

# **Solar Drying Method as a Pre-Treatment: Investigation of Biogas Production with Solar Dried Mixtures of Agricultural and Organic Residues**

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## **Abstract**

Biogas production through anaerobic digestion is a well-established practice combining waste treatment with energy production. Among European countries, Germany is the largest producer of biogas, while on the other hand, Greece is near the end of the list. Although in 2010, the Greek state pledged to produce 350 MW of energy from biogas and biomass until 2020, by 2018 only 18.7% of this target had been achieved. The reason for this slow development in Greece compared to other European countries is the lack of an efficient and reliable supply chain of agricultural and organic residues. More specifically, Greek agro-industrial units that produce waste with added energy value are spatially scattered, which increases the cost of collection, transportation, and storage, thus rendering the viability of waste to energy conversion difficult. To overcome the high cost of logistics, some studies recommend biomass densification (Wang, et al., 2016). In this context, solar drying can be an attractive technology for volume reduction. To assess the potential of solar drying as pretreatment for waste towards anaerobic digestion, a pilot greenhouse was constructed by the SOLARGAS project in Peza Union, Crete, Greece, and tests with various substrates are conducted. Here we investigate four different mixtures of food waste (FW), olive mill wastewater (OMW), cheese whey (CW), vegetables residues (VR), liquid pig manure (LPM), and cow manure (CM). Different combinations of this waste were created at a mixing ratio of 1:1 (v/v). For each mixture, solar drying was used to reach a final moisture of 10%. The biochemical methane potential of these substrates was measured before and after pretreatment by solar drying.

**Keywords:** Anaerobic digestion, solar drying, biogas, agro-industrial waste, organic residues

**References**

Wang, D., Huang, H., Shen, F., Yang, G., Zhang, Y., Deng, S., (2016). Effects of biomass densification on anaerobic digestion for biogas production. *RSC Advances*, p. 91748–91755.

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