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Sewage Sludge Composting and Solar Drying Plants in Crete

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Abstract

A fundamental principle of European Union legislation regarding the management of sewage sludge generated by Wastewater Treatment Plants (WWTPs) is to treat sludge as a resource rather than as a waste by-product of the treatment process. Within this framework, several management techniques and practices have been developed to maximize the beneficial use and resources from sewage sludge. The most important of these include composting for the agricultural utilization of the final product as a soil conditioner or fertilizer, anaerobic digestion for biogas production, and thermal drying or incineration for heat and energy generation.

Composting is a controlled biological process involving the decomposition of organic matter, carried out under optimized environmental conditions to enhance microbial activity and maximize process efficiency. Through composting, rapid decomposition of organic matter is achieved, followed by a stabilization phase (maturation), during which degradation continues at a much slower rate. In this stabilized form, the material is biologically stable, environmentally safe, and can be safely utilized in agriculture and other applications.

Solar sludge drying is a dewatering method that utilizes solar radiation together with natural or forced ventilation to reduce the moisture content of sewage sludge. The process takes place in greenhouse-type facilities and, for countries with high solar potential such as Greece, represents a sustainable and cost-effective technology for significantly reducing the volume and weight of sludge while requiring low energy consumption and limited operating costs. In addition, the resulting dried sludge is easier to transport, store, and further utilize or dispose of.

On the island of Crete, two sewage sludge composting and solar drying facilities have already been constructed and are currently in operation. The first facility treats sludge produced by the Rethymno Wastewater Treatment Plant, while the second processes sludge from the Agios Nikolaos and Elounda Wastewater Treatment Plants, as well as from smaller treatment facilities operated by the Municipal Water and Sewerage Company of Agios Nikolaos (DEYAAN). The operation, performance of these two facilities, together with the results achieved to date, are presented and discussed in the following sections.

Keywords: Sewage sludge, Solar sludge drying, Composting, Resource recovery, Wastewater treatment plants