



# Selecting Indicators to Measure Energy Poverty

Under the Pilot Project 'Energy Poverty - Assessment  
of the Impact of the Crisis and Review of Existing and  
Possible New Measures in the Member States

Framework Contract ENER/A4/516-2014

Annex 4  
Interview Minutes

### Contract details

European Commission, DG Energy  
ENER/B3/2015-507 - under framework contract ENER/A4/516-2014  
"Selecting Indicators to Measure Energy Poverty"

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### Date

Rotterdam, 18<sup>th</sup> of May 2016

### Acknowledgements

The authors are grateful for the cooperation from the Spanish Statistical Office - INE (Spain), the National Institute for Statistics - Istat (Italy), Statistics Netherlands - CBS (Netherlands) and the Statistical Office of the Slovak Republic (Slovakia).

### Disclaimer

The views expressed in this report are purely those of the writer and may not in any circumstances be regarded as stating an official position of the European Commission.



Rotterdam, 18<sup>th</sup> of May 2016

Client: European Commission, DG Energy - Unit B3

DG ENER - ENER/B3/507-2015  
under framework contract ENER/A4/516-2014

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**Annex 4**  
**Interview Minutes**

In association with:





**TABLE OF CONTENT**

<b>1. Guidance Note for Interviewees .....</b>	<b>4</b>
Topic Guide for the Interview .....	4
Theoretical framework.....	4
Energy poverty metrics .....	4
1.1. Context and Objective of the Study .....	4
Indicator selection & validation .....	5
<b>2. José Carlos Romero, Pedro Linares.....</b>	<b>9</b>
Introduction .....	9
Theoretical framework.....	9
Energy poverty metrics .....	10
<b>3. José Carlos Linares .....</b>	<b>11</b>
Evaluation of the results of testing for the selected indicators .....	11
Introduction .....	11
Evaluation of the results of testing .....	11
<b>4. Josefina Vanhille .....</b>	<b>13</b>
Introduction .....	13
Theoretical framework.....	13
Energy poverty metrics .....	13
<b>5. Sandrine Meyer .....</b>	<b>15</b>
Introduction .....	15
Theoretical framework.....	15
Energy poverty metrics .....	15
<b>6. Slavica Robic .....</b>	<b>17</b>
Introduction .....	17
Theoretical framework.....	17
Energy poverty metrics .....	17
<b>7. Dr. Harriet Thomson.....</b>	<b>19</b>
Introduction .....	19
Theoretical framework.....	19
Energy poverty metrics .....	20
<b>8. Jaroslav Pavlica .....</b>	<b>21</b>
Introduction .....	21
Theoretical framework.....	21
Energy poverty metrics .....	21
<b>9. Martin Vajčner .....</b>	<b>23</b>
Introduction .....	23
Theoretical framework.....	23
Energy poverty metrics .....	24

<b>10. David Deller .....</b>	<b>25</b>
Introduction .....	25
Theoretical framework.....	25
Energy poverty metrics .....	26
<b>11. Lidija Živcic, Slavica Robić .....</b>	<b>27</b>
<b>12. René Schellekens .....</b>	<b>31</b>
Introduction .....	31
High Income Households .....	31
Geographical Level.....	31
Choice of Metrics.....	31
<b>13. Ing. Ján Magyar .....</b>	<b>33</b>
Evaluation of the results of testing for the selected indicators .....	33
Introduction .....	33
Evaluation of the results of testing .....	34
<b>14. Sergio Tirado Herrero .....</b>	<b>35</b>
Evaluation of the results of testing for the selected indicators .....	35
Introduction .....	35
Evaluation of the results of testing .....	35
<b>15. Luciano Lavecchia and Ivan Faiella.....</b>	<b>39</b>
General remarks:.....	39
Choice of metrics: .....	39
Econometric results: .....	39
Italian results: .....	39



# 1. Guidance Note for Interviewees

## Topic Guide for the Interview

### Theoretical framework

- Do you agree with how energy poverty has been defined? If not, why?
- At the European level, which of the proposed approaches do you find best suited to measure and monitor energy poverty: consensual-based, expenditure-based, or outcome-based?
- Do you agree with the rationale set out for using the different approaches? If not, why?

### Energy poverty metrics

- Are the metrics along with supporting indicators appropriate to measure and monitor energy poverty?
- Can you identify (other) strengths and weaknesses of the shortlisted metrics regarding monitoring and measuring of energy poverty?
- For expenditure-based metrics, do you have a preference regarding the threshold?
- Do you think the selected indicators should be applied only to low-income households? How would you define low-income households (e.g. lowest 20% income, at risk of poverty, under the poverty threshold)?
- Hidden energy poverty: Certain households - which spend little in energy - are not taken into account by the expenditure-based metrics. Do you have any suggestions on how to include them?

## 1.1. Context and Objective of the Study

Energy poverty is defined as a situation in which individuals or households are not able to adequately heat or meet other required energy services in their homes at affordable cost. Research suggests that energy poverty has important consequences, like impacting health, further entrenching poverty and making other objectives less attainable, such as addressing climate change. Much of our current understanding, however, is based on proxy indicators, relating to consensual survey based approaches. This study aims to help bridge the gap in our understanding, by evaluating how indicators can be developed and operationalized with the purpose of putting actions in place to address energy poverty. The specific objectives are:

- To develop a conceptual map for energy poverty and identify indicators suited for regular and systematic assessment of energy poverty in the EU (task 1);
- To apply and test the selected measures of energy poverty in a selection Member States, analyse the results and provide recommendations on the most suitable indicators (task 2); and
- To provide recommendations on options for a tool that could facilitate monitoring and comparing energy poverty, its drivers and outcomes, and at the same time to provide information on measures addressing energy poverty (task 3).



### Indicator selection & validation

At this stage, the team has shortlisted several energy poverty metrics (see table below) and would like to validate them. The indicators require the following characteristics:

- a) The ability to be updated over time without excessive cost;
- b) Provide comprehensive spatial coverage, at least to the Member State level;
- c) Support an unambiguous and broadly accepted definition of energy poverty; and
- d) Allow for comparability of the indicator(s) across Member States, and their effective implementation.

Table 1.1 Overview of energy poverty metrics

Approach	Rationale	Energy Poverty Metrics	Strength / weakness
<b>Expenditure-based</b>	Expenditure-based metrics capture affordability of adequate energy services for those on low income. ('Adequacy' only captured if using 'required' expenditure)	Expenditure on household energy services above a share of total income after ensuring comparability e.g. household occupancy and 'after housing costs' to adjust household income	<ul style="list-style-type: none"> <li>• Share of required expenditure on energy services relative to disposable income above twice the national median in the year, across the period of years, or fixed at 10% for the lowest income group</li> <li>• Actual<sup>1</sup> expenditure on energy services of disposable income above twice the national median in the year, across the period of years, or fixed at 10% for the lowest income group</li> </ul> <ul style="list-style-type: none"> <li>✓ Captures key features of energy poverty</li> <li>✓ Applied / tested in a number of MS</li> <li>✓ Capture severity by use of different thresholds</li> <li>- Problematic to implement across all MS</li> <li>- Sensitive to energy price rises</li> </ul>
<b>Consensual-based</b>	Self-reported indicators can provide an effective way of understanding perceived energy poverty and more explicit insights than quantitative metrics. This family of indicators could be a 'backstop' or complementary to other indicators.	Self-reported inability to adequately cool/ heat household, by income group	<ul style="list-style-type: none"> <li>• Proportion of inhabitants unable to keep home adequately warm (HH050) per income quintile</li> <li>• Proportion of inhabitants who are living in a dwelling not comfortably cool in summer per income quintile</li> <li>• Population living in a dwelling with leaking roof or damp walls, etc. by income group per income quintile</li> </ul> <ul style="list-style-type: none"> <li>✓ Main basis to date for assessment</li> <li>✓ Can be used as a complementary indicator (FR, BE examples)</li> <li>✓ Survey infrastructure in place, just needs improvement (see Thomson)</li> <li>- May not adequately allow for effective quantification</li> <li>- Survey may not have any associated income dimension</li> </ul>
		Self-reported arrears	
<b>Outcome-based</b>	This family of indicators provides a proxy for energy poverty based on outcomes. There are two possible approaches - using utility data or focus on health outcomes	Health outcomes (increased mortality)	<ul style="list-style-type: none"> <li>• Cold related mortality (in lower income groups) per income quintile</li> </ul> <ul style="list-style-type: none"> <li>✓ Measure of actual outcomes</li> <li>- Narrow proxy measure</li> <li>- Many different factors impact health outcomes in addition to energy poverty</li> </ul>

<sup>1</sup> The challenge here is that 'actual' expenditure underplays energy expenditure deficit. Therefore, this could be complimented by indicator on level of household energy by income group

The energy poverty metrics described above will be complemented by a number of supporting metrics (see table 1.2). The energy poverty metrics above will be complemented by indicators that can help to enrich the picture of factors correlated to experiencing energy poverty and the experience of being energy poor. These supporting indicators enhance the picture provided by the metrics above and could help provide a focus for policy action in MS as they measure factors that *contribute* to the social experience of energy poverty. The key distinction is that they are not in themselves considered appropriate for measurement of energy poverty. The selection/use of these supporting indicators is closely linked to data availability from the household budget surveys and the survey on living conditions (SILC).

**Table 1.2 Overview of set of supporting indicators**

Conceptual map element	Supporting Indicator	Data needs
Building efficiency and building stock data	Building efficiency by income group to identify if lower income households live in poorer efficiency buildings	Efficiency proxy based on overall SAP rating, U-value (unlikely to obtain data per income groups), type of housing stock, glazing, air-tightness, HVAC systems' type and efficiency, age of the building, amount of rooms, dwelling type, main fuel used, etc.
Heating systems	Type of heating by income group. Often inadequate heating systems can leave houses under-heated, e.g. Low income households who can't afford the investment for the short cold season (e.g. Southern Europe).	Categorical variable: None vs. room vs. central heating; availability of hot water; fuels used to warm the water/house
Supply choice	Energy supply by income group to reflect access and/or choice	System lock in e.g. urban dwelling on DH system; Lack of choice e.g. off-grid, oil use for heating
Energy prices	Prices paid by different socio-economic groups	Level of energy prices, access to / choice of tariffs
Demographic factors	Size of household and information regarding the household members to identify vulnerability (e.g. children, single parents, older adults)	Type of family (e.g. single parent); household size; number of children, number of adults above 65; tenure status; urban/rural
Policy intervention	Level of social assistance by income group to identify households receiving social support	Income from social assistance; unemployment benefits and other social benefits
Income	Income levels	Available income; income after housing costs; households at risk of poverty; households in severe material deprivation



## 2. José Carlos Romero, Pedro Linares

**Date / Time:** 01/03/2016, 17.00 CET

**Participants:** José Carlos Romero, Pedro Linares (Instituto de Investigacion Tecnologica (IIT)), Nataliya Anisimova (SEVEN)

### Introduction

José Carlos Romero is a researcher at the Institute for Technological Research (IIT) of Comillas Pontifical University. He has defended a PhD thesis in the field of sustainability indicators of the energy sector. At the moment his main areas of his research are indicators of energy sustainability and energy poverty. Some of the recent projects Mr. Romero was working on include: An analysis of energy scenarios: Enagas in 2040; Consequences of climate change in supply and demand of energy in Spain; Design and impact of a harmonized policy for renewable electricity in Europe; Future scenarios and global sustainability indicators for the Self-Sufficient and Sustainable Biocity (BIOCAS).

Pedro Linares is a Professor of Industrial Engineering of the ICAI School of Engineering, and co-founder and Director of Economics for Energy. He is also a researcher at the Institute for Technology Research (IIT) and the BP Chair on Energy and Sustainability, and Affiliate Researcher at the Harvard Kennedy School and MIT CEEPR. Currently he serves as Vice-Rector for Research and International Affairs at Comillas Pontifical University.

His teaching and research focuses on the relationship between energy, economics and environment, and specifically on sustainable energy, renewable energy and environmental policy, and multicriteria methods applied to resource allocation. He has published about these issues in the most journals relevant in the field. He has also been a consultant for several private and public firms and institutions in Spain, Europe and Latin America. He is a member of INFORMS, AEEE-IAEE, AERNA-EAERE and the International Society on MCDM.

### Theoretical framework

The definition provided is suitable to define the energy poverty issue.

At the European level it is difficult to identify the best suited approach to measure energy poverty. The expenditure-based approach provides a reasonably suitable metric for energy poverty, but it doesn't give a full picture, especially if only the actual expenditure of households is taken into account. It doesn't take into account actual (or required) energy needs of the households. It omits a consideration of households that use less energy than they should (e.g., keeping temperatures below a reasonable level) because they cannot afford to pay. These households are energy-poor but would not appear in the expenditure-based indicators.

Consensual-based approaches could add the information about actual energy needs. For example, an indicator of temperature level of households could be useful to measure energy poverty.

For the outcome-based approach there is uncertainty around capturing the actual state of the issue, as it is concentrated only on outcomes, not the causes of energy poverty.

The rational set out for using different approaches was agreed.

### Energy poverty metrics

The metrics complemented with supporting indicators is appropriate to measure energy poverty. Probably the correlation of supporting indicators with main metrics could be observed and on that basis, the most correlated indicators could be selected to complement the main ones. The consensual-based metric is too subjective to give a true picture of the energy poverty level; although it gives additional information about actual energy needs of the households.

The outcome-based approach is rather risky due to the complexity of objective identification of energy poverty outcomes and difficulties in measuring them. Regarding thresholds, a 10% approach doesn't seem to be objective and comparable across Member States. In general any percentage threshold is not rational because of disparities in income. The LIHC indicator provides a useful approach in this regard, giving a threshold relative to the income level in each year. Indicators based on Minimum Income Standards (MIS) are probably the best of those available right now. Also using a threshold related to minimum income could be comparable across MS.

The application of selected indicators only to low income households is not rational, as the households above the general poverty threshold could be in energy poverty. Low income households can be defined as those below a certain income level, for example below 60% of median income. Consideration of households with lowest 20% income is probably not enough to measure energy poverty. Hidden energy poverty could be included in the metric of energy poverty with the use of consensual-based indicators, for example the temperature level of household. However, it would be more interesting to have objective measures for temperature levels, as done by some countries in their surveys.

## 3. José Carlos Linares

**Evaluator:** José Carlos Romero (Instituto de Investigacion Tecnologica (IIT))

### Evaluation of the results of testing for the selected indicators

- At the European level, which of the selected indicators do you find best suited to measure and monitor energy poverty according to testing results in your country?
- Are the selected metrics relevant for your country?
- Which set of metrics would give the best picture of energy poverty in your country?
- Are there any anomalies in the results or explaining factors you can identify?

### Introduction

José Carlos Romero is a researcher at the Institute for Technological Research (IIT) of Comillas Pontifical University. He is developing a PhD thesis in the field of sustainability indicators of the energy sector. At the moment main areas of his research are indicators of energy sustainability and energy poverty. Some of the recent projects, Mr. Romero was working at, are: An analysis of energy scenarios: Enagas in 2040, Consequences of climate change in supply and demand of energy in Spain, Design and impact of a harmonized policy for renewable electricity in Europe, Future scenarios and global sustainability indicators for the Self-Sufficient and Sustainable Biocity (BIOCAS).

### Evaluation of the results of testing

- 1) Unfortunately, there is a lot of uncertainty on this. Energy poverty is a complex issue and we cannot say that a single measure can cope with the entire phenomena. We still need to understand better the problem in order to define appropriate measures. All those measures you have calculated for Spain and other countries (some of them are the same measures we calculated in our report) are indeed related to energy poverty, but we need to understand better to what extent this relation is causal related.
- 2) Idem
- 3) If we had to choose an indicator, we think the MIS is the best. Yet in order to make it more relevant, defining an objective “minimum income” for every country is mandatory. Relative measures for this MI distort the results.
- 4) The results are coherent with our results.





## 4. Josefine Vanhille

**Date / Time:** 01/03/2016, 10.00 CET

**Participants:** Josefine Vanhille (University of Antwerp), Nataliya Anisimova (SEVEN)

### Introduction

Josefine Vanhille is an economist & city planning engineer and works as a researcher at the Herman Deleeck Centre for Social Policy, on a four-year research project on the distributional effects of the transition to a low-carbon society. Energy poverty is one of the principal problems where environmental goals (e.g. higher energy prices) seem to create a trade-off with the social goals of the welfare state. In this context, she has carried out an empirical study of the different approaches to measure energy poverty (expenditure, consensual, outcome), when an indicator for each of them was operationalised on the basis of the Belgian SILC data (which includes energy expenditures) (paper in Dutch). More recently, she has carried out a research project for the Flemish environmental agency on the affordability of water, where a number of similar dynamics play as in the field of energy (albeit less severe). One of the last publications of Ms. Vanhille as a co-author is *The Evolution of Poverty in the European Union: Concepts, Measurement and Data*.

### Theoretical framework

The definition provided is suitable for the issue of energy poverty. It is difficult to define for certain which of the three proposed approaches is most suitable at the European level. The approaches are related to different population groups and can probably complement each other. The overlap between the population groups captured by the different approaches is really small. The expenditure-based approach is focused on low-income group of population. For the consensual based metric, this really depends on the group of households chosen for the survey. Both expenditure and consensual based approaches do not include housing stock quality assessment which is important to reflect energy poverty levels.

The outcome based approach can be used as complementary, mainly to monitor trends over time, but it doesn't seem rational to use it as a main metric. An array of indicators covering all the three approaches could be a good option to measure the energy poverty across MS, as it would also cover all the different types of population groups that are at risk to be/ or in energy poverty due to different reasons. That is why the rational set out for using different approaches is quite reasonable.

### Energy poverty metrics

Supporting indicators are important to measure energy poverty. As the most important conceptual element the building stock energy efficiency was mentioned, which could be said to deserve a more prominent place (if not THE most prominent place) in the energy poverty puzzle. The methodology similar to one to provide the rate of energy performance of building (Energieprestatiecoëfficiënt (EPC) in Netherlands) can be used to obtain the data for building stock energy efficiency.

The expenditure-based metric gives an appropriate measure of energy poverty if it is based on required/necessary expenditures, demonstrating the affordability of energy services, but it might be good to complement this metric with the aspects of energy performance of buildings.

If the actual expenditures are taken into account, they include an error on two aspects: high expenditures can also mean rather high-energy preferences of households, not necessarily affordability of energy services. Low expenditures can also mean self-restraint in energy consumption, most likely because of financial constraints. An actual expenditure indicator would capture the first group and not the latter, while the latter would more belong to the “energy poor” and the first not. By using required expenditure, the groups would be captured more adequately. Of course, building stock quality should be taken into account when measuring required expenditure: in poorly insulated tenant housing, higher expenditures are required than in well-insulated owner-occupied housing.

As for consensual-based metric, it is too dependent on the quality of the survey: who is surveyed, how the questions are formulated within the survey, as well as on the context and series of questions. It is less informative as it is based on feeling/perception of inhabitants of households.

An outcome-based approach is too narrow as it is focused only on a certain group of population, and doesn't include the aspects of affordability and income situation. An outcome indicator will always capture only a small part of the population faced with energy poverty - only those for whom it has led to a tangible outcome such as death, or being cut-off from the grid. Disconnections of households due to non-payment and delays in payments could be also included into selected outcome based indicators.

There is no certain preference concerning the threshold for an expenditure-based metric. A percentage (10%) threshold can be used if it is adapted to a MS on the basis of well-grounded survey on reference budget and energy prices. An approach, that will better manage to capture affordability problems among low-income households, is to use the concept of “remaining income” (disposable income after energy expenditure) and use the threshold of whether this remaining income is below the relative poverty line of the MS (cfr. Energy Poverty report by John Hills)

The selected indicators should not be applied only to low-income households, but capture all income groups, as not only low-income households can be energy poor. A low-income household can be defined as a household in lowest 20% income. Hidden energy poverty can be included by use of required expenditure instead of actual expenditures of households.

## 5. Sandrine Meyer

**Date / Time:** 3.3.2016, 14.30 CET

**Participants:** Sandrine Meyer (Université Libre de Bruxelles - Centre d'Etudes Economiques et Sociales de l'Environnement), Nataliya Anisimova (SEVEN)

### Introduction

Sandrine Meyer has carried out research on energy poverty issues since 2006 with a first study evaluating “social measures in energy” for the federal administration PPS Social Integration, anti-Poverty Policy, Social Economy and Federal Urban Policy. She is a co-author of the research project the Energy Poverty Barometer, initiated by King Baudouin Foundation which manages the Platform Against Energy Poverty and regularly publishes the Energy Poverty Barometer in Belgium, based on research carried out by the Universiteit Antwerpen and the Université Libre de Bruxelles.

In addition to the update of the energy poverty barometer, research for the Walloon Region focusses on potential mechanisms to support / promote the energy renovation of private rented dwellings without penalising the renters (cf. the energy poverty barometer shows that households renting their housing are particularly hit by different forms of energy poverty, notably due to the combination of a lower socio-economic profile and the ‘split incentive’ issue).

### Theoretical framework

The definition provided is agreeable, given that it focuses on basic energy needs of households. It is important to avoid inclusion in energy needs as consumption for extra energy services e.g. for swimming pools, saunas etc. It is difficult to define a best suited approach to measure energy poverty, as the issue is not the same situation for each household. The expenditure based approach is focused on income and doesn't consider that households in many cases constrain their energy consumption to avoid high energy bills.

An expenditure based metric is useful with consideration of expenditures related to disposable income. Use of a fixed threshold however doesn't consider general living conditions and evolution of energy prices. A consensual based approach is complementary; it is not fully measurable and too subjective.

Outcome based approaches consider different potential consequences of energy poverty. It is really difficult to define what the impact of energy poverty is, in comparison to other factors. For a cold mortality indicator, this is also an outcome of general poverty and environmental conditions; it is really difficult to separate the impact of energy poverty from other reasons.

Remark: In the following years, if personal electric vehicles become more popular, it would become more difficult to separate households' energy consumption related to the housing or to mobility.

### Energy poverty metrics

It is important to include supporting indicators for energy poverty metrics. Buildings' energy efficiency plays an important role, but such indicators are not easily comparable across all countries. Even energy performance certificates are implemented differently in different member states. It is difficult to find

a common metric for supporting indicators in all MS. By expenditure based approach, it is important to identify hidden energy poverty, when households don't spend enough to receive a certain standard of energy services due to under-consumption of energy (under-consumption meaning basic needs are not covered).

A consensual-based approach more reflects the perceptions of householders, than a real situation. Also the answers can underestimate energy poverty because the households are not willing to admit they are in a difficult situation with paying for energy services. The results are also highly dependent on the structure of survey. For example, when the structure of SILC survey was changed, the results differed a lot compared to the previous year, although the changes were principally in moving some questions to another section.

Using an outcome-based metric it is difficult to identify the outcomes and to link them to energy poverty. However, it is really important to take into account of the impact on health.

Regarding thresholds, the use of a threshold related to median income in a certain year seems to be reasonable. A relative threshold has to be understood as a measure of the inequity between households and identifies the most vulnerable (structural or long-term energy poverty) while a fixed threshold could include a higher proportion of 'cyclical or short-term' energy poverty.

The selected indicators could be applied for example to five lowest deciles of equalised income. These households could be considered as low-income.

Hidden energy poverty could be taken into consideration with the help of models assessing required energy consumption. One of these models was successfully applied in UK to assess the threshold, but was, for example, not applicable to Belgium, because of a lack of information, and is probably also not applicable in other MS. For example in the case of the Energy Poverty Barometer, the households that could invest in household energy performance/have very good energy performance were excluded by identification of hidden energy poverty.

The households with energy expenditures considered too low were identified by taking into account the energy expenses of similar households (household composition and housing size). The relative threshold for hidden energy poverty is defined for each household as half of the energy expenses of similar households with the same composition and housing size. These energy expenses are calculated as the average energy expenses between:

- the median energy expenses of households with the same composition and
- the median energy expenses of households with a similar housing (same number of rooms).

Only the five lowest deciles of equalised income are taken into account in the hidden energy poverty indicator. These households could be considered as low-income. All situations where 'too low energy expenses' could be justified by another good reason (e.g. very good insulated housing with new heating system; second residence) were also removed from the hidden energy poverty indicator. Both 'measured' energy poverty and 'hidden' energy poverty indicators are broken down into two different indicators: one measuring the number of households hit by energy poverty (extent) and the second measuring the gravity of their situation compared to the reference (depth or gap).

## 6. Slavica Robic

**Date / Time:** 02/03/2016, 13.00 CET

**Participants:** Slavica Robic (Society for Sustainable Development Design, Zagreb, Croatia), Nataliya Anisimova (SEVEN, Prague, Czech Republic)

### Introduction

Slavica Robic is a Program Director at the Society for Sustainable Development Design, Zagreb. She currently works in the team for the REACH (Reduce Energy use and Change Habits) project, the aim of which is to contribute to energy poverty abatement at both practical and structural levels. This project aims to empower fuel poor households to take actions to save energy and change their habits, and to establish energy poverty as an issue that demands structural solutions at local, national and EU level.

### Theoretical framework

The proposed definition is suitable for energy poverty, although it is descriptive and gives no certain measure of energy poverty. No single approach is suitable to measure energy poverty across member states. If it is possible it would be good to combine them. An expenditure-based approach provides a good basis to monitor energy poverty, but it doesn't reflect all the important aspects, for example living conditions of the households.

As consensual-based approach is focused on a certain group whom the survey is addressed to. The outcome-based approach is important to assess health impacts of energy poverty, but is not enough in itself to measure all the important factors of energy poverty. The rational set out for using the different approaches to energy poverty metrics is rather good.

### Energy poverty metrics

Supporting indicators are of high importance to measure energy poverty. The indicators reflecting information about energy services other than heating (cooling, lighting etc.) are probably missing in the proposed set of supporting indicators. As for strengths and weaknesses of different approaches, the expenditure-based approach gives a suitable metric as the statistical data regarding income and expenditures are available in all member states, but it doesn't reflect real living conditions of households, and doesn't capture the main causes of energy poverty.

A consensual-based approach is very limited to measure energy poverty as it is based on a subjective opinion of inhabitants. The answers don't fully reflect the reality. The indication of how people feel about their living situation doesn't seem sufficient.

The outcome based approach is really difficult to collect and compare data for across all member states.

However, it would be interesting to include disconnections of households in an outcome based metric. Regarding the threshold for an expenditure-based metric, the UK-applied 10% threshold is problematic to compare across member states. The threshold related to median income seems to be most appropriate, for example twice median with consideration of the median in each year.

It is necessary to assess what households really need to spend for energy services, not their actual expenditures. The selected indicators should be applied to all income groups rather than only to low-income households. Low income households could be defined as households under the poverty threshold. If we take into account the expenditure needed to cover energy services, not actual expenditure, the hidden energy poverty is also covered by the expenditure based approach.

## 7. Dr. Harriet Thomson

**Date / Time:** 26/2/2016, 11.30 CET

**Participants:** Dr. Harriet Thomson (Univ. of Manchester), Dr. Nataliya Anisimova (SEVEn)

### Introduction

Through her recently completed doctoral research, which she undertook at the University of York, Harriet Thomson conducted a detailed multi-methods investigation into fuel poverty in the European Union. This involved qualitative analysis of policy documents spanning 2001 to 2014, and quantitative analysis of a new household-level index based on EU-SILC data.

In addition to her PhD, Harriet has held research positions at the University of Ulster, and the University of York, working on a diverse portfolio of projects including an examination of the relationship between fuel poverty and disability. Harriet also has experience working at an energy service company (ESCO) project managing local renewable energy grant schemes. In 2011, Harriet founded the EU Fuel Poverty Network, which is a widely recognised online portal that aims to raise awareness of fuel poverty issues across the EU.

### Theoretical framework

The definition of energy poverty could be reworded, as it is not definitely necessary to separate heating from all other energy services. A common mistake in the literature across Europe is to say that EP only refers to heating, when in fact it refers to all energy services in the home, including cooling. By saying all energy services in the home, there is no room for confusion or misinterpretation. Framing the definition in terms of 'affordable cost' puts the emphasis on energy costs and household income rather than energy efficiency. Poor housing standards and poor energy efficiency is the main driver of energy poverty - and improving housing quality is the most effective long term solution for alleviating energy poverty, if a household is unable to attain a socially- and materially necessitated level of domestic energy services it is energy poor.

Expenditure-based approach seems to be most suitable to measure energy poverty in a long term, but the data is not standardized and that's why not comparable across MS. The 10% threshold emerged in the UK from a twice-median basis - i.e. in the late 1970s/early 1980s, median expenditure on energy represented 5% of household income, so Brenda Boardman suggested 10% as the threshold. If you just take the 10% threshold but not the underlying methodology, it is likely to be meaningless and produce invalid results.

Secondly, there is really a value in using relative thresholds (i.e. twice-median expenditure), however, the point was probably to start with expenditure datasets (from HBS or similar) and develop thresholds from the patterns we find in the data. It may be that in some countries a three-times median expenditure threshold is needed - but it is not possible to comment without looking at data. In short term the consensual based approach is the most promising, as there is a standardized survey basis across MS. The survey could be more detailed, for example, for the aspect, if inhabitants able to keep their home adequately warm, could be also included the reasons of the inability, how often they are unable to heat their homes at an adequate level and so on.

An outcome based approach is too difficult to implement as a main metric, as it is really difficult to identify clearly the EP outcomes. Health and social related outcomes are too complex to measure. Cold related mortality for example also includes deaths from other reasons and it's difficult to differentiate them. Besides the static 4 month 'winter' used by Eurostat and others does not accurately reflect winter in most countries. Ms. Thomson co-produced a journal article that argues the current cold related mortality approach is only accurate in 2 out of 30 European countries, and proposed a new measure based on heating degree days

<http://jpubhealth.oxfordjournals.org/content/early/2015/12/28/pubmed.fdv184.abstract>.

### Energy poverty metrics

Supporting indicators are important to measure EP. The set of supporting indicators could be broader and could include the indicators related to energy market liberalization, competition in energy market, frequency of tariff switching by users, social assistance aspects. Building stock energy efficiency data can be collected from EPBD in the future (long term suggestion). The current Policy intervention indicator was very broad and would be very difficult to collect as we are trying to gather information on all social assistance schemes in MS. Instead, it was suggested to focus on schemes related to EP, e.g. special energy tariffs, retrofit schemes.

The expenditure based metric, referring to 'required' expenditure, accurately captures the state of energy poverty, but requires a lot of data to produce, and only a minority of MS have the survey infrastructure in place to achieve this. In addition, it doesn't accurately capture whether households are able to achieve a minimum level of energy service. In terms of 'actual' expenditure - this has many more weaknesses, especially the risk of not identifying under-consuming households as energy poor. The preference would be to use a 'required' expenditure approach, not an 'actual' expenditure approach.

The consensual-based metric is easy to implement and it gives insights on EP issues; however, it is difficult to interpret because energy consumption also have to do with cultural habits. The outcome based metric has a weakness of complexity to identify and measure outcomes.

There is no certain preference regarding threshold as income level differ quite a lot across MS, and changes over the time. That is why the threshold probably should not be fixed. The threshold is likely to be different across MS and regions.



## 8. Jaroslav Pavlica

**Date / Time:** 23.2.2016, 16:30 CET

**Participants:** Jaroslav Pavlica, State Environmental Fund of the CZ, Jiri Karasek, SEVEN

### Introduction

Jaroslav Pavlica is a project manager at the State Environmental Fund of the Czech Republic. He also works as a consultant on energy policy issues. He worked as a specialist in renewable energy technologies at the Ministry of the Environment of the Czech Republic. His field of expertise comprises renewable energy technologies, energy policy, and environmental aspects resulting from energy utilization as well as energy poverty. Presently he serves at the Department of National Programmes management concerning the incentives projects aiming for energy savings in households, which helps to decrease energy poverty.

### Theoretical framework

The definition of energy poverty is suitable and reflects the main aspects of energy poverty. The important component of this definition is “at affordable cost” as well as an emphasis on “required” energy services. All the three proposed approaches (expenditure-based, consensual based and outcome based) are relevant to the appropriate measurement of energy poverty levels across member states. The expenditure-based metrics were mentioned as the best suited. One of the strengths of this approach is, that it could be really sensitive to the rise of energy prices. The consensual-based approach is also suitable as a metric of energy poverty, as it could bring useful data that are comparable across different states. The outcome-based approach is not completely suitable without any other complementary indicators, as it also covers outcomes resulting from other factors beyond energy poverty.

The rational set out for different approaches was agreed, although the outcome-based approach seems to be rather unconvincing, as long as is it applied as a main metric, the outcomes could be misinterpreted. Also, it is almost impossible to measure these outcomes in an appropriate and comparable way.

### Energy poverty metrics

The metrics complemented with supporting indicators are appropriate to measure and monitor energy poverty. Some metrics and supporting indicators could be added to the list of indicators selected for testing, e.g. rate of disconnections, inability to pay energy bills, rate of indebtedness, level of competition in energy market etc. The housing stock characteristics are important in this aspect, as they have a direct impact to the energy efficiency of buildings, and as a result to level of energy consumption and energy poverty.

It is also important to monitor the rate of energy price vs. income growth and to cover the opportunities to increase energy efficiency of households, and simultaneously to decrease indebtedness caused by energy services bills.

As mentioned above, the expenditure- and consensual-based metric gives a suitable measure of energy poverty and have relatively good data availability, as well as are comparable across countries, although

the consensual-based metric has a quite subjective nature. As for outcome-based approach, it can be used as a complementary to the other approaches, as it doesn't cover the direct reasons of energy poverty. Also the outcomes of energy poverty are difficult to identify.

It is difficult to define certain preferences regarding thresholds. A 10% threshold is too specific to apply it in other states, so the threshold could be different in each EU member state according to income level and energy prices, as these aspects differ a lot across countries. The threshold shouldn't be fixed, as energy poverty is not a static term and main aspects such as income, energy expenditure level, and energy efficiency of housing stock change over time.

## 9. Martin Vajčner

**Date / Time:** 10/3/2016, 10.00 CET

**Participants:** Ing. Alexandra Vobořilová, Ing. Hana Hanková, Ing. Martin Vajčner (Ministry of Regional Development); Ing. Jiří Karásek, Ph.D. (SEVEEn).

### Introduction

The Ministry of Regional Development of the Czech Republic has the following experience and competence in the field of energy poverty: The Ministry is inter alia responsible for housing policy, and therefore manages finances, coordinates and finances various activities, and is in charge of investment policy. Based on this, the Ministry focuses on increasing energy efficiency in the housing sector, which has an impact on three strategic targets of the housing policy of the Czech Republic - availability, stability, and quality of housing:

- **Affordability** - increasing the affordability of adequate housing across all forms of housing.
- **Stability** - creating a stable environment in the areas of finance, legislation and institutions for all participants in the housing market.
- **Quality** - lasting quality improvement of housing, including improving the quality of the surroundings of residential areas.

The Analysis Unit of the Housing Policy Department performs analysis for the needs of the housing policy, its implementation and administration of the housing policy programmes. Participating Experts:

- Ing. Alexandra Vobořilová, head of the Analysis Unit and deputy head of the Housing Policy Department of the Ministry of Regional Development
- Ing. Hana Hanková, analyst of the Housing Policy Department of the Ministry of Regional Development
- Ing. Martin Vajčner, analyst of the Housing Policy Department of the Ministry of Regional Development

### Theoretical framework

The definition was agreed. It is a common definition of energy poverty. The Consensual-based indicators are considered by the experts as the most important especially those from the SILC survey. However, the results cannot be objective, because the answers of respondents are based on their personal feelings, and are not objective

The expenditure-based approach, although it is quite often regarded as an applicable one, is not considered as suited to measure energy poverty across the Member states. The data collected through this approach are difficult to compare; especially due to the different consumption priorities, different needs, different economic situation; and different preferences in the countries. Also climatic conditions are not included in the basic data set. Expenditure-based metrics that use fixed threshold do not respect the local conditions in the country. The great problem is sensitivity to changes in prices, not only energy prices. Outcome-based indicators are not considered as suitable for the research. Such indicators include many different influences e.g. Quality of health care and climate conditions.

However, the rationale for selecting approaches (all three) is clear and covers the energy poverty topic. It was recommended to use a consensual-based approach as the main metric, supported with the expenditure-based approach.

### Energy poverty metrics

The chosen metrics along with the supporting indicators are appropriate to measure and monitor energy poverty. The chosen metrics along with the supporting indicators are appropriate to measure and monitor energy poverty. However, the most relevant indicators are already set up in the SILC research. SILC is considered as long-term observed data set with the most relevant indicators included.

The respondents agree with the selected strengths and weaknesses of the indicators. The influence of climatic conditions and the distribution of expenditure should be added in the metrics, especially for low income households. Very high number of households are also at risk (close to the edge) of energy poverty. Due to this fact the definition is very important; it would be good to assess the number of such households.

For expenditure-based metrics there is no one certain preference comparable in all member states. Two reasonable approaches are 2x median or certain percentage threshold. It is important to consider, whether the incomes include social transfers or not; otherwise the data are determined by the volume of social benefits in the certain member state.

To the question *Do you think the selected indicators should be applied only to low-income households?*, it is possible to focus the research only on low-income households, but generally the approach relative to income is not best suited as the income structure differs quite a lot across member states. Also income data are not usually published to be sorted by legal grounds for use of dwelling.

There was also discussed the hidden energy poverty issue. Hidden energy poverty is connected with the income of households and it is as serious topic, because many households heat their dwellings only partially or only when temperatures are low or for shorter than standard heating periods to save on expenditure. The second extreme sees high income households in energy poverty because of their low motivation to reduce energy cost and typically large dwellings. Those households are not subject to the energy poverty reducing programmes.

The testing issues of the indicators were discussed with the experts. First, it included a selection of the countries, the approach to testing and finally, country specifics. E.g. Slovakia has a very different income structure across households and also the housing stock in the rural areas is very different from the Czech housing stock. It is expected that the results will be significantly different in both countries. There should probably be a Scandinavian country included in the testing of the results, to evaluate the climatic conditions.

## 10. David Deller

**Date / Time:** 29/2/2016, 10.30 CET

**Participants:** Dr. David Deller, (University of East Anglia), Jiří Karásek, Ph.D. (SEVEn)

### Introduction

Dr. Deller has following experience in the field of vulnerable consumers and energy market:

- University of Essex, Colchester, UK, PhD in Economics.
- Co-ordinator for a major research project investigating the determinants of consumer switching behaviour in the UK's gas and electricity markets. Includes responsibility for a substantial part of the design, implementation and administration of a survey sent to c. 20,000 individuals.
- Worked for the report 'Affordability of utilities' services: extent, practice, policy' for the Centre on Regulation in Europe (CERRE). Further details at: <http://www.cerre.eu/publications/affordability-utilities%E2%80%99-services-extent-practice-policy>
- Presentation of the information about energy affordability in Europe to DG Ener's Vulnerable Consumers Working Group in Brussels in December 2015
- Participation at a research project at the Centre for Competition Policy at the University of East Anglia financed by the UK Energy Research Centre to investigate 'Equity and Justice in Energy Markets' over the next two year.
- A member of the UK Energy Research Centre.

### Theoretical framework

The definition of energy poverty was agreed. It is based on definitions used in the United Kingdom. There is probably no other approach existing for the energy poverty assessment, except the three proposed.

Consensual-based indicators are considered as difficult to evaluate due to the low data availability. For example, the indicator "population living in a dwelling with leaking roof or damp walls" is not a good indicator as it is not totally clear how relevant it is to measuring energy poverty. Probably it could be relevant if considered by income group/per income quintile. The expenditure-based approach is considered as the most important one. The data availability is an important issue in this approach. Eurostat provides data for the consensual based measures every year, but for the expenditure based metric only once every five years. National household budget surveys are realized as well not every year in all member states, also the structure of the survey is not completely the same for all member states. To provide annual expenditure based measures, new data would need to be collected, which is likely to be expensive and time demanding.

Outcome-based indicators are not considered as suitable for the research; e.g. cold winter mortality is connected with overall quality of the health care, climatic conditions, and general economic situation in the country. The rationale for selecting approaches (all three) is clear and covers the energy poverty topic. The respondent is focused on expenditure-based approach within his research.

### Energy poverty metrics

The metrics along with the supporting indicators are appropriate to measure and monitor energy poverty with some comments related to the supporting indicators. On building efficiency and building stock data, these indicators should be applied. However, it needs large data sources to represent the building stock. Heating systems indicators should be used, but is likely to require a lot of data collection. Also cooling systems should be added to this group of indicators. Common heating and individual heating should be distinguished in the data collection. Average lengths of the heating season should be included.

Supply choice should also be used, including consideration of the energy carriers available to different households. Energy prices should be used but it should be carefully interpreted due to the various energy tariffs (hundreds in Europe) for different households. Moreover, demographic factors should also be used but will be dependent on data availability. Finally, policy interventions are not addressed to the energy poverty but to energy policy. This type of indicators should be discussed in detail.

The respondent agreed with the selected strengths and weaknesses of the approaches and proposed data availability as an important factor for considering indicators. The consensual based approach has the most easily available data, as Eurostat publishes it on an annual basis. The expenditure based approach has probably the greatest problem with data availability.

Sensitivity to the energy price rises is not considered as a weakness of the expenditure-based approach, because the energy price influences the households and is a relevant part of the selected indicators. As for expenditure based metrics, there are two essential approaches used: 2x median or 10% threshold. The specific feature of the median is taking the difference (e.g. income) within the country, but then the comparability across member states is lower.

Ideally, the selected indicators should not be applied only to low-income households, but the data is not probably available in this shape. Hidden energy poverty wasn't addressed during the interview, as this question was added later to the questionnaire.

# 11. Lidija Zivcic, Slavica Robić

**Date:** Thursday 04 February, 2016, 10:00 - 11:00h, Skype

**Participants:** Jessica Yearwood, Alipio Ferreira (Trinomics); Lidija Zivcic, Slavica Robić (REACH project)

1. **Tour de table:** participants of the meeting introduced themselves.
2. **Introduction of the project “Selecting indicators to measure Energy Poverty” for DG ENER.** Trinomics introduced the project, explaining its aims and status. The aims of the project is to better understand energy poverty by improving EU wide data collection and monitoring on the topic, through a set of selected indicators. Currently, we have completed a review of literature & existing indicators and are starting the process of data collection and testing the indicators in selected countries (ES, SK, NL).
3. **Introduction of REACH.** Lidija and Slavica explained REACH.
  - REACH has two fronts of action: firstly, it trains people to give free advice to poor households as to how they can make their energy and water consumption more efficient. These energy auditors also produce a report with suggestions that is then sent to the households. Secondly, it gives support to policy makers by producing studies and policy advice on energy poverty.
  - Regarding the impact of REACH on household expenditures with energy and water consumption, there is no accumulation of data yet. Some results should appear in the next semester. However, there are some rough estimates from the programme ACHIEVE regarding the impact of this program on reducing energy consumption expenditures. On average, households visited by the programme presented savings on electricity and heat of about 10%. Savings of water were around 20%. Financially, households saved on average more than 100 EUR on these expenditures. In Slovenia, in a national programme savings were around 108 EUR.
  - These savings were possible because poor households have various aspects that reduce their energy and water efficiency. The main ones are lack of insulation and double glazing, old appliances (such as boilers, fridges and even TVs), and bad water pipes. Buildings are themselves old, which does not contribute to preservation of heat inside the house. In Croatia, for example, a survey with 280 households found that 91% of them had no insulation. A similarly great amount had single glazing, and most of them were older than 25 years.
  - These actions show that many poor households are simply unaware of how much energy each appliance consumes and how much they could save by optimising consumption or changing them.
4. **Indicators for Energy Poverty**
  - Lidija and Slavica discussed the possible indicators for energy poverty that can be used for policy monitoring and interventions. For now there is no consensus on which indicator is better. Indicators that consider a household energy poor if its energy expenditures exceeds a certain threshold (e.g. 10% of household income). According to the 10% metric, nearly all households in Bulgaria and Macedonia should be considered energy poor.

- For policy interventions and research on energy poverty in Balkan and Eastern European countries, energy-poor households are indirectly identified: interventions target those household that receive some kind of social aid, for example. Croatia uses the definition of “vulnerable consumers” to address problems related to energy poverty. Only social welfare and disabled aid beneficiaries are currently vulnerable. REACH and other projects are advocating for a wider definition of both vulnerability and energy poverty.
- Some measures of energy poverty are considered, but it is often perceived that measures suggested for Western European countries (like the UK) do not apply well to Eastern Europe. Examples of studies that propose methods for defining energy poverty threshold and indicators are Hills, Buzarovsky and Thompson & Snell. Currently there is no official measures of energy poverty being used in any of the countries targeted by REACH.

## 5. Data issues

- Lidija and Slavica stressed the need to get access to detailed data on household spending, which is not always available or difficult to access. For EU countries, such as Croatia and Slovenia, there are surveys carried out in harmonization with EU rules, but that is not the case for various Balkan countries.
- There are some specificities about Eastern European and Balkan countries that make it difficult to have a single indicators or policies that apply both to them and to Western Europe. Some examples of specificities are: in Eastern and Balkan countries there is a high share of ownership of houses, even among poor households, whereas several policies in Western European countries are directed to the landlords. In the Slovak Republic, housing costs are unusually high for European standards. Moreover, various Eastern European countries face problems of households with no access to the grid or illegal access to it, something that is usually not considered in measures of energy poverty in Western Europe. There is an undergoing project gathers data on energy consumption and production and which is being carried out in seven countries, including the non-EU Balkan countries. It is called “South East Europe - Sustainable Energy Policy” and one of key activities, promotion and development of energy model is based DECC energy model. Currently Red Flag Report on Energy Poverty in SEE is under development. Expected launch of the report is End of October 2016.
- The SILC survey provides a lot of useful information for measuring energy poverty, but often the level of detail is not high enough. It is difficult, for example, to assess the access of households to energy services. It can be the case that a household has low spending on energy, but its access to energy services is also too low. In order to have a good assessment of energy poverty, physical conditions of the household must be evaluated (insulation, presence of mould, draft), as well as outcomes of energy poverty, such as physical or mental health problems.
- Another interesting but problematic aspect is the indicator of disconnection from the grid. Though it may be interpreted as an outcome of energy poverty, data (provided by energy supplied) is not detailed enough to differentiate voluntary disconnections from disconnections due to bill arrears).

## 6. Follow up

- Lidija and Slavica agreed to participate in a follow-up stage of the DG ENER project, in which they will be asked to give their opinion on the choice of indicators sent by Trinomics and partners (UCL & SEVEN).
- Lidija and Slavica also offered to send some studies/reports on energy poverty aspects in Eastern Europe: about specificities of energy poverty characteristics in Eastern Europe,



results of ACHIEVE or REACH programs, and other documents that may be interesting for the DG ENER project.

## 7. Information Received

- Information on ACHIEVE:
  - <http://achieve-project.eu/> or in the final report:
  - Final report: [http://achieve-project.eu/index.php?option=com\\_phocadownload&view=category&download=332%3Afinal-publishable-report-achieve&id=32%3Aeu-dissemination&Itemid=6&lang=eueu](http://achieve-project.eu/index.php?option=com_phocadownload&view=category&download=332%3Afinal-publishable-report-achieve&id=32%3Aeu-dissemination&Itemid=6&lang=eueu)
- **Indicators and situation for Slovakia:** check article GERBERY, D. - FILCAK, R. Exploring Multi-dimensional Nature of Poverty in Slovakia: Access to Energy and Concept of Energy Poverty. In *Ekonomicky casopis/Journal of Economics*. Vol. 62, no. 6 (2014), p. 579-597.
- **On specifics of the region** (the text is a copy-paste from REACH project proposal to the IEE):
- REACH covers countries that face the following common specifics in their situations:
  - in REACH countries fuel poverty is an issue of low or no political interest and hence the problem is less defined, monitored or tackled than in countries like UK or France,
  - inhabitants of REACH countries had to make a switch from subsidized energy prices to market oriented ones, which is an additional factor contributing to fuel poverty, unlike in most of ACHIEVE countries,
  - in countries, covered by REACH, no clear division between social housing and non-social housing buildings or areas can be detected, unlike in several countries covered by ACHIEVE and EC-Linc (France, Germany, UK), where it was possible to target buildings or areas with social housing and low-income households,
  - in covered countries, most of the households can benefit from installation of 'low-tech' devices, such as draft proofing or efficient light bulbs, while this was not the case in some countries from ACHIEVE (e.g. in Germany or UK double glazing is a standard, so installed devices tended to be 'high-tech', for example wireless switchers, which are more expensive),
  - in REACH countries there is less existing social support for fuel poor households (e.g. paying of heating bills is not granted, but subject to application for funds).



## 12. René Schellekens

**Date:** 21<sup>st</sup> April 2016

**Participants:** René Schellekens (Rijkswaterstaat - Ministerie van Infrastructuur en Milieu), Alipio Ferreira (Trinomics), Jessica Yearwood (Trinomics), Siegmund Nuyts (Trinomics)

### Introduction

During the first part of the interview, Trinomics discussed the feedback sent by Mr. Schellekens by email about the report that had been shared with him earlier. Three issues were highlighted by him in this assessment:

1. Some metrics of Energy Poverty capture a large number of high income households, which should not happen;
2. Energy Poverty should be followed at a more local level, even at neighbourhood level; and
3. The most interesting indicator seems to be the above-the-threshold indicators using share of energy expenditure. Each one of these topics were discussed in the interview.

### High Income Households

Some metrics presented in the testing report captured a relatively large number of middle and high income households. Mr. Schellekens noticed this and stressed that it should be considered as a shortcoming. From a conceptual point of view, energy poverty should be looked at as a specific phenomenon within the general phenomenon of poverty. In this sense, energy poverty is not a parallel concept of poverty, but a more specific way of looking at the phenomenon of poverty.

Monitoring energy poverty would be a way to find some specific solutions that can alleviate poverty in general. Moreover, looking at energy poverty as a phenomenon within general poverty is more politically palatable for policy-makers, which are already sensitive to the issue of fighting poverty.

### Geographical Level

Energy poverty is an essentially local phenomenon. The analysis carried out by Trinomics only looks at regions (i.e. provinces within the country), and not at cities or neighbourhoods. This type of analysis is not very useful for policy-making, because it is still difficult for policy-makers to target the areas that are vulnerable. Indeed, within the same province or the same city, there are richer and poorer areas, and looking at the aggregate figures may give a false, “average” picture of energy poverty. For example, the eastern part of province of Drenthe is relatively poor, whereas the western part is relatively rich. Looking at the province in aggregate may give the false impression that energy poverty is not a problem. However, Mr. Schellekens admitted that in such cases a partial solution is to use absolute figures in a region (such as the number of households in energy poverty as opposed to the share of households in energy poverty). Another possible solution would be to look at a more local level, which would require additional data.

### Choice of Metrics

Mr. Schellekens believes that the above-the-threshold metrics are more useful for monitoring energy poverty. When asked about the hidden energy poverty metrics, he argued that these metrics should be used with caution. In the Netherlands, there is a recent trend in constructing energy efficient social

housing, and even buildings that are transferred to zero-energy houses. These houses are clearly not in energy poverty, but they would appear under hidden energy poverty. As for the above-the-threshold metrics, he agreed that using the share of expenditure exclusively may be an imperfect metric, for a rich household may still spend a large fraction of income with energy and still have plenty of resources for other kinds of consumption. In this sense, a metric that uses the share threshold but limits the universe to poor households would be more adequate. Such a metric is proposed in the form of the Low Income High Costs metric, which is acknowledged by Mr. Schellekens as a good indicator.

## 13. Ing. Ján Magyar

**Evaluator:** Ing. Ján Magyar (Slovak Innovation and Energy Agency, National Energy Agency, SK)

### Evaluation of the results of testing for the selected indicators

- At the European level, which of the selected indicators do you find best suited to measure and monitor energy poverty according to testing results in your country?
- Are the selected metrics relevant for your country?
- Which set of metrics would give the best picture of energy poverty in your country?
- Are there any anomalies in the results or explaining factors you can identify?

### Introduction

Based on 3<sup>rd</sup> EU Energy package and according to Act No. 250/2012 Coll. on regulation in network industries, the Regulatory Office for Network Industries prepared an informative document “The concept of consumer protection complying with the conditions of energy poverty” which the Government of the Slovak Republic discussed and approved on the meeting on 11.06.2014. Based on the conclusion of the meeting, there has been established interinstitutional working group consisting of representatives of Regulatory Office for Network Industries; Ministry of Economy; Ministry of Employment, Social Affairs and Families and Ministry of Finance of the Slovak Republic. The task of this working group is to investigate energy poverty as phenomenon and prepare the proposal for the Slovak government how to define, monitor and which specific actions should be performed in order to decrease the level of energy poverty in the Slovak Republic. Regarding the potential solutions, the discussion is moving (based mainly on social aspects) from tariff policy at the beginning of the discussion towards targeted social contributions, but due to the complexity of energy poverty issue, nowadays, are not defined specific legislation measures or decided detailed action plan with defined timeframe, yet.

The Regulatory Office for Network Industries performs its mission pursuant to the Act No. 250/2012 Coll. on regulation in network industries, and thus through determining the prices and conditions of their application in network industries, and the conditions for the regulated activities performance.

The Ministry of Economy is according to Act No. 575/2001 Coll. on the organization of government activities and the central government as amended responsible e.g. for energy, including nuclear fuel management and disposal of radioactive waste and energy efficiency.

The Ministry of Employment, Social Affairs and Families is according to Act No. 575/2001 Coll. responsible e.g. for definition and implementation of policies in the area of state social benefits.

The Ministry of Finance is according to Act No. 575/2001 Coll. responsible e.g. for formulating and implementing the policies in the area of finance, taxes and duties, customs, financial control, internal audit and government audit.

### Evaluation of the results of testing

[Answer to the questions 1-4]

At the moment energy poverty in Slovakia is not clearly and precisely defined, that is why it is not possible to determine percentage of people in energy poverty and the experts were therefore unable to verify each indicator for the accordance to the real situation in the country.

According to available information from the responsible state institutions, about 7% of the population who are the recipients of material aid and another approximately 5% of the population that have a disposable income below EUR 500 per month are two main groups who are supposed to be in energy poverty (due to the lack of the official definition it cannot be precisely quantified or stated).

On the basis of the above and after an analysis of the indicators tested it was concluded, that neither of indicators fully reflects the assessed current state of the issue. In the point of view of the experts, the trend of graphs doesn't fully reflect the evolution of energy prices during these years, as well as an increase in minimum wages over the period. From the testing results received it was not entirely clear what specific weights of parameters were used in the calculation and therefore it was difficult clearly to assess the substantiality of results for the local conditions.

The best suited indicators to monitor energy poverty according to the distribution and the share of energy poor inhabitants, that reflect (at least partly) the anticipated real situation in local conditions, are those in the graphs 2M Slovakia and LHC Slovakia.

At the moment a development of regulations for the energy poverty in Slovakia has started, within this all the indicators tested can be useful.

Anomalies in the results for the year 2005 were discussed as well, when a number of graphs show significant increase in the share of energy poor population in that year. The reason of this deviation could not be identified based on the current knowledge as it is not clear what has caused such a large difference in the share comparing to all other years.

## 14. Sergio Tirado Herrero

**Evaluator:** Dr. Sergio Tirado Herrero (RMIT Europe)

### Evaluation of the results of testing for the selected indicators

- At the European level, which of the selected indicators do you find best suited to measure and monitor energy poverty according to testing results in your country?
- Are the selected metrics relevant for your country?
- Which set of metrics would give the best picture of energy poverty in your country?
- Are there any anomalies in the results or explaining factors you can identify?

### Introduction

Dr Sergio Tirado Herrero is a researcher associated with RMIT's Centre for Urban Research. He is investigating the social and environmental dimensions of the transition to sustainable energy futures and works in identifying opportunities and creating partnerships for advancing RMIT's urban research agenda in Europe. He is also visiting research fellow of the University of Manchester and founding member of the Spanish Association of Environmental Sciences (ACA).

Sergio holds a PhD (2013) in Environmental Sciences and Policy from Central European University in Budapest. His research looks at issues of social justice, vulnerability and resilience in the domain of residential energy use and the built environment. A recognised scholar in the field of energy poverty and the multiple benefits of climate investments, Sergio is also interested in mobility as an urban energy service of paramount importance for a sustainable and fair energy transition.

Sergio has a growing publication record in energy, environment and geography journals. He has also led and contributed to a number of high-impact initiatives such as two pioneering assessment reports of energy poverty in Hungary and Spain and the Global Energy Assessment.

### Evaluation of the results of testing

#### 1) At the European level, which of the selected indicators do you find best suited to measure and monitor energy poverty according to testing results in your country?

The collection of indicators presented captures the breadth of approaches currently being applied by researchers and practitioners for quantitatively assessing the extent and evolution of energy poverty in Member States and across the EU. It is worth noting that the consensual approach is considered - sometimes it is disregarded for being too depending on the understanding of EU SILC questions by respondents from different countries and social, cultural and demographic backgrounds. While acknowledging this drawback of the consensual approach, it has been shown that the results of allegedly objective expenditure-based (i.e., energy poverty rates) are very dependent on the type of indicator and assumptions applied by.

Another contribution of interest are the 'hidden energy poverty' (HEP) indicators applied to address the drawback that expenditure-based indicators outside the UK rely actual expenditure data coming from national Household Budget Surveys (HBS), which is a significant deviation from UK methods based on required energy expenditure data.

There are the following issues with the indicators presented nevertheless

- In my understanding of the MIS indicator based on Heindl (2013) and after my own consultation with the [Spanish think-tank 'Economics for Energy'](#) disposable household income should be calculated after taxes, **housing** and energy costs.
- MIS thresholds seem to be very low in general. In the UK a properly calculated Minimum Income Standard results in a very substantial income figure: <https://www.jrf.org.uk/report/minimum-income-standard-britain-what-people-think>. If a proper MIS threshold (one that guarantees a level of consumption that is equivalent to the cost of covering basic goods and services) is applied it will result in a large percentage of the population in energy poverty. The issue here is that this indicator is capturing many households whose income is below the MIS level and therefore have difficulties to afford not only the energy they need, but the rest of basic goods and services a household requires. In fact, what we can see in the UK is that income levels provided minimum salary and by unemployment and other benefits are well below the Minimum Income Standard calculated by the Joseph Rowntree Foundation.
- The arrears indicators considers utility bills different from energy (i.e., water, building common costs, etc.)
- I miss the often considered SILC indicator 'People living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor'. It has its own drawbacks (i.e., is a poor measure of the condition of the dwelling) but provides valuable information nevertheless.
- It is unclear if or how household income and energy expenditures are being equalised in 'Energy expenditure above the threshold' indicators. I assume it is based on a simple division of household energy expenditure by household income, which is akin to say that the same equalisation factors are used both in the numerator and denominator of the calculation. It has been argued that equalisation factors should be different for income and energy expenditures, such as the LIHC method does.

In summary, the following is recommended EU Member States):

Indicators that are **best suited** to measure and monitor energy poverty according to testing results in Spain

- ✓ House not warm (Warmth): key consensual indicator, even if it only considers one domestic energy service (space heating)
- ✓ Arrears in utility bills, Severe arrears: which allows differentiating by degrees of incidence
- ✓ Twice the national median share (2M)
- ✓ 10%: this threshold is suitable for the Spanish case where median percentage of energy expenditure vs income (energy burden) is the range of 3 to 5%. It will not be suited for other contexts like Hungary (see [paper](#)) where median consumption is above 10%. I myself recommend use various thresholds (from 5 to 3'0%, depending on the country) when applying this indicator for my research.
- ✓ HEP 5 EUR: it is nevertheless unclear why this threshold has been used. Absolute minimum expenditure levels will probably to be very different in different EU Member States and need to be supported with national data.
- ✓ Half the national median expenditure (HEP M/2 EXP): HEP indicators based on absolute expenditure produce results consistent with other indicators

Indicators that are **less suited**:

- ✓ Half the national median expenditure (HEP M/4 EXP): probably too low of a threshold



- ✓ Low income, high cost (using actual expenditure) (LIHC): insensitive to changes in key short-term factors such as household income and energy prices. Given the absence of required energy expenditure data it is not possible to estimate the value of the ‘fuel poverty gap’ which is the indicator used in the official UK method to observe the ‘total intensity’ of fuel poverty in the sample. It also tends to be very much concentrated in low income households, whereas other indicators (such as those from the consensual approach) show that mid-income households are sometimes also in difficulties.
- ✓ All MIS indicators: as they apply very low MIS thresholds (not covering the cost of basic goods and services) and possibly captures households not being able to afford neither domestic energy nor all other essential household items.

Indicators **not suited**:

- ✓ Twice the national median expenditure (2M Exp)
- ✓ Half the national median share (HEP M/2)
- ✓ HEP M/4

As disaggregated results by income level show, 2M EXP mostly captures better off households whose energy consumption is high and therefore indicates their ability to perfectly satisfy their domestic energy needs. In the case of HEP M/2 and HEP M/4, high incidence of energy poverty is detected mostly in high income households, whose energy expenditures vs income ratio is often very low. This is the opposite of what energy poverty is about.

**2) Are the selected metrics relevant for your country?**

Yes, they are. Consensual indicator ‘dwelling was not comfortably cool during summer’ is missing though. It is an important one as it captures thermal discomfort during summer, which is an overlooked aspect of energy poverty especially in Mediterranean countries. It is only available for 2007 and 2012 (EU SILC *ad hoc* modules).

**3) Which set of metrics would give the best picture of energy poverty in your country?**

The ones selected as best suited in question one with exception of HEP 5 EUR, which would need to be calibrated with actual energy consumption data for Spain.

**4) Are there any anomalies in the results or explaining factors you can identify?**

The following has been detected:

- ✓ Indicators Twice the national median expenditure (2M Exp), Half the national median share (HEP M/2) and HEP M/4 result in high income households being more affected by energy poverty than low income. They are at odds with the rest of the indicators and actually capture households whose energy consumption is high and/or the percentage of energy expenditures income is low - the opposite of what an energy poor household is.
- ✓ Disaggregated results for Spain include Ceuta and Melilla. The population of these constituencies is much smaller than in the rest of Spanish Autonomous Communities. In my experience with Spanish indicators it is risky to report results for these territories as they often contain a very small subsample (a few tens of households) of the HBS and SILC microdata.
- ✓ There is a very visible ‘bump’ around 2005 in expenditure-based indicators for Slovakia which does not correspond with the bump in consensual indicators recorded for 2009 and 2010.
- ✓ There is a fast and significant increase for the warmth indicator in Italy that is much decoupled from the stable arrears and severe arrears indicator.



## 15. Luciano Lavecchia and Ivan Faiella

**Date:** 9th May 2016, via e-mail

**Evaluators:** Luciano Lavecchia and Ivan Faiella (Banca d'Italia)

### General remarks:

The two experts acknowledged that defining energy poverty (EP) is particularly difficult and agreed with the approach taken to use several EP indicators. However, the two experts suggested the following as possible improvements to the analysis:

1. The discussion of energy poverty cannot be dissociated from a discussion of the dynamic of international energy markets, RES support through the electricity bill, energy market liberalization, among others.
2. Not only headcount should be used as a metric to monitor energy poverty, but some measure of the intensity or “depth” of the phenomenon is also desirable. In this case, the authors welcome metrics such as “energy poverty gap, as in Miniaci et al. 2014;
3. The authors missed a better statistical appraisal of the indicators and sources: no reference to their variability in terms of sampling variability, measurement errors, etc.
4. The authors also stressed the need to define very clearly the terms. For example, explicitly mention that energy expenditure does not include transportation costs, making the difference between “vulnerability” and “poverty” situations.

### Choice of metrics:

Mr. Lavecchia and Mr. Faiella agreed with the approach of looking at energy poverty in different income quintiles and discarding those metrics that capture high income households. Particularly metrics such as HEP (Hidden Energy Poverty) M/2 captures a high share of high income households, and should be discarded. They also argued that consensual based metrics (based on the SILC survey) are highly unreliable, as they derive from self-reported conditions. The expenditure-based indicators that were based on relative characteristics (median share or median expenditure) are more adequate. Metrics such as MIS 5 euro may be interesting in specific contexts, but they are simply too arbitrary. Finally, they recognized that one single metric may be insufficient to provide a complete picture of the phenomenon. Regarding the supporting indicators, the experts would add a few other variables that are useful to understand energy poverty: deprivation metrics (present in the SILC survey) and information on the country's energy mix.

### Econometric results:

The authors criticised the econometric approach, as it was unclear in which way they contributed to choosing the energy poverty metrics. Moreover, they provided methodological criticism, mentioning that the use of non-linear probabilistic models were not motivated well enough (linear models with corrections for heteroscedasticity could still have worked with the setting available).

### Italian results:

The experts noted that, differently from what was done in the study, it is common practice to use Italian data aggregated at NUTS (region) level instead of provinces. Moreover, they criticised the fact that the Household Budget Survey was not used, mentioning that this survey collects high quality, relevant data. They also noticed that, differently from what seems to be assumed in some interpretations, energy poverty is not a phenomenon that is restricted to elderly population. In recent years, it seems to be increasing among the young population as well.

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