

22

BioGas Affordable System for Crisis Zones Application (bGAZA)

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Abstract

In crisis zones, emergency affected areas, or conflict regions, the challenges of waste management, energy access, and sanitation are magnified. Traditional methods of waste disposal and energy generation are often unavailable or unstable. This study proposing an emergency biogas system that can presents an innovative, low-cost, and sustainable solution to address challenges while meeting an adequate basic environmental and health requirement. By converting organic waste, such as food scraps, animal manure, and human waste, into biogas (renewable energy) and nutrient-rich slurry, these systems can meet essential needs like cooking fuel, sanitation, and fertilization in crisis areas. This affordable biogas system operates through an anaerobic digestion, in which microorganisms break down organic matter. This results in the production of methane gas, which can be captured and used for cooking or heating, and a byproduct slurry that serves as a natural fertilizer. The application of this biogas technology in crisis zones not only provides clean energy but also reduces reliance on firewood, mitigating deforestation and respiratory illnesses caused by traditional cooking methods. Additionally, it improves waste management and sanitation by offering a practical solution to safely handle human and animal waste. This system technically feasible, socially accepted, and environmentally friendly. The system design is simple, scalable, and cost-effective that can be easily integrated into humanitarian aid programs. Furthermore, it helps in refugee camps and post-disaster settings, illustrating the potential of biogas to improve living conditions and foster resilience in crisis-stricken communities. Ultimately, the widespread adoption of biogas technology could play a pivotal role in addressing multiple humanitarian challenges simultaneously, offering sustainable solutions to energy, waste, and sanitation needs in the world's most vulnerable regions.