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INVESTIGATION OF BIOGAS POTENTIAL OF THE THRACE REGION THROUGH SYSTEM DYNAMICS MODELLING

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Abstract

This study enables the determination of biogas potential of animal manure and food waste in the Thrace Region, one of Turkey's important biogas resources, with a dynamic system model. The factors affecting biogas production such as changes in cattle, sheep, and goat numbers along with poultry population of the region and regional characteristics were determined in detail. A simulation model consisting of feedback loops was built by establishing mathematical relations. The effect of changes in different manure types on biogas production was analysed with sensitivity tests. Model results show that while the number of cattle increases over time, the population of sheep and goats decreases due to the low reproduction rate. The poultry population is also expected to grow rapidly due to fast reproduction and low mortality rate. It was observed that the poultry population in the region consistently remained higher (53%-87%) than the total of cattle, sheep and goat populations throughout the project period. Model simulation results show that the "Biogas Accumulation" values between 18 and 46 billion m^3 in 2034 and the region continues to remain as one of the Turkish biogas reserves in the future. Keeping up with the latest commercially available technologies, government strategies and fiscal incentives plays an important role in delivering effective and sustainable environmental solutions. Biogas is inevitably a significant source of demanded and safe investments for both public and private entrepreneurs.

Key words: biogas potential, dynamic modelling, feedback loops, manure, sensitivity tests

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