

Techno-Economic and Environmental Assessment for Biomethane Production and Cogeneration Scenarios From OFMSW In Mexico

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Research Article

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Abstract

Mexico City is one of the largest cities in the world and therefore there is a high generation of waste, of which 44% is equivalent to the Organic Fraction of Municipal Solid Waste (OFMSW). In this work, two case studies are evaluated for the application of biogas obtained in an anaerobic digestion process using OFMSW. CASE I considers obtaining biomethane, while CASE II considers energy cogeneration. The biogas yield was determined and was used to carry out an analysis of the process through an economic and environmental impact evaluation on different amounts of OFMSW (100-500 MT). The net present value of this project does not show the feasibility of the process, unless subsidy support is considered. The value of the smallest subsidy over the total investment to find $NPV = 0$, is 5.64 % for CASE I and 6.84% for CASE II at 200 MT of OFMSW. The Waste Reduction (WAR) methodology was used, which shows that the potential for environmental impact for the two cases is only 4%. The in-depth research of this work helps to maintain the anaerobic digestion process in a circular economy context, for the supply of energy and the protection of the environment.

Full Text

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Figures

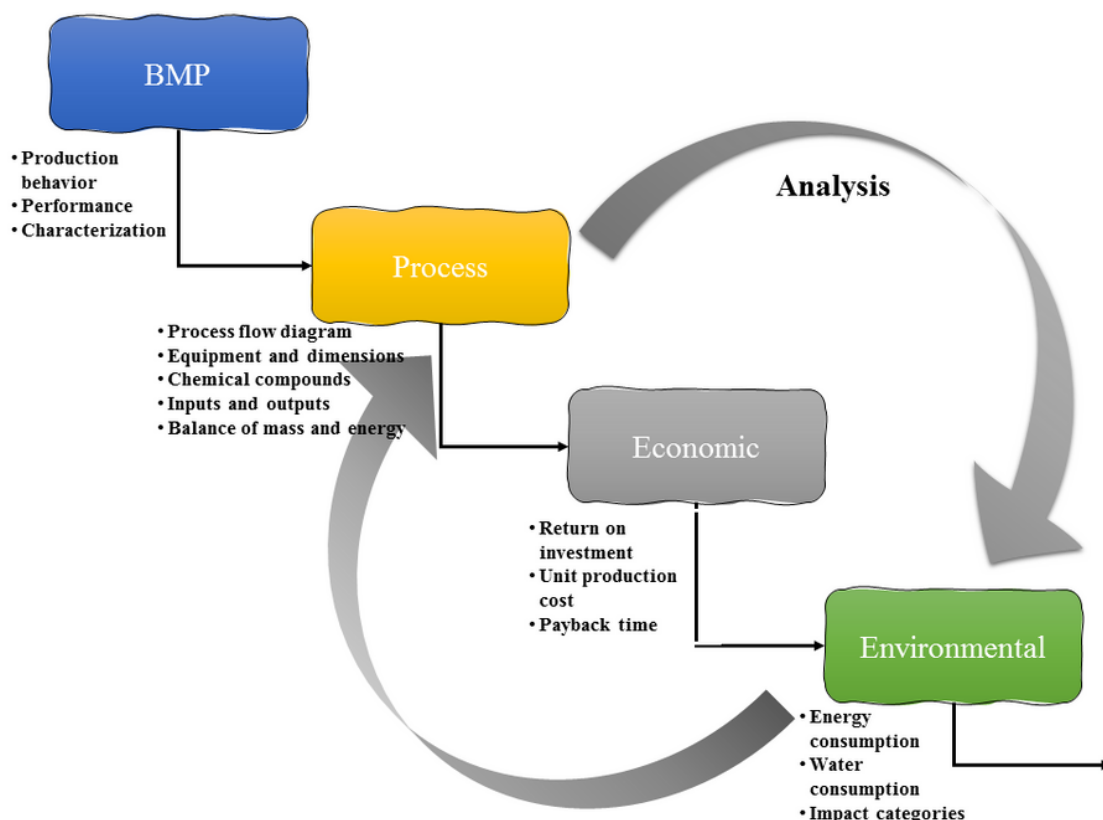


Figure 1

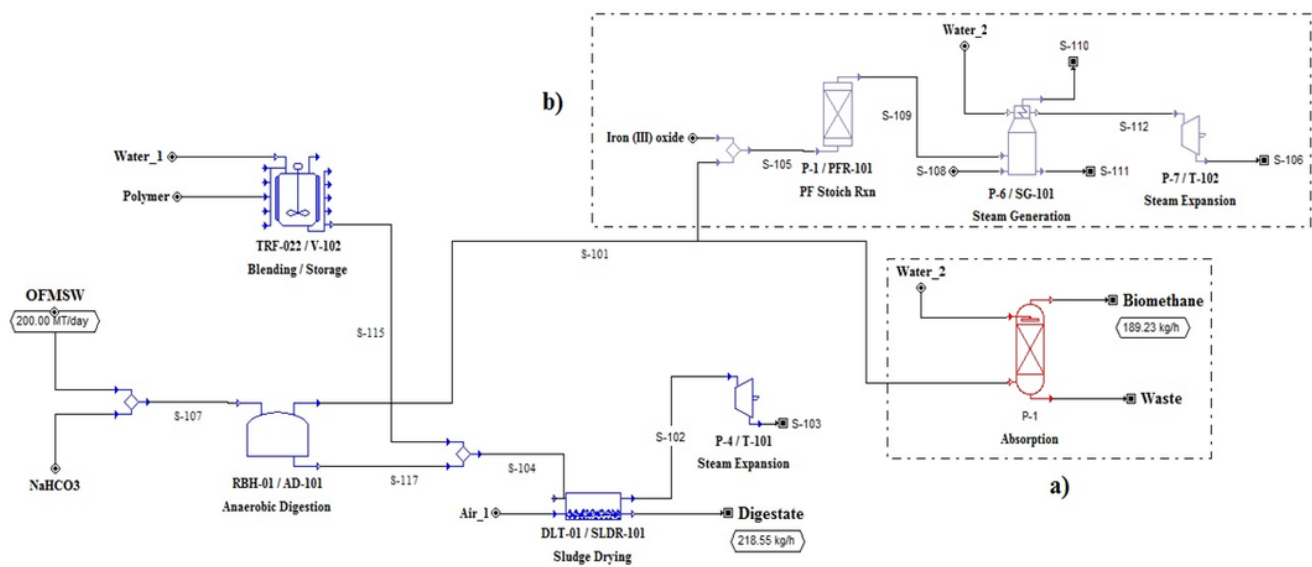


Figure 2

Flowsheet representing the process of anaerobic digestion for a) CASE I and b) CASE II

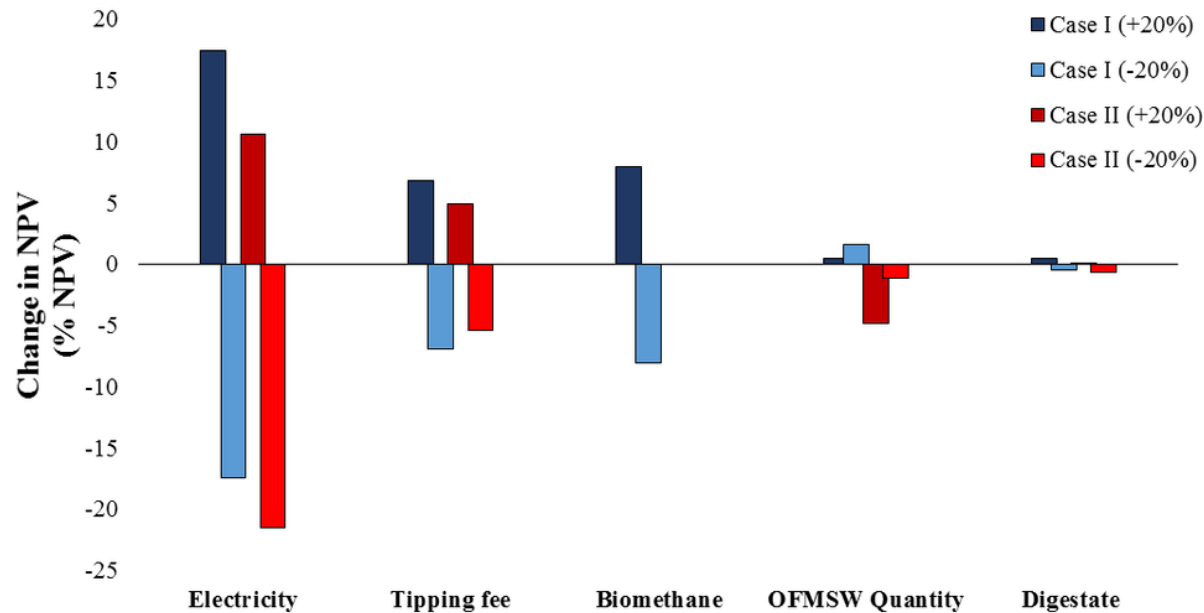


Figure 3

Sensitivity analysis showing the effect of the variables used in ADP on NPV for a) CASE I and b) CASE II

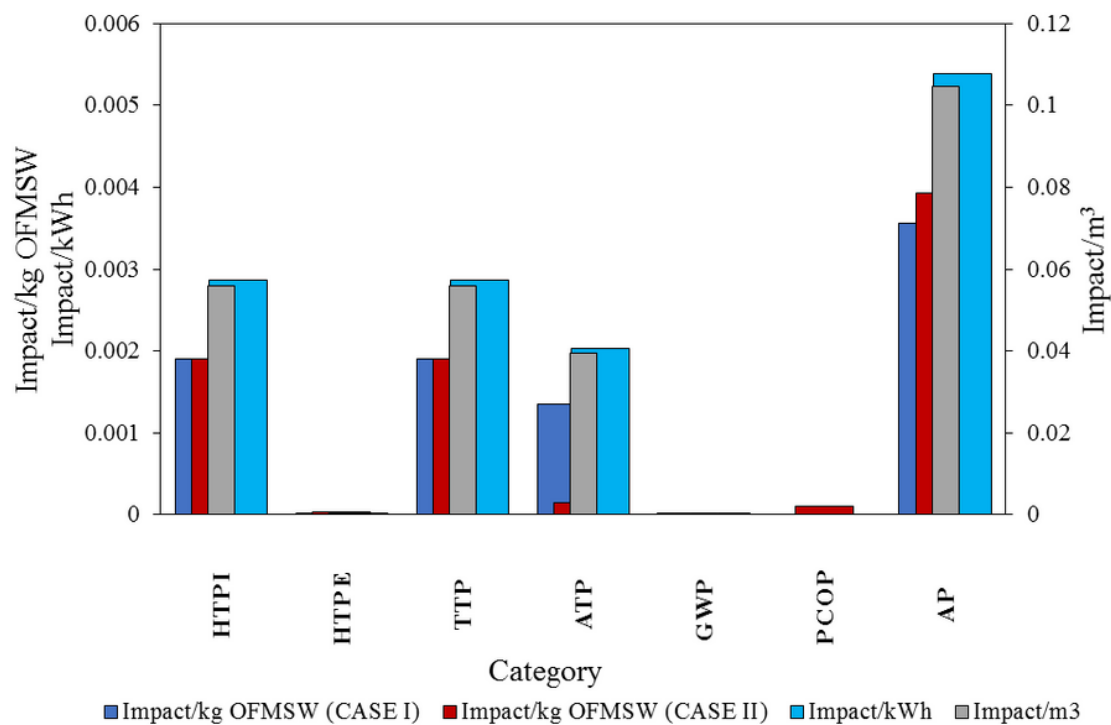


Figure 4

Environmental impact index by amount of OFMSW treated, volume of biomethane produced and electricity generated.

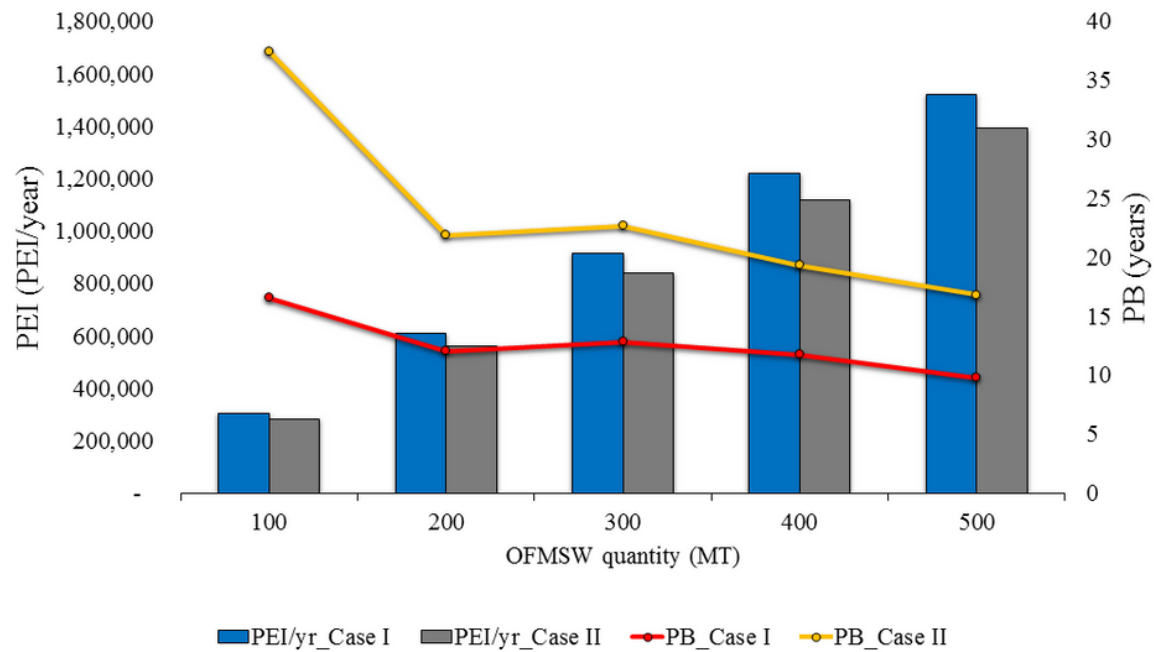


Figure 5

Comprehensive evaluation of ADP for CASE I and CASE II

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