Biogas Production from Organic

1. INTRODUCTION

Biogas production is a sustainable energy solution that involves converting organic waste materials into biogas through anaerobic digestion. This biogas, primarily composed of methane, can be used as an alternative to conventional fuels for cooking, electricity generation, or heating. The increasing global focus on renewable energy and waste management creates significant opportunities in the biogas sector. In India, organic waste disposal remains a critical issue, and biogas offers an environmentally friendly and energy-efficient solution. Uttarakhand, with its agricultural focus, abundant organic waste, and supportive government policies, presents a promising location for setting up a biogas production unit.

2. MARKET IN INDIA AND UTTARAKHAND

The biogas sector in India is witnessing steady growth due to the rising demand for renewable energy sources and the government's emphasis on waste-to-energy projects. The Indian government has set ambitious targets under the National Bioenergy Mission, including a push for biogas-based electricity generation and the promotion of biogas plants in rural and urban areas. Uttarakhand, with its strong agricultural output, generates substantial organic waste, which can be used for biogas production, making it a favorable location for such a venture. Additionally, the growing need for effective waste management and clean energy solutions presents an opportunity to address both environmental and energy concerns in the state.

3. DESIRED QUALIFICATION FOR PROMOTER

To succeed in the biogas production business, the promoter should possess:

- Basic knowledge of renewable energy systems, particularly biogas production processes.
- Expertise in waste management and environmental sciences.
- Background in mechanical or civil engineering to understand plant operations.
- Strong business management skills to handle operations, procurement, and marketing.
- Familiarity with government policies and incentives related to renewable energy and waste management.

4. BUSINESS OUTLOOK AND TRENDS

Biogas production is gaining traction as an important part of the renewable energy landscape in India. The growing emphasis on sustainable waste management and clean energy solutions ensures that biogas production is a promising business opportunity. Key trends driving this market include:

- **Waste-to-Energy Initiatives**: The Indian government is promoting decentralized biogas plants to manage organic waste while generating energy.
- **Rural Electrification and Cooking**: Biogas is increasingly used for rural electrification and cooking in off-grid areas, a market ripe for growth.
- **Environmental Awareness**: The public's growing concern about pollution and the need for renewable energy is further bolstering biogas demand.

5. MARKET POTENTIAL AND MARKETING ISSUES

- **Market Potential**:
    - India is one of the largest producers of agricultural waste, which can be converted into biogas.
    - Increasing demand for renewable energy and organic waste management solutions makes this an attractive market.
    - Rural and semi-urban areas in Uttarakhand have a significant opportunity for decentralized biogas plants for cooking and electricity production.
- **Marketing Issues**:
    - **Awareness**: Lack of awareness about biogas technologies and their benefits among consumers.
    - **Initial Investment**: High initial investment costs may deter small-scale farmers or entrepreneurs.
    - **Regulatory Challenges**: Obtaining environmental clearances and adhering to waste management regulations could be time-consuming.

6. BUSINESS INPUTS

- **Raw Materials**: Organic waste (e.g., agricultural residues, cow dung, kitchen waste, sewage).

- **Machinery and Equipment**: Biogas digesters, gas storage tanks, compressors, filtration units.
- **Manpower**: Skilled workers for the operation of the plant, maintenance personnel, and administrative staff.
- **Technology**: Biogas production software, monitoring systems, and plant design technology.

7. MANUFACTURING PROCESS

The process of biogas production involves the following stages:

1. **Collection of Organic Waste**: Gathering raw materials such as agricultural waste, kitchen waste, animal manure, and sewage.
2. **Preparation of Feedstock**: Sorting and preprocessing the waste to remove non-biodegradable materials and ensure uniform size for digestion.
3. **Anaerobic Digestion**: Organic waste is placed in a sealed digester, where it undergoes anaerobic digestion by microorganisms, producing methane gas.
4. **Gas Storage and Filtration**: The biogas is stored in tanks and filtered to remove impurities.
5. **Energy Generation**: The filtered biogas is then used to generate electricity, fuel gas for cooking, or provide heating.
6. **By-products**: The residual slurry from the digestion process can be used as organic fertilizer for agricultural purposes.
7. **Quality Control**: Ensuring the efficiency of the digestion process and gas quality through continuous monitoring and maintenance.

8. MANPOWER REQUIREMENT

Sr. No	Particulars	No.	No. of Months per Year	Wages/Salaries per Month (Rs. in Lakhs)	Annual Expense (Rs. in Lakhs)
1	Self-Employed	1	12	0.60	7.20
2	Plant Operator	3	12	0.20	7.20
3	Technician/Engineer	2	12	0.25	6.00
4	Helper/Support Staff	2	12	0.12	2.88
Total		8			**23.28**

9. IMPLEMENTATION SCHEDULE

Sr. No	Activity	Time Required (in months)
1	Acquisition of premises	1
2	Design and construction of the plant	3
3	Procurement & installation of machinery	2
4	Arrangement of finance	1.5
5	Recruitment and training of staff	1
Total		**4.5**

10. COST OF PROJECT

Sr. No	Particulars	Annual Expenses (Rs. in Lakhs)
1	Land	0.00
2	Building (Rented)	2.50
3	Plant & Machinery	8.00
4	Equipment and Furniture	1.50
5	Miscellaneous Fixed Assets	0.20
6	Preoperative & Preliminary Expenses	0.05
7	Working Capital	2.50
Total		**14.75**

11. MEANS OF FINANCE

Sr. No	Particulars	Annual Expenses (Rs. in Lakhs)
1	Promoter's Contribution	5.90
2	Bank Finance	8.85
Total		**14.75**

12. LIST OF MACHINERY REQUIRED

Sr. No	Particulars	Unit	Price per Unit (Rs. in Lakhs)	Total Amount (Rs. in Lakhs)
1	Biogas Digester	1	5.00	5.00
2	Gas Storage Tanks	2	1.50	3.00
3	Gas Filtration Units	1	1.00	1.00
4	Power Generation Equipment	1	2.00	2.00
Total		-		**11.00**

13. SALES REALISATION

Sr. No	Product	Sales Realisation (Rs. in Lakhs)
1	Biogas (per ton)	4.00
2	Organic Fertilizer (per ton)	2.50

14. PROFITABILITY CALCULATIONS

Sr. No	Particulars	Annual Expenses (Rs. in Lakhs)
i)	Sales Realisation	12.00
ii)	Cost of Production	8.50
iii)	Gross Profit	3.50
iv)	Depreciation	0.50
v)	PBIT	3.00
vi)	Income Tax	0.60
vii)	Net Profit	2.40
Repayment		1.00
Retained Surplus		**1.40**

15. BREAKEVEN ANALYSIS

Particulars	Rs. in Lakhs
Fixed Cost	4.00
Variable Cost	6.50
Contribution Margin	30%
Break-even Point	10.50
Variable Cost per Unit	4,000
Revenue per Unit	7,000
Margin per Unit	3,000
Number of Sales to Break-even	350 units
Annual Capacity	1000 units

16. STATUTORY/GOVERNMENT APPROVALS

- Environmental Clearance from State Pollution Control Board
- Biogas Plant Registration with the Ministry of New and Renewable Energy (MNRE)
- Trade License
- GST Registration

17. TRAINING CENTERS AND COURSES

1. **Indian Biogas Association** – Training in Biogas Production and Management
2. **National Institute of Renewable Energy (NIRE)** – Biogas Technology Training
3. **Renewable Energy Training Institute** – Biogas Plant Operations and Maintenance

The Swayam portal (link: https://swayam.gov.in/) can also be accessed for enhanced learning on business commerce, accounting, production, marketing, and areas of entrepreneurship.

Entrepreneurship program that helps to run businesses successfully are also available from Institutes like the Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

Disclaimer

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.