

PROFESSIONAL ROI REPORT – BIOPOWER 500 KG/DAY BIOGAS PLANT

1. PROJECT SUMMARY

- Plant Capacity: 500 kg/day food waste
- Biogas Output: 20–22 kg LPG-equivalent/day
- Total Project Cost: ■18,90,000
- Technology: Modified MUASB Anaerobic Digestion

2. ASSUMPTIONS USED FOR ROI

- LPG price range: ■70–■80 per kg
- O&M; Cost: ■8,000 per month (■96,000 per year)
- Genset Efficiency: 1 kg biogas \approx 1.8 kWh electricity
- Electricity tariff: ■9 per kWh (commercial)

3. ROI WITHOUT GENSET (ONLY COOKING GAS SAVINGS)

Gross Annual Savings:

- Low case: $20 \text{ kg} \times \text{■}70 \times 365 = \text{■}5,11,000$
- High case: $22 \text{ kg} \times \text{■}80 \times 365 = \text{■}6,42,000$

Less Annual O&M; Cost: ■96,000

Net Annual Savings:

- Low case: ■4,15,000
- High case: ■5,46,000

Payback Period:

- Low case: $18,90,000 / 4,15,000 = 4.55 \text{ years}$
- High case: $18,90,000 / 5,46,000 = 3.45 \text{ years}$

ROI %:

- Low case: 22%
- High case: 29%

4. ROI WITH GAS GENSET (POWER GENERATION MODE)

Biogas energy conversion:

- 20–22 kg/day = 36–40 kWh/day electricity

Annual Electricity Generation:

- $36 \times 365 = 13,140$ kWh
- $40 \times 365 = 14,600$ kWh

Annual Monetary Savings (at ₹9/kWh):

- Low case: ₹1,18,000
- High case: ₹1,31,000

Total Annual Combined Savings:

- LPG + Power (net of O&M;):
 - Low: ₹4.15L + ₹1.18L = ₹5.33L
 - High: ₹5.46L + ₹1.31L = ₹6.77L

Revised Payback:

- Low: $18,90,000 / 5,33,000 = 3.54$ years
- High: $18,90,000 / 6,77,000 = 2.79$ years

5. LPG CYLINDER EQUIVALENT COMPARISON

Commercial LPG Cylinder:

- 1 cylinder \approx 19 kg LPG
- Plant output 20–22 kg/day = 1 cylinder per day

Monthly Equivalent:

- 30 cylinders/month
- Cost per cylinder \approx ₹1,300
- Monthly value \approx ₹39,000

Annual Value:

- ■4,68,000 worth of LPG saved per year

6. FINANCIAL SUMMARY TABLE

- Net Annual Savings (No genset): ■4.15L – ■5.46L
- Net Annual Savings (With genset): ■5.33L – ■6.77L
- Payback: 2.79 – 4.55 years
- 10-Year Benefit: ■40–■65 lakh depending on usage

7. CONCLUSION

The 500 kg/day BIOPOWER biogas plant provides:

- Strong financial savings
- Low O&M; requirement
- Fast payback (2.8–4.5 years)
- High ROI: 22%–35%
- Significant LPG and electricity offset

This makes the project financially attractive and environmentally beneficial.