of lights and appliances, each have much to recommend them.

Continuing and new challenges

Fuel poverty is currently high on several political agendas, both in the UK, where it has prompted a reassessment of the definition, and in other European countries, where fuel poverty is gaining new political awareness. Boardman reflects on the main challenges policymakers face.

Defining the fuel poor

Regarding the interim results of the Hills Review, the 'fuel poverty gap' is useful for combining both depth and extent of fuel poverty; however, the median fuel costs measure used in the proposed definition is problematic because it results in too few households being defined as fuel poor, often neglecting households who are likely to be in significant need. There are also concerns about the adaptability of the definition for use in well-targeted policy delivery. It remains the case that the perfect definition of fuel poverty is proving elusive, with debate over the use of an absolute or relative definition, and mis-targeting arising from the choice of a single criterion, such as age or income.

Incomes and fuel prices

Since 2004, fuel prices have risen by over 70% in real

terms, at a rate faster than energy efficiency programmes can offset. Fuel prices are likely to continue to rise, and there is an inexorable shift from progressive, tax-based policies to regressive ones, whereby levies are applied to household utility bills. Stronger Regulators are needed, equipped with powers to curb a liberalised market.

Energy efficiency

In the UK, approximately half the fuel poor live in the worst standard of housing, rated F and G on the energy performance certificate scale. Policies to improve the energy efficiency of the worst housing would enable the Government to fulfil two legal obligations; to the fuel poor under the Warm Homes and Energy conservation Act 2000, and to the mitigation of carbon dioxide emissions under the Climate Change Act 2008. However, Government remains ambiguous on whether the responsibility for energy efficiency improvements lies with the landlord or owner and occupant or tenant.

Required policy action

The UK faces considerable challenges in order to eradicate fuel poverty by 2016 and for all energy use in all homes to result in zero carbon emissions by 2050. Boardman puts forward several proposals to address these challenges.

The property owner

Boardman proposes unlocking the equity in homes by making available lifetime mortgages at zero, or close to zero interest, for the sole purpose of upgrading the energy efficiency of the property. Around two-thirds of the fuel poor in the UK own their property, often outright, but are unable to afford the capital for energy efficiency improvements. A lifetime zero interest mortgage would remove this barrier, and would only have to be paid back when the property is sold.

The local community

The scale of upgrades to the national housing stock can only be delivered with the involvement of local authorities. A core proposal would require local authorities to introduce Low Carbon Zones (LCZ) focussed on the worst housing and poorest people.

The LCZ is an area-based approach to tackle every home, on a street by street basis, upgrading to a high level of energy efficiency. Such an approach would offer substantial economies of scale, and through community and neighbourhood network involvement, would ensure that all households, even the hidden fuel poor, could be incorporated.

Electricity use

Just over half of all fuel bills pay to provide hot water, run fixed lighting and to heat the home, whilst the remaining expenditure is for the energy used in other lights and all appliances. As heating demand decreases, energy for lighting and appliances will represent a larger proportion of bills. EC driven product policies to introduce labelling and

minimum standards, whilst delivering substantial energy efficiency improvements over time, are not beneficial for the fuel poor as many cannot afford to purchase new equipment. Two solutions are possible:

- Scrappage schemes that replace old inefficient appliances in low-income households with new appliances
- Personal carbon allowances, with the possibility for the poorest households to sell part of their allowance to better-off households

Conclusions

At heart, reducing fuel poverty is about enabling people on low incomes to be warm, comfortable and healthy. They can only achieve this if they are able to purchase cheap heat and inexpensive energy services. In the developing world this is often about access to energy – for example about whether a community has a supply of electricity or not. In the developed world it is about the efficient delivery of energy services. In both cases, the underlying issue is the level of capital expenditure targeted on energy use by the poorest households.

The causes and solutions to fuel poverty have been known about for over 20 years. The complexities of accurate delivery have been identified and now the overall housing, energy and climate change policy framework has been sketched in (Boardman 2012). The penalties in terms of blighted lives and a diminished society have been confirmed and fuel poverty is recognised as a major public health issue. All the required technologies are there, though some need to become cheaper through wider take-up.

Parliament in the UK has provided the legislative framework, and the European Commission is beginning to tackle the issue. All that is now needed is for each government to introduce and deliver a comprehensive strategy to eradicate fuel poverty. There can be no justification for further delay in providing one of the most basic of human rights.

Afterword by William Baker

Consumer Focus, UK

Fuel poverty: 1991 – 2012

This booklet explores the concept of fuel poverty: what it is, what it means for people living in fuel poverty, why it is important to tackle the problem and how it is being tackled. It discusses the measurement of fuel poverty, its impact on people's lives, the links with ill health and stress and the policies required to address it. This final section aims to show how fuel poverty is linked to other policy areas, some of which represent the biggest challenges our society faces.

The first area of policy relates to Brenda's conclusion that governments must take action now to make sure that this most basic human right is met, namely the right to a warm, comfortable and healthy home. Academics are about to publish the results of the latest poverty and social exclusion survey in the UK. The methodology used by the survey for measuring poverty is used in many countries across the world and by the European Union. Essentially it uses public opinion to identify the basic necessities everybody is entitled to and then establishes how many households lack these necessities. In the UK and many other countries, a warm, dry home will either feature at the top or close to the top of the list.

This suggests that there is strong and popular support for tackling fuel poverty. And that there is potential to open up a new front in demanding the action required on the basis of human and legal rights.

The second policy area relates to anti-poverty and inequality. We need to show that the growth in fuel poverty forms part of a pernicious trend seen in many Western countries of growing poverty and inequality – a trend heightened by the austerity programmes adopted by many Western governments. In some respects, fuel poverty is a less intractable problem than poverty in general in that capital expenditure on housing can make a significant contribution to solving the problem. And while the expenditure required may seem quite substantial in countries with poor 'leaky housing', such as the UK, the amounts involved are relatively modest when compared with other big ticket items, such as the up-grading of our aging energy infrastructure.

The third policy area relates to health. In the UK, the National Health Service is undergoing major upheaval and reorganisation with many predicting a further widening of health inequalities as a result. However, the move of public health to local government in England alongside initiatives in many countries to address the wider social determinants of ill health, offers an opportunity to make the health case for tackling poor housing. This will require multi-agency approaches, use of local intelligence and the shifting of resources between health, housing, social care and other agencies.

In the past many of the great leaps forward in the general health of the population arose from, for example, investment in sewage systems, social housing and clean air. We must now argue the health case for investment in energy efficient housing, including showing how such investment will reduce the costs of providing many mainstream health and social care services. Given that many health benefits will take a long time to realise, it is important that long term planning takes place.

The fourth policy area relates to affordability. International agreements on climate change are broadly based on the principle of 'contract and converge'. This recognises that developed countries need to drastically reduce the excessive quantities of carbon they produce while developing countries need support to achieve sustainable growth. In effect it provides a framework for ensuring a more equitable distribution of carbon emissions between countries. A similar approach is required within Western countries. Affluent consumers consume far more energy than is sustainable while low income consumers often ration their already modest use of energy and suffer cold homes as a result.

We must make the transition to a low carbon energy market. However, fuel poverty and 'energy inequality' represent formidable barriers to achieving this goal. We need to construct an energy market that rewards those who are low energy users, makes sure energy is not wasted in 'leaky' homes, provides equitable access to energy services and addresses the barriers to equitable access that many consumers in vulnerable positions face.

Affordable energy services are also closely related to affordable housing in general. In the UK, rents and house prices have risen much faster than inflation while social housing is only available to a small minority. Despite its growing population, house building in the UK is at its lowest level since the second world war. Thus, affordable housing has become increasingly inaccessible to many low income households. Fuel poverty policy rightly emphasises the importance of retrofitting our existing housing stock. However, this must form part of wider policy initiatives to improve the supply of affordable housing in general.

The fourth policy area relates to economic development. The International Energy Agency is currently carrying out a major research programme on the 'non energy benefits of energy efficiency'. This includes consideration of the macro-economic benefits. Cambridge Econometrics recently carried out a study which compared investment in a major energy efficiency programme focussed on the fuel poor in the UK with other potential fiscal stimuli packages, such as investment in infrastructure projects or cuts in taxation. The study found that the energy efficiency package represented the most cost effective method of getting the economy moving again. It reduced gas imports, freed up disposable income to spend on other goods and services and created jobs – mostly in local economies – in an industry operating below capacity.

Investment in energy efficiency represents a far more cost effective way to meet low carbon goals than investment

in new generation capacity – as some countries (sadly not England) recognise. As Europe moves towards a single energy market, it is essential that ambitious energy efficiency programmes that improve all our homes but particularly those of the fuel poor form a central component of the new market.

The delivery of energy efficiency programmes is a major challenge for policy. It is clear that markets will not deliver the transformative programmes required on their own. In some parts of the UK systematic delivery on a street by street basis involving extensive community engagement and strong partnerships with trusted ‘civil society’ organisations is widely seen as the way forward. This may require us to re-think the emphasis current policy places on targeting efficiency and means-testing. These issues become less important under ambitious programmes that aim to eventually reach everyone. However, complementary non-area specific programmes are also needed to make sure help reaches priority households otherwise ‘at the back of the queue’.

The final theme relates to fuel poverty as an international issue. The UK and its constituent nations have long been heralded as having the most advanced institutional framework for tackling the problem. Scandinavian governments with their generous welfare states, egalitarian income distributions and highly advanced building standards may well have a case when they argue fuel poverty is not an issue for them. However, most Western countries, and the EU as a whole, need to make more concerted efforts. Sub-standard housing, while endemic in the UK, is also common-place in other countries. Almost all countries are facing escalating energy prices, while energy market liberalisation almost inevitably results in increased energy inequality unless Governments and regulators intervene to prevent this. And many countries are experiencing growing levels of poverty and inequality, as described above.

There are encouraging signs within the EU to address fuel poverty as part of wider energy supply and demand policies, although the links with health and housing policy are still not being made. These moves will require the development of fuel poverty related indicators. While it is extremely difficult, if not impossible, to develop a common measure of fuel poverty across EU states, the UK Government might have been in a good position to advise on developing some common or proxy metrics related to fuel poverty. It has long experience of producing fuel poverty and related housing, energy and income statistics. It is therefore disappointing that the UK Government appears intent on adopting a fuel poverty definition for England that is not only impossible to replicate in any form in other EU countries but is not even accepted by the devolved UK nations.

The UK Government also appears to be discarding all its past experience of fuel poverty policies and programmes, with its move to reliance on the market and energy companies to deliver fuel poverty programmes in England. Publicly funded grants have disappeared. We no longer have minimum standards in social housing. Area programmes are only tolerated in so far as they

are able to compete with other energy efficiency delivery methods in the market-place. And while local authorities are nominally encouraged to ‘help out’, this comes at a time when their finances have been slashed to such an extent that many are struggling to deliver even the most minimal of statutory services.

So, in terms of learning from and developing good practice across different countries, we will need to look elsewhere. Fortunately, other parts of the UK have not adopted the ‘year zero’ approach of the UK Government in England. The Scottish Government, for example, has increased public funding of grants, integrated its funding with supplier obligation programmes, set up a one stop shop referral system, given local authorities key responsibility to deliver area-based programmes and put an influential and independent fuel poverty forum in charge of review.

There are also important lessons from other countries on key constituent parts of fuel poverty policy, for example on welfare support, building standards, financing of energy efficiency programmes, progressive energy tariffs and the integration of public health and housing policy. The challenge, therefore, is to integrate these experiences to inform a common purpose while creating a framework that is flexible to accommodate local circumstances.

In conclusion, we should set a common goal across all Western countries that will allow us to say in 21 years time that fuel poverty and the acceptance of people living in cold and damp homes is truly a phenomenon of the past.

About the postgraduate authors of this booklet

Ryan Walker is a postgraduate student at the University of Ulster. He has completed an MRes and an MSc thesis, both in the area of fuel poverty. He is currently carrying out doctoral research. A consistent theme throughout his postgraduate career has been the exploration of area-based approaches to tackling fuel poverty. His primary studies have been in Environmental Sciences, where he has specialised in Geographic Information Systems (GIS). However, he has more recently collaborated with a team of psychologists at the University, with a view to using GIS tools to target fuel poverty measures towards households in greatest need. Together with Christine Liddell, he has published the results of his work in 2 scientific publications, and he is currently part of an active postgraduate group interested in finding new solutions to fuel poverty.

Harriet Thomson is a postgraduate student at the University of York. She has completed an MRes thesis in fuel poverty measurement, and is currently completing her doctoral research in the department of Social Policy and Social Work. Her postgraduate interests focus on fuel poverty within countries of the European Union, and she also researches consumer protection issues arising from energy efficiency policy. Her activities have been supported by prestigious organisations such as National Energy Action and eaga Charitable Trust. Working together with her doctoral supervisor Dr. Carolyn Snell, she recently published her first scientific publication on this topic. She is also the founder of the influential European Fuel Poverty network www.fuelpovertynetwork.eu, through which many researchers in this area are able to share their work and forge new collaborations.

