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Title of the project: - ELECTRICITY PRODUCTION USING BIOGAS FOR RURAL AREA

Name of the College & Department: -Don Bosco Institute of Technology and Department of Electrical and Electronics Engineering

Name of the students & Guide(s):

Mr. Shashikumar V

Mrs. Swathi K L

Mrs. Vandana C

Mr. Anand Garasangi &

Mrs. Padmashree V Kulkarni

Dr. Prakasha P K

KEYWORDS

- Electricity production
- Biogas production
- Rural area
- Biomass
- Renewable energy
- Anaerobic digestion
- Off-grid
- Energy access
- Sustainable development
- Carbon footprint
- Waste-to-energy

INTRODUCTION

Rural areas worldwide continue to grapple with energy poverty, often due to their remote locations and the high costs associated with extending conventional power grids. Biogas-based electricity production offers a promising solution by utilizing the power of organic waste. Through anaerobic digestion, organic materials such as agricultural residues and livestock manure can be transformed into biogas, which can then be used to generate electricity. This approach not only addresses the energy needs of rural communities but also promotes sustainability and reduces environmental impact, making it a viable and impactful solution for rural electrification.

OBJECTIVES

- Proper utilization of biodegradable waste involves recycling it into compost or biogas, reducing landfill waste. This practice helps to mitigate climate change by reducing methane emissions. It also promotes resource conservation and supports a circular economy by converting waste into valuable products and renewable energy sources.
- Biogas is produced through anaerobic digestion of organic waste, releasing methane-rich gas. It serves as a renewable energy source for cooking, heating, and electricity generation. Biogas production helps reduce greenhouse gas emissions and promotes sustainable waste management.
- Electricity is generated from biogas by utilizing it as fuel in power generators. The combustion of biogas produces heat, which is then converted into electrical energy. This process provides a sustainable and renewable source of electricity while reducing greenhouse gas emissions.

METHODOLOGY

- Assess the availability and potential of organic waste resources in the rural area, including agricultural waste, animal manure, and food waste.
- Construct anaerobic digesters to convert the organic waste into biogas through the process of anaerobic digestion.

- Implement biogas purification systems to remove impurities and ensure the quality of the biogas for electricity generation.
- Install biogas-fueled generators or engines to convert the purified biogas into electricity, considering the electricity demand and load requirements of the rural area.
- Develop a reliable distribution network to distribute the electricity generated from biogas to the rural households and businesses.
- Provide training and support to local technicians and operators for the maintenance and operation of the biogas production and electricity generation systems.
- Regularly monitor and optimize the biogas production process, exploring opportunities for feedstock diversification, technological advancements, and integration with other renewable energy sources to improve efficiency and effectiveness.

RESULTS AND CONCLUSIONS

RESULTS

- The Outcomes depends on the amount of input garbage to the biogas unit approximately it gives 30% to 40% of gas corresponding to input.
- The unit can produce approximately 2KVA electricity from 1000 litres biogas unit.
- It gives good natural manure as bio product which can be used for agricultural purposes and it is odourless.

CONCLUSIONS

- Electricity production using biogas presents a sustainable and efficient solution to meet the energy needs of rural areas, utilizing organic waste as a renewable energy source.
- This approach reduces dependence on fossil fuels, mitigates greenhouse gas emissions, and promotes local energy self-sufficiency in remote communities.
- Biogas-based electricity production addresses waste management challenges, contributing to a circular economy and minimizing environmental impact.

- It fosters economic opportunities, job creation, and resilience to fuel price fluctuations, empowering rural areas with reliable and affordable electricity.
- By embracing biogas technology, rural communities can achieve sustainable development goals, improve living conditions, and contribute to a greener and more sustainable future.

SCOPE FOR FUTURE WORK

- Efficiency enhancement: Future work can focus on improving the efficiency of biogas-based electricity production systems to maximize energy output from organic waste.
- Scalability and affordability: Research efforts can target developing cost-effective and scalable biogas technologies suitable for rural areas, ensuring access to affordable electricity.
- Waste management integration: Exploring innovative approaches to integrate waste management systems with biogas production can optimize resource utilization and promote a circular economy.
- Energy storage solutions: Developing efficient energy storage solutions for biogas-based electricity can overcome the intermittent nature of biogas production and provide reliable power supply to rural communities.
- Technology transfer and capacity building: Emphasizing technology transfer programs and capacity building initiatives can empower local communities to adopt and maintain biogas-based electricity systems, promoting sustainability and self-sufficiency.