Energy Poverty in Austria and Perspectives from Social Science

Thomas Berger

Introduction

This paper will discuss the current situation and research on energy poverty in Austria, starting with approaches toward its definitions and followed by a summary of results of recent Austrian energy poverty research. To put this theoretical discussion into the context of the Austrian energy poverty situation I will also give a short historical overview of the development of the Austrian energy system. I will then present key findings of a case study carried out in the Austrian province of Styria during my year as an IAS-STS fellow. The last part of this paper will try to fathom the potential of selected perspectives from environmental sociology and science and technology studies on energy poverty and will conclude with possible future research approaches.

Definition

Energy poverty has not yet been defined consistently (especially for the Austrian context) as the further description of the theoretical foundations will show, but it can be generally understood as the financial inability to afford adequate energy services (electricity, warmth and other forms of energy use) in a private household. Energy poverty is therefore generally found in low-income or socially vulnerable households. The term 'energy services' includes all forms of energy that are consumed in the private home. All other forms of energy consumed outside a private household (e.g. for mobility) are excluded.

Only two European countries (United Kingdom and Ireland) have an official definition of energy poverty.[1] Those definitions mainly refer to the monthly expenditure for heating and tend to exclude other forms

of energy use in the household (Morgan 2008). The issue and public perception of the inability to pay monthly energy bills by a significant part of the British population originated in the oil crisis in the 1970s. The main causes were the dramatic increase in fossil fuel prices and a change in the billing policies for homes by the energy utilities that led to cash flow problems of the residents (Boardman 1991).

Boardman (1991) understands energy poverty as a combination of low income, energy affordability and energy efficiency. Energy poverty thus consists of three dimensions that are connected, but can also be understood as separate issues. These dimensions are the general problem of income poverty (1), the disproportional expenditure for energy services and the ever rising prices of (especially fossil based) energy (2) and also behavioural aspects of energy use in the private home (3). The first dimension (income poverty) focuses on the socio-economic structure of a society. Energy efficiency is crucial for energy consumption in the private home (dimension three) and is therefore influenced by the building infrastructure (insulation and heating system) and the energy efficiency of white goods. The energy efficient behaviour of tenants is influenced by their general information on the subject, the embeddedness of energy use in daily practices (see also Shove 2003) and their individual ability to act (this ability can be hindered by social, physical and psychological circumstances).

An essential point is Boardman's argument for the characteristic of energy poverty as a unique and legitimate social problem. Energy poverty is often only seen as a by-product of general income poverty, but is primarily rooted in the inability to change or improve energy efficiency. This situation cannot be changed by an increase of wages alone:

> Fuel poverty is different from poverty. General poverty can be reduced through additional income support, but the most effective way to lessen fuel poverty is through capital investment. It is the crucial role of capital stocks – the house, heating system and other energy using equipment – in causing fuel poverty that determines the need for policies that are specific to the problem. A home is energy inefficient, because of a lack of investment and improvement. The occupants, therefore, have to buy expensive warmth and other energy services – they have to pay more to keep warm than people in homes where there has been a higher level on investment in energy efficiency measures. (Boardman 1991, 221)

According to Boardman's understanding a household is energy poor when the monthly expenditure for all energy services exceeds ten percent of the overall household budget (Boardman 2010). This '10 % definition' is broadly operationalized among policy and decision makers as well as the research community concerned and it can be seen as the classic approach. There still remain significant challenges for the 10 % definition. For example there is as yet no understanding on the duration of energy poverty – does the inability to pay for energy in one month or in one year qualify to be labelled as energy poor? Since there is no specific statistical data to prove or investigate this definition for the Austrian context, the 10 % definition will represent a basis for discussion rather than an analytical framework. There exist also other quantitative approaches to define energy poverty that will not be further discussed in this paper. One approach focuses on the adequate level of warmth in the living area (between 18-21°C according to standards of the World Health Organization (WHO 2007)); another approach is based on statistical indicators (Healy 2004). In his analysis of energy poverty in Eastern Europe Stefan Buzar defines energy poverty '*as the inability to heat the home up to a socially- and materially-necessitated level*' (Buzar 2007, 9). I will use a qualitative definition of energy poverty for this paper in alignment with Buzar's approach that includes all kinds of energy services in the private home: *energy poverty is the inability to afford adequate energy services in respect to socially- and materially necessitated levels*. This definition thus respects the subjective wellbeing of members of a specific household and also includes minimal standards of warmth and lighting. Furthermore it can be operationalized without the lacking statistical data for the Austrian context.

Energy poverty in Austria

The concept of energy poverty originated in the United Kingdom (UK) during the oil crisis of the 1970s and therefore the first conceptualizations and research activities emerged in the area of the UK. The research of the past two decades has dealt mostly with the desideratum for a consistent definition, quantitative analysis of the problem, policy strategies and

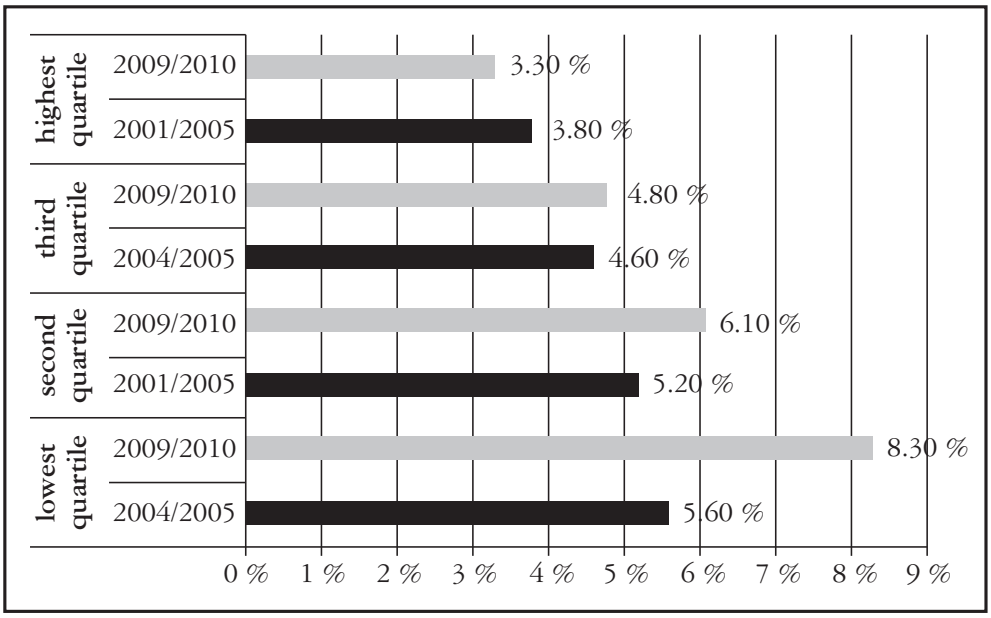
approaches to tackle the issue on the household level. Despite all this research activity in the UK it is a relatively new topic in the Austrian scientific community. The first report on energy poverty in Austria was published in 2009 (Proidl 2009). Since then research has mostly been embedded in applied programmes to increase the energy efficiency of low-income or socially vulnerable households. Furthermore, a series of programmes that focused specifically on energy counselling for vulnerable households was launched. Long-term effects of such initiatives remain to be evaluated. An increase in scientific activity can also be observed in the last three years. The main target of several research projects was to analyse energy efficiency and the individual energy lifestyle of low-income households. Qualitative research was carried out to understand the consequences, effects and coping mechanisms of energy poor homes.

Due to the lack of an official definition of energy poverty in Austria the national statistical agency does not provide specific data on the issue. The subject of energy poverty is still rarely discussed and is not perceived as a standalone social problem in the public discourse. But the issue of ever rising prices for energy services is of increasing importance. The German term '*Energiearmut*' (a literal translation of 'energy poverty') is hardly ever used in public media or in policy discourses, but the development of energy prices and rising income poverty are regular topics of news coverage. The issue of affordable warmth tends to become relevant at the start of the heating season and during cold spells. It is brought to the public mostly by campaigning social welfare NGOs. Subsidies for heating do exist, but vary from province to province due to Austria's federal system. Few utilities provide special social tariffs for vulnerable customers and such provisions must be seen as exceptions. To amplify the recognition of energy poverty as a genuine social problem in the future a national definition must be established and more comprehensive quantitative and structural data must be gathered (Getzinger & Berger 2011).

Rising fuel prices, energy inefficient housing and increasing income poverty are the main drivers of energy poverty in Austria. About one million of the 8.4 million citizens or 12 % of the population are at risk of income poverty (Statistik Austria 2011a). The annual change in the poverty rate due to OECD calculations is + 2.7 %, which is one of the highest growing

rates for poverty in the OECD (OECD 2011). The EU-SILC survey (survey on income and living conditions) for the year 2010 showed that about 4 % (313,000 citizens) of the Austrian population were not able to heat their living space to an adequate level (BMASK 2011). The latest published study on household consumption in Austria shows a serious negative development for low-income households (see also Figure 1). From 2004 to 2005 the lowest income quartile used 5.6 % of its budget for energy. In the current study focusing on the period between 2009 and 2010 the lowest income quartile already spent 8.3 % of its budget for energy services. In contrast to this development, the monthly expenditure of the richest household quartile dropped from 3.8 % (2004/2005) to 3.3 % (2009/2010) (AK Oberösterreich 2011; Statistik Austria 2011b). This trend can also be observed in the European Quality of Life Survey (EQLS) 2007, where 3.7 % of the population answered that they are unable to afford adequate heating in the living area. The lowest income quartile was above average at 6.7 % (EQLS 2009).

Figure 1. Development of monthly household energy expenditure 2004/2005 vs. 2009/2010 by income quartile (AK Oberösterreich 2011; Statistik Austria 2011b, modified by author)



For the context of this paper it is important to note that the consumption of energy, or specifically of electricity cannot be judged as a direct factor for the quality of life in the so-called developed countries *per se*. Mazur analysed the historical period between 1980 and 2006 concerning life expectancy and electricity consumption. Mazur found no statistical evidence that an increased consumption of energy above average daily requirements has any significant influence on the improvement of quality of life in the 21 highest developed countries. He finally concludes that arguments by governments that link the *increase* of energy production and quality of life are simply wrong (Mazur 2011). On the contrary, the *lack* or the individual inability to afford basic energy services can have tremendous effects on the health of the energy poor concerned. The negative consequences of energy poverty range from an increased risk of long-term illnesses to psychological problems. Cold and moisture in the dwelling space favour respiratory illnesses, which pose a serious health risk, especially for older people. An energy deprived lifestyle can lead to permanent neuroses and social isolation (EFPEE 2007). According to Liddell and Morris there are various proven and implicit health related issues concerning energy poverty. Inadequate room temperature can lead to physiological and psychological deterioration. There is sufficient medical proof for the connection of room temperature and physical health of infants and children and psychological problems in adults and the elderly (Liddell & Morris 2010). For example, the estimated annual cost to the British public health services as a result of inefficient insulation in private households is about 145 million pounds (Mason & Roys 2012). The lack of proper heating in private homes can also cause damage to the dwelling itself (EFPEE 2007).

The development of the Austrian energy system and modern forms of housing

Compared to the development of the British energy system Austria can be classified as a latecomer. For example, when coal started to replace wood as the primary source of energy during the 1850s in Austria (at the time

of the former Austro-Hungarian Empire), the United Kingdom already obtained more than 50 % of its primary energy demand from coal. Coal was then replaced by fossil oil and gas as the primary energy source between 1950 and 1975. In the same period the Austrian energy turnover doubled due to the post-war industrialization process and the increase in private energy consumption (Plackner 2010; Sieferle 2006). In conjunction with the general historical evolution of the energy system, the development of modern forms of housing is another important factor for the understanding of energy poverty, mainly in urban and sub-urban areas. The accelerating division of labour, the process of urbanization and the increase in private consumption led to new private forms and desires of living. The standardization of housing and related products must therefore be seen in the context of this co-evolution. Häußermann et al. state that the home also became a place of social distinction, because the abilities to increase the standard of living are bound to socio-economic factors (Häußermann et al. 2000). Thus, the social status of a person or family influences the quality of the housing conditions significantly (Hradil 2005).

The post-World War Two liberalization of the European energy system can be divided into two historical phases: the first one ranging from the 1950s to the 1960s and the post-1985 era. The first phase focused on a reduction of the legal and infrastructural boundaries to transmit energy between EU countries. These efforts must also be seen in the context of the rebuilding of the war-torn European countries. The second phase introduced a legal framework for the founding of private energy companies as well as rules for competition among private entities and marked the beginning of the end of national energy monopolies (Lagendijk 2011). The liberalization of the Austrian energy system started in 1998 when the legal foundation for the unbundling and commercialization process was laid. Since 2001 private customers have been free to choose their suppliers. In the same year the Austrian energy control agency (E-Control) was founded in order to foster market transparency (e.g. regulations for energy billing) and to regulate and improve legislation. E-Control was one of the first agencies of its kind in the European Union (EU). Bozem states that the structures of the Austrian utilities did not change significantly due to liberalization. The former state owned utilities are still bound to

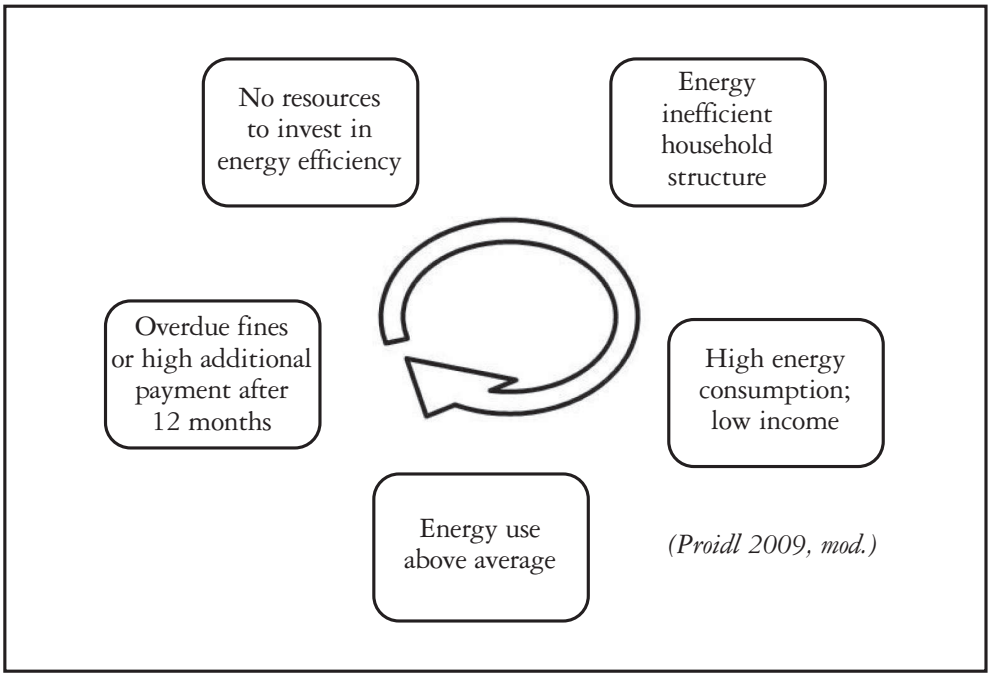
their traditional regional markets and consumers have shown little interest in switching their providers (only 1.7 % switched in 2010 (E-Control 2011)). There is little foreign activity and the new private entities are mostly publicly owned or at least controlled by blocking minorities (Bozem 2007).

Only one consistent (quantitative) long-term study on the connection between the liberalization (vertical disintegration or unbundling) of the European energy system and its consequences for the low-income consumers exists at the present time. The authors analysed data of the European Community Household Panel (ECHP) and the European Survey on Income and Living Conditions survey (EU-SILC) and combined it with data on the liberalization process between 1994 and 2001. One key factor to prevent negative price developments was found to be effective competition. Poggi and Florio state that the connection between deprivation (i.e. energy poverty in this context) and liberalization is hard to detect and further analysis is needed, but that there is a clear connection between 'decreasing vertical integration in the electricity sector and reducing public ownership' and the probability to experience energy poverty in the timeframe involved (Poggi & Florio 2011). The study however does not provide specific data on Austria.

Current research in Austria

The term 'energy poverty' emerged in the Austrian research community in 2009 when the first study about energy consumption in low-income households was published. The financial inability of income poor households to increase their energy efficiency was one of the main findings of the report and was described as a vicious circle that cannot be broken on the individual household level. Due to their inadequate financial situation and the low standard of their houses or flats the energy consumption in these households is disproportionally high. This increased energy consumption culminates in the inability to pay energy bills and often leads to additional fines by the energy utilities. Hence, this financial situation keeps perpetuating itself because of the inability of the poor households to change their situations in any substantial way. External financial support or non-cash benefits are needed to increase their energy efficiency (Proidl 2009).

Figure 2. The vicious circle of energy poverty in Austrian households.



Since then research has focused mainly on energy consumption on the household level and a systematic analysis of energy poverty in Austria still remains a research desiderate. A recently finished qualitative study on the energy lifestyle of income poor households in Vienna came to the following conclusions: income poor households have a very limited potential to increase the energy efficiency of their homes; they already live in financial scarcity and do not waste energy intentionally; the landlord-tenant dilemma[2] also prevents improvements in energy efficiency (installation of new windows or other measures to improve insulation) (Brunner et al. 2011).

Besides the described research efforts to understand energy poverty, several applied initiatives to increase the energy efficiency of low-income households were launched. These programmes mainly involved a combination of financial support with obligatory energy consulting to increase the energy efficiency on the behavioural level (some included the replacement

of old white goods with new energy efficient ones). Until now no study exists on the long-term effects of such counselling based programmes.

In 2011 the Austrian Climate and Energy Fund recognized energy poverty as a standalone research desiderate for the first time. The respective research call included a project to optimize energy consulting for low-income households and the potential of information and communication technologies (ICT) to reduce energy poverty. Both topics targeted the individual or behavioural dimension and underline the current individualistic research agenda on energy poverty in Austria. According to E-control the current year 2012 will bring several legislative changes for utilities concerning the management of customers with financial difficulties. Utilities will be obligated to document and publish service disconnections of private customers on an annual basis. These new legislative requirements for customer relations will have a positive effect on the availability of statistical data required to understand energy poverty (but have not yet been officially published). Furthermore, fines for the disconnection of households and the installation of prepayment meters will be harmonized.

Case study in Styria

The first study on the situation of energy poverty in the Austrian province of Styria showed that the issue has not yet been properly perceived by public or private institutions and organizations (this observation can be generalized for most parts of Austria), but the consequences of it can be observed in the daily business of social workers, utilities (customer management and relations) or social welfare NGOs. The study included a review of the current literature and statistical material and an interview series (semi-structured) with experts (energy utilities, social workers, energy agencies and social welfare NGOs). The study shows that energy poverty, as a combination of low income, rising energy prices, the lack of energy efficiency and rising energy consumption is highly individualized and is primarily seen as a problem of consumption behaviour. As the key findings show, the systemic background of energy poverty still plays a minor role:

- The term 'energy poverty' is not used in the working contexts of the experts interviewed. However, the symptoms of energy poverty (inability to pay bills, disconnection or installation of prepayment meters) do play an increasing role in the daily work of social workers, NGOs and energy utilities. The lack of appropriate terminology thus substantially limits the perspectives on the future development or potential mitigation of energy poverty in Styria.
- The lack of official statistics on the Styrian level concerning the issue led to reluctant statements by the experts to characterize the energy poor groups or the quantitative extent of the problem. Their statements are thus inconsistent, but the 'classic' income-poor social groups also seem to be the most vulnerable social groups in Styria: single parent families, seniors and persons with a migration background.
- Sickness, depression, deteriorating social inclusion and long-term unemployment are social and psychological factors that hinder social workers' efforts to improve the living conditions of their clients. These negative social circumstances also diminish the potential for more efficient energy consumption in the household.
- Energy utilities play a key role in the energy poverty discourse and tend to be the scapegoats in local media reports when the affordability of the ever rising energy prices is discussed. The representatives of utilities emphasized the structural reasons of energy poverty and see themselves as actors in a systemic problem and their institutional limitations to act on the matter. Disconnections and the installation of prepayment meters are legal options for Austrian utilities. The quantitative extent of the implementation of these measures in Styria is still unknown.

Furthermore, the representatives of the two largest Styrian energy utilities made consistent statements that the unbundling process induced by the liberalization of the Austrian energy system had major implications for customer relations and the handling of 'problematic' cases. These changes range from the reorganization and acceleration of the dunning process, growing numbers of prepayment meters and disconnections of indebted

households to a new corporate understanding of energy as a product of private consumption. The prepayment meter can also be seen as a symbol of liberalization and its implication for low-income households. It is a technological device that prevents a total disconnection from the distribution grid and forces customers to more or less disconnect themselves in times of financial distress.

The largest utility of the Styrian capital Graz had about 200 prepayment meters installed at the time of the interview series conducted in 2011. This is a relatively small number compared to the deployment of prepayment meters in the UK (see Brutscher 2012), but due to growing social hardship among low-income households the utilization of prepayment meters is increasing. These meters are a measure to keep indebted households connected to the supply grid and create a reliable method for the repayment of the debt and are usually removed after the debt is paid. The charging of the costs for the installation and removal of the meters remain a topic of heated discussion (the harmonization of prepayment meter fees among Austrian utilities is still in progress). Social welfare NGOs criticize that in some cases up to 50 percent of the amounts paid are used for debt repayment, which creates additional financial pressure on already struggling households. People living in rural areas face additional difficulties as the smart cards can only be topped up in the field offices of the utilities. Additionally there are signs that prepayment meters might have negative psychological consequences on their users, but the psychological dimension of their usage is still lacking consistent and thorough research.

Perspectives from environmental sociology and science and technology studies

In the final section of this paper I will discuss the research presented on energy poverty from some selected viewpoints of social science. My aim is to try to develop the first steps of a sociological approach towards energy poverty that differs from the common individualistic perspectives that see the problem mainly as linked to consumption patterns and the develop-

ment of energy prices. The focus of current research (as important as it is to reduce energy poverty on a practical municipal level) is mainly targeted at identifying the vulnerable consumers (in conjunction with the modification of the energy poverty definition) and policy approaches to tackle the problem. From my point of view there is still a lack of analysis that sets energy poverty into a larger perspective. Until now sociological research, as depicted previously, was invested in the energy deprived lifestyles and coping strategies of energy-poor households and energy policies. The systemic roots that constitute energy poverty (e.g. in Austria) are still not sufficiently researched. I will thus explore the potentials of environmental sociology and science and technology studies (STS) to enhance the understanding of energy poverty as a social problem by discussing certain theoretical implications of these sub-disciplines in conjunction with the results shown earlier.

Since the founding of environmental sociology, various perspectives on the connection between social processes and the environment have been developed (e.g. the sociology of risk by Ulrich Beck or sociological research on people's attitudes toward environmental issues like global warming), but a broadly accepted theory on the linkages of environmental processes with social inequality (a perspective that is essential when dealing with energy poverty) is still not fully developed. In recent years the movement for environmental justice also had some influence on German environmental sociology. This theoretical perspective originated from critical US movements concerned with the unequal distribution of environmental hazards on marginalized social groups. Contemporary environmental sociology (I will mainly refer to the German discourse) faced the problem of the connection of the traditional exclusion of physical or environmental processes when describing or researching their influences on modern societies. In the German speaking realm this sociological subdiscipline is relatively new and began to form at the beginning of the 1990s, building on theoretical streams that developed in the 1970s primarily in the United States. Groß summarizes the development and the different theoretical approaches of contemporary environmental sociology and sees great potential in the combination of environmental sociology in interdisciplinary research. The challenges of global environmental change and

global developments can only be understood and shifted through a combined scientific effort by different disciplines. The concept of environmental justice would appear to be valuable for the social implications of environmental change, but is still theoretically underdeveloped (Groß 2010; Heinrichs et al. 2007).

Heinrichs et al. explore the common ground of social inequality and the perspective of the interaction of societies and the environment through the historical development of environmental sociology. The authors discuss the connection of inequality and environmental conditions through the frameworks of environmental justice and then shape the term 'socio-ecological inequality' to discuss the underlying questions by modifying a classic definition by Hradil to define social inequality for this purpose (Heinrichs et al. 2004):

> Social inequality exists when certain people of a society regularly receive more 'valuable goods' than others because of their position in the social structure. (Hradil 2005, trans. by author)

Heinrichs et al. therefore frame socio-ecological inequality as follows:

> The socio-ecological structures shape the life chances and risks of people. The unequal distribution of social positions and thereby socio-ecological circumstances [...] as well as the particular situation of access to distribution of goods, juridical procedures and provision determine the environmental benefits and environmental damage or environmental opportunities and risks for persons. (Heinrichs & Groß 2010, trans. by author)

This modification and extension of Hradil's definition forms a basis for a connection of energy poverty and the social inequality discourse. In conclusion, Heinrichs et al. urge that the institutionalized streams of environmental sociology should consider the classic paradigms of inequality research. Certain social groups are impeded in accessing the resources necessary to establish energy efficiency in the private home. Low-income households are thereby systematically excluded from publicly funded schemes to encourage the introduction of photovoltaic technologies or to improve thermal insulation. Such funding schemes are mainly targeting

financially capable middle-class households, because they only offer a certain percentage of co-funding for the installation of photovoltaic panels or the upgrading of thermal insulation.

Kraemer argues against Beck's thesis that the former classic conflicts of the social classes of industrialized nations are replaced by new universal risks (such as global warming, environmental pollution, etc.) that pose a threat to every world citizen whether he or she is poor or rich. Kraemer states that Beck is undervaluing the importance of social inequality that still exists or is even newly on the rise in all global societies by over-emphasizing the global equalizing effects of greenhouse gas emissions (Kraemer 1999). He also argues that the courses of life are always in alignment with a person's individual resources (financial or social capital, health, etc.) and shape their opportunities to acquire a certain standard of living (for example energy efficiency). Kraemer tries to solve the classic sociological dilemma of explaining social phenomena only through social facts by defining the 'use' of nature as a social act. Humanity uses nature as a source (e.g. fossil resources), a sink (e.g. the pollution of the atmosphere) and in terms of space (e.g. farming). Kraemer also adds the symbolic 'use' or instrumentalization of the environment in terms of symbolic and thereby social acting. Kraemer's notion of the inability to participate in technologies to reduce environmental consequences is essential in the context of energy poverty. There are several environmentally unfriendly consequences of energy poverty. The energy poor are obliged to consume more energy to achieve an adequate level of warmth in their homes, which results in higher CO2 emissions. The energy poor must stick to the cheapest tariffs possible and cannot afford utilities that provide green(er) energy. They lack the financial possibility for replacing outdated energy inefficient electronic equipment. Research on the energy lifestyles of energy poor people in Vienna has shown that the persons concerned are very much aware of their energy and financially deprived living situation, but lack the financial leverage to change it. The shape of the environmental burden caused by poverty is a key question of the future, even in the so-called industrialized countries of this world. Energy poverty, according to Kraemer, can be an example for environmental and social justice research (Kraemer 2007; 2008; 2011).

Another approach to decipher the underlying social dynamics of energy poverty is to analyse its embeddedness into daily routines of energy consumption. Shove makes a strong case for a better understanding of our daily (energy demanding) practices that play a major part in our current system of energy consumption and therefore in CO2 emissions. One of her main arguments is that contemporary policy strategies mainly focus on the behavioural change of consumption patterns. She calls this approach, which is found in most UK policy papers, 'ABC' (attitude – behaviour – change). This point of view is rooted in psychological behaviourism and follows the notion that more or better information and education induce people to change their behavioural patterns. This paradigm is, according to the author, insufficient to understand and target the systemic reasons of ever growing energy demand. A lot of factors that frame our daily routines are not within the range that can be changed by individual consumers. For example, energy poor households have little or no influence on the quality of insulation of rented flats or on the efficiency of household equipment. Practices are bound to institutional and legislative change and are not to be understood as individual spheres of influence. Policy makers need to shape energy consumption and relevant policies in a more holistic or systematic manner and not focus on individual decision making alone (Shove 2010).

In alignment with the critique of the dominant ABC perspective in current policies, Berker states that the use of energy in private households is influenced by three major dimensions: the socio-economic circumstances of the household (1); the cultural embeddedness or lifestyles of the persons; and thirdly the socio-technical configuration of private energy usage (3). Berker argues that the socio-technical dimension of domestic energy consumption is a relatively neglected area in contemporary research, and agendas to boost energy saving potentials in private homes. Current approaches (as depicted previously by Shove) promote educative information to change consumer behaviour. There is an underlying dynamic between the usage of energy, the daily routines performed and the development of the household technologies used for these routines. So-called irrational energy consumption patterns or the waste of energy therefore has an incorporated logic that makes these practices plausible

and unquestioned in the mind of the consumer; for example, cultural standards of comfort that will be sustained regardless of their energy wastefulness. Berker is critical of the possibility to rapidly change the framework of modern energy usage on a structural level, but sees potential in acting within emerging socio-technical trends and not against them. According to Berker, more energy intensive standards of living are to be expected in the future, because of their rapid normative adaptation to expectations about ways of living. Energy efficiency therefore needs to be integrated in the ever accelerating dynamics of modern daily life. An example by the author is to make use of the trend to more modular systems that can be individually calibrated. Heating systems could be arranged in a way that individual apartments could replace their source of heating. The heating system of houses is structurally pre-defined at the present time and the private household owners have little influence on the arrangement of the system itself (e.g. the tenant-landlord dilemma). Energy efficiency could be 'sneaked' into this kind of development for more individual customization (Berker 2008).

The approaches illustrated in this section of the paper show two possible perspectives on energy poverty that could add essential aspects to its understanding beyond current research approaches. The first one highlighted the combination of social inequality and the hindrances to influence the energy efficiency of poor households on a macro level that emerge with it. Secondly, the perspective of science and technology studies showed how the daily patterns of energy usage or consumption cannot be understood from an individualistic point of view alone.

Synthesis

Contrary to the origin of environmental justice, it is not the unequal exposure to industrial pollution we are faced with when dealing with energy poverty. We are faced with a complex social situation that is rooted in various (generally separately discussed) issues. The issue of the built environment and different unevenly distributed living or housing conditions among citizens must be taken into account. Low-income house-

holds find themselves in a difficult situation balanced between the part of their scarce budget they need to spend on energy services and the part of their budget they can spend on other requirements. The general discussion on the affordability of energy or the general right of a basic energy provision is in alignment with the issue of disconnection of indebted private households. Two macro-developments must be considered for the Austrian energy poverty situation, which were highlighted in the Styrian case study: on the one hand the privatization of the Austrian energy market, which changed the management of clients and on the other hand the growing number of vulnerable households in general. In my view the rise of energy poverty is partly rooted in the transition of modern energy systems and the stratification of housing and income conditions. The challenge is to connect different aspects of an interdisciplinary problem. Energy poverty is embedded in the development of socio-technical urban, suburban and rural configurations. The privatization of public energy utilities in Austria took place over the past two decades and its effects and connection to the rise of energy poverty have not yet been consistently analysed.

Two developments of sociological interest took place in the historical timeframe of energy market liberalisation. The first is the increasing social problem of income poverty and the growing number of vulnerable households in Austria (as shown by the previous statistical overview). And secondly, technologies were developed or introduced that allowed new forms or more direct management of consumers that struggled to pay their monthly energy bills. As illustrated above, the technology of electronic prepayment meters offers chances for new forms of management but also creates barriers for consumers (Coutard & Guy 2007). Technologies do not always lead to the expected effects that were intended by their introduction. For example, Cupples describes the strategies of resistance that emerged from liberalization and unbundling reforms that started in the 1990s in Nicaragua. The utilities were mostly divided into distribution, transmission and generation companies. Cupples analysed the unintended effects of new billing forms and strategies that were initially designed to generate more profit. By using an actor-network approach she shows how the newly installed meters and energy bills are instrumenta-

lized by organized protestors to form resistance. She concludes that newly introduced technologies originally intended to have more control over the customers can be neutralized or turned around to foster protest against liberalization measures (Cupples 2011).

Energy systems are socio-technical configurations where technologies, institutional arrangements (e.g. regulation, norms), social practices and actor constellations (such as user–producer relations and interactions, intermediary organizations or public authorities) mutually depend on each other, and are embedded in broader contexts of cultural values and socio-economic trends (globalization, individualization, etc.) (Rohracher 2007).

> Institutional change and the emergence of new technologies and their practical applications develop in a socio-technical process of co-evolution. For example, the process of unbundling of the former monopolistic energy corporations would not have been possible without a massive investment in new software management systems that allowed in-time management of different economic actors and consumers. (Rohracher 2008)

This configuration of socio-technical change is a reciprocal process. Political actors, institutions and new technological possibilities of client management form a configuration of socio-technical co-evolution. New metering technologies enabled utilities to manage customers with cash flow problems, an aspect that was not initially intended. The development of modern customer relationships is thus also influenced or even driven by new technological applications. Energy poverty can only be fully understood by an analysis of the connection between technologies, actors and institutions. As Rohracher (2007) illustrates, the new horizontal management paradigm and legal changes of the liberalized energy system allowed the forming of new customer relations and even the beginning of various forms of decentralized micro-generation of power. The new possibilities offered by liberalization and the emergence of new technologies, however, do not enable all groups in society to participate equally. For example, alternative decentralized technologies of power generation can only hope to be an effective measure against energy poverty if vulnerable groups get external support (i.e. financial investment by the public sector) (Walker

2008). A successful participation of all social groups in the transition to a low- or non-carbon based energy system needs to consider the problem of financial barriers that also hinder energy poor households to increase their energy efficiency. Kraemer, as presented in the previous section, outlines how low-income households in a precarious financial situation are excluded from the possibilities to increase their energy efficiency, reduce their carbon footprint or participate in innovative concepts of decentralized energy generation. There is a systematic exclusion of low-income households to participate in the general transformation towards a sustainable and renewable future and the reduction of greenhouse gas emission. (Kraemer 2007; 2011). In the discussion about the change of our current energy system into a more sustainable one, the social component (or social sustainability) of such an approach must not be excluded. One of the key factors is the active inclusion of low-income households in this process. Saunders et al. identified community involvement, sharing of information and financial incentives in combination with low interest rates as the most important factors to include vulnerable households in such transformation processes (Saunders et al. 2012). The growing problem of energy poverty in Austria described hinders or even counteracts successful transformations of this kind.

Energy poverty is a good example of how to analyse the connection between the social stratification of a society, environmental performances of different social groups and the implementation or instrumentalization of new technologies by various actors. Energy poverty shows the complexity and linkages between social and environmental processes and also the inability or difficulties to deal with them in their traditional or classic institutional settings. It also incorporates all three pillars of sustainability and illustrates that a holistic solution is needed to overcome the problem in the long run. Neither policy action nor individual behavioural changes of consumption will eradicate the risk of becoming energy poor alone.

New meter technology in the process of energy liberalization can influence the energy situation of poor homes. The prepayment meter is an interesting example for following the historical and current developments of modern energy systems. They have a long history that started at the end of the 19th century when they were used in the delivery systems

for gas and electricity (Vaughen 1911). The technology still serves the same purpose and saw a rise in utilization by energy companies in recent years, hence leading to a much more effective management of clients who face problems in paying their bills. It is my aim to go deeper in the analysis of the liberalization of the Austrian energy system, the organizational changes of the utilities and the implementation of new management tools for 'troublesome' customers. This paper is a first outlook where this research might go and where the potentials lie for an approach that is not oriented to the individual energy performance of the private household, but sets the energy poor household in the context of a framework consisting of the development of the built infrastructure, development of the energy system, the fossil regime of energy provision, and liberal/individualistic policies in order to change their energy behaviour.

Notes

[1] In this paper the term 'energy poverty' is used instead of 'fuel poverty' (which is the common term in the United Kingdom), because it is a direct translation from its German counterpart, has a more holistic meaning and considers all forms of energy services that are consumed in the private household.

[2] Neither the tenant nor the landlord is interested in investing in the thermal structure of the private home. The wasted energy for heating due to bad insulation does not affect the landlord financially and the tenant has no incentive to improve the structural living conditions by installing, for example, new window frames.

References

AK Oberösterreich (2011), 'Energiearmut: In immer mehr Haushalten fehlt das Geld für Strom und Heizung!' *http://www.arbeiterkammer.com/bilder/d154/PKU_Energiearmut_Juli2011.pdf, 21.11.2011*.

Berker, Thomas (2008), 'Energienutzung im Heim als eine sozio-technische Praxis. Untersuchungsergebnisse, Trends und Strategien', in Fischer, Corinna (Ed.), *Stromsparen im Haushalt. Trends, Einsparpotentiale und neue Instrumente für eine nachhaltige Energiewirtschaft*, München: oekom Verlag.

BMASK (2011), 'Armuts- und Ausgrenzungsgefährdung in Österreich Ergebnisse aus EU-SILC 2010. Tabellenband', *http://www.statistik.at/web_de/static/tabellenband_zu_eu-silc_2010._armuts-_und_ausgrenzungsgefaehrdung_in_oeste_060385.pdf*, *02.02.2012*.

Boardman, Brenda (1991), *Fuel Poverty. From Cold Homes to Affordable Warmth*, London/New York: Belhaven Press.

Boardman, Brenda (2010), *Fixing Fuel Poverty. Challenges and Solutions*, London: Earthscan.

Brunner, Karl-Michael, Spitzer, Markus and Christanell, Anja (2011), 'Energiekonsum und Armut', in Mikl-Horke, Gertraude (Ed.), *Sozioökonomie: Die Rückkehr der Wirtschaft in die Gesellschaft*, Marburg: Metropolis-Verlag.

Brutscher, Philipp-Bastian (2012), 'Self-disconnection among pre-payment customers – A behavioural analysis', Cambridege Working Paper in Economics. *http://www.dspace.cam.ac.uk/handle/1810/242214, 23.10.2012*.

Buzar, Stefan (2007), *Energy Poverty in Eastern Europe. Hidden Geographies of Deprivation*, Hampshire: Ashgate.

Coutard, Olivier and Guy, Simon (2007), 'STS and the city politics and practices of hope', *Science, Technology & Human Values* 32 (6): 713–734.

Cupples, Julie (2011), 'Shifting networks of power in Nicaragua: Relational materialisms in the consumption of privatized electricity', *Annals of the Association of American Geographers* 101 (4): 939–948.

EFPEE (2007), 'Diagnosis of causes and consequences of fuel poverty in Belgium, France, Italy, Spain and United Kingdom', *http://www.fuel-poverty.org/documents.htm, 12.01.2011*.

EQLS (2009), 'European Quality of Life Survey 2007 – Mapping the results', *http://www.eurofound.europa.eu/areas/qualityoflife/eqls/eqls2007/2eqls_07_08.htm, 15.11.2011*.

Getzinger, Günter and Berger, Thomas (2011), 'Energiearmut: Ursachen, Folgen und Wege zu ihrer Bekämpfung', in Steiermark, Landesenergieverein (Ed.), *Heading towards a sustainable energy future. A summary of scientific papers in memoriam Manfred Heindler*, Graz.

Groß, Matthias (2010), 'Umweltsoziologie', in Kneer, Georg and Schroer, Markus (Eds.), *Handbuch Spezielle Soziologien*, Wiesbaden: VS Verlag für Sozialwissenschaften.

Healy, Jonathan D. (2004), *Housing, fuel poverty, and health: a pan-European analysis*, Hempshire: Ashgate.

Heinrichs, Harald, Agyeman, Julian and Groß, Matthias (2004), 'Die Umweltsoziologie und das Thema der sozial-ökologischen Ungleichheit', in Bolte, Gabriele and Mielck, Andreas (Eds.), *Umweltgerechtigkeit. Die soziale Verteilung von Umweltbelastungen*, München: Juventa.

Heinrichs, Harald and Groß, Matthias (2010), 'Introduction: New trends and inter disciplinary challenges in environmental sociology', in Heinrichs, Harald and Groß, Matthias (Eds.), *Environmental Sociology. European Perspectives and Interdisciplinary Challenges*, Heidelberg/London/New York: Springer.

Heinrichs, Harald, Groß, Matthias and Lange, Hellmuth (2007), 'Umweltsoziologie vor neuen Aufgaben. Sektion Soziologie und Ökologie', *Soziologie* 36 (2): 202–207.

Hradil, Stefan (2005), *Soziale Ungleichheit in Deutschland*, Wiesbaden: VS Verlag.

Kraemer, Klaus (1999), 'Globale Gefahrengemeinde? Ulrich Becks Nivellierungsthese und die Verteilungsrelevanz der globalen Umweltnutzung', in Rademacher, Claudia, Schroer, Markus and Wiechens, Peter (Eds.), *Spiel ohne Grenzen? Ambivallenzen der Globalisierung*, Opladen/Wiesbaden: Westdeutscher Verlag.

Kraemer, Klaus (2007), 'Umwelt und soziale Ungleichheit', *Leviathan* 35 (3): 348–372.

Kraemer, Klaus (2008), *Die soziale Konstitution der Umwelt*, Wiesbaden: VS Verlag für Sozialwissenschaften.

Kraemer, Klaus (2011), 'Prekärer Wohlstand und nachhaltiger Konsum', *Österreichische Zeitschrift für Soziologie* 36 (2): 35–54.

Liddell, Christine and Morris, Chris (2010), 'Fuel poverty and human health: A review of recent evidence', *Energy Policy* 38 (6): 2987–2997.

Mason, Viv and Roys, Mike (2012), The Health costs of cold dwellings, *http://www.foe.co.uk/resource/reports/warm_homes_nhs_costs.pdf, 04.01.2012.*

Mazur, Allan (2011), 'Does increasing energy or electricity consumption improve quality of life in industrial nations?', *Energy Policy* 39 (5): 2568–2572.

Morgan, Eluned (2008), 'Energy poverty in the EU', *http://www.socialistsanddemocrats.eu/gpes/public/sectionhome.htm?section=LIB&category=PUBL&request_locale=EN, 11.09.2010*.

OECD (2011), 'Income distribution and poverty', *http://www.oecd.org/document/14/0,3746,en_2649_33933_38910286_1_1_1_1,00.html, 11.04.2011*.

Proidl, Harald (2009), E-Control & Caritas – Pilotprojekt 'Energieberatungen von einkommensschwachen Haushalten', Endbericht, *http://www.e-control.at/de/projekte/soziale-verantwortung, 31.03.10*.

Rohracher, Harald (2007), 'Die Wechselwirkung technischen und institutionellen Wandels in der Transformation von Energiesystemen', in Dolata, Ulrich and Werle, Raymund (Eds.), *Gesellschaft und die Macht der Technik. Sozioökonomischer und institutioneller Wandel durch Technisierung*, Frankfurt / New York: Campus: 133–151.

Rohracher, Harald (2008), 'Energy systems in transition: Contributions from social sciences', *International Journal of Environmental Technology and Management* 9 (2/3): 144–161.

Saunders, R. W., Gross, R. J. K. and Wade, J. (2012), 'Can premium tariffs for micro-generation and small scale renewable heat help the fuel poor, and if so, how? Case studies of innovative finance for community energy schemes in the UK', *Energy Policy* 42 (0): 78–88.

Shove, Elizabeth (2003), *Comfort, Cleanliness and Convenience. The Social Organisation of Normality*, Oxford/New York: Berg.

Shove, Elizabeth (2010), 'Beyond the ABC: climate change and theories of social change', *Environment and Planning A* 42: 1273–1285.

Statistik Austria (2011a), 'Armutsgefährdung vor und nach sozialen Transfers nach Geschlecht und Alter', *http://www.statistik.at/web_de/static/ergebnisse_im_ueberblick_armutsgefaehrdung__023833.pdf, 02.02.2012*.

Statistik Austria (2011b), 'Monatliche Verbrauchsausgaben der privaten Haushalte – Quartile der Äquivalenzausgaben', *http://www.statistik.at/web_de/static/monatliche_verbrauchsausgaben_der_privaten_haushalte_-_quartile_der_aequiv_055977.pdf, 15.11.2011*.

Vaughen, F. G. (1911), 'The use of prepayment electric meters', *Journal of the Franklin Institute* 172 (3): 253–266.

Walker, Gordon (2008), 'Decentralised systems and fuel poverty: Are there any links or risks?', *Energy Policy* 36 (12): 4514–4517.

WHO (2007), 'Housing, energy and thermal comfort. A rewiev of 10 countries within the WHO European Region', *www.euro.who.int*, 30.05.2011.