

RECP Best Practice Catalogue

Anaerobic treatment of wastewater

Developed within the framework of MED TEST II

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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



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Best Practice - Anaerobic treatment of wastewater

SECTOR:	Food & Beverage
SUBSECTOR:	Grain mill products, starches and starch products
PRODUCTS	Maize products
CATEGORY	Technology upgrade/Eco-innovation
APPLICABILITY	Utilities
COMPANY NAME	---
COMPANY SIZE	Large

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Description of the problem (Base scenario):

The company generates around 25 m³/hr of wastewater. That wastewater has high COD and BOD levels, resulting in noncompliance of the wastewater treatment facility. The wastewater has the following characteristics:

- BOD : 20,000 - 25,000 mg/l
- COD: 35,000- 40,000 mg/l
- TSS : 5,000 – 10,000 mg/l
- TKN: 1,500 – 2,000 mg/l
- TP : 300 – 500 mg/l

Description of the solution

Installing an anaerobic digestion unit (Upflow Anaerobic Sludge Blanket) will partially treat the wastewater, converting the COD to methane gas. This shall reduce the pollution load on the existing WWTP, and thus increasing its efficiency meeting the environmental requirements.

In the same time, the generated methane gas can act as fuel for the boiler instead of the natural gas.

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Economic Benefits

wastewater = 20 hrs * 25 m³/hr = 500m³/day

COD 35,000 mg/l

Thus the COD is 35 kg/m³ * 500 m³/day = 17.5 ton/day

Methane generation = 0.250 kg/kg COD

The total methane generation = 4.375 ton/day * 50MJ/kg = 218,750 MJ/day
/40.5 MJ/m³ = 5,401 m³/day

for 300 day operation, this would yield 1,620,370 m³ of natural gas savings.

Assuming conversion factor of 90%, the savings are approx. 1,458,333 m³/year of natural gas. ~ 251,563 Euro/year

Environmental Benefits

Reduction of natural gas by around 1,458,333 m³/year (29% of baseline) leading to 3,312 ton of CO₂ emissions being avoided.

Meeting the environmental regulations for the wastewater disposal, 6,300 ton of COD will be reduced.

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Capital investments & financial indicators	Investment is around 100,000 Euro. Payback is estimated as 0.4 years.
Suppliers	
Other aspects	The original idea was to utilize the methane in electricity generation, however based on a previous study the company conducted for this purpose, generating methane for electricity generation is not feasible (need to add cost of gas to electricity converter + operation of that plant)
Implementation	This measure is retained for study, pending full feasibility study.

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Replicability sectors	Factories with high organic load in wastewater (high COD levels) such as yeast manufacturing companies.
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Aspects to investigate for replicability	Wastewater quantity Composition of wastewater
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Useful resources
