ECOSTREAM: IOT-ENABLED SMART WASTE MANAGEMENT

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ARCHITECTURE 3 - B

23/01/2026

BRIEF OVERVIEW

Rapid urbanization has led to inefficient waste collection, resulting in overflowing landfills and increased carbon emissions. Traditional "fixed-schedule" collection is outdated.

RELEVANCE

Inefficient waste management contributes significantly to greenhouse gas emissions, spreads disease, and wastes municipal tax money on unnecessary fuel and labor.

WHO ARE AFFECTED

- Urban Residents: Health risks from overflowing bins and pests.
- Municipalities: High operational costs.
- Sanitation Workers: Hazardous working conditions.

THE PROBLEM

- Inefficient Logistics: Garbage trucks follow fixed routes regardless of whether bins are full or empty.
- Lack of Segregation: Citizens often mix recyclables with general waste due to a lack of information or incentives.

FROM DATA

- Global Crisis: According to the World Bank, global waste generation is expected to increase by 70% by 2050.
- Resource Waste: Up to 40% of waste collection costs are spent on "air"—collecting bins that are not yet full.

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THE SOLUTION: "ECOSTREAM SMART BINS & ROUTING SYSTEM"

- IoT Ultrasonic Sensors: Detect real-time fill levels of bins and transmit data to the cloud.
- Route Optimization AI: An algorithm that generates the most fuel-efficient route for trucks, stopping only at full bins.
- Citizen Mobile App: Users scan a QR code on the bin when they recycle to earn "Eco-Points" (gamification) and view a map of nearby recycling centers.
- Predictive Analytics Dashboard: Helps city planners predict waste spikes during holidays or events.

Global Waste Generation Projection (2016-2050)

Global Waste Treatment Methods
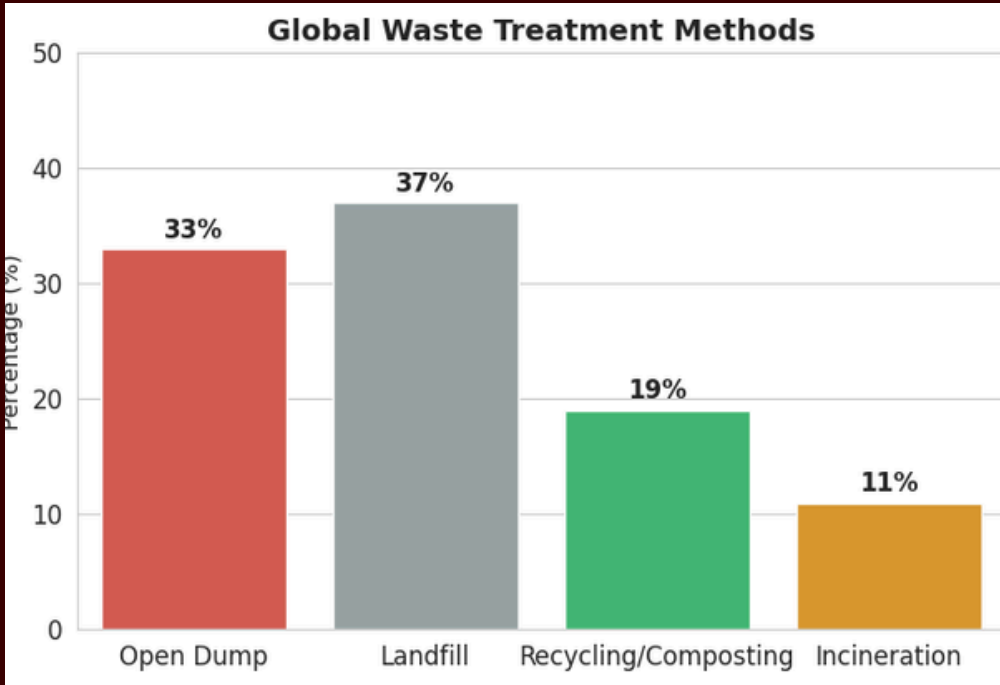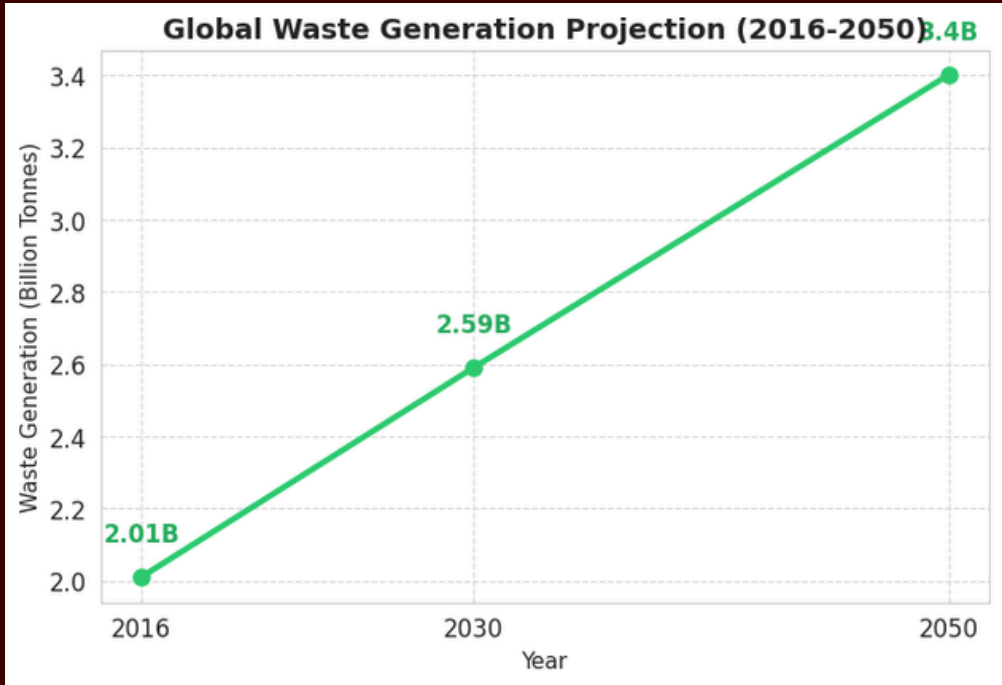
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