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CHALLENGES AND POTENTIALS TO ACHIEVE ENERGY EFFICIENCY TARGETS IN THE BUILDING SECTOR IN SELECTED CEE COUNTRIES: POLICY BASED ENERGY DEMAND SCENARIOS UNTIL 2030

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Overview

European households (EU-28) were responsible for 26% of the final energy consumption in 2012 (Eurostat 2014). At the same time, buildings efficiency stands in a central position to achieve the climate and energy goals proposed in the 2030 climate and energy package (EurActiv 2014).

The most significant instrument to achieve energy savings in the European building sector is the Energy Performance Building Directive 2010/31/EU (EPBD, recast of 2002/91/EC) (European Parliament 2010). The directives have to be implemented on the national level setting up policy instruments to trigger investments in energy efficiency measures. In this paper, policy instruments to achieve energy efficiency in the building sector will be analysed in Bulgaria, Czech Republic and Romania, which stand for CEE countries exemplary. On the one hand, the CEE countries have a similar building stock, namely high share of apartment buildings, the dominated ownership status and high share of centralised heat supply. However, on the other hand, the countries are located in different climate, have different cost structure and different energy prices. All these factors lead to differences in the effectiveness of the policy instruments between these countries. Thus, the paper focuses on the following questions: (I) what is the impact of the existing policy instruments on the final energy demand until 2030 in the building sector in the investigated countries? (II) What energy saving potential exists while implementing ambitious policy sets and what role play parameters such as different climate, energy prices on the effective design of policy?

Methods

Corresponding to the main questions of this paper, the following steps are carried out: (I) data on the building stock, renovation solutions and prices, investor specific decision criteria and policies were collected (II) current energy demand for space heating and hot water in the whole building sector are calculated (III) scenarios until 2030 are modelled implementing existing national policy instruments firstly and then implementing ambitious policy instrument sets equal for all three countries.

The scenarios are modelled by using a bottom-up, techno-socio-economic approach in Invert/EE-Lab model. Invert/EE-Lab is a dynamic bottom-up building simulation tool that evaluates effects of economic and regulatory incentives on the energy demand in the whole building sector in a country. The scenarios are basically modelled by three core elements of the model. The first element calculates final energy demand for space heating and hot water based on highly disaggregated level of the building stock, heating and hot water systems. In the second element, reinvestment cycles and new investment in renovation measures and technologies are determined. In the third element, called decision module, the kind of renovation measures and technology investments are modelled. The decision module is built on stakeholder-specific investment decision-making approach which reflects economic feasibility of the renovation measures and technologies. Policy instruments, basically investment subsidies, effect economic feasibility of renovation measures and thus increase renovation rate and depth of measures in the country (Kranzl et al., 2012), (Kranzl et al., 2013), (Müller, 2010).

Results

The final energy demand for space heating and hot water in the residential and service buildings in 2008 is 89 TWh in Czech Republic, 82 TWh in Romania and 27 TWh in Bulgaria. The implementation of existing policy measures (see Figure 1, BAU scenario) shows energy demand reduction of 20%, 26% and 7% from 2008 to 2030 in Czech Republic, Romania and Bulgaria respectively. The variation of energy savings between the countries is due to the different policy instruments. While in Bulgaria, the policy instruments are dominated by building codes and there is only limited financial support for building renovation, there are funding investments in renovation measures in Czech Republic and Romania. Funding investments in renovation measures have an impact on the renovated building share and thus on the energy demand reduction.

The ambitious scenario, additionally to the BAU scenario, provides intensified investment subsidies, financial instruments, building performance requirements and information instruments. The policy sets are harmonized for the investigated countries in this scenario. Ambitious scenario leads to the energy savings of 27%, 33% and 27% in Czech Republic, Romania and Bulgaria respectively.

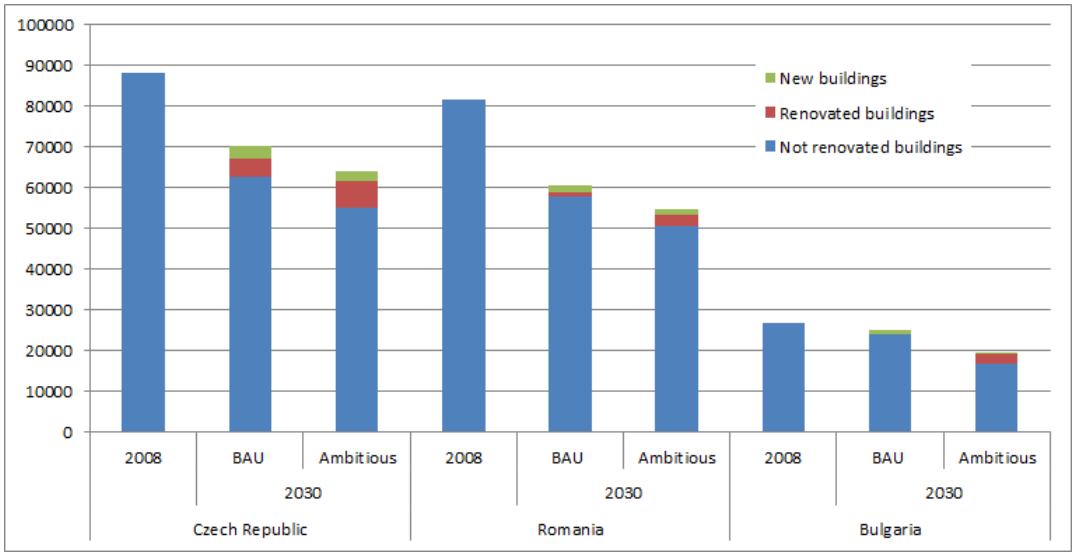

Figure 1 Final energy demand for space heating and hot water in 2008 and 2030 in Czech Republic, Romania and Bulgaria building sector, in BAU and ambitious scenarios

Conclusions

The preliminary results show different energy saving potentials among the countries despite the same policy instruments (Ambitious policy scenario). These differences are due to the different climate conditions, energy prices and costs of investments which have an impact on the effectiveness of renovation measures and the corresponding renovation rate of the building stock, which is often considered as the main indicator for an effective policy. The full paper will include an economic comparison of renovation activities in the selected countires which will form the basis regarding conclusions for economic incentives of policy making or potential cooperation between countries. Ambitiuos policy scenario shows a high energy saving potential in the building sector. Hovewer, to achieve these energy savings, a very intensive desing of policy has to be implemented.

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