

# Feasibility study on anaerobic digestion of waste from Dhaka's fresh markets

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## Introduction

Effectively collecting and disposing municipal solid waste in Dhaka has become a serious and challenging problem. The principal issues that undermine the city's waste management measures include limited funds to pay for the daily transportation costs, limited capacity to manage a constant citywide collection effort, and a scarcity of land for the establishment and expansion of landfill sites.

## Anaerobic digestion of waste from fresh markets

A fresh market waste survey in Dhaka was performed to analyse the feasibility of implementing alternative waste management solutions. As most of the waste, on average 85%, comprises biodegradable matter, decentralised processing of waste by anaerobic digestion is a potential alternative to the current waste disposal system. The feasibility was techno-economically analysed.

## Feasibility study

A conceptual design was set up for the current waste disposal and waste disposal incorporating an anaerobic digestion plant for a fresh market generating 18 m<sup>3</sup> waste per day, representing a medium sized fresh market.



**Figure 1.** Current waste disposal: collection and disposal of waste from fresh markets. Waste is collected and transferred to the secondary (waste) transfer stations using vans. The waste is transported from the secondary transfer stations to the landfill using trucks.



**Figure 2.** Anaerobic digestion of biodegradable waste. The secondary transfer station is partly replaced with an anaerobic digester, transport by trucks and landfilling are reduced, the solid fraction of the digestate is composted.

## Techno-economic analysis

Based on results from the fresh market waste survey and assumptions on anaerobic digestion of fresh market waste, the annual costs and revenues of the current waste disposal and waste disposal incorporating an anaerobic digestion plant were estimated.

**Table 1.** Estimated annual costs and revenues for current waste disposal and waste disposal incorporating an anaerobic digestion plant for a fresh market generating 18 m<sup>3</sup> waste/day in Bangladeshi Tk and €.

	Current waste disposal		Anaerobic digestion plant	
	M Tk/y	k€/y	M Tk/y	k€/y
<b>Market waste</b>				
Collection	7.1	76	7.1	76
Transport	3.4	37		
Landfill	1.3	14		
<b>Non-biodegradable waste</b>				
Transport			0.5	6
Landfill			0.2	2
<b>Biodegradable waste</b>				
Labour			0.9	10
Maintenance			0.8	9
Financing			2.8	30
<b>Solid fraction digestate</b>				
Transport			0.3	4
Composting			0.1	1
<b>Wastewater discharge</b>				
Sewer			-	-
<b>Revenues</b>				
Electricity			3.8	41
Compost			-	-
<b>Total costs</b>	<b>11.8</b>	<b>127</b>	<b>8.9</b>	<b>96</b>

## Conclusions

- Decentralised processing of biodegradable waste of fresh markets by anaerobic digestion seems economically interesting.
- Compared to the current collection, transport, and landfill costs, the total costs of waste disposal incorporating an anaerobic digestion plant are estimated to be 24% lower.
- The transport and landfill costs are strongly reduced. The labour, maintenance, and financing costs of the anaerobic digestion plant are nearly covered by the revenues from the offset of electricity.
- Waste disposal incorporating an anaerobic digestion plant reduces greenhouse gas emissions and improves the circularity.

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