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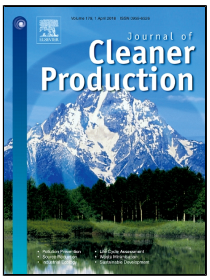

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Federica Cucchiella, Idiano D'Adamo, Massimo Gastaldi, Michela Miliacca

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A profitability analysis of small-scale plants for biomethane injection into the gas grid

Federica Cucchiella[1], Idiano D'Adamo[1], Massimo Gastaldi[1,*] and Michela Miliacca[2]

1. Department of Industrial and Information Engineering and Economics, University of L'Aquila, Via G. Gronchi 18, 67100 L'Aquila, Italy

2. Department of Enterprise Engineering, University of Rome Tor Vergata, Via del Politecnico 1, 00133 Rome, Italy

federica.cucchiella@univaq.it;idiano.dadamo@univaq.it; massimo.gastaldi@univaq.it;

michela.miliacca@uniroma2.it

* Corresponding author

Abstract

Biomethane is a promising renewable energy carrier with the potential to diversify and decarbonise natural gas. It is produced from a range of waste sources and can be distributed into the natural gas grid or used as a vehicle fuel or converted into in cogeneration units.The economic evaluation of small plants for biomethane injection into the gas grid is not well defined in literature.This paper proposes a mathematical and economic model useful to evaluate the profitability of these plants in according to Discounted Cash Flow (DCF) method. The indicators used are Net Present Value (NPV),Discounted Payback Time (DPBT), Internal Rate of Return (IRR) and Profitability Index (PI). The baseline case studies analyse three different small-scale sizes (50 m^3/h, 100 m^3/h and 150 m^3/h) concerning two typologies of substrates (organic fraction of municipal solid waste (ofmsw) and a mixture of maize and manure residues). Results define that the profitability is verified only for 150 m^3/h ofmsw plant in baseline case study (NPV is 615,694 €, DPBT is 3 y, IRR is 33% and PI is 0.18). Furthermore, alternative case studies are conducted on the main critical variables (subsidies, investment costs of biogas production, transport costs of substrates and percentage of