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Cost-Benefit and Environmental Assessment of AOSDU Development and Operation: Evidence from the LIFE-INOFEED Demonstration Project

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Abstract

The LIFE-INOFEED project (LIFE24-ENV-EL-LIFE-INOFEED, Grant No. 101215561), co-funded by the European Union under the LIFE Programme 2021–2027, aims to transform urban, agricultural and agro-industrial food-related bio-wastes into animal feed ingredients in a sustainable, economically viable and environmentally beneficial manner. Central to this approach is the development and deployment of transportable Autonomous On-Site Solar Drying Units (AOSDUs), designed to process bio-waste directly at the point of generation, thereby eliminating the logistical, economic and environmental burdens associated with centralised waste treatment.

The present study provides an early-stage assessment of the economic viability and environmental performance of the LIFE-INOFEED AOSDU system, drawing on real-world data from prototype unit operation and pilot-unit construction activities. The techno-economic evaluation examines three distinct business scenarios: the operation of the existing INOFEED facility (Scenario A: net profit €230,000/yr, payback <3 years), full-scale expansion across Crete (Scenario B: €760,000/yr, NPV €6.25M), and the commercialisation of AOSDU units to third parties across the Mediterranean basin (Scenario C: €3.5M turnover). The economic assessment is complemented by an environmental performance evaluation, demonstrating that solar-assisted on-site drying achieves over 90% renewable energy coverage, resulting in an estimated 98% reduction in CO_2 emissions per tonne treated compared to conventional composting, with total project savings of −5,600 t CO_2-eq across the demonstration phase.

A comparative analysis against conventional waste management alternatives — including composting, landfill and centralised drying — confirms the superior performance of the AOSDU approach across key criteria including product value, transport cost, scalability and regulatory compliance with EU feed legislation. These preliminary results establish the AOSDU system as a technically robust, economically attractive and environmentally superior solution for decentralised bio-waste valorisation, with strong replication potential across the European agri-food sector.

Keywords: alternative feed, cost benefit analysis, environmental assessment

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