

## Alternative Fuel Production from Sewage Sludge

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**Abstract :** The treatment and disposal of sewage sludge is one of the most important and critical problems of waste water treatment plants. Currently, 180 thousand tonnes of sludge dry matter are produced in the Czech Republic, which corresponds to approximately 17.8 kg of stabilized sludge dry matter / year per inhabitant of the Czech Republic. Due to the fact that sewage sludge contains a large amount of substances that are not beneficial for human health, the conditions for sludge management will be significantly tightened in the Czech Republic since 2023. One of the tested methods of sludge liquidation is the production of alternative fuel from sludge from sewage treatment plants and paper production. The paper presents an analysis of economic efficiency of alternative fuel production from sludge and its use for fluidized bed boiler with nominal consumption of 5 t of fuel per hour. The evaluation methodology includes the entire logistics chain from sludge extraction, through mechanical moisture reduction to about 40%, transport to the pelletizing line, moisture drying for pelleting and pelleting itself. For economic analysis of sludge pellet production, a time horizon of 10 years corresponding to the expected lifetime of the critical components of the pelletizing line is chosen. The economic analysis of pelleting projects is based on a detailed analysis of reference pelleting technologies suitable for sludge pelleting. The analysis of the economic efficiency of pellet is based on the simulation of cash flows associated with the implementation of the project over the life of the project. For the entered value of return on the invested capital, the price of the resulting product (in EUR / GJ or in EUR / t) is searched to ensure that the net present value of the project is zero over the project lifetime. The investor then realizes the return on the investment in the amount of the discount used to calculate the net present value. The calculations take place in a real business environment (taxes, tax depreciation, inflation, etc.) and the inputs work with market prices. At the same time, the opportunity cost principle is respected; waste disposal for alternative fuels includes the saved costs of waste disposal. The methodology also respects the emission allowances saved due to the displacement of coal by alternative (bio) fuel. Preliminary results of testing of pellet production from sludge show that after suitable modifications of the pelletizer it is possible to produce sufficiently high quality pellets from sludge. A mixture of sludge and paper waste has proved to be a more suitable material for pelleting. At the same time, preliminary results of the analysis of the economic efficiency of this sludge disposal method show that, despite the relatively low calorific value of the fuel produced (about 10-11 MJ / kg), this sludge disposal method is economically competitive. This work has been supported by the Czech Technology Agency within the project TN01000048 Biorefining as circulation technology.

**Keywords :** Alternative fuel, Economic analysis, Pelleting, Sewage sludge

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