

Topic:
biofuel technologies –fermentation and anaerobic digestion

Potentials assessment and financial appraisal of manure / energy crops codigestion for small scale heat and power plants: a case study in southern italy

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Introduction

Over the last ten years anaerobic digestion has become established in many European countries, including Italy. The plants have been developed for renewable energy generation, but also to control the emission of odors from zootechnical farms and to stabilize biomass before its agronomic use. In Italy the subsidies available for power generation from biomass has given rise to renewed interest in biogas. In particular, the livestock sector could be the driving force for the development of anaerobic digestion on a larger scale. Despite of this, in Southern Italy the manure suitable for biogas generation is highly dispersed over a large number of small-size zootechnical farms, while power generation facilities are affected by scale economies and the aggregation of input biomass is a major logistic, managing, economic and environmental drawback towards the diffusion of such technologies.

In this paper a methodology for the assessment of the energy potentials of cow manure and herbaceous energy crops (triticale) for anaerobic co-digestion is proposed and applied to one of the most promising basins of Puglia region, Southern Italy. The main issues towards the development of such investments are also addressed. Moreover, a financial appraisal of biogas power plants for the selected case study is evaluated, considering the sale of heat, power and digestate residual of the process, and the scenarios of medium scale generation (1 MWe) and small scale (250 kWe) are proposed.

Results and conclusions

The results show that about 5-7 MW of power plants could be installed in the selected territory, respectively in the case of only manure fermentation or integration of energy crops. Moreover, because of the small scale of the zootechnical farms of the territory, the average number of farms required to feed a anaerobic fermentation plant is about 40 or 150 respectively in the case of a small power plant (250 kWe) or a medium scale power plant (1 MWe). The results also highlight the high profitability of these investments, but also the high sensitivity to the main techno-economic plant parameters, that increases the enterprise risks. The approach is replicable to other contexts and case studies.

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