- Final project report -

FUEL POVERTY IN HUNGARY
A first assessment

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List of ABBREVIATIONS

CEE – Central and Eastern Europe
COICOP – Classification of Individual Consumption by Purpose
CHP – Combined Heat and Power
CPI – Consumer Price Index
DALY – disability-adjusted life years
DH – district heating
EBRD – European Bank for Reconstruction and Development
EUROSTAT – Statistical Office of the European Communities
EU SILC – EU Survey on Income and Living Conditions
EWD – excess winter deaths
EWM – excess winter mortality
fSU– former Soviet Union
GHG – greenhouse gases
IEA – International Energy Agency
kgoe – kilograms of oil equivalent
KSH – Központi Statiszkai Hivatal / Hungarian Central Statistical Office
MaTáSzSz –Magyar Távhőszolgáltatók Szakmai Szövetségé / Association of Hungarian District Heating Enterprises
NMS 10 – The 10 New Member States that joined the EU in 2004 and 2007
WHO – World Health Organization

1. SETTING THE FRAME

1.1 Fuel poverty: definitions and policy relevance

The concept of fuel poverty can be located in the broad frame of the lack of or inadequate access to energy services, which refers to the lack access, mostly in developing countries to quality energy services as those provided, for instance, by electricity (Birol, 2007; Pachauri and Spreng, 2003). This is an issue of a much larger (global) scope as it is estimated that 2 billion people worldwide suffer from various major access-to-energy problems (Sagar, 2005).

Clearly, Hungarian society does not suffer from a widespread lack of access to quality energy carriers but there are concerns about the affordability of energy services as income is well below EU average, energy prices have increased substantially in late years (Section 2.2.1) and there is evidence of the low energy performance of its residential stock (Section 2.2.2). In this way, fuel poverty is defined, for the purposes of this assessment, as the inability to afford adequate energy services for the household. The apparently more common wording 'fuel poverty' is employed in this report, as noted in its title and main headlines, without failing to recognize that 'energy poverty' is also a preferred phrasing in recent key studies in Central and Eastern Europe (CEE).

The proposed definition can be put in the context of previous research. An often cited operational definition of fuel poverty first proposed by Boardman (1991, p. 201, in Morrison and Shortt, 2008) reads as the "inability to obtain adequate energy services for 10% of a household income". Though criticized for the lack of scientific rationale behind the 10% threshold (Healy, 2004), it is and has been of common use among researchers and practitioners in the UK and was subsequently linked to a "satisfactory heating regime"[1]. Such structural or materialistic approaches are said to be unable "to capture the wider elements of fuel poverty, such as social exclusion and material deprivation" (Healy, 2004, p. 36). This is closer to a relative definition of deprivation that considers fuel poverty as a situation in which "the amount of warmth in [the] home does not allow for participating in the 'lifestyles, customs and activities which define membership of society'" (Buzar, 2007a, p. 225). This report explores both the materialistic and perceptional approaches to fuel poverty.

Though fuel poverty is a concept to be framed in more general considerations about poverty and deprivation, some of its key distinctive features are:

- Unlike other goods and services[2], the purchase of energy is, to a certain extent, not an option for households. In Hungary as in many other temperate countries, a minimum amount of heating is compulsory in winter. As energy

[1] The UK Fuel Poverty Strategy, following WHO guidelines, defined a fuel poor household as "one needing to spend in excess of 10% of household income to achieve a satisfactory heating regime (21° C in the living room and 18° C in the other occupied rooms)" (BERR, 2001, p. 30)

[2] That is not always the case. For example, food is similar to energy services in this regard: families need it at a minimum, no matter their income, and it also has an influence on the health conditions, as fuel poverty does. Figures recorded by the KSH on food consumption by households show that lower-income families tend to buy cheaper, less healthy food (KSH, 2008).

use is normally income inelastic, lower income households will experience disproportionately higher heating expenses (Brophy et al., 1999).

- However, not all low income households are fuel poor and there are fuel poor households that do not belong to the lowest income percentiles (Waddams Price et al., 2006). This indicates a more complex interaction between low income and residential energy inefficiency (Morrison and Shortt, 2008).
- Consequently, there are solutions other than increasing or supporting the households' income or subsidizing energy prices, namely improving the energy performance of dwellings, appliances and equipment. It is eventually possible to bring households out of fuel poverty while keeping or reducing their energy consumption (Milne and Boardman, 2000). This touches upon related issues like GHG emissions reduction or reducing energy dependency.
- In addition to that, there is evidence showing that inadequate indoor temperatures increase excess winter mortality rates (The Eurowinter Group, 1997) and are connected to certain diseases (Morrison and Shortt, 2008; Roberts, 2008), with more intense impacts on vulnerable populations like elders (Howieson, 2005) and children (de Garbino, 2004). It is uncertain to what extent that fuel-poor households are aware of the health risks of suffering low in-house temperatures.

Fuel poverty is somehow gaining priority in the political and research agendas, but it is far from being a common issue of concern. At a global level, it has been related to the right of adequate housing as defined by the Universal Declaration of Human Rights and to other high level agreements (Friel, 2007). Following recent developments in the global economy, the EU has stated that "a growing number of EU citizens are unable to afford their energy bills and that vulnerable customers, including the elderly, disabled and low income families, are those most affected; [...] as a consequence of the financial crisis, energy poverty is likely to grow in Europe" (EUFORES, 2008, p.3). However, as the EU-funded EPEE (European fuel Poverty and Energy Efficiency) project (2008) found out, Member States like Italy, France, Spain or Belgium do not have a working definition of fuel poverty and lack specific strategies or policy frameworks. In fact, very few countries – only the UK (DEFRA/BERR, 2008; BERR, 2001), Ireland (MacAvoy, 2007) and New Zealand (Chapman et al., 2009) – have started any significant action. In the UK, the latest fuel poverty strategy annual monitoring report establishes that by 2018 no British household should be spending more than 10% of its income on energy (DEFRA/BERR, 2008).

1.2 Fuel poverty in Central and Eastern Europe

Considering the three factors often considered in the analysis of fuel poverty (energy prices, household income and energy performance of the residential stock), there are concerns about the incidence of this particular type of deprivation in CEE countries. First, the structural reforms of the transition process starting in the early 1990s eliminated the State-owned energy monopolies, lifted subsides, applied full-cost recovery tariffs and liberalized energy markets (Ürge-Vorsatz et al., 2006), which resulted in higher energy prices. Second, CEE countries' GDP per capita – as a proxy of income available to households – is still below Western European standards and, in the case of

CEE EU Member States, their per capita income is in all cases lower than the EU's average (CIA, 2009). Third, the high energy consumption of the average residential unit is a consequence of the long time subsidised energy prices and the lack of basic energy efficiency requirements (Ürge-Vorsatz et al., 2006), as well as of to the deterioration of the privatised residential sector (Duncan, 2005). Finally, fuel poverty has been also linked to the inability of the region's post-1989 democratic governments to provide an adequate level of social protection and to develop adequate policy frameworks for improving the thermal efficiency of the residential stock occupied by the lower income households (Buzar, 2007a). This eventually led to a situation in which homes have become 'prisons' for households unable to properly heat their living space (Buzar, 2007b).

Unlike the energy poor in developing countries, most of CEE and former Soviet Union (fSU) countries households are connected to utility networks (Lovei et al., 2000) that provide high quality carriers such as gas and electricity. This means that difficulties experienced by families have to do with the affordability of energy services rather than with a widespread lack of access. The appearance of such problems is historically connected to the economic and political changes happened since 1989 (World Bank, 2000b). However, 20 years later, the new CEE and fSU states are in quite different situation and three models or 'geographies' of fuel poverty have been identified (Table 1).

Table 1. The geographies of fuel poverty in CEE and the fSU.

Insular geography	Potential geography	Pervasive geography
Central Europe, Baltics	**Central Asia, Caucasus, Russia**	**Balkans, fSU republics**
- Residential energy provided at long-run marginal costs - Energy sectors operate under market principles - Energy affordability problems concentrated among specific social groups - Wide range of policy tools for energy efficiency investment	- Below cost-pricing for residential energy - Energy sectors not fully marketised - Widespread non-payment for energy services - Inadequate frameworks for energy efficiency investments	- Energy pricing approaching long-run marginal cost - Regulation of energy sectors still struggling with leftover of Communist policies - Widespread energy affordability problems - Inadequate framework for energy efficiency investment

Source: Buzar (2007c, p. 73).

Previous research (Buzar, 2007c, p. xii) has pointed that fuel poverty in the CEE region is "virtually unknown to the relevant academic and policy literatures" and that "there are not standardized measurement frameworks for energy poverty and no consistent systems for data gathering", which explains the overall paucity of information in the region. There are nonetheless exceptions that make up a valuable set of precedents for this assessment. Several key contributions by Buzar (2007a; 2007b; 2007c) have developed a conceptual framework for the analysis of fuel poverty and explored the situation in Macedonia and Czech Republic. More recently, a EU cross-country assessment (Morgan, 2008) has included information on all the CEE EU Member States. The affordability of electric power, district heating (DH) and water (Fankhauser and Tepic, 2005; EBRD, 2003) has also been analysed in order to understand the impacts of charging full-cost recovery tariffs. On the impacts, the WHO

(2004; 2007) and Morgan (2008) report figures of up to 240,000 excess winter deaths in the region, 48,000 of them possibly related to housing conditions.

1.3 The Hungarian case

Many of the trends described in the Section 1.2 are applicable to Hungary (see for instance Kremer et al., 2002 or Kocsis, 2004). However, some national conditions provide a context for the analysis.

The energy intensity of the Hungarian economy is one of the lowest among CEE countries, and it is expected to keep its downward trend in the next future (OECD/IEA, 2007). On the other hand, Hungary relies heavily on imported hydrocarbons (mainly from Russia), with nuclear energy being the most important source of domestic energy supply and quite a small but growing share of renewables, mostly biomass (EUROSTAT, 2009a). In relation to fuel poverty, the following aspects can be highlighted:

- Hungary is one the most gas-dependent IEA countries. Threats to the continuity of supply in last years have motivated the development of strategic gas storages to buffer the effect of future disruptions. Such strategy may have an impact on the gas prices in the future (OECD/IEA, 2007).
- The structure of the energy demand is different from the EU average, with residential and commercial sectors covering the largest share in the mix (European Commission, 2007). Both sectors consume up to 80% of the total final consumption of natural gas, the highest percentage in the EU (EUROSTAT, 2009a) and the IEA forecasts that gas will be the main source of energy for domestic and commercial consumers in 2030 (OECD/ IEA, 2007). This is mostly the result of a massive fuel switching between 1990 and 1998 that replaced most tile stoves and coal and oil boilers with more efficient gas boilers. Subsidised domestic gas prices played an important role in this process (Energia Központ, 2008).
- There are delays in the liberalisation of the energy markets and real competition is low (OECD/IEA, 2007). Competition (or the lack of it) between utility companies is likely to influence future energy prices.

In Hungary, as in most EU member states, there is no official definition of fuel poverty, though various rights (articles 18, 66, 67 and 70E) recognised in the Constitution of the Republic of Hungary (2009) provide a ground to the claims for an adequate access of energy services for Hungarian citizens. Society and institutions are aware and concerned of energy affordability problems and the price of natural gas has been quoted as a "dangerous political question" (Boross, pers. comm.) but, to our knowledge this is the first assessment of fuel poverty in Hungary. However, the *Központi Statisztikai Hivatal* (KSH[3], 2004; 2006) has explored the burden of energy expenses upon the budget of different household typologies, in line with the 'insular geography' hypothesis (Table 1). At a local level, Kocsis (2004) analyzed heating and house maintenance expenses in a study on housing poverty in Budapest. In rural areas, a survey carried out by the *Autonómia Alapítvány*[4] (2004) found evidence on the very poor quality of the

[3] Hungarian Central Statistical Office
[4] Hungarian Foundation for Self-Reliance

insulation, fuel sources and heating equipment of Roma households in the Borsod county. More recently, the Budapest-based NGO *Energia Klub* has produced a critical analysis of the various state-funded schemes supporting residential users (see Section 4.2.1) and pointing at the need to eliminate subsidies that distort the market, keep energy prices artificially low and do not provide enough incentives to invest in domestic energy efficiency (Fülöp, 2009).

2. MEASURING FUEL POVERTY IN HUNGARY

2.1 Approaches to measuring fuel poverty

Three main approaches have been identified (Healy, 2004):

- Temperature: which aims at detecting households unable to satisfy an adequate heating regime (see Section 1.1). It provides direct measurements but is fraught with practical difficulties. None of the indicators selected follow this approach because of the lack of such data for Hungary.
- Expenditure: a more common approach, which defines a household of fuel poor when energy expenses are above a certain percentage of its net income. The indicator presented in Section 2.2.3 follows this approach.
- Consensual: this approach attempts to capture the wider elements of fuel poverty. It accounts for certain household's attributes or lack of items (i.e. absence of central heating or presence of damp) as indicators of fuel poverty, since these are necessities widely recognized by society. Results for three types of consensual indicators are discussed in Section 2.2.4.

In addition to the actual indicators, contextual information on the evolution of energy prices and income and on the energy performance of the building stock is presented in Sections 2.2.1 and 2.2.2. They also constitute numerical evidence on the incidence of fuel poverty and help to understand the indicators.

2.2 Quantitative measurements of fuel poverty in Hungary

2.2.1 Energy prices and households' income sources

In an EU context, EUROSTAT data indicate that nominal gas prices in Hungary in 2007/08 were the seventh lowest in the EU and that electricity prices were close to the EU27 average. However, in purchasing power parity units (PPPs)[5] Hungarians experienced middle to high range gas prices and the highest electricity prices of the EU during the second semester of 2008.

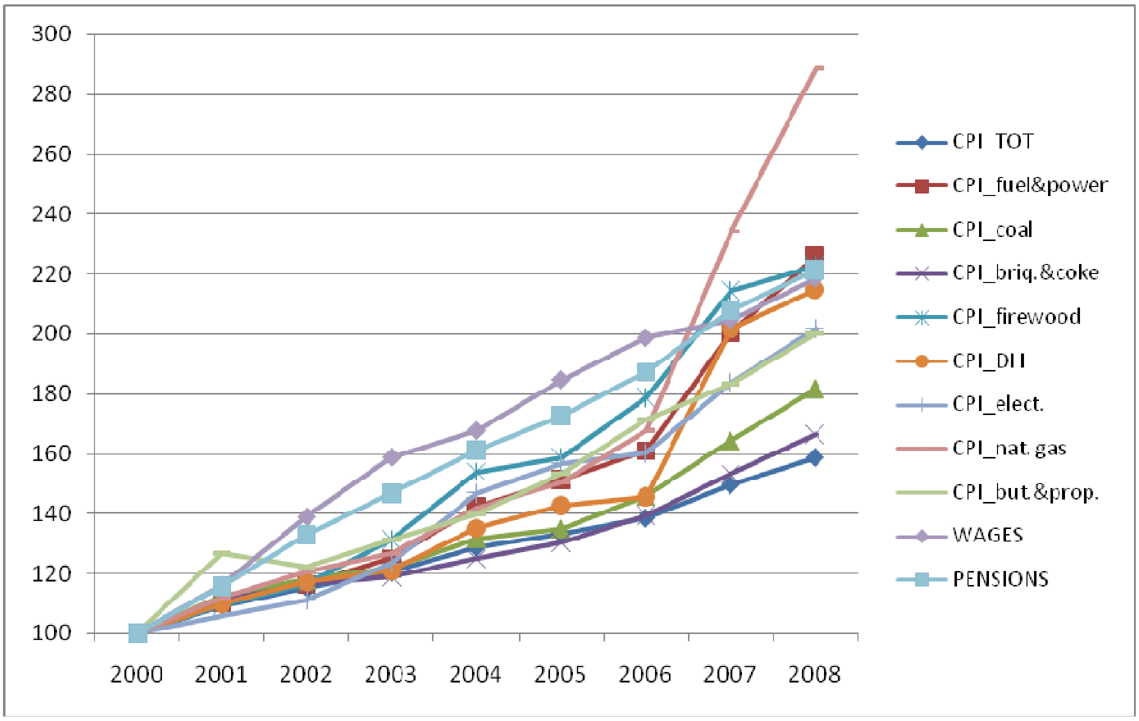
Changes in nominal prices since 2000 indicate that between 2000 and 2007 Hungary was among the top 3 EU countries (with data available) in terms of gas

[5] PPPs allow comparing between countries with different overall price levels: "PPPs are price relatives that show the ratio of the prices in national currencies of the same good or service in different countries. For example, if the price of a hamburger in France is 3.11 euros and in the UK1.94 pounds, then the PPP for hamburgers between France and the UK is €3.11 to £1.94 pounds, or €1.60 to the pound [...] PPPs can refer to a single product, a product group, or the economy as a whole" (EUROSTAT, 2009c).

(110%) and electricity (75%) price raises. Increases in 2007/08 were on the average of EU figures (higher for electricity) [6].

The state of affairs in Hungary since 2000 analysed through KSH data (Figure 1) shows that the nominal prices of all energy carriers increased at a faster rate than the general Consumer Price Index (CPI). However, until recently wages and pensions – the main sources of income for Hungarian households – had grown at a higher rate than the CPI for fuel and power. This situation came to an end in 2006, when the price of gas and purchased heat (district heating), the two most common sources of heat for Hungarian households, more than doubled in two years. As a result, the CPI of fuel and power equalled the rate of increases of pensions and salaries in 2008. Since no data after 2008 are available, it is unclear how Hungarian households are being affected by the economic crisis after experiencing a significant loss of energy services purchasing power between 2006 and to 2008.

Figure 1. Changes in prices of energy carriers and main household income sources (wages and pensions) in Hungary (2000-2008) *[2000 = 100]*.



Source: own elaboration after data retrieved from KSH.

For the Hungarian rural population without access to piped gas, particularly important were the increases in butane and propane (bottled gas) and, above all, firewood, which was the fuel with the second highest price raise rate (122%) after natural gas in 2000/08. The latter can be linked to the enhanced wood extraction for biomass power generation following the introduction of a preferential feed-in tariff in 2003. As a consequence, poor people may have

[6] EUROSTAT changed the prices collection methodology in 2007, thus data from before and after this year are not strictly comparable. Calculations were based on national currency units (i.e., in Hungary, HUF) to avoid distortions from EUR vs. national currencies exchange rates

fallen back on illegal wood collection for domestic uses (OECD, 2008), which poses a collateral question about the social impacts of renewables in Hungary.

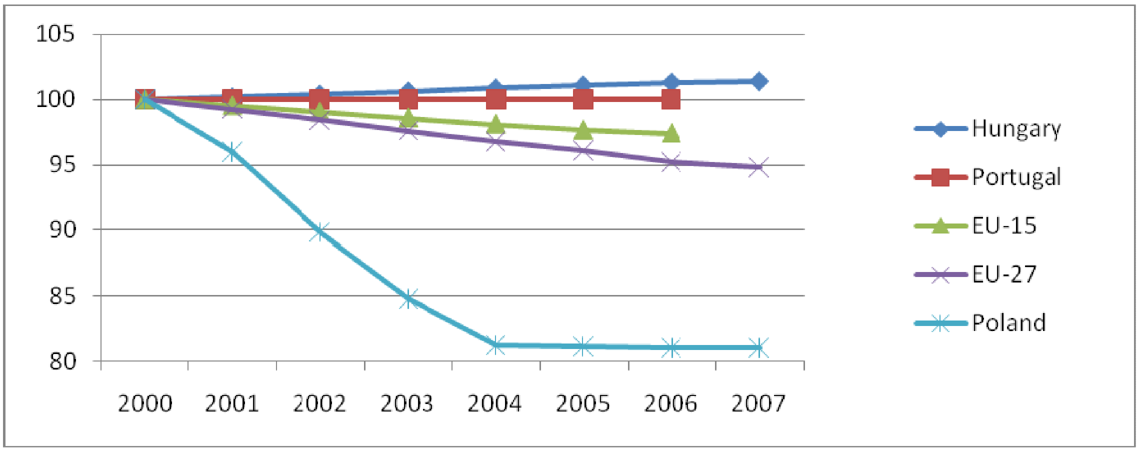
The comparison between energy prices and income sources needs to be put in a certain context, nevertheless. First, the Hungarian economy has recorded quite low employment rates for a number of years and currently suffers from the second lowest rate (56.7%) of the EU after Malta (EUROSTAT, 2009b). This means that nearly half the working-age Hungarian population do not have any regular source of income, but still their households were equally hit by the price hike described above. Second, although pensions have increased at a similar rate as wages did since 2000, in absolute terms retirement and other types of allowances are still substantially lower than the average salary[7].

2.2.2 The energy performance of the residential stock

Data retrieved from the ODYSSEE database[8] indicate that Hungary is one of the top-ten EU27 countries in terms of dwelling energy consumption per m^2 scaled to EU average climate. Among former socialist EU Member States, only Latvia and Slovenia consumed more. On average for 2000/07, Hungarian dwellings' consumption was an 11% higher than the EU27 average.

There is thus room for improving the energy performance of the sector, but such potential is not being realised. Between 1998 and 2005, Hungary's overall ODEX energy efficiency index (for a description, see Lapillone et al., 2004) decreased by 8%, a bit less than the EU average in that period (9%). However, such improvements occurred mostly in the industrial sector (Elek, 2007). This contrasts with the situation in the households and transport sectors, for which the ODEX index remained stable for that same period (Energia Központ, 2008).

Figure 2. Evolution of the ODEX energy efficiency index for households. Hungary vs. EU and selected countries, 2000-2007 *[2000 = 100]*.



Source: ODYSSEE database

[7] According to KSH, in 2008, the average net monthly earnings of employees was 122,267 HUF and the average monthly pensions per capita was 87,247HUF.
[8] ODYSSEE [URL: http://www.odyssee-indicators.org/] is a database of energy efficiency indicators in Europe run by ADEME, the EIE program of the European Commission/DGTREN and energy efficiency agencies in the EU27 Member States in Europe plus Norway and Croatia.

As for the residential sector alone, Hungary was the only EU Member State in which the households ODEX indicator actually worsened between 2000 and 2007 (in Portugal, the country with the second worst performance after Hungary, the indicator remained on the same level as in 2000). This is quite the opposite of what happened in almost all other CEE EU Member States, which increased their dwellings' energy efficiency faster than the EU27 average. In fact, Poland was the nation with the best record in that period.

Such results indicate that, while the average Hungarian dwelling sector is among the most energy demanding of the EU, no significant improvement in its energy efficiency (rather the opposite) has happened since 2000. They also point out that Hungary is lagging behind all other EU27 and New Member States in improving the energy performance of the building stock. This is likely to have had an effect on the incidence of fuel poverty since the 2000s.

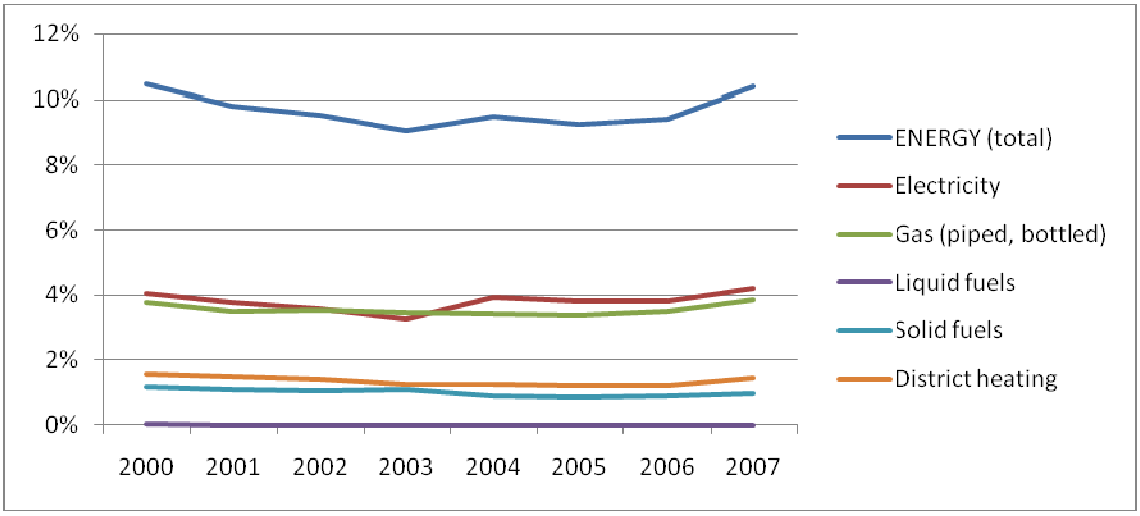
Among the various factors behind such a negative record, energy prices could be a key explanatory element as artificially low energy prices and subsidies for Hungarian households have been criticized for providing few incentives for investing in energy efficiency (Fülop, 2009). However, between 2006 and 2008, gas and DH prices experienced a tremendous increase, though available data do not allow estimating to what extent households have reacted. We might be on the eve of a qualitative change for Hungarian residential sector, with higher-than-ever gas prices eventually forcing households to start action. It is not clear, though, whether high energy prices automatically trigger such changes: low income households may lack the means to secure the initial investment (or have more pressing priorities) and, additionally, the information gap – unawareness of the benefits of installing energy-saving technology – is thought to be a major reason for the market failure in domestic energy efficiency (Healy, 2004).

2.2.3 Measures based on the expenditure approach

The usual application of the expenditure approach consists of estimating the percentage of energy expenses in the households' income. If this combines with a threshold (i.e, 10% or more of the net income, as first proposed by Boardman, 1991) and a representative sample of households is available, then it is possible to estimate the number of households suffering from fuel poverty, as done yearly by the UK government (DEFRA/BERR, 2008). Such expenditure-based measurement has been criticised because of the lack of scientific evidence supporting the 10% threshold (Healy, 2004). Other shortcomings to be mentioned are that this indicator does not consider total income (e.g., a household in the highest income decile can be also classified as fuel poor) or the fact that high energy expenses may indicate people's preferences (e.g., willingness to pay for keeping an indoor temperature well above a satisfactory heating regime) rather than difficulties to satisfy basic energy needs.

In Hungary, the KSH survey on the financial and living conditions of Hungarian households allows estimating the average burden of energy expenses on their net income. Based on disaggregated data on per capita net income and expenditures by COICOP – Classification of Individual Consumption by Purpose – categories, Figure 3 indicates that the mean energy expenses of families have been around 10% (9.7%) of their net income between 2000 and 2007. This is quite a striking result because it implies that the average Hungarian household would be defined almost as fuel poor if the widely used 10% threshold was applied to the Hungarian case. Since microdata – detailed records on all the units sampled – were not available, no feasible estimate of the actual number of fuel poor households according to this approach could be produced.

Figures 3. Percentage of per capita net income devoted to the household's energy expenses. Hungary 2000-2007.



Source: KSH. Level and structure of household consumption (2000-2007).

After food and non-alcoholic beverages, energy was the second most important COICOP expenditure category in 2000/07. As seen in Figure 3, this indicator reached its lowest value in 2003 (9.0%) and then went up again to the 10.4% maximum in 2007, reflecting the 2006/07 energy price increases recorded in Figure 1. Although no data on expenditures and income were available for 2008, the 2007/08 additional price rise plus the initial effects of the global crisis[9] on the households' income may have pushed percentages further up in 2008. In a longer time frame, it is probable that the situation has improved during the last 20 years, as figures recorded by Hegedűs et al. (1994) for the 1990s suggest.

By energy carriers, electricity expenses were the highest among the various employed by the Hungarian domestic sector. This is probably explained by the fact that these are aggregated, average figures and that, while most households use electricity for lighting and powering house appliances, several heating and cooking fuel alternatives are available. Another relevant result is that solid fuels (such as firewood, coal, briquettes or coke) expenses represented on average almost as much as DH (supplying around 15% of Hungarian households), which indicates the importance of traditional fuels still in nowadays Hungary.

Detailed results – available only for 2007 – illustrate differences by social groups. As expected, fuel poverty hits harder the poorer members of society,

[9] The effects of the global crisis on the Hungarian economy are patent: in the second quarter of 2009, the GDP fell by 7.4% compared to the same period of 2008 (EUROSTAT, 2009d) and the unemployment rate had increased up to 10.3% (EUROSTAT, 2009e).

though in Hungary the average representative household from deciles 1 to 8 spends more than 10% of its net income on energy. By regions, the eastern part of the country (Northern Hungary, North Great Plain and South Great Plain) records the highest percentages of energy expenditures, reproducing the existing differences in regional economic performance (see Enyedi, 2009). By household typologies, the category with the highest proportion of energy expenses vs. income (14%) is the one-member household without children and, in general, households without children (11%) perform worse than households with children (9.6%), which is somehow at odds with the results for the consensual indicator 'Arrears on utility bills' (Section 2.2.4.2). By age of the head of the household, the highest energy expenses vs. net income ratios (12% and over) are recorded for households whose head is 65 years or older. In fact, all pensioner households spend more than 10% of their income on energy, even though it is believed that elder manage their energy affordability strains is by cutting expenses and not by delaying payments (see Section 2.2.4.2).

2.2.4 Measures based on the consensual approach

The consensual approach, as defined by Healy (2004), aims at accounting for certain basic goods (i.e adequate heating facilities) or essential household attributes (i.e., a damp-free home) considered as 'socially perceived necessities' and whose absence can be taken as an indicator of fuel poverty. As it based on the households' actual perceptions and statements and can be adjusted through time to incorporate variations in those socially perceived necessities, it is regarded as measurement preferable to the expenditure-based approach. As for the shortcomings, it is limited by the various ways in which different households understand their necessities and home's characteristics, especially when it comes to subjective indicators.

Following Healy (2004), two subjective 'consensual' indicators ('Section 2.2.4.1 and 2.2.4.2) and one objective indicator ('2.2.4.3) are presented. Data were retrieved from EUROSTAT's Survey on Income and Living Conditions (EU-SILC), which allows comparing the situation in Hungary with the rest of EU-27 Member States[10] in 2005/07. The figures display trends in Hungary and in EU27, NMS10 and Euro area countries, plus the two Member States with the best and worst performance for the corresponding indicator in 2005/07.

2.2.4.1 Inability to keep the home adequately warm

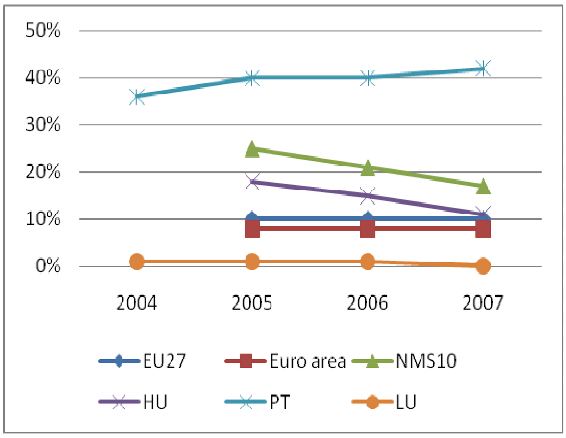
An average of 14.7% of the total population of Hungary (the 6th highest record in EU-27) could not afford to keep their home adequately warm in 2005/07 according to EU-SILC item HH50. This percentage (see Figure 4.1) is below the average for the 10 New Member States (NMS10) and equaled the EU-27 average in 2007. A clear downward trend between 2005 and 2007 can be observed.

Such results (for Hungary) were quite unexpected because of the very substantial domestic energy price increases occurred after 2006 (Section 2.2.1), clearly reflected on the income devoted to energy expenses (Section 2.2.3), and also because of the worsening energy performance of the residential stock

[10] Bulgaria is missing and data for Romania is only available for the year 2007.

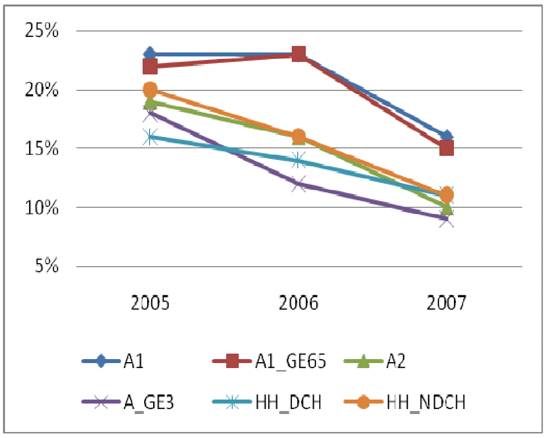
(Section 2.2.2). Without discarding comparability problems between EUROSTAT, KSH and the ODYSEE database, this might indicate that, in the short-term, people have reacted to higher energy prices by increasing the amount indebted to utility companies rather than by cutting energy use.
Within Hungary and by household types, the lower income strata experienced harsher living conditions. Also, as a general rule, the higher the number of adults (i.e, sources of income) living in the household and the smaller the number of dependent children, the less likely it is that people will not be able to afford enough heating at home. Particularly worrying is the situation of single-person households below 60% of median income because each third person in this social segment was unable to heat sufficiently her house in 2005/07, although their situation improved significantly between 2006 and 2007.

Figure 4.1. Percentage of the population unable to keep the home adequately warm. Hungary vs. EU-27.



Notes: The figure includes trends for EU27, the Euro area and NMS10, plus Hungary and the two Member States with the highest (Portugal) and lowest (Luxembourg) records for this indicator.
Source: EUROSTAT. EU-SILC (ilc_mdes01).

Figure 4.2. Percentage of the population unable to keep the home adequately warm. Hungary (household types).



Household types: A1 (single person); A1_GE65 (one adult older than 65 years); A2 (two adults); A_GE3 (three or more adults); HH_DCH (hhold. with depend. children); HH_NDCH (hhold. without depend. children).

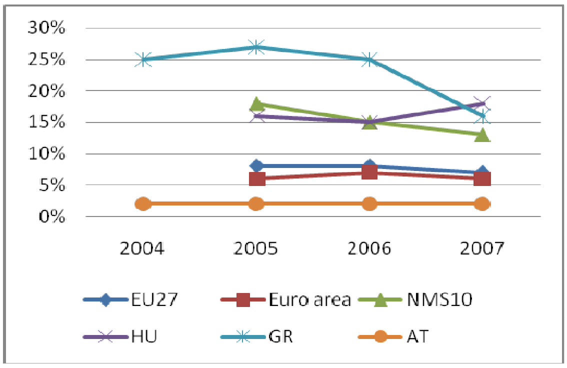
This indicator 'Inability to keep the home adequately warm' is closely related to the definition of fuel poverty employed in this and previous research and allows making a straightforward approximation of the number of fuel-poor people in Hungary. Taking average figures of the population in Hungary for 2005/07, some 1,480,000 inhabitants in Hungary identified themselves as fuel poor per year. If the findings by Healy (2004) for Western Europe indicating that consensual are more conservative, but more reliable, estimates than expenditure-based hold for Hungary too, the above-reported average would be a lower-bound estimate to the actual number of fuel-poor people in Hungary

Some caution is needed when reading these numbers. First, the EU-SILC methodology warns that question HH50 "is about affordability (ability to pay) to keep the home adequately warm, regardless of whether the household actually needs to keep it adequately warm" (European Commission, 2008b, p. 172). Also, this is a self-reported estimate depending on subjective perceptions on what thermal comfort and inability to pay is (EPEE project, 2008).

2.2.4.2 Arrears on utility bills

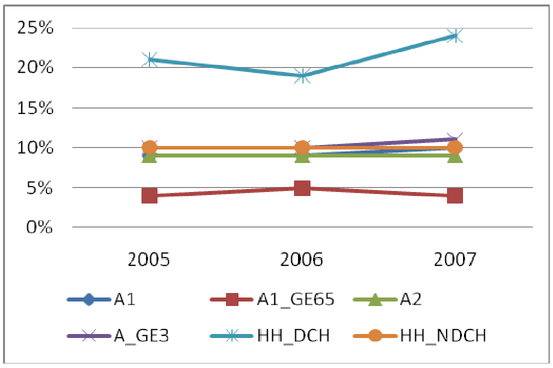
Between 2005 and 2007, Hungary, with an average of 16.7% of the population (some 1.65 million people) with arrears in utility bills[11], ranked third for this indicator in the EU-27. However, in 2007, Hungary was the Member State with the highest proportion (18%) of people in such situation and detached itself from the NMS10 downward trend observed since 2005 (Figure 5.1).

Figure 5.1. Percentage of the population with arrears on utility bills. Hungary vs. EU-27.



Notes: The figure includes trends for EU27, the Euro area and NMS10, plus Hungary and the two Member States with the highest (Greece) and lowest (Austria) records for this indicator.
Source: EUROSTAT. EU-SILC (ilc_mdes07).

Figure 5.2. Percentage of the population with arrears on utility bills. Hungary (household types).



Household types: A1 (single person); A1_GE65 (one adult older than 65 years); A2 (two adults); A_GE3 (three or more adults); HH_DCH (hhold. with depend. children); HH_NDCH (hhold. without depend. children).

By household types in Hungary (Figure 5.2), again the most affected households were those whose income was below the 60% of the median and, among them, those with dependent children. Interestingly, some the most affected types according to this indicator differ from those suffering inadequate heating levels (Section 2.2.4.1), and viceversa. In that way, the households with dependent children (HH_DCH) recorded a higher-than-average percentage of people in arrears on utility bills (21.3% as a 2005-2007 average) but a moderate inability to get enough heating (13.7%). Particularly significant is also the difference found for 'One adult older than 65 years' (A1_GE65): although, on average, only 4.3% of such persons had financial difficulties to pay on time their bills, 20% of them reported not being able to afford enough heating for the home. And that was also the case for the type 'Two adults, at least one aged 65 years and over'.

The differences in the results for both indicators may indicate that switching-off the heating and failing to pay on time utility bills are two (complementary) short-term coping strategies employed by households facing affordability strains. It is likely that people in fuel poverty make use of both at the same time, but in certain cases (pensioners) choose lower-than-desired temperatures at home as a way to deal with their inability to pay for as much energy as they need. Such decision has important public health implications as excess winter mortality is almost an exclusive phenomenon of people older than 60 (see Section 2.2.5). Plainly speaking, this means that by avoiding arrears on their utility bills, Hungarian pensioners may be putting themselves at risk of

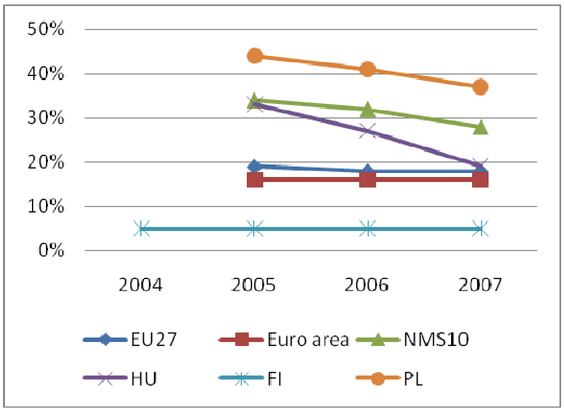
[11] EU-SILC item HS020 includes at least heating, electricity, gas, water, sewage and rubbish, but not telephone bills (European Commission, 2008b, p. 183).

becoming an early death related to inadequate indoor temperatures. This behaviour may well be related to the 'social stigma' of energy debt and payments arrears already identified for CEE pensioners (Buzar, 2007c).

2.2.4.3 Leaking roof, damp walls, floors or foundation, or rot in window frames or floor

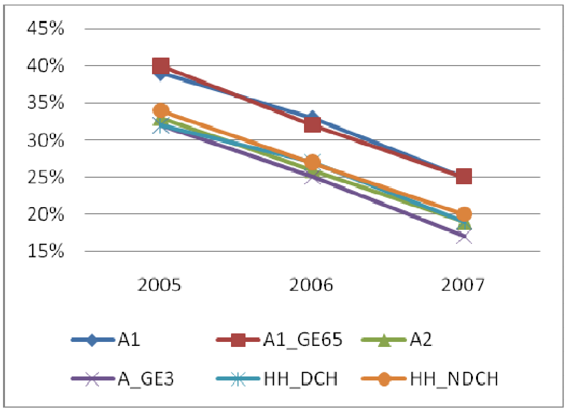
As presented in Figure 6.1., the percentage of people living in improperly maintained dwellings (EU-SILC item HH040) decreased since 2005 at a substantially faster rate in Hungary than in the rest of NMS10 and by 2007 it had almost reached the EU-27 level. This in a way contradicts the worsening energy performance conditions of the Hungarian residential stock 2000 and 2007 (Section 2.2.2)[12]. As an average for 2005/07, a 26.3% of the Hungarian population (around 2.65 million people) experienced bad housing conditions and Hungary was the Member State with fifth highest incidence of the problems reported by this indicator.

Figure 6.1. Percentage of the population with leaking roof, damp walls, floors or foundation, or rot in window frames or floor at home. Hungary vs. EU-27.



Notes: The figure includes trends for EU27, the Euro area and NMS10, plus Hungary and the two Member States with the highest (Poland) and lowest (Finland) records for this indicator.
Source: EUROSTAT. EU-SILC (ilc_mdho01).

Figure 6.2. Percentage of the population with leaking roof, damp walls, floors or foundation, or rot in window frames or floor at home (household types).



Household types: A1 (single person); A1_GE65 (one adult older than 65 years); A2 (two adults); A_GE3 (three or more adults); HH_DCH (hhold. with depend. children); HH_NDCH (hhold. without depend. children).

Some prudence is advised for reading these numbers, as usual. In that way, dwellings of very different quality (from slight window rot to overall house maintenance problems) may fall under the same category, which would explain why this consensual indicator show higher percentages than the previous two.

Like in the two other consensual indicators, there is also inequality in fuel poverty-related housing conditions and as much as a 40.7% of the Hungarian households with an income below 60% of the median income were living in badly kept dwellings in 2005-2007 (the same figure for families above that income threshold was 24%). By household types (Figure 6.2), clearly single person families seem to live in houses in poorer conditions. A worth mentioning

[12] Without forgetting that information sources are different, a possible explanation might be that reducing home maintenance problems (e.g., eliminating mould or dampness) does not necessarily increase the energy efficiency of the dwelling

result is that no significant differences were found between households with and without dependent children. Still, on average for 2005/07, 26% of the people living in households with dependent children (HH_DCH) reported home maintenance problems in some degree. This is important in terms of the health impacts of fuel poverty because, as discussed in the following section, children are particularly vulnerable to inadequate indoor hygrothermal conditions. Finally, all household categories witnessed a significant reduction in the percentage of the population affected by poor housing conditions in 2005/07.

2.2.5 The health impact of fuel poverty: excess winter mortality (EWM) and morbidity effects

Seasonal changes in human health are known since long ago and it is well established that mortality related to respiratory, cerebrovascular and ischemic heart diseases at temperatures increases above and below optimum thermal thresholds (Hassi and Rytkönen, 2005; The Eurowinter Group, 1997). Most countries suffer from a 5% to 30% relative EWM, with Portugal, Ireland and Spain reporting the highest rates in Western Europe (Healy, 2003).

EWM is not an indicator of fuel poverty *per se* but a measurement of a visible social impact of the inadequate access to energy services, namely heating. Previous research has found out that EWM depends on a multiplicity of factors (climate, expenditure in healthcare provision, lifestyle, etc.) and not only on the quality of housing stock or on the proportion of people enjoying an adequate indoor thermal comfort (The Eurowinter Group, 1997; Healy, 2003). Because of this, only a fraction (see below) of all excess winter deaths (EWD) is strictly attributable to low in-house temperatures or inadequate housing conditions.

Figures on excess winter mortality were estimated based on KSH monthly mortality statistics for the period 1995-2007 and following state-of-the-art EWM calculation methodologies (Johnson and Griffith, 2003; Healy, 2004). To our knowledge, no previous estimates of excess winter deaths exist for Hungary.

Table 2. Excess winter mortality in Hungary (1995–2007).

Season	Average summer deaths	Average winter deaths	EWM (total)	EWM (%)
95-96	45,555	54,587	9,033	19.83%
96-97	44,521	50,602	6,082	13.66%
97-98	45,605	47,588	1,983	4.35%
98-99	44,685	53,384	8,700	19.47%
99-00	43,105	53,824	10,719	24.87%
00-01	42,768	45,264	2,496	5.84%
01-02	43,641	46,526	2,886	6.61%
02-03	43,263	50,060	6,798	15.71%
03-04	42,394	48,070	5,676	13.39%
04-05	43,159	48,953	5,795	13.43%
05-06	43,005	46,045	3,040	7.07%
06-07	43,120	46,705	3,586	8.32%
		Average	**5,566**	**12.71%**
		Std. Dev.	2,860	6.47%

Source: Own elaboration after data on monthly mortality collected by KSH.

These estimates indicate that in the period 1995-2007 (Table 2), an average of 5,566 people died more in winter (i.e., December to March) that in non-winter (i.e., August to November and April to July) season. This equals to a figure of

12.71% relative EWM, which is below the average of relative EWM for the EU14 in the period 1988-1997 estimated by Healy (2004). Such result is in a way unexpected as many indicators presented in previous sections show that Hungary performs worse in terms of fuel poverty than most Western European countries. This could be explained by the difference between the periods selected (1988-1997 for EU14 and 1995-2007 for Hungary) or by the above mentioned variety of factors behind EWM.

Detailed results indicate that, as expected, most excess winter deaths are registered for population over 40 years old (mostly among elders above 60) and are caused by diseases of the respiratory and circulatory systems.

Just a portion of EWM is explained by fuel-poverty related living conditions. A very preliminary estimate of the average number of excess winter deaths (EWD) occurred in Hungary in 1995-2007 was done based on percentages recorded in the literature and it is presented in Table 3. They represent the number of EWD that could be avoided per year by eliminating fuel poverty. Such initial, rough estimates would need to be upgraded with a proper statistical analysis as done by The Eurowinter Group (1997), Wilkinson (2001) or Healy (2003; 2004).

Table 3. Estimate of EWD attributed to fuel poverty-related living conditions (Hungary, 1995–2007).

Reference	Description	% over total EWD	Estimate of fuel-poverty related EWD in Hungary
Bonnefoy and Sadeckas (2006), in Buzar (2007c)	Proposed proportion of EWD attributed to inadequate heating for a comparison with annual mortality from transport accidents in selected European countries.	25%	1,391
Clinch and Healy (1999)	Percentage of cardiovascular- and respiratory-disease EWD associated to poor housing standards in Ireland, estimated in comparison with Norway.	44%	2,449

Source: Own elaboration after figures in Table 2 and references above.

No data on the impact on morbidity rates were collected for the purposes this research. However, there is evidence on the relationship between cold and damp dwellings and several physical and mental illnesses (Morrison and Shortt, 2008). Of particular importance seems to be the effect of inadequate hygrothermal conditions of the dwelling (see Section 2.2.4.3) as dampness and mould are very important indoor air pollution sources (WHO, 2009) and are connected to several diseases (WHO, 2004). Children are particularly sensitive to illnesses caused by dampness, condensation and mould (de Garbino, 2004).

3. CASE STUDIES

3.1. Beyond figures and statistics

Complementing the quantitative measures presented in Section 2, one field visit to the Bodválenke settlement and several semi-structured interviews were combined with bibliographical revision in order to gather real-life information on the conditions experienced and strategies employed by fuel-poor households in Hungary. Cases were selected through non-probability sampling techniques (Taylor-Powell, 1998), according to their availability and representativeness.

Roma people, inhabitants of rural areas, pensioners, large families and single parents have been traditionally considered as the most disadvantaged social groups in Hungary. Tough not all of them were reached for the purposes of this study and even the cases selected cannot describe to a full extent the experience of fuel poverty in Hungary, they present some especially relevant situations that contribute to understand the complexity of the issue.

3.2. Case studies. The experience of fuel poverty in Hungary

3.2.1 In the outback. Fuel poverty in deprived rural Roma communities

Roma constitute a particularly deprived and socially excluded fraction of the Hungarian population. As stated by the New Hungary Development Plan (NHDP) 2007-2013 (The Government of the Republic of Hungary, 2006). At the same time, in Hungary, poverty is higher in rural areas because of a combination of demographical, educational and labour market factors (Bertolini, 2009; European Commission, 2008a). Both features – being Roma and living in rural areas –contextualise the analysis of this sub-typology of fuel poverty.

Based on evidence gathered for the Mezőcsáti microregion and the Borsod-Abaúj-Zemplén county, Roma households in rural areas of Hungary rely on the following energy carriers: i) electricity (illegal or legal connection to the grid); ii) propane gas cylinders, mainly for cooking; and iii) firewood collection, sometimes illegal, for cooking and heating. In regions supplied by gas pipelines, low- and middle-income households (Hungarian and Roma alike) are unable to make the initial investment for connecting to the network, which points that fuel poverty is also the inability to afford the access to quality energy carriers.

There is evidence that some households have to devote income initially allocated to pay for other basic needs such as education. For instance, H3 mother in Bodválenke stated they were behind with their electricity bill payments because "she preferred to pay for her [17 year old] daughter's studies" in a professional training secondary school (*szakközépiskola*) in Miskolc. The existence of this kind of forced trade-offs between a household's basic needs could be in fact taken as an indicator of fuel poverty to be further explored.

The low quality of the buildings in which many Roma families live is also to blame on their inability to afford adequate energy services. In the Encsi microregion, the *Autonómia Alapítvány* (2004) found scarce wall insulation, roofs in poor conditions and many broken and single-pane windows. There, people seemed to be aware of the heat losses, as respondents to the survey said that "Roma heat the streets" (*A romák az utcát fütik*). In Bodválenke, the *Állami Népegészségügyi és Tisztiorvosi Szolgálat* (ÁNTSz)[13] has recommended demolishing dwellings occupied by the poorest families and closer to (or right besides) the swamp because of health reasons. In this settlement, only family H1

[13] Hungarian National Public Health and Medical Officer Service

– out of the three that were interviewed – uses some sort of simple insulation strategy (cloth around window frames) in winter.

Illegal firewood collection, reported for Sajószentpéter, Bodválenke and the Mezőcsáti microregion, is a reality for many of the poor Roma communities living in rural areas. K. Szombati, project coordinator of the *Polgár Alapítvány az Esélyekért* [14] reports that in the Mezőcsáti microregion, as firewood is often collected in the territory of neighbouring Bükki and Hortobágy National Parks, there is a constant threat to be fined by the rangers of protected areas. In this area, more control and increased fines have forced women, who are mostly responsible for gathering firewood, to walk into more remote areas less surveyed and has increased the time need for collection. There does not seem to be much understanding by the National Parks management towards the behaviour of Roma families, in spite of the existing opportunities for illegal firewood collection being redirected to invasive species (Szombati, pers. comm.).

Electricity theft – as a way to deal with power supply expenses – is also "not a new thing" (Bari, pers. comm.) and, in the Sajószentpéter settlement, various neighbours are capable to by-pass house meters. In this location, if a family is disconnected from the grid, the community will help to regain access[15]. As seen in the households visited in the field visit to Bodválenke, most Roma dwellings use electricity to power a TV and DVD (a must), fridge, washing machine, microwave, mixer, coffee maker, radio, hi-fi system, etc. Evidence from the Encsi microregion indicates the purchase of appliances is based on its price and not on long-term estimates of energy savings (Autonómia Alapítvány, 2004).

Such experiences of fuel poverty defy common expenditure-based measures because not all income sources and costs are monetary (e.g., labour employed in firewood collection, self-consumption of seasonal agricultural production grown by families, opportunity of cost of time spent in prison, etc.). It is nevertheless difficult to generalize about these behaviours: although perceived as such, Roma "do not live in homogeneous communities", meaning that families and individuals deal in different ways with the situation they live in. "They are solving their problems as families, not as communities" (Bari, pers. comm.).

The way poor Roma families in rural areas deal with energy supply has consequences for their welfare and security. First, both illegal firewood collection and power theft often end up with fines and, if they are not paid, in imprisonment at least for some days. There is also uncertainty about how people will cope with cold in winter months. In Sajószentpéter, heating is "*the* topic of discussion in the beginning of the winter" and expressions like "we will freeze to death this winter" can be heard (Bari, pers. comm.). For the Mezőcsáti microregion, some particularly visible health impacts the indoor air pollution coming from firewood burning, namely respiratory problems (that in children could a cause of poor attendance to school), although no freezing in winter,

[14] Civil Foundation for Opportunities

[15] However, this phenomenon is not exclusive of deprived rural Roma communities. In 2001, N. Boross (ELMŰ) stated that electricity theft in Budapest was "more likely to [happen in] a house with a heated swimming pool than in a poor area" (Eddy, 2001),.

dampness or mould has been recorded. Interestingly, families seem to be only partially aware of their situation “as if they were self-repressing the problem because they can do little to improve things” (Szombati, pers. comm.). In the Encsi microregion, the low quality of technologies – usually a multi-function heating device (*sparhelt* or *masina*), often in bad conditions – and the burning of waste (including hazardous items, like shoes, plastic bottles and bags, old furniture and rags) fills the room with smoke, damaging people’s respiratory health, especially children’s (Autonómia Alapítvány, 2004). In Bodválenke, H3 – the poorest of the three households visited – mother recalled that in winter they open windows to let the smoke out (and the cold in) and stated that they would prefer electric heating to avoid the “dust” caused by burning firewood.

3.2.2 The thermal trap. District heating (DH) in suburban areas

According to data from MaTáSzSz (Sigmond, 2009), in 2007 202 DH systems belonging to 98 utility companies and operating mostly on natural gas supplied with heat and other services (such as hot water) 650,00 households in 92 urban settlements all over Hungary. Despite its long tradition, DH systems are not as extended as in other countries in the region (OECD/IEA, 2007). The percentage of dwellings served has declined slightly in the last 20 years – from 16.6% of in 1990 to 15.2% in 2007 (Sigmond, 2009) – because newly built residential units do not use this service and because some of the connected households have moved away if their financial situation allowed (KSH, 2004).

More than three-quarters of the dwellings connected to DH are prefabricated panel buildings in suburban areas. Many DH networks are now obsolete and need modernization both on the heat provider and on the consumers’ side. This results in low thermal efficiency: the average Hungarian dwelling connected to DH has a specific heat (including hot water) demand of 70 kWh m^{-3} $year^{-1}$ (189 kWh m^{-2} $year^{-1}$), notably higher than the figure of 42 kWh m^{-3} $year^{-1}$ reported for Finland. Typically, consumers living in these blocks are low income families or individuals, often pensioners, for whom heating costs are high (between 180,000 HUF and 360,000 HUF per year). That may represent from 5% to 20% of the households’ income, although in winter time house maintenance expenses (including energy) can rise up to 60% of their income. The government supports families with direct payments (*távhőtámogatás*) that in 2009 amounted to a maximum of 100,000 HUF per year and per household (Sigmond, 2009).

That the cost of DH is higher than other types of energy carriers is a view widely shared by the persons interviewed. In comparison with other carriers, Norbert Boross, director of communication and corporate strategy of the Budapest electric utility company (ELMŰ), believes that DH is the “most problematic” energy carrier after natural gas and electricity[16] because, in addition the above mentioned reasons, the burden of non-payment is distributed among all users.

Other disadvantage of DH is the lack individual meters, which has implications in terms of thermal comfort because there is not possibility of regulating the

[16] Still, electricity prices (in PPPs) are the highest in the EU and electricity expenses make up to 40% of all energy expenses of the average Hungarian household (see Sections 2.2.1 and 2.2.3).

temperature, so that "higher floors usually enjoy higher temperatures and lower floors the opposite" and some consumers (e.g. older people) are not comfortable at home and still have to pay expensive bills (Mester, pers. comm.).

It is believed that "district heating and hot water is the more affordable option if the population density is high, everyone in a building (or neighbourhood) uses it, if there are building-level meters and controls enabling each apartment to regulate its use and influence its bills, if the heat network is technically and managerially efficient, and if the building is weatherized" (Alliance to Save Energy, 2007, p. 84). This seems to be far from the current situation in Hungary. It is then probable that many of the lower-income 650,000 Hungarian households relying on DH are trapped in dwellings that cannot be easily disconnected from the network and therefore have to carry on paying painful energy bills without any clear perspective of improvement.

3.2.3 Old and cold. Pensioners in urban areas.

Elderly people are a social segment particularly vulnerable to fuel poverty for various reasons. First, pensioners' live in houses with low occupancy rates (KSH, 2004), a risk-factor for fuel poverty (DEFRA/BERR, 2008). Second, few pensioners fail to pay utility bills and are disconnected from energy networks because, for them, "the first thing to pay is the bills" (Barabás, pers. comm.). This statement is supported by national (KSH, 2006) and EU (see Section 2.2.4.2) statistics and echoes similar findings in the CEE region that point at the existence of a negative social stigma related to energy debt and payments arrears and of a certain pride in paying bills on time among pensioners, as recorded by Buzar (2007c). Third, they are particularly sensitive to in-house temperatures and are at greatest risk of becoming an excess winter death for excess risk rises steeply with age (Wilkinson et al., 2001), as presented in Section 2.2.5. Fourth, people over 60 (especially when they live alone), are among social segments with a high percentages of the population unable to keep their house adequately warm (see Section 2.2.4.1). This might indicate that elders react to fuel poverty switching off the heating rather than delaying (or skipping) payments. Recent developments like the government's decision to scrap the 13th month pension (Barabás, pers. comm.) are likely to worsen the situation of elders experiencing or at risk of falling into fuel poverty.

Elders deal with energy affordability problems in other ways too, like heating only a few rooms or burning traditional fuels. For instance, it is particularly significant that the president of the pensioners' association *Tisztelet Társaság*[17] is heating her "own flat with firewood because it's cheaper". In rural areas, things might be worse because, although "municipalities sell wood", some people may have difficulties to operate stoves that require a certain physical strength (Barabás, pers. comm.).

Additional perceptions on the issue indicate that pensioners are a particularly disadvatanged population segment because they "don't move much" [i.e., spend more time at home] and are "less flexible" to change dwelling. Therefore,

[17] Society or Circle of the Honoured

sometimes they stay in places in spite of "the high energy fees". They often "live alone" and families "do not always help", with difficult situations when one of two members of the couple living together dies (Mester, pers. comm.). Additionally, "municipalities only see those who ask for help" and disregard "hidden" citizens, like pensioners with reduced mobility (Barabás, pers. comm.)

The state is providing some relief at a local level besides DH and gas price support. The *Családsegítő Szolgálat*[18] of Budapest district III offers elders the opportunity to sell their own flats and buy smaller, cheaper ones ("2 to 4 million HUF") with lower utility costs. In more severe situations, pensioners can resort to "social housing" (Mester, pers. comm.). Though such services are not available, or at least not to the same extent, in all city districts or municipalities in Hungary, they are an example of how the administration can provide creative, efficient solutions to fuel poverty. They are important because pensioners seem to be the least capable population segment able or willing to do something to reduce their energy expenses (KSH, 2004). For CEE countries, Buzar (2007c) has argued in this regard that the attitude of elderly people is determined by their advanced age and short remaining lifespan, which discourages them to make significant investments in improving their dwelling.

3.2.4 A glance to the other side. Utility companies and local governments

The burden of disproportionately high energy expenses is mostly borne by households, but also puts additional pressure on utility companies and the central and local governments. Thus a complex picture arises: certain customers may owe money equivalent to several months of bills to different energy suppliers, utility companies threaten indebted users with disconnection (but not always enforce it), and occasionally the social services mediate to avoid disconnection and support households willing to get rid of debts through, for instance, the debt management service (*adósságkezelési szolgáltatás)*.

Some collected evidence points in that direction: according to EUROSTAT (Section 2.2.4.2), Hungary had the highest percentage of people with arrears on utility bills of all EU27 countries in 2007. This has an impact on the functioning of utility companies. As N. Boross (pers. comm.) stated, such organizations are reluctant to provide data on payments arrears because this is "sensitive information", which probably indicates that utility companies have incentives to reduce arrears and non-payments to avoid costs related to the management of such cases and to improve their general operation. In this respect, S. Mester, from Budapest district III *Családsegítő Szolgálat* stated that fee collecting and companies are operating along with utility companies and that "companies sell debt to each other" for prices below the value of the total sum owed, which is an indication of the costs of managing non-payments and arrears.

In respect to payment arrears or other affordability problems, the official position of ELMŰ is that if customers with problems "have willingness and devote at least a part of their income to pay for bills, the company is also ready to make an effort and to find a framework for solving the situation" because

[18] Family Help Service

ELMŰ has "interest in long-term business" as the sector requires investments with long payback periods. Though 1.3 million notifications of delay are sent per year, only 200 consumers (out of 2 million) are "constantly disconnected" and in fact it is difficult for the company to completely cut off people from the grid. ELMŰ finds difficult to deal with clients with very low or no income, and for which the company "cannot be responsible" (Boross, pers. comm.).

From the local government's perspective, it has also been pointed out that utility companies behave in an "incoherent" or "unpredictable" way in regard to payment arrears or user debts. In Budapest district III, some families get disconnected after some months of delay in the payment, but then "one family owing 2 or 3 million HUF because they didn't pay for years their gas and electricity bills was never disconnected" (Mester, pers. comm.).

4. THE ROLE OF INSTITUTIONS

4.1 Context and trends

Although fuel poverty does not seem to be a high political priority or a properly researched phenomenon, the current state-of-affairs and future developments in Hungary's (and CEE's) energy system will very likely have an impact on the affordability of energy services in the middle and long run.

At the same time, central and local governments' action in the frame of the energy and social policies is probably lessening the financial burden of energy costs on the households' budget. For the purposes of this analysis, two types of measures have been identified: those having short term effects that help households afford energy consumption, avoid disconnection or compensate increases in energy prices (Section 4.2.1.) and more complex, capital-intensive solutions that, like investing in domestic energy efficiency, would not only reduce fuel poverty in the long-term but also would have many other positive effects in terms of the various co-benefits identified by the literature (Section 4.2.2). Additionally, energy security improvements are sought through large infrastructure developments in Hungary and the region (Section 2.4.3).

4.2. Current policies related to fuel poverty in Hungary

4.2.1 Support to households and consumers

In Hungary, as no official definition fuel poverty exists, a set of more or less disparate measures is addressing various needs related to the affordability of house maintenance costs. This includes the gas price support (*gázártámogatás),* district heating price support (*távhőtámogatás),* home-maintenance support (*lakásfenntartási támogatás)* and debt management service (*adósságkezelési szolgáltatás).* Among them, gas and DH price supports are the most important since they consist of direct subsidies to domestic energy consumption and benefit a larger fraction of the Hungarian population. A thorough critical revision of both has been recently produced by *Energia Klub*[19] (Fülop, 2009).

[19] Energy Club

Although somehow uncoordinated and overlapping, those various state-funded schemes are probably contributing to lessening the burden of energy bills to a certain extent, although they are unequally distributed: gas and DH price support services mostly benefits urban dwellers (where such grids exist) whereas many low-income rural households relying on firewood are not eligible. In addition, the number and quality of services available depends on the budget or sensitivity to social problems of local administrations. All in all, it seems that urban citizens have better information, more chances to apply for a wider range of services and are likely to receive a bigger amount of such benefits.

More importantly, such straightforward income transfers have been criticized because, although they may succeed in reducing temporally fuel poverty, it is likely that the saved income be will spent by energy inefficient households on more energy than rather invested in improving the efficiency of their dwellings, thus not providing a long term solution. This happens as a result of market failures like the information gap (i.e., households unaware of the benefits, or even the existence, of energy-saving alternatives) and the restricted access to capital by lower income households (Healy, 2004).

In that line, Fülop (2009) has argued that, in Hungary, price support schemes distort the market, send a wrong signal to consumers and provide little incentives to invest in domestic energy efficiency. As discussed in Section 2.2.2, this may be related to the very low performance of the residential stock in the 2000s (Hungary was the only EU country where the ODEX energy efficiency index for households actually worsened in 2000/07). Besides, they are an additional burden on the government budget, consuming financial resources that could be employed in energy efficiency (OECD/IEA, 2007). In relation to this, it can be also said that these schemes, while helping to keep households' consumption levels, are also cash transfers from the State budget to the utility companies – whose revenues depend on the amount of energy delivered and not on the satisfaction of the household's energy needs – through the pockets of energy consumers. This is linked to a collateral discussion on the lack of incentives for energy providers to promote energy efficiency (see Kushler et al., 2006).

Because of those various reasons, it is has been suggested replacing the existing subsidy schemes with income-related benefits targeted at households in worse conditions (OCED/IEA, 2007; Fülop, 2009). Some steps have been taken in that direction: the government substituted from 2007 the system previously benefiting all gas and DH consumers by an income-dependant compensation in order to have a fairer and more efficient structure (The Government of the Republic of Hungary, 2007). Other solutions like life-line tariffs (World Bank, 2000a; 2000b) could be also considered for reducing the incidence of fuel poverty in Hungary.

Last but not least, it is also thought that the situation of electricity tariffs, levied with subsidies to the renewable and combined heat and power (CHP) sectors that increase the electricity costs of Hungarian households might be quite the contrary. Therefore, a reduction has been advised to avoid oversubsidisation and enhance energy and economic efficiency (OECD/IEA, 2007).

4.2.2 Investing in energy efficiency for the residential sector

Improving the efficiency of domestic energy consumption is preferable to direct financial assistance because it provides long-term solutions, indoor temperatures are easier to maintain once the renovated units is ready (households tend to spend some of the efficiency gains on increasing thermal comfort) and improvements bring along a number of co-benefits for individuals and the society (Wilkinson et al. 2001). Such solutions accrue substantial net economic benefits in terms of energy saving, increased comfort, reduced emissions, avoided health impacts, etc., as cost-benefit analyses in Ireland (Clinch and Healy, 2001) and New Zealand (Chapman et al., 2009) have shown.

Some of the current, representative programmes promoting energy efficiency and mitigation in buildings in Hungary are (Hoogwijk et al., forthcoming):

- Environment and Energy Operative Programme (KEOP 2007-2013)
- National Energy Saving Program 2008 (NEP)
- "Successful Hungary" Residential Energy Saving Credit Programme
- Energy Saving Credit Fund (former German Coal Aid Revolving Fund)
- ÖKO-programme (LFP-2008-LA-9)
- Grants for Renovation of Prefabricated-Panel Residences ('Panel programme')
- UNDP/GEF Public Sector Energy Efficiency Programme (2002-2008).

However, from a fuel poverty alleviation perspective, three critical reflections are proposed at this early stage of the analysis of the existing initiatives.

First, there seems to be a bias against this type of measures in the allocation of financial resources. In that way, Fülop (2009) has documented that, in 2008, the Hungarian State spent 80 billion HUF on gas and DH price support but only 3.1 billion HUF in efficiency improvements through the National Energy Saving Program and about 10 billion HUF in the 'Panel Program'.

Second, there may be limits to the implementation of domestic energy efficiency measures based on the physical characteristics of the residential stock. A revision of the features of the Hungarian stock would allow estimating what fraction could be retrofitted with the existing technology.

Third, it is unclear whether or how fuel poverty considerations are directing the government's energy efficiency action. As a result, some schemes could be neglecting households in worse conditions or benefiting user capable to self-finance investments. A more detailed analysis of the existing initiatives would be needed to understand their potential for alleviating fuel poverty in Hungary.

4.2.3 Enhancing the energy security

As the most gas dependent of IEA member countries, the continuity of supply has been a primary concern of the Hungarian government since the interruptions of January 2006 (OECD/IEA, 2007). This explains the involvement in the 'Nabucco' project (Spiegel Online International, 2009) and the ongoing efforts to increase the country's gas storage capacity (Socor, 2009).

Developing such infrastructures not only requires large amounts of money, which could be invested in demand-side solutions, but may also influence long-term energy prices. In this respect, the latest IEA review of Hungary's energy policy recommended to "consider the introduction of this measure [creation of a strategic storage] carefully, owing to its high cost, and that it should be implemented as part of a suite of measures, such as increasing energy efficiency and supply source diversification". This statement has patent fuel poverty implications as the IEA advocated for delivering "the increase in [energy] security at a low cost to the gas consumer" (OECD/IEA, 2007, p. 11).

4.3 Other small scale initiatives

Central and local governments' action is complemented with more targeted initiatives carried out by non-governmental organizations that are showing the potential of Hungary's residential buildings to reduce emissions and energy dependency while improving the welfare of citizens. That is the case of the flexible, low-cost solutions provided by Habitat for Humanity Hungary or the *Magyar Energia Brigádok*[20] on an individual basis. Other small scale schemes – with governmental and EU support – are the STACCATO project (Concerto Initiative) in Óbuda, the SOLANOVA project in Dunaújvaros (Hermelink, 2006) and the *Durgá-Vishnu Dévá* Ltd. projects in Budapest and Miskolc.

In comparison with nation-wide, government-supported schemes, such initiatives have less financial resources and a limited impact in terms of fuel poverty alleviation. But they are able to provide low-cost, easy-to-implement solutions, focus on particularly disadvantaged social groups (e.g., households without access to credit) or regions or test technological alternatives or management models before they are implemented at large scale.

5. KEY MESSAGES

Although society and institutions are aware of and concerned about energy affordability problems, Hungary, as many other EU Member States, lacks any official definition of fuel poverty. Given its geographical location (continental climate with cold winters), socio-economic conditions (income per capita well below Western Europe standards, the second lowest employment rate of the EU, rising energy prices) and the presence of an increasingly energy inefficient residential stock relying to a large extent on natural gas, it is reasonable to foresee that a sizeable share of Hungarian households are struggling to pay for the energy (mostly heating) they need. Previous research (Kocsis, 2004; Autonómia Alapítvány, 2004; KSH, 2004; KSH, 2006; Fülop, 2009) has highlighted some aspects of the issue in Hungary from various perspectives and at different scales but, to our knowledge, this is the first comprehensive assessment of fuel poverty at a national level.

In Hungary – as practically in any country but the UK – there is not systematic collection of statistics aimed at estimating the incidence of fuel poverty.

[20] Hungarian Energy Brigades

However, data recorded for more general purposes allow producing meaningful figures that illustrate the extent and key aspects of the phenomenon:

- Measured in purchasing power parity units (PPPs), Hungarian consumers currently (as of the second half of 2008) face middle to high range gas prices and the highest electricity prices of the EU. Between 2000 and 2007, energy prices increased at a faster rate than any other Consumer Price Index (CPI) item and approximately as much as wages and pensions grew. Particularly strong price rises were registered for gas and DH between 2006 and 2008.
- The energy consumption per m^2 of the average Hungarian household was among the highest ten among EU27 countries. Also, according to the ODEX index for households, Hungary was the only EU Member State whose residential sector became more energy inefficient in the period 2000/07.
- Expenditure-based measures of fuel poverty based on KSH data indicate that, on average, Hungarian households allocated 9.7% of their income on energy expenses in the period 2000/07. If the 10% threshold currently in use in the UK is applied to Hungarian data (year 2007), the average household of all but the two highest income deciles would be defined as fuel poor.
- Self-reported measures of fuel poverty following the consensual approach (Healy, 2004) and based on EU SILC data show that, on average for the period 2005/07, a 14.7% of the Hungarian population was unable to afford enough heat for their homes, a 16.7% was in arrears on utility bills and a 26.3% was living in a house with bad fuel-poverty related house-maintenance conditions (leaking roof, damp floor and walls, rotten windows, etc.). Some trends suggest that households may have initially reacted to the 2006 energy price shock by delaying their payment of utility bills rather than by cutting energy expenses.
- EU SILC results for the indicator ‘Inability to keep the home adequately warm’ were selected for producing a first estimate of the number of fuel-poor people in Hungary. According to them, nearly 1.5 million inhabitants reported being in such condition every year (as an average for the period 2005/07).
- Figures on excess winter mortality (EWM) estimated following state-of-the-art EWM calculation methodologies (Johnson and Griffith, 2003; Healy, 2004) indicate that for the period 1995–2007, an average of 5,566 people died more in winter (i.e., December to March) that in non-winter (i.e., August to November and April to July) season, which equals to a relative excess winter mortality figure of 12.71%. Some initial, rough estimates indicate that, in Hungary, between 1,400 and 2,400 people (between 25% and 44% of all EWD) may die prematurely every year because of poor housing and living conditions related to fuel poverty. It is also know that fuel poverty has morbidity impacts, but no data for Hungary were collected for this research.

Fuel poverty in rural areas is likely to be a particularly underexplored and complex typology of energy deprivation. Severe cases of fuel poverty experienced by Roma families living in geographically remote rural areas where very few income earning opportunities exist have been identified. For these families, electricity and firewood theft are part of the strategies to secure energy supply in winter months and the existence of forced trade-offs between energy and other basic needs like education – something to be further explored as an indicator of fuel poverty– has been also detected. In this respect, it has been noted the effect the impact on firewood prices of wood extraction for renewable (biomass) energy generation and its connection with illegal wood collection by poor households (OECD, 2008). This provides a certain ground for a collateral discussion about the social impact of renewables and on the potential of forests to act as locally managed fuel sources for deprived rural households.

Particular attention has been paid to district heating (DH) because of the heavy burden it poses on the budget of low- and middle-income households living in the suburban areas of Hungary's largest cities supplied by DH plants. It is likely that among the 650,000 Hungarian households connected to DH, many lower-income users are trapped in dwellings that cannot be easily disconnected and have to carry on paying painful energy bills without any clear perspective of improvement. However, as the Danish experience (Odegaard, 2009) indicates, DH as combined heat and power (CHP) has a significant potential to provide affordable, reliable energy to households with low GHG emissions.

Elderly people are a social segment particularly sensitive to fuel poverty because they spend more time at home, often live in underoccupied dwellings and are less flexible to change their place of residence or to make significant investments in improving their dwelling. Besides, evidence from Hungary (Section 2.2.4.2) and CEE (Buzar, 2007c) suggests that they tend to react to energy affordability problems by switching off the heating rather than by delaying payments. Finally, for the period 1995-2007, all the excess winter deaths in Hungary were recorded only for people over 40 years old and the probability of becoming an excess winter death was ten times bigger among people of 60 years and above than in the 40 to 59 year age group.

However, the burden of fuel poverty is not only borne by households, but also puts additional pressure on utility companies: according to EUROSTAT, Hungary had the highest percentage of people with arrears on utility bills of all EU27 countries in 2007. This has an impact on the functioning of energy providers, which have incentives to avoid the costs related to the management of such cases and to improve their general operation. Local governments are also part of the picture as social services mediate to avoid disconnection and support households willing to get rid of utility debts.

The relationship between income, energy supply, domestic energy efficiency and the role of institutions is complex and multi-faceted. While price increases have clear welfare impacts (e.g., the additional money spent on energy means less consumption of other goods and services and/or less savings, that is, future consumption), they also provide incentives for improving energy efficiency. Such reaction will not take place immediately and it is probably influenced by factors like the cost of improvements, expectations about the evolution of prices in the middle to long-term, availability of technology and expertise, information about feasible alternatives, capacity of the households to afford the initial investment, availability of credit, etc. Precisely because some of the latter can act as barriers, and although investing in energy efficiency is often a decision at the household level, institutions need to provide the adequate context and mechanisms that increase the likelihood of such investments. At the same time, households unable to escape from fuel poverty will need some kind of state support to secure the access to a minimum amount of energy services.

For Hungary, this translates into a series of critical recommendations concerning mostly to the responsibility of the government:

- There is a need to move from measures (income transfers) with short term effects that help households afford energy consumption, avoid disconnection or compensate increases in energy prices towards investing in domestic energy efficiency, which offers a long-term solution to fuel poverty and has other positive welfare effects in terms of co-benefits for individual households and the society. For that, the current structure of subsidies to gas and DH prices, which distorts the market, provides little incentives to invest in domestic energy efficiency and is an additional burden to the government's budget, needs to be replaced by measures better targeted at the households in a more difficult situation (OCED/IEA, 2007; Fülop, 2009). Then, many more resources would have to be directed to programmes aimed at improving the energy performance of Hungary's residential sector as way to reduce fuel poverty, cut emissions and reduce energy dependency. In this regard, two market failures acting as barriers identified in the literature (Healy, 2004) – the information gap and poor access to credit by low income households – would be a matter of primary concern.
- Though small scale initiatives are useful to explore the potential of feasible improvements (e.g., the SOLANOVA project achieved 80 to 90% reductions in the annual space heat consumption of a conventional panel building in Dunaújvaros), the government's involvement is needed for extensive (country-wide) energy efficiency programmes that require large initial investments and long implementation periods.
- Considering the existing strains on the government budget, innovative ways of financing the large investments needed are to be sought. Hungary is already developing expertise in the use of Green Investment Schemes in the residential sector (Rábai, 2009; Sharmina, et al., 2008) and a revision of the available EU funds would be also advisable in order to allocate resources following economic efficiency – welfare gains vs. costs to the society – criteria to prioritise investments among sectors and sub-sectors.
- Following IEA's recommendations (OECD/IEA, 2007), it is also suggested: i) a careful assessment of the strategy to enhance Hungary's energy security through large infrastructure developments (i.e., strategic gas storage and 'Nabucco' pipeline) that may have negative impacts in future gas prices and diverts financial resources otherwise needed for domestic energy efficiency; ii) to consider a reduction in the subsidies to the renewable and CHP sectors, which increase electricity tariffs, in order to avoid oversubsidisation and enhance energy and economic efficiency.
- Lastly, it is also advisable to devise mechanisms for measuring the various aspects and welfare impacts of fuel poverty in Hungary either through specific data collection tools or through the expansion of the existing capacities (e.g., KSH survey on households' financial and living conditions).

These suggestions point to the urgent need to move from supply-side approaches based on consumption of energy (e.g., kWh of electricity, m^3 of natural gas, etc.) to demand-side solutions focused on the provision of energy services (e.g., ensuring thermal comfort, covering lighting requirements, etc.). They are consistent with developments in the climate and energy policy areas that follow the mounting evidence on the effects of climate change and the increasing concerns about energy security. In the transition to a low-carbon, more energy-secure economy, those goals need to be made compatible with the aim of an affordable access to adequate energy services for all citizens.

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