

Modern agriculture faces enormous challenges. On the one hand, the quality and quantity of food must be ensured; on the other, the environmental impact of agricultural production must be reduced. In the dairy sector, these challenges are particularly pronounced: farms consume a lot of energy and at the same time are obliged to reduce greenhouse gas emissions. The aim of this project is to investigate how efficiently Polish dairy farms use energy and how their carbon footprint compares to other EU countries. The project also pays particular attention to farmers' attitudes towards energy consumption and new technologies in the face of post-2020 economic change.

The project addresses an important research gap. Most of the available data deals with production efficiency or environmental aspects in isolation from the real economic and social context. Meanwhile, rising energy prices, the COVID-19 pandemic and the war in Ukraine have significantly changed farm conditions. Therefore, we need up-to-date knowledge that takes into account both hard data and the perspective of farmers themselves.

The research is divided into four interlinked modules. The first part analyses data from Eurostat and the EU FADN (Farm Accountancy Data Network) to determine how Poland compares to other countries in terms of energy efficiency and emissions. The second module tracks how the energy efficiency of Polish dairy farms changed between 2014 and 2022 - a period that includes significant economic and political changes. The third module looks at the impact of various variables such as the share of pasture in the farm structure, the education of the farmer or having a successor on energy consumption and emissions. The fourth module is qualitative interviews with farmers to understand what drives them to invest in energy-efficient technologies and what discourages them.

The project uses both modern quantitative methods (e.g. efficiency analyses, causal regression models) and qualitative methods (in-depth interviews, attitude analysis using the theory of planned behaviour). This combination provides a more complete picture of reality and allows conclusions to be formulated with practical relevance.

The expected outcome of the project is not only a better understanding of the relationship between energy consumption, emissions and production efficiency, but also the identification of barriers and motivators that influence farmers' decisions. The results will be applicable to the development of climate and energy policies, agricultural support programmes and advisory services. The project will contribute to building a more sustainable and resilient dairy sector in Poland.