

Energy efficiency in Polish municipalities and market failure (on the example of selected municipalities in the Masovia Province)

Energy efficiency is the priority of the energy policy in many countries. The improvement of the rationality of energy use should aim not only at reducing consumption of energy and natural resources necessary for its production, but it should also serve to reduce the failure of energy market, i.e. a situation where there is no effective allocation of resources through the market mechanisms. Municipalities as entities of public sector are tasked with providing public goods and services and organizing the activities of local communities. One of the areas of communal intervention in the market is promoting energy efficiency.

The main aim of the dissertation is to show the role of municipalities in improving energy efficiency, in the context of the electricity market failure. Energy efficiency is defined as the ratio of the obtained service effect of a service, product or energy in relation to energy consumption. The following question will be helpful in presenting this issue: do the municipalities in their activities aiming at improving energy efficiency reduce the electricity market failure?

The main thesis has been formulated:

Thesis1: Increasing energy efficiency in municipalities reduces market failure, but only to a limited extent

The following auxiliary hypotheses were formulated:

Hypothesis1: Information asymmetry occurring on the electricity market is offset by municipal activities in the field of energy efficiency improvement

Hypothesis2: The economies of scale on the electricity market are offset by the municipalities' efforts to improve energy efficiency

Hypothesis3: External effects on the electricity market are offset by municipal activities in the field of energy efficiency improvement

The dissertation consists of six chapters. The first chapter presents the importance of effectiveness for organizations, theories of economic efficiency, including Pareto's theory of prosperity, Pigou theory, value judgments in theories of well-being, such as Scitovsky theory and the theory of limited rationality.

The second chapter contains a description of the role of the state in the economy, the characteristics of municipalities and the role of the public sector in providing public goods. In

this chapter, the author will also characterize market failure and examples of defects in the functioning of the market mechanism.

The third chapter contains the characteristics of the electricity market in Poland. The structure, methods of state intervention will be presented, and forecast of the development of the electricity market. The complexity of this market and its strategic importance for the economy require details of its functioning.

In the next chapter, the author describes activities in the field of energy efficiency that can be undertaken by municipalities and the objectives of the activities undertaken. The innovative character of investments improving energy efficiency will be shown. The rebound effect and external effects of energy policy will also be characterized.

The fifth chapter presents legal, technical as well as organizational conditions related to improving energy efficiency in Polish municipalities. Due to the exemplary role of municipalities in improving energy efficiency, it is necessary to learn the specificity of municipalities in terms of the possibilities to improve the rationality of electricity use.

The last chapter presents the research methodology and the results of researches undertaken. This chapter also includes an assessment of energy efficiency improvement in the communes of the Mazowieckie Voivodeship and a description of the impact of energy efficiency improvement on the competitiveness of the communes of the Mazowieckie Voivodeship. The impact of increasing energy efficiency on improving the quality of life in municipalities, residents' satisfaction, security and reducing the costs of municipalities is also defined here.

Municipalities in their activities improving energy efficiency reduce the electricity market failures to a limited extent. Market failure manifests itself in four main areas, i.e. the occurrence of external effects, economies of scale, public goods and asymmetry of information. The analysis of the failure of the electricity market shows that there is no reason to reject the hypothesis about the reduction of market failure by municipalities in activities improving energy efficiency. However, this is a limited reduction, as the market failure is not fully limited, i.e. external effects, public goods, economies of scale and asymmetry of information, but only the external effects are reduced. Other manifestations of market failure, i.e. asymmetry of information, benefits from scale and public goods are not subject to limitation by municipalities improving energy efficiency. Therefore, there is no reason to reject the hypothesis that the municipalities of the Masovian voivodship will be limited by the failure of the electricity market. The lack of grounds for rejecting the hypothesis was confirmed by in-depth case studies conducted in three communes of the

Masovia Province. Municipalities, due to the lack of financial, legal and organizational capacity, are not able to fully limit the unreliability of the electricity market through activities aimed at energy efficiency.

Keywords: energy efficiency, market failure, energy efficiency in Polish municipalities, the electricity market.