

## ABSTRACT

Project title	"Provision of methodology and analysis services for the purposes of the project "Improving the brand through the development of a carbon footprint assessment system in the cross-border region" (CB CARBONFREE)"
Activity 2	Development of a methodology for saving the energy in Bulgaria
Result no	D3.2. 2 of the project
Beneficiary	Haskovo Chamber of Commerce and Industry
Artist	Center for Testing and European Certification Ltd
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The project is co-funded by the European Union and National Resources of the participating countries under the " INTERREG V-A GREECE - BULGARIA 2014-2020 "Cooperation Program.

The analysis of the current state of energy efficiency in the food sector in Bulgaria aims to support the development of an energy saving methodology and a methodology for calculating and reducing the carbon footprint of companies operating in the same sector. The challenges arising from climate change necessitate the need to increase energy efficiency and improve companies' sustainability indicators. The energy-saving methodology and the methodology for calculating and reducing the carbon footprint are instruments that can be applied to support efforts in this direction. Based on the thorough analysis, a protocol was developed to reduce the carbon footprint of micro, small and medium-sized enterprises in the food sector in Bulgaria.

The report distinguishes between methodology and methodology. The methodology develops the strategic approaches, theories and principles and gives answers to the questions: what, why, and for what purpose will be researched, in contrast to the methodology, which adapts these principles to the specific topic and tasks of the research.

The current **methodology for saving energy for companies in the food sector in Bulgaria** was developed based on a desk study. Methodological approaches to energy saving known in European and Bulgarian practice have been identified and analyzed. A relevant approach has been identified that corresponds to the aims and objectives of the study. During the implementation of the study, a general overview of the food industry in Bulgaria was made. Based on statistical data, a graph is presented that shows the significant share that HVP has of the general industry (14.7%) and the processing industry (18.2%). The period covered is from 2010 to 2021.

Within the framework of the analysis, the consumption of HVP in Bulgaria was reviewed. It was found that the available data, specifically for the food sector, is very fragmented and a single comprehensive database is missing. It is summarized that energy consumption in food and beverage production is



determined by the type of food product, the type of production processes, packaging, transport, building systems and equipment efficiency.

The analysis also focuses on the specifics of the enterprises in terms of their potential to improve energy efficiency. This potential has been found for both production systems and industrial buildings. In general, the possible actions to achieve energy savings are identified. These actions are reflected in the energy-saving methodology developed later.

The Energy-Saving Methodology provides an overview of the general situation regarding state initiatives and programs that are aimed at promoting energy efficiency in industry and, in particular, in enterprises from HVP. In general, the programs include incentives for companies to invest in renewable energy and energy-saving technologies, as well as regulations and standards that require companies to meet certain energy efficiency goals. A detailed overview of the current regulatory documents applicable to industry and, in particular, to the food and beverage sector, is presented. In the context of the study, the goals set in the Integrated National Plan in the field of energy and climate until 2030 of the Republic of Bulgaria (INPEC) were considered, which are:

- stimulating low-carbon development of the economy;
- competitive and secure energy;
- reduce dependence on fuel and energy imports;
- guaranteeing energy at affordable prices for all consumers.

goals and priorities of the energy and climate of the Republic of Bulgaria laid down in the Integrated National Plan, were also examined.

When developing the methodology for saving energy in the enterprises of the HVP in Bulgaria, a systematic approach to the specific area of research and, accordingly, methodological selection of the appropriate actions for the purposes of the project was carried out. In the process of the study, it was found that specifically for HVP in Bulgaria there are no available data on energy consumption in the production of the various groups of food products. There is a lack of studies



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on energy use during the life cycle stages of products. It is recommended that a study with data on energy use in the production of food product groups, processing processes and energy sources is needed to identify the most energy-intensive processes. Data should be aggregated by food subsectors, for example, data on energy consumption in dairy production, bread and pasta production, food preservation technologies, etc. The study needs to cover an indicative period to account for changes in technology, processing efficiency and type of energy used and structural changes in the sector. The survey can serve to produce a single database of specific energy consumption for products, processes and food distribution based on indicators of the energy intensity of the products.

For the methodology, good practices in the field of energy efficiency, based on energy audits of industrial enterprises, including enterprises from the food and beverage sector, have been studied. It was concluded that in practice, from energy efficiency surveys of industrial systems, the largest share of savings in saved energy and CO2 carbon emissions is obtained from the introduction of the following types of energy-saving measures:

- Replacement of technological equipment and Technological aggregates and equipment;
- Replacement of fuel base;
- Recovery of waste heat;
- Replacement of lighting installation;
- Introduction of a monitoring and control system.

Based on these studies, the selection of further measures and activities, which outline the methodology, was carried out. First of all, these are energy audits. They are one of the primary tasks that must be accomplished in the implementation of an effective program for managing energy consumption in enterprises. Special attention is paid to the steps that the enterprise must follow to carry out an energy survey.



Reaching conclusions and formulating energy-saving measures (ESM) through an energy audit usually precedes the creation of an energy efficiency program. The energy efficiency survey and the introduction of a system for Energy management in an industrial plant are important tools to have a key role in the mix of policies to increase energy efficiency in industry and in particular in the HVP. For this reason, the introduction of energy management is the second measure proposed in the methodology. The ISO 50001:2018 standard "Energy management systems. Requirements with guidelines for implementation" is precisely such a mechanism for improving energy consumption. It provides a framework for promoting energy efficiency in the supply chain and helps organizations make better use of existing energy resources. The basis of the standard is Deming's cycle for continuous improvement: Plan - Execute - Check - Act.

measures are identified, which can be deduced after carrying out an energy audit of the enterprise, with the observation that the appropriate measures are identified for each specific case. Possible measures covered in the methodology are:

- Measures to improve the energy performance of the industrial and administrative buildings of the enterprises from the HVP;
- Energy saving concerning lighting systems;
- Improving the efficiency of electricity supply systems;
- Technological modernization measures;
- Measures for the use of waste heat;
- Use of renewable energy sources;
- Other measures and activities.

The report also developed **a methodology for calculating and reducing the carbon footprint of companies from the food and beverage sector in Bulgaria.** The concept of "carbon footprint" is considered a starting point in the methodology. A product's carbon footprint is the sum of greenhouse gas emissions and removals in the production system, measured in carbon dioxide equivalent.



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The calculation is based on a life cycle assessment using a climate change impact category. To explore the impact of the product system on the environment, the LCA (Life Cycle Assessment) method was used. The essence of the life cycle assessment approach is defined and its use as a tool for organizations in the food industry sector that wants to reduce their environmental footprint is argued.

LCE approach integrates resource use and emissions throughout the life cycle of the analyzed system, from the extraction of natural resources through material processing, production, distribution and use, to recycling and disposal of all remaining waste. This makes it a suitable method by which companies can identify the best environmental impacts, benefits and necessary trade-offs.

A review was made of several scientific articles and research sources in the field of sustainable development in the food sector and greenhouse gas emissions.

In connection with the initially set specific goals, within the methodology for calculating and reducing the carbon footprint of companies from the food and beverage sector in Bulgaria, "hot spots" of greenhouse gas emissions in the HVP and opportunities to achieve a reduction of the carbon footprint of food products. Among these options are reducing animal protein intake and fortifying foods with animal protein concentrates, such as soy, pea, wheat, and oat proteins; implementing strategies for sustainable food production and packaging; use of renewable energy sources; recycling food and waste and using rail instead of road transport.

The possibilities for saving costs are also considered and an example of energy saving in a Bulgarian cannery, surveyed for energy efficiency by CIES EOOD, is indicated. The prescribed measure consists of the construction of a photovoltaic park for its own needs on the roofs of the production halls with an installed capacity of 2 x 200 kW. The monetary annual savings that the enterprise will realize upon implementation of the measure are indicated.

Special attention is paid to the greenhouse gas emissions of supply chains, the decarbonisation of which is one of the most important and complex challenges



facing the global economy. It was concluded that in order to act in the direction of decarbonization of the supply chain, the most important thing is for companies to have data and information about the full range of emissions from their supply chain, which information should be public.

A toolkit has been developed for the integration of greenhouse gas emissions into the decision-making process, which includes the following tools:

- Create transparency regarding supply chain emissions data
- Setting an ambitious emissions reduction target for companies and publicly reporting on progress
- Designing sustainable packaging that can be recycled
- Responsible production with sustainable product ingredients and minimal waste
- Integrate emissions metrics into public procurement standards and track performance

Based on an in-depth analysis of existing strategies, **a protocol has been developed to reduce the carbon footprint of micro, small and medium-sized enterprises from the food and beverage sector in Bulgaria**. In the context of the objectives of the report, detailed research and analysis of the Farm to Fork strategy has been done. It comprehensively embraces the challenges of sustainable food systems and recognizes the inextricable links between healthy people, healthy societies and a healthy planet. The strategy is central to the Commission's agenda for achieving the UN's Sustainable Development Goals. The scope of the strategy, which consists of 27 actions aimed at making the European food system a global standard for sustainability, is examined. The goals in the 2030 strategy include:

- 50% reduction in pesticide use
- At least 20% reduction in the use of artificial fertilizers
- 50% reduction in sales of antimicrobials for farm animals



25% of the agricultural land to be cultivated according to the rules for organic farming.

The measures that all member states, including Bulgaria and Greece, must include in their programs and which cover the following areas are specified:

- Knowledge transfer and awareness actions (professional training, information activities, etc.);
- Consultancy services, farm management support services and farm replacement services;
- Implementation of quality management systems applicable to agricultural products and food;
- Participation of farmers in voluntary quality schemes;
- Investments in physical assets: processing of agricultural products, infrastructures, improving the results and sustainability of the farm, etc.;
- Restoring agricultural production potential damaged by natural disasters and catastrophic events and introducing appropriate preventive measures;
- Development of agricultural holdings and enterprises;
- Stimulating the initiation of activity by young farmers, non-agricultural activities in rural areas;
- Basic services and renewal of villages in rural areas - broadband access, cultural activities and tourist infrastructure, etc.;
- Establishment of producers' groups and organizations;
- Maintaining agricultural practices that have a positive contribution to the environment and climate and promoting the necessary changes in this regard (agri-environmental measures).
- Supporting organic farming;
- Promoting cooperation between actors in the agricultural sector and those in the food chain.





It is concluded that the change in the behavior of the economic operators from the food sector in the cross-border region of Bulgaria and Greece and their responsible ecological attitude is the right step that can lead to the achievement of visible and sustainable results for solving the problems related to conservation of the environment.

The measures to be taken to efficiently manage the carbon footprint of the food and beverage sector are analyzed in detail. Among the many measures identified are the optimization and concentration of production facilities and individual commercial facilities, the optimal location of production/commercial facilities within a given territory, the use of energy-saving equipment to maintain optimal operating factors of the working environment, the use of renewable energy sources and etc.

Suggested possible steps to reduce the carbon footprint of micro, small and medium-sized enterprises in the food sector include:

- Assessment of the current carbon footprint;
- Energy efficiency;
- Renewable energy sources;
- Eco-transport;
- Waste management;
- Local food supply;
- Education and awareness.

Main protocols and names related are examined in detail the calculation of carbon emissions and the carbon footprint. These are The Greenhouse Gas Protocol - the protocol for measuring and reporting carbon emissions, the series of standards БДC EN ISO 14064, the specification PAS 2050, GHG Protocol for the Food Sector. Details are provided in a tabular form on each aspect of the (PAS) 2050 and The GHG Protocol Product Standard methodologies, the differences between them and an assessment of whether the difference may affect the bottom line.



A concrete example is presented to calculate the carbon footprint of a farm that uses natural gas for heating and electricity from a supplier, and transport of the products. Calculation tools, developed in partnership with industry, which represent a methodology for quantifying best practices are indicated. Calculation tools are available on the GHG Protocol website and are designed to implement the protocol and facilitate calculations.



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