

## METHODS AND EXPECTED BENEFITS FROM THE STUDY OF NON-ENERGY BENEFITS FROM ENERGY EFFICIENCY

### Summary of analytical report

Energy efficiency is one of the cornerstones of the European Union's energy and environmental policies, relying on well-established policies and measures as well as on innovative initiatives to achieve the ambitious goals set in this area. After many years of practice showing that the reduction of energy consumption and greenhouse gas emissions are achievable consequences of significant dimension as a result of the implementation of energy efficiency measures, the interest in achieving other benefits, such as stimulating local economies, reducing energy poverty, improving urban air quality and protecting the environment comes to the fore. These secondary benefits - also known as non-energy, wider, or multiple - are crucial not only because of the growing interest of a number of stakeholders in their implementation, but also because of the ability to make programs and projects for energy efficiency more attractive from a financial and economic point of view.

Bulgaria has a huge potential for energy-efficient renovation in the residential and public building stock - we can only recall the fact that "93% of the housing stock in the country does not meet the requirements for energy efficiency"<sup>1</sup>. The renovation process is obviously related to the availability of political, institutional, organizational and financial resources, the latter of which are currently provided mainly through national initiatives such as the National Programme for Energy Efficiency of the Multifamily Residential Buildings<sup>2</sup>, and to a much lesser extent (and generally extremely insufficient) through private capital investments. Achieving the national goals for improving the energy efficiency of the building stock et in the Bulgarian LTRS requires significantly more resources, but also factoring in the budgeting of programs the non-energy benefits (NEB), which have the potential to balance the costs of their implementation.

This largely applies to Bulgarian municipalities, which are a major stakeholder in the implementation of regional and local initiatives for energy efficient renovation. The design of such initiatives can be much more responsive to the growing needs of the local communities than the aforementioned National Energy Efficiency Programme or other programs at national level - in particular, in terms of focusing on the potential for non-energy benefits. In addition to the environmental benefits mentioned above, there are other categories of NEBs that are of great interest to municipalities. One such example are the economic benefits, which include employment, local investment, and the health status of the population, which affects both overall working capacity and the cost of medical services. Another category is the level of development of the social environment and inclusiveness, which depends on the economic condition of individuals and households as a whole, as well as on the presence and degree of energy poverty. As the results of the international research project COMBI show, Bulgaria's lag in the field of energy efficiency is in fact an exceptional opportunity to stimulate employment and economic growth in the coming years via dedicated investments, which our society should take full advantage of.

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<sup>1</sup> National Recovery and Sustainability Plan, October 2021

<sup>2</sup> National Program for Energy Efficiency of Multifamily Residential Buildings

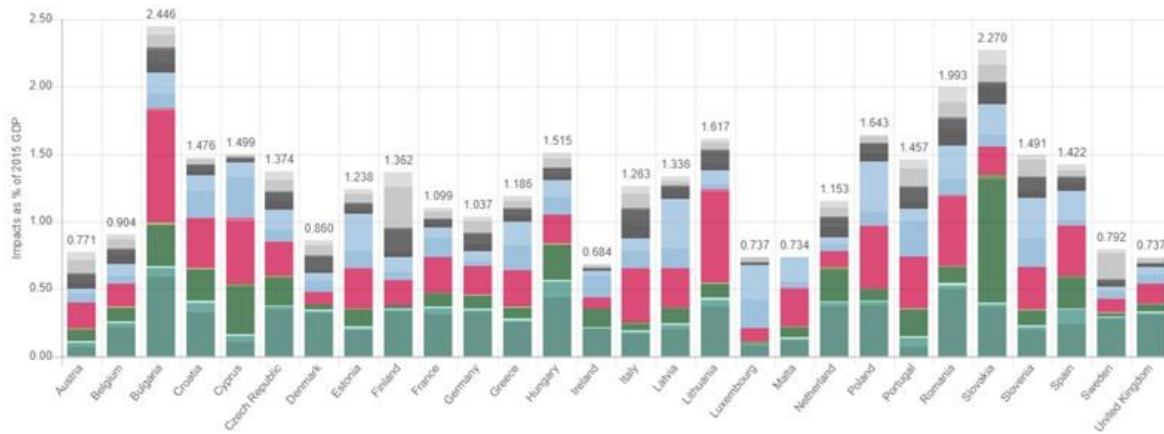


Figure 1: Projected increase in GDP in 2030 compared to 2015 as a result of implementing energy efficiency initiatives in different sectors (red and cyan are for the Transport and Housing sectors, respectively). Source: COMBI project.

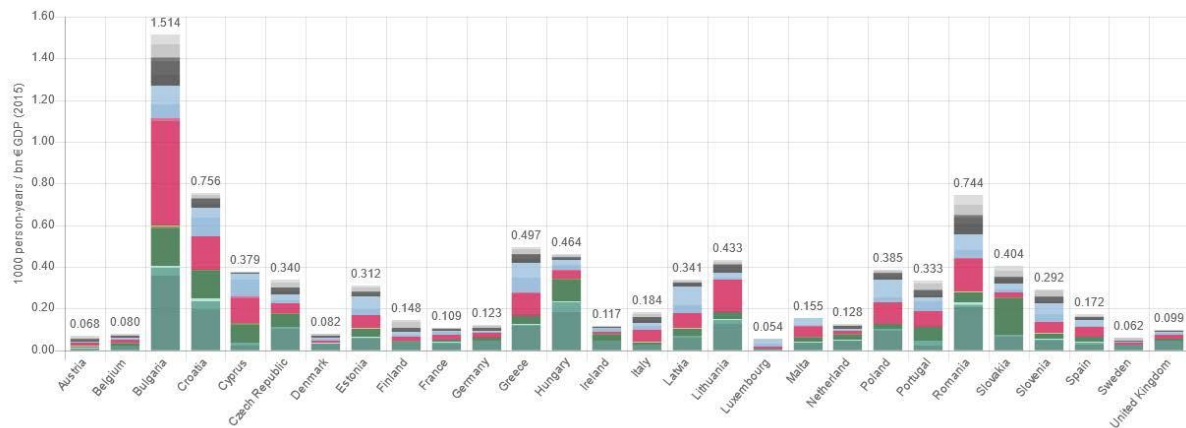


Figure 2: Projected trend of increasing employment in 2030 compared to 2015. Source: COMBI.

## CHALLENGES AND OPPORTUNITIES FOR REPRESENTATION OF NEB IN PROGRAMS AND PROJECTS FOR ENERGY EFFICIENCY

The main challenges facing national and local authorities in analyzing the NEB from energy efficiency programs are the following:

- Identification, understanding, prioritization and presentation of the whole set of NEBs that will be implemented in the implementation of a specific national or municipal program or project for energy efficient renovation
- Quantitative sizing and determination of the financial value of each of the NEBs, in order to obtain an overall picture of the full value of the mentioned program and project

The first challenge is somewhat easy to overcome due to the fact that in the last few years sufficient analytical and qualitative research has been carried out, which has brought a great deal of empirical clarity on the NEB, and more specifically to identifying, defining and

categorizing these benefits. It is widely accepted that NEBs fall into three main categories - economic, social and environmental - and manifest themselves at several levels: individual, sectoral, municipal and regional, national and international. From the point of view of the municipal authorities, of course, the most important are the NEBs, which are achieved at the municipal / regional and individual level. Such benefits are most often related to job creation, public budget improvements through reduced energy consumption costs, increased energy security, extended energy infrastructure life, increased local economic product, environmental protection, improved health and well-being, reducing poverty (especially energy poverty) and increasing disposable income. There are still no official data on the benefits of renovation to increase the value of real estate, but a number of expert assessments draw attention in this direction, as in the several cities with multiple renovated buildings there is an obvious decline in market demand for non-renovated properties.

However, the quantification and financial valuation of the NEB is a really difficult task to solve, as Bulgaria has very little experience in this regard and such experience has yet to be gained, as coherent research practice should be established and continuously improved. This report presents a number of methods for identifying and evaluating NEBs, and certainly if not all, then at least some of them can be applied in the future - initially as part of pilot and demonstration projects (also needed to increase stakeholder capacity this topic), and subsequently as an established standard in the creation, implementation, monitoring and evaluation of energy efficiency initiatives at regional and municipal level. The whole process can be planned and implemented through the following steps:

#### **A. Identification of potential NEBs that can be implemented at the individual level**

The Identification of potential NEBs should start with the application of methods for determining the importance of the NEB in the implementation of energy efficiency programs and projects at the individual level, which give an idea of the priorities of households in terms of expected benefits using:

- Method **"MOTIVATION FOR ENERGY EFFICIENT RENOVATION"**
- Method **"WILLINGNESS TO PAY FOR ACHIEVED BENEFITS"**

#### **"MOTIVATION FOR ENERGY EFFICIENT RENOVATION"**

<b>Indicator</b>	Degree of importance of the motives when deciding on energy efficient renovation
<b>Implementation approach</b>	Subjective
<b>Type of assessment</b>	Mostly qualitative
<b>Application</b>	<b>Preliminary determination and prioritization of feasible NEBs</b>
<b>Time frame</b>	Medium to significant; requires the collection of data and information from beneficiaries
<b>Capacity level</b>	Average; analyzes are required
<b>Strengths</b>	Easy to organize and implement
<b>Weaknesses and limitations</b>	High degree of subjectivity requires an experienced study team to avoid distortion of the results
<b>Essential for the following NEBs</b>	Health and well-being; improved quality of life / reduced poverty; environmental improvements

**"WILLINGNESS TO PAY FOR ACHIEVED BENEFITS"**

<b>Indicator</b>	Classification of NEB according to monetary value
<b>Implementation approach</b>	Subjective
<b>Type of assessment</b>	Predominantly quantitative
<b>Application</b>	<b>Financial valuation of the NEB</b>
<b>Time frame</b>	Medium to significant; requires the collection of data and information from beneficiaries
<b>Capacity level</b>	Average, a comparative analysis is required
<b>Strengths</b>	The advantage of this method is that it gives monetary value to a set of benefits that can be compared with each other.
<b>Weaknesses and limitations</b>	The disadvantages of the method are the difficulty that beneficiaries may face in giving the answers, the inconsistency of these answers, and the dependence of those on socio-economic, demographic, and personal variables.
<b>Essential for the following NEBs</b>	Health and well-being; improved quality of life / reduced poverty; property value (to a lesser extent)

**B. Expanding the scope of NEBs by identifying and evaluating specific NEBs at both individual and municipal level**

In this step, significant results can be achieved from the application of the method **"COMPARISON OF THE HEALTH OF HOUSEHOLD MEMBERS IN RENOVATED AND NON-RENOVATED BUILDINGS"**, which can be applied both at the individual and municipal level, as subjective and objective indicators<sup>3</sup> are both employed with minimal time and resource investments. By the same logic, the method **"CLASSIFICATION OF THE IEQ IN HOUSEHOLDS"** can be applied (the same can be applied to the administrative building stock), given that there are already developed tools at European and national level.

**"COMPARISON OF THE HEALTH CONDITIONS OF HOUSEHOLD MEMBERS IN RENOVATED AND NON-RENOVATED BUILDINGS"**

<b>Indicator</b>	Improved health and well-being
<b>Implementation approach</b>	Objective and subjective
<b>Type of assessment</b>	Qualitative and quantitative
<b>Application</b>	<b>Qualitative and quantitative assessment of health and productivity-related NEB</b>
<b>Time frame</b>	Average to significant, depending to the approach; requires the collection of data and information from beneficiaries, as well as the designation of representative research groups
<b>Capacity level</b>	Medium to high depending on the approach
<b>Strengths</b>	Qualitative and quantitative valuation of NEB
<b>Weaknesses and limitations</b>	Requires the consent of the beneficiaries for the disclosure of personal data and information; need to interact with medical personnel and organizations

<sup>3</sup> Sample surveys in households through a questionnaire or review of data on absences due to health reasons at the level of municipal administration

<b>Essential for the following NEBs</b>	Health and well-being; increased quality of life / reduced poverty
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**"CLASSIFICATION OF THE IEQ IN HOUSEHOLDS"**

<b>Indicator</b>	Thermal comfort, air quality, lighting comfort, noise insulation
<b>Implementation approach</b>	Objective; subjective or both
<b>Type of assessment</b>	Objective and subjective
<b>Application</b>	<b>Qualitative and quantitative assessment of NEB</b>
<b>Time frame</b>	Significant
<b>Capacity level</b>	High, requires both analysis and handling of complex data collection equipment and devices
<b>Strengths</b>	Great accuracy in the results when using the objective approach
<b>Weaknesses and limitations</b>	Expensive, time consuming, with a significant time frame
<b>Essential for the following NEBs</b>	Health and well-being; improved quality of life / reduced poverty; value of properties

**C. Identification and evaluation of NEB in specific energy efficiency initiatives at the municipal level**

At the regional or municipal level, when it comes to an initiative related to municipal property such as the public building stock or an energy service company, the economic viability of the program or project should always be taken into account by applying proven methodologies. In this regard, the method of **"DETERMINING SOCIAL COSTS"**, which is widely used in North America, can certainly be applied, despite criticisms that NEBs are not sufficiently factorized when using this method. This problem is mostly political (which means that if there is a will, it can be easily overcome) rather than technical. The use of this method has another positive side - it would help the development of public-private partnerships by attracting the participation of mediators (specialists) in energy efficiency to help use this method in particular, as well as the overall creation and implementation of local energy efficiency initiative.

In this regard, equally important is the development of local estimates for the financial valuation of the NEB. While it is currently difficult to assume that such activity is within the power of the municipal administration, the situation creates another great opportunity for a public-private partnership such as the one mentioned above, which will also contribute significantly to mutual benefit in building and using the necessary capacity to determine and evaluate the NEB.

**"DETERMINATION OF SOCIAL COSTS"**

<b>Indicator</b>	Compare the value of the benefits with that of the costs
<b>Implementation approach</b>	Objective
<b>Type of assessment</b>	<b>Quantitative; profitability method</b>
<b>Application</b>	Municipal energy efficiency programs
<b>Time frame</b>	Average
<b>Capacity level</b>	High (requires trained specialists in the field of economic analysis)

<b>Strengths</b>	The method is designed to calculate the value of important NEBs such as environmental protection
<b>Weaknesses and limitations</b>	In practice, only a partial set of NEBs are included - mostly those related to reducing air or water pollution, as quantification is difficult due to lack of local estimates
<b>Essential for the following NEBs</b>	Optimizing the productivity and prolonging the useful life of the local infrastructure for providing energy services; improved environment; optimizing and improving the condition of the public building stock

## *CONCLUSION: THE IMPORTANCE OF UNDERSTANDING AND REPORTING THE NON-ENERGY BENEFITS OF ENERGY EFFICIENT INITIATIVES*

Energy efficiency is one of the main tools for achieving the goals set in the European Union's ambitious policy in the fight against climate change and in favour of green economic development. The recent practice is that the results of energy efficiency initiatives (strategies, plans, programs and projects) are assessed according to the achieved energy savings (reduced energy consumption costs) and the associated reduced greenhouse gas emissions. In recent years, however, the experience gained in both implementing and evaluating and understanding the benefits of these initiatives has shown that non-energy benefits play a significant role and are sometimes expected and accepted by various stakeholders with much more attention and desire than traditional energy benefits.

For the successful implementation of national energy efficiency initiatives, regional and municipal administrations are expected to participate much more actively in the implementation of both national programs such as the National Energy Efficiency Programme and of their own, which are much more responsive to local needs, interests and public attitudes. For example, in larger municipalities, energy efficiency measures are much more likely to be expected to increase the cleanliness of ambient and indoor air or increase productivity; while in smaller municipalities the priorities are certainly focused on job creation, improving the social environment and increasing the local economic product. This requires not only a deepening of knowledge about the different types of NEBs, but also the successful presentation of these to the various stakeholders on whom the adoption and implementation of a specific program or project depends. This situation is even more valid when local authorities administer energy efficiency initiatives with their own funding – whether from the municipal budget or a specially created municipal fund - independently if these initiatives are aimed at private beneficiaries (households or businesses) or at municipal properties.

With this study, the Center for Energy Efficiency EnEffect seeks to strengthen the understanding and give impetus to the wider involvement of NEBs in local - individual and municipal - energy efficiency initiatives. For this purpose, the types of NEB essential in the implementation of energy efficient programs and projects at the local level are presented, as well as approaches and methods for quantitative sizing and financial evaluation of selected NEBs. In addition, European projects aimed at creating toolkits for evaluating and presenting the NEB have been analyzed as potential sources for national- and local-level analysis of the potential economic, social and environmental benefits. EnEffect will continue its activities in this area, hoping that other public and private stakeholders will also show interest and take the initiative for practical expansion and application of this topic in Bulgaria.

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The full report is available in Bulgarian at:

<http://www.eneffect.bg/images/upload/new/NEBenefits.pdf>