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Programme to reduce energy poverty in the Czech Republic

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ABSTRACT

In recent years, household expenditures on energy consumption have significantly increased. Consequently, the number of households that cannot afford to keep their homes adequately warm in winter or adequately cool in summer has increased as well. Such households are affected by energy poverty.

The main goal of the paper is to examine existing approaches to energy poverty including energy poverty indicators and to compare system of support for energy poor households in the Czech Republic and in the United Kingdome. Another goal is to describe the most endangered types of households needing government support and to draft possible measures and programme to minimise the impact of energy poverty. The energy poor households that need government support were detected based on aggregated statistics of Housing Budget Survey and a comparison of the current situation. According to th introduced model, the number of households under energy poverty is 16% in the Czech Republic.

Existing support programmes were examined to determine their potential use. The main conclusion of the paper involves appropriate next steps and future programmes designed to reduce energy poverty in the Czech Republic.

1. Introduction

Households are increasingly struggling with fluctuating energy prices and this is leading to instability and rising costs. Energy poverty is now being discussed more often in the Czech Republic. Nevertheless, unlike the most advanced Western European countries, the issue has not been tackled at a high enough level. The biggest shortcomings are the lack of definitions and detailed description of energy poverty as well as the lack of strategies aiming at decreasing the occurrence and impact of energy poverty on households. In addition, there is a lack of general awareness of the problem both among professionals and the overall population. Therefore, the first step should be to map out the situation and define particular tasks.

The European Parliament has adopted the EPBD II directive, which sets out basic principles and requirements leading towards a significant decrease in the energy consumption of buildings in the EU. The Czech Republic has to implement the EPBD II in its legislation and create a set of policy measures to achieve final energy consumption savings. Consequently, various support schemes have been introduced that should help households implement savings measures regarding energy losses in their buildings (DG ENER, 2014; Energy Management Act, 2000; EED, 2010).

Energy poverty takes two basic forms. The first is unavailability of energy sources, which primarily endangers households in less advanced countries. This form will probably not affect households in the Czech Republic, but Czech households will be endangered by energy poverty caused by a lack of available funding to cover the building's energy demand. In the last few decades, the level of comfort (and consequently energy consumption) in households has increased. The number of appliances has also risen and, generally, a higher quality standard is required than ever before (constant temperature, humidity and other air treatments). To satisfy all these requirements, it is necessary to pay higher energy costs (Anisimova, 2011).

It is therefore necessary to establish a definition of energy poverty for the Czech Republic or to adopt a definition used in other Member States that have been dealing with this issue for some time, such as UK (Sovacool, 2015).

Energy poor households are one of the areas where the objective to decrease the final energy demand can be attained. Nevertheless, it is necessary to choose a type of support that will be feasible in terms of the household's income. At the same time, the support must be effective for the shortest payback period possible and for decrease of energy demand. A programme focusing on energy poverty decrease should be based on the requirements of the affected households and should provide sufficient support aiming primarily at decreasing energy expenditures in households while preserving the level of comfort (NAPEE, 2016; Valentová and Honzík, 2011).

Households affected by energy poverty cannot invest in savings

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measures or spend most of their income on energy in order to keep their homes comfortably heated. Therefore, it is desirable to find assistance that would ensure a proper living standard and help decrease energy expenses. Most EU Member States (including the Czech Republic) have not set any anti-energy poverty strategies yet. It is therefore necessary to study and use the knowledge gained by other countries that have been dealing with the issue of energy poverty over a longer period (Waddams Price et al., 2012; Bouzarovski et al., 2012).

In order to set the right strategies and decrease energy poverty, this issue has to be precisely defined. As the Czech legislation, has not drawn up its own definition yet or adopted a definition from other countries, the definition of the European Commission is most often used. However, this definition is rather vague. Another option is to use the more accurate definition of Great Britain:

A household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use (Moore, 2012; Defining Fuel Poverty, 2006).

The definition is clear and comprehensible and shows the exact energy poverty threshold. Yet, before this definition is adopted by other countries, it should be considered whether the definition and its parameters correspond to the parameters of the given country (e.g. the Czech Republic) and whether the definition is applicable there. Each country should consider local conditions and customs, particularly lifestyle and comfort requirements, when setting the definition of energy poverty.

2. Methods used

To resolve energy poverty issue, it is necessary to find suitable indicators which display the current state of the art. Household income and expenses, as well as the technical condition of dwellings need to be described. Energy poor households that need government support are detected based on statistics and a comparison of the current situation among the EU Member States. The chapter on methods used includes comparison of selected indicators of energy poverty (Section 2.1) as it is crucial to find appropriate indicators to tackle with the problem. Section 2.2 describes a calculation method used to estimate the extent of energy poverty in the Czech Republic. The last part of the chapter describes the method of using statistical data.

2.1. Selection of energy poverty indicators

It is necessary to establish indicators that show at least two levels of energy poverty. The first level should consider the results at the national level. Therefore, to compare the situation in various European and other countries a unified system should be taken into account for determining energy poverty. Studies and their results should be independent of local requirements and should consider mainly data showing satisfaction of the requirements. These results will not reflect the cause of energy poverty, but it will be possible to assess them according to the percentage of energy poor households and to compare them with the results in other countries.

The national level should also indicate endangered households in relation to local conditions and should help identify the cause of energy poverty. Then the best practices to decrease energy poverty can be set. The issue of energy poverty is influenced mainly by the development of energy prices, energy consumption in households and household income. These are the main factors that help track the development of energy poverty in the country. To learn about the risks of energy poverty, it is essential to know the data pertaining to particular households, as these may differ in relation to the type of building as well as to its technical condition, which largely influence energy consumption (Rademaekers, 2016).

Indicators must be divided according to the types of data examined. Indicators needed for comparing the situation in various countries differ from those showing conditions in particular countries or for examining particular projects. The first group involves indicators based on household income and expenses data. One of the most frequently used indicators in Europe is the Ten Percent Rule, which is an essential condition of the British definition of energy poverty. The line is determined by household income and expenses, but the rule does not consider the heat and technical condition of the building, which is (indirectly) included in household energy expenses. Therefore, the rule can be understood as an indicator of household conditions, but it is not able to identify the cause of energy poverty (Taylor, 1993).

Another possible indicator is Low Income High Costs (LIHC), which can be used for cross-country comparison as well. This indicator can identify energy poor households and at the same time shows the difference between household energy expenses and the energy expenses median of all households (Hills, 2012).

Indicators reflecting the situation at the national level must also provide information concerning local conditions in particular regions. Most importantly, they should reflect information regarding energy prices, median household income, the state of the housing stock and the climatic zones.

The last important group of indicators are indicators of energy poverty in relation to particular projects. In addition to showing the financial situation of households, these indicators should mainly determine the potential causes of energy poverty so that the impact of energy poverty can be eliminated or reduced to an acceptable level. The most suitable indicators have been selected to cover

2.2. Estimation of endangered households

As detailed analysis on energy poor households and their income and structure is still missing in the Czech Republic, an estimation of endangered households is presented in the paper. Households were divided into groups according to the type of building:

- Family houses;
- Apartment buildings – panel, brickwork.

Average energy losses and energy consumption have been calculated for various types of buildings. Calculation are based on statistical data, especially floor areas and building envelope data. The households were divided into five income categories. In each category, the average household income was compared to the operational cost of the building.

The Eq. (1) presents estimation of the percentage of household's expenses to energy:

$$PHE = EA / IE * 100 \quad (1)$$

PHE The percentage of households expenses to energy in a category;
EA Anticipated expenses to cover the energy consumption for a type of object;
IE Estimated income households living in a type of object and its size.

Based on the statistical data it is possible to estimate the distribution of the energy poverty Czech households. Model buildings have determined the average energy demand for certain type and size of the building. The electricity consumption curve was determined based on the size of the building and the year of construction. The calculation uses the size distribution of the building based on statistical data. Such estimation is provided according to the frequency of the individual categories in relation to their representation.

$$HEP = \sum (PHE * FOT * FOS * FHT * FHS) \quad (2)$$

HEP The percentage of energy poor households;
FOT Frequency coefficient for the object type;