

ABSTRACT

The dissertation titled “**Determinants of the environmental life cycle assessment for the system of collection, transport and wastewater treatment**” discusses the specific aspects of environmental assessment of wastewater management system by applying the life cycle assessment technique (LCA-Life Cycle Assessment). The whole life cycle of the investment (phase of construction, operation and decommissioning) was taken into account and environmental assessment of the system of collection, transport and wastewater treatment was performed. The LCA method was chosen due to its advantages which enable to assess the environmental loads in different impact categories.

A literature review proved that evaluation of wastewater management systems on par with the economic aspects should also include an assessment of environmental performance. This recommendation directly results from the increasing environmental protection requirement. In view of the foregoing, it is necessary to determine the environmental impact of various elements of the system in reference to his whole life cycle. Noteworthy is the fact, that the applicability of the LCA analyses in reference to a wastewater system which takes into account four system components such as: septic tanks, household sewage treatment plant, sewage networks and waste water treatment plant, has been not yet described in the literature.

The main, scientific goal of the research was to evaluate the determinants of the environmental impact of the system of collection, transport and wastewater treatment by the use of life cycle assessment. An additional objective of the work was to develop methods for assessing environmental burden of analyzed system. This study proposes a comprehensive environmental impact assessment for the system of collection, transport and wastewater treatment, along with indication of environmental impacts determinants. The analysis were performed for the reference object.

Moreover, parameterization of factors allow to use developed method in reference to alternative technical system solution. These factors identified as determinants provide the basis for the development of methods to assess environmental burden of the system including various impact categories (e.g. greenhouse gas emissions, fossil depletion, metal depletion and eutrophication).

Both, the results of the comprehensive environmental assessment carried out taking into account the whole life cycle of the system as well as method of evaluation system developed within the study are a valuable contribution to the national practice of conducting environmental assessment.

The developed method allows to assess the environmental impact of each element of the system (e.g. collection, transport and treatment) throughout the whole life cycle or any of its phases. Moreover, an assessment may be performed in reference to the current state of the

system or in relation to the planned construction or expansion and enables to conduct a comparative analysis for different system configuration solutions. Evaluation is made in relation to the functional unit, expressed as 1PE (population equivalent) and for the entire system taking into account all elements in each of four impact categories (greenhouse gas emissions, fossil depletion, metal depletion and eutrophication).

The research problem undertaken within the work is particularly important in reference to the European Union guidelines as well as in terms of the new challenges of the circular economy paradigm. Therefore, both the research results as well as the assessment model developed within the work can successfully be used as a **practical tool which enables meet the latest guidelines and requirements of the wastewater management.**