

# Energy poverty in Europe: Towards a more global understanding

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## Abstract

The diversity of European national contexts considerably complicates the global understanding of the phenomenon of energy poverty. However, this global understanding is a key element of an effective fight against this problem. On one hand, this will make it possible to develop a concrete definition of energy poverty, enabling diagnosis, quantification of the problem and definition of targets at national and European levels; and on the other hand, a global vision of the problem could allow drawing common lessons from different countries, in respect of particular contexts of each of them.

This paper provides a non-exhaustive overview of the situation in 7 European countries (Belgium, Denmark, France, Hungary, Romania, Spain and UK). It compares and analyses the contexts of energy poverty, the real or perceived consequences of the problem, and the policies related to energy poverty (including procedures for non-payment) in these countries.

The paper also investigates the advantages and disadvantages of a common and relative definition of energy poverty. The average fraction of household expenditure that is spent on energy for housing varies from country to country, between less than 5 % and more than 14 %. This large range not only seriously compromises the use of the English definition of energy poverty on a European scale, but also reminds the relativity of the concept of poverty itself.

Finally, this paper highlights the problem of building general solutions, a problem caused (among other factors) by important differences between rental markets of different countries (the rental market is almost non-existent in some countries),

the existence of district heating in some countries (for example, Romania, Hungary and Denmark), and some large differences in energy prices (nearly 3 times more expensive in Denmark than in Romania).

## Methodology

In the framework of several studies we have conducted around the topic of energy poverty in Belgium and in Europe<sup>1</sup>, we have collected a lot of publicly available (and yet quite interesting) information. We have since received many requests to synthesize and analyse these data. This paper is our response to these requests. In a first step, it highlights the diversity of the national contexts (consequences and causes of energy poverty). Then it states the problem of a common definition. And it finally outlines measures intended to fight against energy poverty.

An important data source is Eurostat, and in particular the EU-Statistics on Income and Living Conditions (EU-SILC), that is the EU reference source for comparative statistics on income distribution and social inclusion at the European level. The minimum size of the sample of the overall population that is surveyed every year is of about 100,000 households in the EU countries.

These data have been completed by the Housing statistics in the European Union (2006, Ministry of the Infrastructure of the Italian republic and Federcasa) and other national statistics (within the census of 2002 in Romania).

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1. including a study conducted in the framework of the Belgian presidency of the UE, on behalf of the Belgian Ministry of Energy (SPF Economie, classe moyenne, PME et Energie)

Some keys to understanding the national contexts have also been founded in national reports of energy regulators ([www.energy-regulators.eu](http://www.energy-regulators.eu)), via information disseminated by Energy agencies, institutions or organisation in charge of social problems, and in documents of the EPEE (European fuel Poverty & Energy Efficiency) project.

## Introduction

The energy poverty problem is of course part and parcel of the problem of poverty in general, from which, in the view of some, it is entirely inseparable. Nevertheless, the specific characteristics of energy (compared with other consumables) call for this energy poverty to be considered as a component of poverty in its own right, a component that contributes substantially to the regrettable consequences of poverty, but also, if we are not careful, to its causes and aggravating factors.

### ENERGY, A NECESSARY COMMODITY

If energy poverty deserves this special consideration, it is primarily on account of the consequences of energy hardship. In the field of heating, lighting, hot water for sanitary use, cooking and refrigeration among other things, deprivation has an effect on health and the maintenance of a minimum level of comfort to guarantee dignified living conditions. In this respect it is clear that access to energy constitutes a necessity for all households.

### ENERGY, A FACTOR OF POVERTY

Households with the lowest financial resources may moreover find it much more difficult to reduce the cost of this necessary energy. Indeed, this cost is intrinsically dependent on the energy efficiency of the home and equipments, energy prices and the energy carrier (via the price of energy). A consumer whose situation has become financially insecure often has few means of impacting on all these factors, since he does not have the funds at his disposal that would enable him to carry out home improvements or change the form of heating. Conversely, more well-off households are able to invest in home improvements and thereby positively impact on their energy bills. However, at present, the consumption in the housing is lower for the poorest, probably because of the amount of equipment, and the heated surface area of the housing.

Except in Romania, the proportion of expenditure allocated to energy by a household in the 1<sup>st</sup> quintile is higher than for a household in the 3<sup>rd</sup> quintile of income distribution (between 7 and 35 % higher), a statistic that reflects this difficulty in keeping energy costs down. This is more obvious if we look at the relationship between the 1<sup>st</sup> and 3<sup>rd</sup> quintile when it comes to other expenses: Energy expenditure apparently overrides expenditure associated with health, education, clothes, household goods, leisure activities, and basically only yields to spending on food, tobacco and alcoholic drinks, water supply, and – in 4 of the 7 countries studied – the actual or imputed rental for housing. Furthermore, although we couldn't verify this categorically<sup>2</sup>, the surface area of the dwellings alone probably constitutes the main factor to which the absolute difference in

consumption between the first quintile and the third can be attributed. On this subject, the situation clearly differs considerably from one state to another.

### DEFINITION IN PRINCIPLE

For the purposes of this article, we will adopt the following definition in principle:

Energy poverty is the impossibility (or the difficulty) for a household to gain access to the energy it needs to ensure dignified living conditions at an affordable price from the point of view of its income. In the restrictive context of heating, this means the impossibility of heating its home to an adequate level and at an affordable cost.<sup>3</sup>

In the context of this article, we shall limit ourselves to households' energy consumption occurring in their dwelling. Forms of consumption such as those associated with transport, for example, are therefore excluded. However, we will consider consumption in the wider sense than merely that associated with heating.

This definition, which transcribes quite closely the problem described above, does not easily lend itself to practical use in that it is based on fairly subjective concepts that are hard to quantify. It raises such questions as the following:

- What are dignified living conditions?
- How does one determine the amount of energy needed to ensure dignified living conditions?
- What is an "affordable" cost?

In Europe there is a chance that the answers given to these questions will differ widely from one state to another,

## Consequences of energy poverty

The consequences of energy poverty as described above are of several types:

- Doing without energy,
- Indebtedness linked to energy bills,
- Doing without or indebtedness on commodities other than energy.

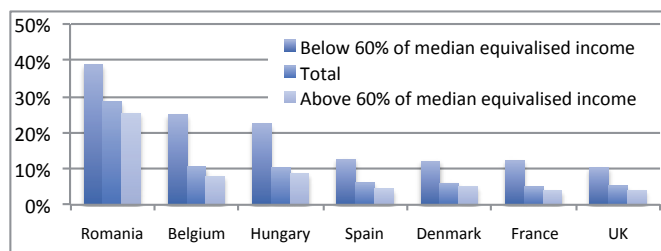
### DOING WITHOUT ENERGY

At European level, the inability to keep the home adequately warm gives an indication of energy hardship, at least as regards the heating and/or air conditioning component. This indicator – recorded by SILC Survey – is, in fact, about affordability (ability to pay) to keep the home adequately warm, and refers to the perception of the participants (and not to an objective criterion of thermal comfort).

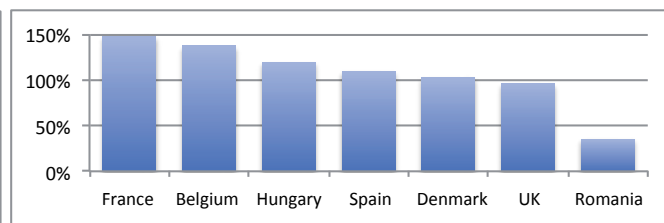
The situation differs considerably from one country to another. An average Romanian household is faced with this problem to a greater degree than a Belgian household below the poverty line. A similar disproportion exists between Belgium

2. It would have been interesting to compare consumption per m<sup>2</sup> for the different quintiles. This data is unavailable.

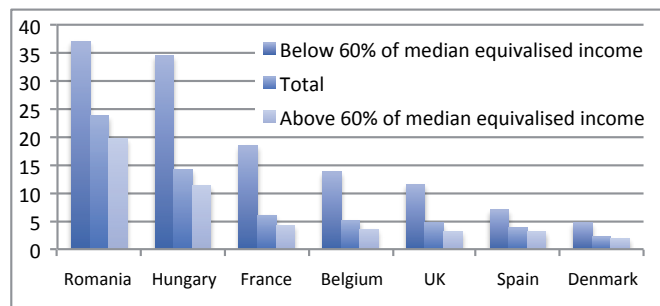
3. The partners of the EPEE project have adopted a quite similar definition for "fuel poverty" (for heating only).



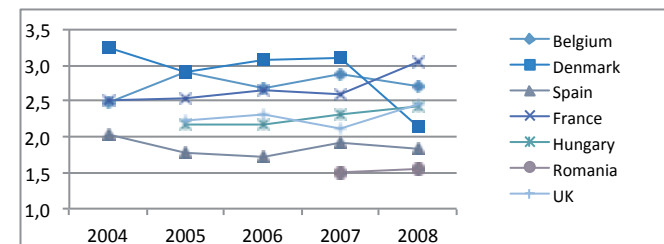
**Figure 1. Inability to keep home adequately warm (2007-2008)**  
(Eurostat ilc\_mdcs01). Percentage of population.



**Figure 2. Inability to keep home adequately warm (2007-2008)**  
(calculated from Eurostat data ilc\_mdcs01). Excess for people whose income is lower than 60% of the median equivalised income.



**Figure 3. Arrears on utility bills (2008)** (Eurostat ilc\_mdcs07). Percentage of population.



**Figure 4. Ratio between the percentage of households affected by arrears on utility bills below 60% of the median equivalised income and on average.** (Calculated from the Eurostat data ilc\_mdcs07).

and France or the UK. Overall, Romanian households are faced with this problem 5 times more often than British households.

On the other hand, this inability is systematically much more widespread among households that are below the poverty line. The excess of the inability to keep homes adequately warm for these households in relation to the average is comprised between 82 % and 152 % for practically all the states studied. Romania is the exception, with an excess of less than 35 %. This can be connected to the especially high level of the inability to keep home adequately warm in Romania: if nearly 30 % of the households are unable to keep home adequately warm, and only 20 % are living below the poverty line, then the inability is necessarily also quite frequent among households that doesn't live below the poverty line. The poor quality of most housing, combined with low incomes, could probably explain this widespread inability.

#### ARREARS ON UTILITY BILLS

The proportion of households affected by payment arrears (at least once in the year under consideration) on utility bills (heating, electricity, gas, water, sewage, etc.) is more than 10 times higher in Romania than in Denmark. This indicator applies not only to energy. However, the energy bills are the major part (around 75 %) of the utility bills.

Excepted in Romania, arrears on utility bills are highly (around 2 times) more frequent for households whose income does not exceed 60 % of the median equivalised income than for the others. The exception in Romania (where arrears on utility bills are still slightly more frequent for households below the poverty line) could possibly be explained by an argument similar to above: if nearly 25 % of the households are affected

by arrears, and only 20 % are living below the poverty line, then arrears are necessarily also quite frequent among households that doesn't live below the poverty line. This could easily be explained by very low incomes.

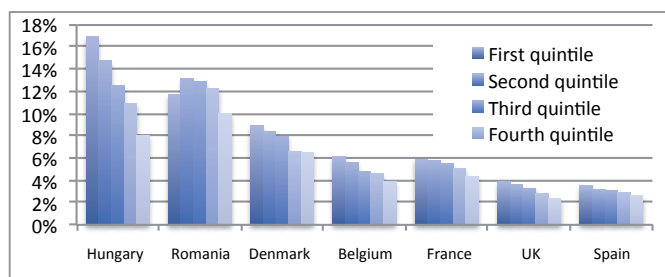
#### DEPRIVATION OR INDEBTEDNESS EXCLUDING ENERGY

The consequences of energy poverty in the field of general poverty are difficult to quantify, insofar as the supposed impact of a situation of energy insecurity is necessarily attenuated amidst the numerous other factors of poverty.

#### Causes and aggravating factors

The phenomenon of energy poverty has its roots in several causes of different types. On the one hand, energy poverty may come about as a result of a situation of general poverty. In this respect, the excess of the expounded consequences of insecurity for the lowest incomes, expounded above, very clearly reveals this influence. And on the other hand, it may also undergo the influence of specific factors such as:

- The overall cost of energy, basically resulting from:
  - the energy efficiency of the housing,
  - the way in which the dwelling and its facilities are used,
  - the way energy prices evolve (also taking into account possible social tariffs or aids),
- The context of the dwelling, including
  - the overall cost of the dwelling, of which the overall energy cost forms a part,



**Figure 5. Household's expenditure on electricity, gas and other fuels in the housing as a percentage of all expenditure, by income quintile (2005) (Eurostat hbs\_str\_t223).**

- the occupation status (owner occupied or let out to a tenant).

Eurostat's macro-data (e.g. the share of the expenditure that is spent on energy in the housing) can be used to come closer to a quantification of these different causes, but do not make it possible to quantify the link between these causes and the consequences of energy poverty.

Nonetheless, the link between energy poverty and the overall cost of energy is generally regarded as self-evident, and in the UK has been elevated to the title of definition of energy poverty. The proportion of total expenditure allocated by households to energy varies, for the 3<sup>rd</sup> quintile, between 3 % in Spain and more than 12 % in Hungary. For the 1<sup>st</sup> quintile, this proportion ranges from 3.5 % in Spain to almost 17 % in Hungary. In Romania and in Hungary, the importance of the expenditure on energy is probably due to the low median income (respectively 17 % and 36 % of the European median income), while the low expenditure on energy in Spain could be explained by the climate.

This indicator comes close – at least for the 1<sup>st</sup> quintiles – to the British definition of energy poverty expressed in function of the proportion of income allocated to energy. The major differences on this indicator, from one country to another, clearly highlight the difficulty involved in setting an absolute threshold for energy poverty.

Aside from these differences, it is a fact virtually across the board that those who earn least are also those who devote the largest part of their spending to energy. Romania is the exception to this rule, since the first income quintile there devotes a proportion of its spending that is lower than that devoted by the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quintiles. This exception in Romania could – once more – result from extremely low incomes: when it is not possible to buy both enough food and enough energy, households would give preference to the purchase of food. This hypothesis is confirmed by statistics since, in Romania, food is nearly the only thing for which the first quintile spends a larger share of his expenditure than the third quintile.

However, it is wrong to think that absolute energy spending by low-income households is higher than that of the average household. In practice, a household in the 1<sup>st</sup> quintile is the one that spends least on energy everywhere.

## GENERAL POVERTY AND INCOME DISTRIBUTION

Although energy poverty is not limited to people affected by general poverty, this general poverty and – more widely – the distribution of income, are essential factors in it. The at-risk-of-poverty rate<sup>4</sup> can be as much as twice as high in one state as in another. The Gini Coefficient quantifies inequality of income. Although Europe is broadly speaking very egalitarian, we nonetheless see some logical variations of the Gini Coefficient, between Romania and the UK on the one hand, and Denmark and Hungary on the other.

## CONSUMPTION AND ENERGY EFFICIENCY

Energy consumption depends on a large number of factors, including:

- The energy efficiency of the housing,
- The surface area of the housing,
- The way in which the housing is used.

Furthermore, the comparisons must also necessarily take account of the climate.

The average household consumption shows major differences between one state and another. In Belgium this consumption exceeds 23,000 kWh/yr, whilst in Spain or Romania it is around 12,000 kWh/yr. Whilst this distressing difference can be explained by the climate in the case of Spain, this is an explanatory factor that does not apply to Romania. In the case of Romania the difference cannot be attributed to the quality of the housing, either, which is relatively poor. Danish households cover an occupied surface area of 120m<sup>2</sup> on average. Conversely, Romanian households make do with less than 65m<sup>2</sup> (a high estimate). Thus, the surface area more than suffices to explain the difference in consumption between states with occupied surface areas and consumption levels at the extreme ends of the scale. The high energy consumption in the Belgian dwellings can also be attributed to a high surface area, and in addition, to the high rate of ancient constructions (before 1919, or between 1919 and 1940) and the small amount of dwelling that has been renovated (Dominique Vanneste et al., 2007).

This finding suggests a substantial influence of the heated surface area. Moreover, other factors such as the equipment, the way in which the housing is used (e.g. Are the bedrooms heated?) or the use of non-commercial energies (e.g. biomass) might also help explain the Figure 7.

We also note that among the studied countries, the higher the gross national income is, the higher the surface area (comparison with Eurostat nama\_inc\_c for the year 2009).

The type of means of heating used to heat homes can also be considered as a factor of inequality in energy efficiency. There are obviously no grounds to suppose that central heating is necessarily more efficient than other forms of heating. Nevertheless, the absence of central heating is regularly made up for by the use of inefficient means of heating or expensive devices, such as paraffin stoves or electric radiators. In Romania, 60 % of the population uses stoves, most of which use solid fuels (IN-

4. The at-risk-of poverty rate is measured as the share of persons with an equivalised disposable income below the at-risk-of-poverty threshold. The threshold is set at 60 % of the national median equivalised disposable income.

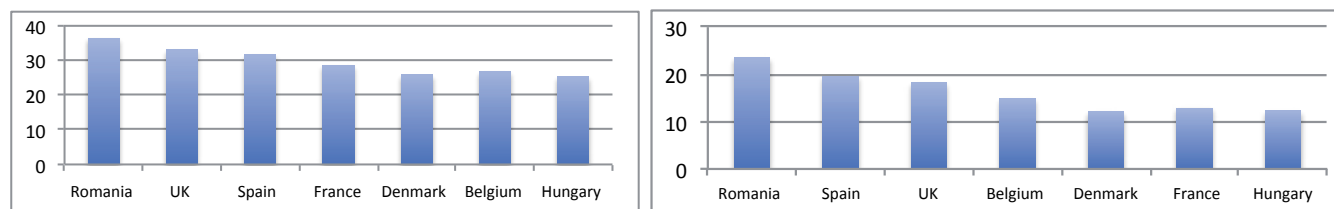


Figure 6. On the left: Gini Coefficient (Eurostat tess190) On the right: At-risk-of-Poverty rate [%] (average 2007–2009) (Eurostat tess125).

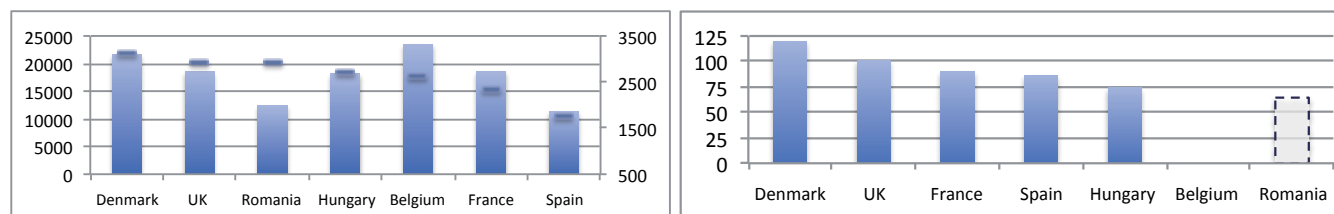


Figure 7. Total consumption (not only for heating) per household (average 2005–2008) [kWh/yr/household] the countries are ranked by descending order of annual degrees day of heating (right-hand scale) (calculated from Eurostat nrg\_100a).

Figure 8. Occupied surface area [m<sup>2</sup>/household]. (Housing statistics in the European Union, 2006). Romania: estimate based on the higher values of the surface area categories used by the INSSE for the 2002 census. (Belgium: no estimate).

SSE, 2002). In Spain the low extent to which central heating is used is mainly attributable to the climate.

In 3 countries in our selection, district heating covers a significant proportion of households:

- Denmark: almost 60 % of households are supplied with heating at prices that are often lower than gas prices (Danish Energy Regulatory Authority, 2008);
- Romania: almost 30 % of households are supplied with heating (PEEREA, 2006), often without individual meters to record the heating consumed and by means of poor-quality networks; however, individual billing is now obligatory; the current heating prices are not necessarily competitive with gas prices (which are very low) and some consumers are disconnecting from the district heating;
- Hungary: almost 15 % of households were supplied with heating in 2007 via networks that were often obsolete (Hungarian Energy Office, 2008); this number is coming down; individual billing is not generalised.

Thus, in some countries district heating is clearly an advantage, whilst in others it can deprive the household of any room for manoeuvre as regards its consumption (in the absence of individual metering) and can generate higher costs. In this latter case, this can obviously become a factor contributing to energy poverty.

#### THE CONTEXT OF THE HOUSING

The context of the housing is a key factor, which is liable to exacerbate energy inequalities, or conversely curb it:

- When someone is deciding on a place to live, the availability of housing obviously takes precedence over its energy efficiency; in a context of low availability, it is often impossible for those with the lowest financial resources to take the energy criterion into account when choosing a home;

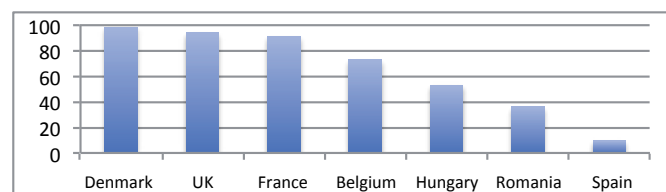


Figure 9. Percentage of housing fitted with central heating. (Housing statistics in the European Union, 2006.)

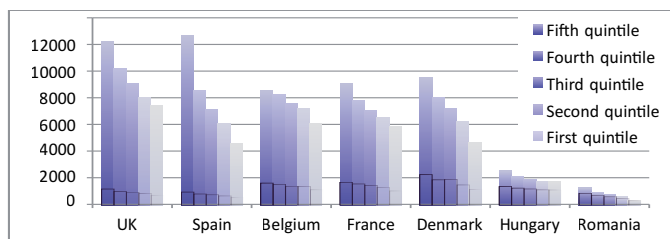
- Letting often implies a greater curb on improvement of the home by its occupant; the lessor's obligations may nonetheless also constitute the guarantee of a minimum guaranteed quality, provided the legislation makes provision for this and the availability of housing so allows;
- The budgetary difficulties and inequalities linked to energy necessarily fall within the wider context of the overall cost of the housing. A home that is unaffordable but energy-efficient will obviously not simplify the budgetary equation of a household that is incurring the costs of energy inequalities,

Except in Spain and Romania, the impact of housing (including all charges) on expenditure is greater for the lowest incomes (excess for the 1<sup>st</sup> quintile from 17 % in Denmark to 38 % in Hungary). However, the cost of housing, as for energy, is still less expensive for the 1<sup>st</sup> quintile than on average (from 13 % in Hungary to 52 % in Romania). In most countries, the expenditure on energy is quite low, compared to the expenditure on housing. Thus, for a household in poverty, energy will probably be seen as a secondary concern (cf. Figure 10).

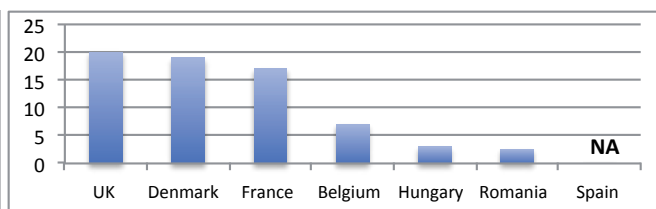
The presence of "social housing" is the guarantee of a supply of housing at rents that are deemed to be affordable<sup>5</sup>. The UK and Denmark are simultaneously the countries where the

5. The term "social housing" (or local authority housing) does not represent the same thing everywhere.

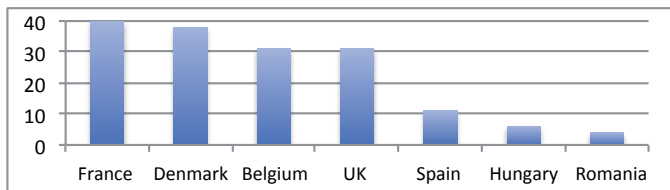




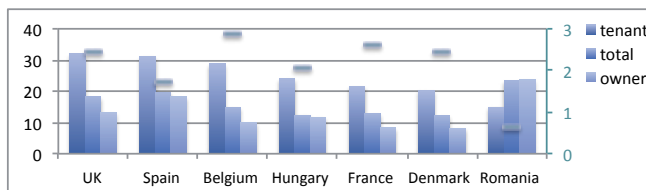
**Figure 10. Expenditure (PPS – Purchasing Power Standard) on electricity, gas and other fuels compared with expenditure on housing, (2005) including electricity, gas and other fuels, by income quintile (calculated from Eurostat hbs\_str\_t223).**



**Figure 11. Percentage of social housing in the housing stock.**  
The concept of social housing covers very different realities depending on the state in question. (Housing Statistics in the European Union, 2006)



**Figure 12. Percentage of rental housing on the housing stock**  
(Housing Statistics in the European Union 2006).



**Figure 13. At Risk of Poverty rate [%] by tenure status (average from 2007 to 2009)** On the right-hand axis, ratio between the At-Risk of Poverty rate for tenants and for owners (calculation based on Eurostat tessi125).

proportion of social housing is highest, and where the cost of housing represents the largest share of expenditure. One might think that social housing meets a greater need in these countries than in others. Moreover, social housing in Europe has often been built without any concern for energy. Most of the old members of the European Union have since started on renovation and regeneration, but the task is generally far from having been successfully completed.

The tenure status very often impacts directly on energy poverty, since the owners letting out the home have little interest in improving its energy efficiency, whilst their tenants do not have any certainty of benefiting fully from any investment they might bear the costs of themselves. This problem is probably less of a priority in Romania and Hungary, where letting is something of the exception<sup>6</sup>. Elsewhere, rental housing represents a proportion of housing of between 10 and 40 %, and exceeds 30 % in four of the seven countries. Moreover, as a rule the most impoverished live in rented housing (cf. Figure 13). The rate of people at risk of poverty is 2 to 3 times higher for tenants than for homeowners. Here we can see a retroactive effect: the most impoverished live in rented housing; the rented house or flat is not renovated since the owner has little interest in doing so; the household encounters more and more difficulties in assuming the costs of its energy and topples into poverty through energy poverty. However, the example of Romania and Hungary suggests that home ownership does not necessarily provide a solution for improving the energy performance of dwellings.

Finally, it should be noted that the owner-tenant dilemma is not necessarily inevitable, provided the legislation stands in the way of this (for example by means of obligations incumbent upon owners). It would be interesting to assess the situation in

the social housing sector in Denmark, where the principle of tenant democracy is applied.

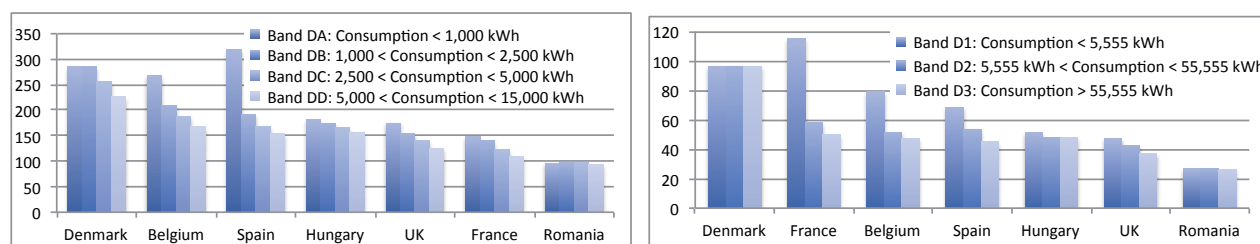
#### ENERGY PRICES

Energy prices directly impact on the expenditure devoted to energy, and thereby obviously constitute an essential factor in energy poverty. Although this measure is for the most part applied proportionally for all consumers, we do nonetheless see several factors of inequality in the price structure:

- price variations resulting from the choice of energy medium are undeniably the main ones; thus, the price of gas (or heating oil) is generally more than two times lower than that of electricity; what's more, the price of district heating in Denmark is often appreciably lower than the price of gas;
- tapering charges, which are generally applied by the suppliers, benefit large-scale consumers rather than the smaller consumers (those on low incomes are generally those who consume least, cf. Figure 10);
- the choice of supplier is obviously a source of price diversification, but there is no guarantee that this will benefit those who need it the most;
- depending on the legislation in force, the supplier may have a degree of scope in the way it carries out intermediate billing; it may thus occur that a customer pays trivial amounts for a number of months before receiving a huge bill to regularise his situation, and vice versa.

On the basis of the same energy medium, energy prices can sometimes vary from one country to another by a factor of 3. In Denmark, the particularly high prices are the result of a taxation policy intended to “protect the citizens against low energy prices”. Interestingly, it is seen that the countries in which energy prices are highest are not necessarily those in which the problem

6. This is the result of the sale of the public housing stock to occupants in the 1990s.



**Figure 14. Electricity and gas prices for different bands of consumption (domestic consumers in 2009).** On the left: Price of electricity [€/MWh]. On the right: Price of gas [€/MWh] (Eurostat nrg\_pc\_202 and nrg\_pc\_204).

of energy poverty is most evident, and – conversely – the country where the prices are lowest is the one facing the problem to a considerable degree. However, this observation is only true in absolute value: the prices expressed in PPS are still higher in Denmark than in most other countries, but they are quite similar to (gas), or even higher (electricity) in Romania than in other countries. In relation to the GDP per capita, the prices in Romania and Hungary are 2 times higher than in the other countries.

For electricity and for gas, tapering charges are a reality in most of the countries studied. Apparently they are not a reality in Denmark and Romania, at least for the smallest consumers. It should be noted that in Romania prices are practically identical irrespective of the consumption, in respect of both electricity and gas.

## Defining energy poverty

### WHY DEFINE ENERGY POVERTY MORE ACCURATELY?

Generally speaking, we can expect a definition (or a set of indicators) of energy poverty to enable us to:

1. Quantify the overall scope of the problem and monitor its evolution over time,
2. Characterise the regional situations and make a comparative study of these possible,
3. Characterise individual situations, so as to diagnose cases of energy poverty<sup>7</sup> and deal with them appropriately.

The definition in principle expounded above clearly does not lend itself to these uses. In practice, the British definition is, by contrast, suited to them:

A household is said to be in fuel poverty if it needs to spend more than 10 % of its income on fuel to maintain an adequate level of warmth (usually defined as 21 degrees for the main living area, and 18 degrees for other occupied rooms). (The UK Fuel Poverty Strategy, 2008)

### Importance and difficulties of a common definition

Directives 2009/72 and 2009/73 state that:

Energy poverty is a growing problem in the Community. Member States which are affected and which have not yet

done so should therefore develop national action plans or other appropriate frameworks to tackle energy poverty, aiming at decreasing the number of people suffering such situation. In any event, Member States should ensure the necessary energy supply for vulnerable customers.

It is therefore conceded that energy poverty is a problem that affects Europe. Moreover, it is a problem clearly subjected to the influence of European policies. The liberalisation substantially alters the position of the energy consumer and impacts on prices, whilst the EPBD aims to enable energy costs to be taken into account more effectively in the overall cost of housing and for the energy efficiency of the housing stock to be improved. Thus, the importance of a common definition at European level results not only from the possibility of objectivising the observation of the problem Europe wide, but also of carrying out a comparative assessment of the situation in the States and to draw similarly objectivised lessons on European policies and their implementation in different states.

However, the Commission states:

The Commission does not consider it appropriate at this stage to propose a European definition of energy poverty or of vulnerable customers. [...] There is no consensus on what actually constitutes energy poverty. The lack of a uniform definition should not be a problem per se as it allows for solutions that are adapted to national and local conditions. (An energy policy for Consumer, 2010)

For all that, there is still (as the Commission appears to concede) a considerable haziness surrounding the terminology, which prompts the following questions:

- How do you set about “decreasing the number of people suffering from energy poverty” if you do not give yourself the means of measuring this number? In other words, how do you establish and check the objectives without a definition?
- If the problems dealt with in the different states do not lend themselves to a common definition, albeit subject to a different parameterisation according to the states, is there still cause to consider this as a common phenomenon?
- Can we hope to draw lessons from the wide range of situations and policies in the different EU Member States in the absence of solid terminology and common indicators?

7. Deciding whether it would be advisable to aim to combine the individual scale of this latter concern with the more global scale of the first three concerns would require more in-depth reflection.

### TOWARDS A RELATIVE DEFINITION

The diversity of European contexts means it is not very easy to set an absolute threshold for energy poverty at European level, as was done in the UK. In this respect we would recall that:

- The proportion of the expenditure of a Romanian household in the 5<sup>th</sup> quintile which is allocated to energy is practically 10 %, whilst that allocated by the Spanish or British first quintile is less than 4 %. The use of a common threshold would thus lead to the conclusion that almost all Romanians are in a situation of energy insecurity, whilst virtually no Britons or Spaniards are affected. Even so, no state escapes problems of inability to keep an adequate temperature in the home, in respect of certain households.
- The share of expenditure of a Danish household in the 5<sup>th</sup> quintile that goes towards energy is also higher than the share devoted to energy by Belgian or French households in the 1<sup>st</sup> quintile. And yet Denmark records fewer arrears on payments, and the proportion of households unable to maintain an adequate temperature there is substantially lower than the proportion observed in Belgium.

There would thus appear to be a sizeable risk of a common absolute definition of energy poverty, based on the share of income devoted to energy expenditure, failing to translate the problem and its consequences correctly. The alternative possibility of defining energy poverty via its consequences, despite its theoretical relevance, seems impractical: It would be both dangerous and complicated to set targets and characterise individual situations on the basis of perceived consequences that may be quite difficult to objectivize (e.g. inability to keep home adequately warm), or influenced by many other factors (e.g. arrears on utility bills).

As soon as one aims to describe the phenomenon at European level in a harmonised manner, the choice of a relative definition therefore becomes fairly self-evident. In this respect, common observations such as, i.e., the influence of income on the consequences of energy poverty and on the share of the expenditure allocated to energy strongly suggest a common phenomenon, that could be defined and measured on a common basis.

### Defining an energy poverty threshold

However, this finding does not compromise the principle of the British definition, insofar as the threshold of 10 % of income is made flexible in function of the situation of the states. What is involved is therefore an adaptation of the equation verifying households in a situation of energy insecurity in the following way:

$$\left\{ \frac{\text{Expenditure on Energy}}{\text{Income}} \geq 10\% \right\} \rightarrow \frac{\text{Expenditure on Energy}}{\text{Income}} \geq f(\text{State or Region})$$

where  $f(\text{State or Region})$  is the “Energy Poverty Threshold”.

This equation raises the following questions:

- How does one establish an Energy Poverty Threshold?
- What do we include under expenditure on energy? Is account taken only of heating, or are other uses of energy in-

cluded? Is consideration given to real consumption or consumption which is regarded as necessary?

- What do we include under income? Are incentives, allowances, and other housing-linked income included?

The threshold can be fixed, for each country and each time period, in many ways. One possibility consists in merely leaving the states to set a threshold themselves, which is adapted to their situation. Even though there is a risk of the comparison being less obvious, this possibility nonetheless makes it possible for the evolution specific to the state to be objectivised and for a comparative analysis of these developments to be carried out. Besides, the most obvious common base for this threshold can be expressed in function of the national average of the indicator:

$$f(\text{State}) = f\left(\frac{\text{Expenditure on Energy}}{\text{Income}}\right)_{\text{Average}}$$

One possibility of this type could consist, e.g., in fixing the threshold at double the national average. For the UK, this threshold more or less amounts to the current threshold for heating. It should be noted that this kind of threshold could be used a priori as it stands for all types of energy use, without any particular restriction to the case of heating.

This definition corresponds to a quantification of inequalities of energy affordability inside the country. This is highly dependent on the income distribution – in a similar way as poverty itself – but it doesn’t take into account the effect of a low average income (e.g. in Romania) or a high average consumption (e.g. in Belgium). However, such a definition is appropriate if the issue is to avoid widening an “energy poverty” gap. A topical issue in the changing context of energy. Anyway, this form of definition can obviously not translate alone the whole problem and should mainly be seen as a way to set targets, provide an overall picture and help to characterize individual situations.

### Defining expenditure on energy

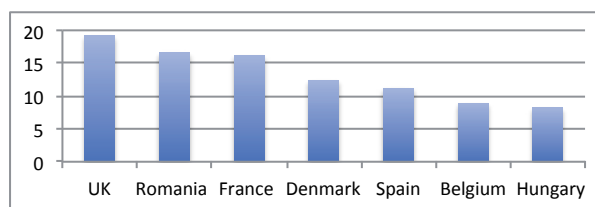
Expenditure on energy can in most cases cover expenditure associated with heating, but also that associated with lighting, appliances, and any other domestic use of energy. Furthermore, this expenditure can be assessed according to different approaches, which include:

1. A realistic approach based on the consumption observed,
2. A normative approach, based on forms of use deemed to be necessary.

This second approach is applied to the case of heating by fixing e.g. the indoor temperatures that are considered to be adequate. This is what was done in the framework of the British definition<sup>8</sup>. Nonetheless, the extension of the concept of energy poverty to include other domestic energy uses in the context of a normative approach raises the question of which forms of energy use are regarded as necessary: washing machine, freezer, television, lighting, etc. How does one judge, even at the level of one state, what is needed to guarantee dignified living

8. An adequate level of warmth is usually defined as 21 °C for the main living area, and 18 for other occupied rooms





**Figure 15: Estimated share of households spending a considerable share (twice the national average) of their expenditure on energy** (source: European Commission, 2010).

conditions? How does one determine the normal mode of use of equipment that is deemed to be necessary? How does one record the efficiency or poor state of repair of the equipment? In short, how does one arrive at a correct diagnosis? And finally, how does one obtain an overall view on this basis? Questions to which it is difficult to find common answers.

The realistic approach clearly dispenses with these questions and favours a pragmatic indicator, which is easily measurable and stripped of any value judgement. This approach also paves the way for a genuinely common measurement of energy poverty. On the other hand, this approach presents the risk of diagnosing energy poverty in respect of households whose means of consumption – were it to be judged excessive – is the result of a choice of lifestyle, or not making an energy poverty diagnosis for households suffering severe energy deprivation. This approach also deserves to be accompanied by other indicators.

### An initial rough picture

At the moment there is no harmonised European measurement of the phenomenon according to this type of definition. Nonetheless, the European Commission recently published an estimate of the percentage of households devoting a considerable share of their expenditure to energy (%). The term “considerable share” should be understood as a proportion equal to twice the national average or more. We note that there are large differences between the Figure 15 and the figures of the consequences of energy poverty: e.g. UK stands here in the first place, while it doesn't figure very prominently in the indicators showing the consequences.

This finding indicates that this indicator is not ideal. We note that it substitutes share of expenditure for share of income: someone living alone in a big house, with high incomes and a normal expenditure, devotes a considerable share of his expenditure to energy, but is not necessarily affected by energy poverty. This substitution distorts more the result for countries where average incomes are sufficient to enable households to save money. This could help to explain the position of the UK, France and Denmark. Another explanation is that the indicator measures inequalities inside the country, while the consequences of energy poverty can also result, for example, from low energy performances on national average. Therefore, the indicator is strongly dependent on the income distribution, which is relatively unequal in the UK. We finally note that this indicator doesn't consider energy deprivation, since it uses the real consumption, and not a “necessary consumption”.

## Combating energy poverty

The fight against energy poverty and its consequences can take on very different aspects:

- Mechanisms for consumer protection or the protection of vulnerable consumers; these measures can guarantee a minimum supply, delay the electricity or gas supply being cut off, simplify the procedures for the settlement of disputes and consumer information, or even bring indebted customers into contact with the social services.
- Measures intended to improve prices or increase income; this may, for example, involve social tariffs or various allowances aimed at enabling the persons in question to pay their energy bills.
- Measures aimed at improving the energy efficiency of the housing and equipments.

### CONSUMER PROTECTION AGAINST DISCONNECTION

Less than 60 % of the EU Member States have any form of consumer protection against disconnection for electricity or gas (ERGEG, 2009). Of the countries studied, Denmark is the only country that has no protection against disconnection of either the gas or the electricity supply. Spain reportedly does not have this protection for gas.

In 6 EU Member States, these forms of protection apply to everyone. The other countries only apply protection measures to certain categories of customer, such as senior citizens, disabled persons, those living in isolated areas, the socially needy (Hungary) or those whose financial difficulties are not of their own making (illness, unemployment, etc.) (Finland). Including in the countries that do not have any form of protection against disconnection, it is customary for the supplier to be obliged to warn the customer before any disconnection, and to be bound by legal periods of notice. Below we present a non-exhaustive overview:

- In Denmark, the electricity can only be cut off after two reminders.
- In Hungary, in respect of gas and electricity, disconnection of the supply is only authorised after 3 months of payment arrears, an attempt at conciliation and a moratorium. The customer is offered the installation of a prepayment meter. For district heating, disconnection is authorised after 60 days and a written warning.
- In Romania, for electricity, the supplier may bill surcharges 30 days after the payment deadline. 45 days after the deadline, the supplier may send a notice warning that the supply will be cut off, and effect the disconnection 5 days later (more than 200,000 disconnections in 2008).
- In France, the supplier grants a period of 15 days for unpaid bills, after which it is authorised to disconnect or install a limiter (for electricity) after sending a second letter initiating a second period of 20 days. If the applicant submits a request for assistance, the procedure is suspended until the decision is taken.
- In the UK, when a customer has a debt he is not allowed to change supplier. The supplier negotiates a payment plan. If it does not manage to do this, it suggests the installation of

a prepayment meter. If these attempts fail, the social services are notified. In 2008, the suppliers' disconnection procedures involved at least 3 reminders, a pre-disconnection visit and a total period of 80 days counting from the date on which the bill was sent.

- In Flanders, 1 month lapses, counting from the date of the payment reminder, before the decision to terminate the contract can be taken. The customer then has 2 months in which to find another supplier. Failing this, he is transferred to a supplier by default, which install a prepayment meter. A minimum supply is guaranteed on all electricity prepayment meters. In case of non-payment, this supply can be cut on the advice of an external body.
- In Brussels, disconnection must be the subject of a court order. For gas, the minimum disconnection period is 110 days counting from the payment reminder. For electricity, a limiter is installed at least 35 days after the reminder was sent. If a payment plan fails to be observed, the supplier can request disconnection (after 60 days). If it embarks on a debt mediation process, the household can be "protected" during a period of 6 months.

The prepayment meter and power limiter are regularly used as an alternative to disconnection. The prepayment meter (Wallonia, Hungary and the UK) does not avoid energy hardship: households are induced to consume according to their budget and not according to their needs. It also deprives the household of the spreading of billed consumption over the entire billing period. Finally, part of the budget pumped into the meter generally serves to repay the debt, which results in the financial burden increasing further. The limiter (France and Brussels) doesn't guarantee debt reduction, but can be used to impose a form of austerity whilst still guaranteeing a minimum supply. The coupling of the two devices (e.g. in Flanders) enables a minimum supply to be guaranteed, whilst favouring consumption attuned to the budget.

In some countries, specific measures are taken to avoid disconnections in winter. A ban on winter disconnections is applied in France, in the UK and in Wallonia in respect of certain types of households, and in Flanders in respect of everyone. In Brussels, the possibility of preventing a winter disconnection is a decision left to the justice and the social services. In Wallonia, cards to feed the prepayment meters are distributed to protected customers for gas during the winter season.

In several countries, measures are taken to ensure that the social services can be notified. In Belgium, the supplier informs the social services when a limiter or a prepayment meter has been installed, or when a household's supply has been disconnected. In Denmark, the supplier must advise the social services if there are children in the household. In France, a letter mentions the possibilities of aid that can be obtained through the social services.

In some cases, disconnection is subject to the advice of an external body. This is the case *inter alia* in Brussels (court order) and in Flanders. Moreover, Directive 2009/73 explicitly stipulates that:

Member States shall ensure that an independent mechanism such as an energy ombudsman or a consumer body is in

place in order to ensure efficient treatment of complaints and out-of-court dispute settlements.

Fuels other than gas and electricity are often not covered by measures protecting households against shortage.

#### MEASURES DESIGNED TO IMPACT ON PRICES AND INCOME

Aside from measures aimed at combating general poverty (which we will not go into in detail here), less than half of the EU Member States have economic support mechanisms intended to help certain categories of consumers.

##### Social tariffs

Among these mechanisms, social tariffs are a frequent feature. These may involve:

- a lump-sum reduction on the amount of the bills (e.g. France for gas),
- a proportional reduction (e.g. Hungary),
- the removal of the fixed rental (e.g. Spain for electricity),
- the granting of a free amount (e.g. Flanders, granting of a basic volume for everyone<sup>9</sup>),
- progressive pricing (e.g. Romania, pricing by blocks).

In some cases these tariffs are regulated, whilst in others they are not. In the UK (e.g) the social tariffs are defined by the suppliers themselves in the framework of voluntary agreements with the government. The suppliers have considerable freedom in determining both the target public and the price, insofar as this tariff is their lowest tariff.

In the context of a deregulated market, the difficulty facing social tariffs is the setting of a price that is the most advantageous for the target group. In Belgium, the social tariff is explicitly calculated on a six-monthly basis to be the least expensive on the market. In Romania, the progressive price per block has been calculated to be the most advantageous on the market as long as consumption remains below 90 kWh/month.

In some states, application of these tariffs is automatic (France and Belgium), whilst in others the suppliers are obliged to keep their customers informed of them.

##### Other economic support mechanisms designed to help consumers

In France and Belgium, there are funds that can explicitly be used to enable the financing of the discharging of energy debts or debt mediation. In Belgium, the services managing these funds are informed by the supplier in the event of non-payment. These services have a degree of freedom as regards the use they make of them. In the UK, two lump-sum allowances (which are automatic under certain conditions) are intended to help people pay their energy bills. One of these is intended for senior citizens. The other is aimed at people on low incomes and is paid whenever there is a cold spell. Denmark does not have any explicit aid for the payment of energy bills but does have sizeable housing subsidies (on average €1,700/yr/household) covering a large proportion of the population (~20 %).

9. Every household here has a free volume of electricity of 100 kWh + 100 kWh per member of the household.

## MEASURES AIMED AT IMPROVING THE ENERGY EFFICIENCY OF HOUSING

### Financing measures

As far as financing is concerned, various mechanisms are cited to enable the improvement of the energy efficiency of housing occupied by low-income households. A good number of these mechanisms derive directly from subsidies intended for the general public. In Belgium, tax reductions for energy-saving investments have been changed into tax credits. In France and Belgium (Flanders) some subsidies and grants are increased for those on low incomes. Finally, in France, some home improvement grants are also increased for owner-lessors who agree to put a ceiling on the rent and undertake to rent out their property to people within certain income brackets.

Some states also make provision for specific financing for certain types of household. In France, some twenty *départements* have set up social funds intended to enable the financing of works for households in difficulties. In Flanders, reduction vouchers are available for the purchase of energy-efficient household electrical appliances. In Wallonia and the UK, some subsidies can be used for the full financing of some RUE (Rational Use of Energy) measures. In Wallonia, the ceiling of the amount granted (€1,365/5yr/household) clearly poses a problem (as does the length of the procedure). This type of financing is also open to tenants (sometimes subject to conditions).

Provision is sometimes made for reduced-rate loans for energy-saving work carried out in the home (for example in France and Belgium). In Belgium, these loans aren't always explicitly reserved for low-income households. In Brussels, where the loan is most explicitly earmarked for low incomes, the result is very mixed: only 160 credits were granted in 2 years. Among other things, this mechanism comes up against the difficulty that low-income households have in envisaging the burden of a new loan – albeit intended for an investment that would be profitable in the medium term – when their financial concerns focus on satisfying short-term basic needs. In practice, the average repayment on a “social green loan” is €150/month... which is more than energy bills. Conceptually, the principle of the third-party investor would appear to be able to provide an answer to this problem. Loans (possibly third-party investor loans) do not easily provide an answer for the problem experienced by tenants, who nonetheless represent in many countries a sizeable proportion of the people in a situation of energy poverty.

The third-party investor mechanism has been implemented for private individuals across the board in Belgium (FRCE – “Fonds de Réduction du Coût Global de l'Énergie”) and in the UK (“Pay as you save” pilot project). In Belgium, the FRCE has social obligations and objectives. The Belgian mechanism encounters difficulties among the social public, probably *inter alia* on account of the fact that a limit is set for the repayment period<sup>10</sup>. One might also think that, in the absence of extremely exhaustive proactive support, the household will naturally give priority to short-term concerns and risks breaking off the steps it is taking the moment the first obstacles appear.

Some countries have also opened a source of financing and initiatives by means of various obligations incumbent upon the suppliers and network managers. In Flanders, an obligation for a reduction in customer consumption, as well as the implementation of housing diagnoses and the distribution of reduction vouchers for the purchase of energy-efficient household electrical appliances by protected customers have been included in the network managers' public service obligations. A similar mechanism exists in Denmark, but does not make any particular provision for people in a situation of insecurity. In the UK, it is the suppliers that are subject to a system of white certificates, 40 % of which must be fulfilled in respect of a priority group.

Finally many countries (Romania, Hungary, Spain) do not make provision for much, if any, specific support for improvements to the homes of households suffering from energy poverty, but basically rely on mechanisms that are available to the public at large. In Hungary and Romania, programmes for the renovation of prefabricated apartment buildings are carried out on the principle of a joint investment by the state, the local authorities and the owners. The owners are generally asked to assume a share of 30 % or more.

### Housing diagnoses, services and support

The housing diagnosis is a vital prerequisite to home improvement work. Apart from the transposition of EPBD, there are specific mechanisms in place in some countries. In Denmark, the labelling of housing has been obligatory since 1985. Some mechanisms for the support to and financing of home improvements also include a diagnostic visit to the house. This is the case in Romania in respect of the programmes for the renovation of apartment buildings, in France for the action carried out by the social funds, and in the UK in the framework of the integrated programmes of the Warm Front type.

What is more, since the diagnosis alone is not as a rule sufficient to give impetus to the renovation, some states have various departments that occupy themselves more with the renovation procedure, albeit without assuming complete responsibility for it. This is *inter alia* the case in France via the assisted self-renovation system, a process instigated by local associations and the local authorities, during the course of which households are trained and supported in the renovation of their home (a 10 % contribution to the materials costs is usually requested). In Flanders, in the context of the public service obligations incumbent upon network managers, housing diagnoses are performed (often in households whose situation has become insecure) and are immediately followed by the implementation of the simplest measures (lagging strips, reflective sheet behind radiators, etc.). In Wallonia, specific support for people in a situation of insecurity is provided at local level by “energy tutors” (who are paid by the region). This involves a simple form of specialisation of the social services that seems to be bearing fruit.

### Awareness raising and measures addressing behaviour

For the measures addressing behaviour as well as for the rest, most of the states have mechanisms aimed at the general public. This is *inter alia* the case in Denmark, via the public service obligations incumbent upon the network operators, and via the numerous campaigns conducted by the Electricity Saving Trust. In Hungary, as in other countries, a network of NGOs

10. A repayment in five years means aiming for investments that are profitable in less than five years.

takes care of awareness raising, meets households, and facilitates micro-credits. Many states disseminate various types of media for the attention of households (guides, specification sheets, etc ...).

Measures addressing behaviour are sometimes given a secondary impetus by raising the awareness of social workers, either by training them (France and Brussels) or informing them in writing.

Finally, the process of raising the target public's awareness and providing them with information also occurs directly, through different channels. In the UK, websites are devoted to the programmes combating fuel poverty and a freefone number "Home Heat Helpline" is very widely disseminated. In Flanders, an awareness-raising campaign addressing the public at large on the means of meeting the challenge and assistance between groups of households ("klimaatwijken") has been adapted for a social public ("klimaat op maat"). The savings recorded in some cases reach ~30 % of the group's consumption with few costs.

#### TOWARDS AN INTEGRATED APPROACH

Each country operates a package of measures aimed at bringing about a more rational use of energy. Each country also has, in its own distinct way, a package of measures aimed at curbing poverty and dressing the wounds of those who suffer its effects. Nevertheless, the importance of developing a coherent interplay between these two packages of measures is, almost everywhere, an as yet recent and still burgeoning concern. The result is that households in situations of energy poverty are often induced to juggle between different types of aid and subsidies, none of which completely and coherently meets the conditions thrown up by their situation.

The UK was the first state to set in train a global reflection on the problem of energy poverty (having done so more than 10 years ago). A definition was adopted, making it possible for the phenomenon to be measured. The "Fuel Poverty Strategy" (2001) set targets in precise figures for the reduction in the number of people affected, and the plan is assessed and updated every year. National programmes have been set up to achieve these targets (including Warm Front). The existence of these programmes and the means that people have at their disposal to contact them (freefone number and contact forms) are widely disseminated. After a request has been made, an expert visits the home, checks that the aid conditions are met, and analyses the relevance of investments. Finally, the teams linked to the programmes carry out the work. The Warm Front programme prides itself on having helped more than 2 Mio customers since 2000. One of its strong points is the integrated approach and the fact that it assumes full responsibility for the renovation project. In 2000, the Government made a commitment to bring all public sector homes up to a "decent homes standard" (including constraints regarding the heating system and insulation). A 36 % drop has been recorded in the number of social housing units failing to meet the standard. Finally, the "Warm Zones" are 2- to 4-year programmes aimed at eradicating energy poverty, in an integrated and more intensive fashion, in a given area (Department of Energy and Climate Change, 2009). The Warm Zones approach involves the proactive, systematic door step assessment of every household in the zone area 4.8. During 2008/09 Warm Zones delivered energy efficiency im-

provements to more than 65,000 households across the 15 operational Zones.

France recently inaugurated an energy poverty observatory. Most of the existing mechanisms for combating energy poverty are organised at levels other than at national level. In Belgium, the process of solving situations of energy poverty currently requires, more often than not, an engineering of resources that neither the social services nor the people concerned are prepared to take on.

#### Conclusion

There is an obvious link between energy poverty and general poverty. Not only can the consequences of energy poverty stem from a situation of general poverty, but a situation of energy poverty may also contribute to tip someone into poverty or worsen a situation of poverty. The statistics provide ample proof of this link. However, although low-income households are those that consume the least, probably mainly on account of the small surface area they occupy and because they sometimes do without, energy nonetheless weighs more heavily on their expenditure than on that of the average household.

The natural factors inherent to or aggravating these situations of energy poverty vary considerably from one state to another. The heating component in consumption represents the major component in many countries, but should not be so in Spain, whilst the tenant problem, a traditional issue in many countries, is not raised in Romania or Hungary.

The fact that there are fairly sizeable differences in the way the states approach and set about solving the problem is also justified. Nonetheless, we have to admit that the majority of the states have not yet developed specific measures, and that a number of them still rely on the combination of purely social or purely RUE (Rational Use of Energy) measures. Social measures do not as a rule provide an answer to the structural problem of the quality of housing, whilst home improvement measures struggle to answer problems such as that of the initial investment and the conflict of scale between the immediate needs of a household in a position of insecurity and the long- or medium-term profitability of an energy-saving investment.

In the context of the incipient awareness of the problem, it is vital to objectivise the situation at European scale, to define indicators of the phenomenon and to set targets in the form of figures. However, this can obviously not be done on the basis of an absolute definition. On the other hand, it seems important that the states opt for a definition the results of which reveal a common problem. This is precisely where a relative definition proves useful.

#### References

- Ademe. Les Fonds Sociaux d'Aide aux Travaux de Maîtrise d'Énergie. [www.ademe.fr](http://www.ademe.fr).
- ANAH (2009) Les aides de l'Anah : Le guide. [www.anah.fr](http://www.anah.fr)
- Comision Nacional de Energia (2010) Spanish energy regulator's annual report to the European commission
- CRE and Médiateur national de l'énergie (2010) <http://www.energie-info.fr/questions-reponses/difficultes-paiement>
- Danish Energy Regulatory Authority (2010) Results & Challenge 2009. [www.energitilsynet.dk](http://www.energitilsynet.dk)



- Department of Energy and Climate Change (2009) The UK Fuel poverty strategy, 7th annual progress report.
- Dominique Vanneste, Isabelle Thomas & Luc Goossens (2007) *Enquête Socio-Economique 2001 Monographies*, SPF Economie, PME, Classes Moyennes et Energie.
- ECME Consortium (2010) The functioning of retail electricity markets for consumers in the European Union, European Commission DG Health and Consumers.
- ERGEG (2009) Status Review of the definitions of vulnerable customer, default supplier and supplier of last resort.
- European Commission (2010) An energy policy for consumers, Commission staff working paper.
- European fuel Poverty & Energy Efficiency project (2009) [www.fuel-poverty.org/documents](http://www.fuel-poverty.org/documents)
- Eurostat, <http://epp.eurostat.ec.europa.eu>. Data: ilc\_mdcs01, ilc\_mdcs07, nrg\_pc\_202, nrg\_pc\_204, tessi125, hbs\_str\_t223, nrg\_100a.
- Hungarian Energy Office (2009) Faq on free switching of customers. [www.eh.gov.hu](http://www.eh.gov.hu)
- Mikael Togeby, Kirsten Dyhr-Mikkelsen, Anders Larsen, Morten Juel Hansen, and Peter Bach (2009) Danish energy efficiency policy : revisited and future improvements. *Proceedings of ECEEE Summer Studies*”.
- Ministry of the Infrastructure of the Italian republic and Federcasa (2006) Housing statistics in the European Union.
- NordReg (2009) Market Design Common Nordic end-user market. [www.nordicenergyregulators.org](http://www.nordicenergyregulators.org).
- Ofgem (2010) Help for vulnerable Consumers. [www.ofgem.gov.uk/consumers/ci/hfvc/Pages/hfvc.aspx](http://www.ofgem.gov.uk/consumers/ci/hfvc/Pages/hfvc.aspx), 2010.
- Pades and Les compagnons bâtisseurs (2005) Créer un service d'accompagnement à l'auto-réhabilitation du logement privé en milieu urbain, [www.padesautoproduction.net](http://www.padesautoproduction.net).
- Romanian Energy Regulatory Authority (2010) National Report 2009
- Sergio Tirado Herrero and Diana Ūrge-Vorsatz (2010) Fuel poverty in Hungary, a first assessment.