CASE STUDY

Biogas As Renewable Source Of Energy
At Nestle Training Farm at Sukheki - Pakistan

WINROCK INTERNATIONAL
Biogas Plant at Nestle Training Farm
150 PSI Gas Storage
Sukheki Farm Statistics

Total # Of Cows: 175
Per Cow Manure: 20 KG/DAY
Average Daily Manure: 3500 KG
Average Collectable Daily Manure: 2800 KG
Biogas Plant Statistics

Total Cost on 200 M3 Plant: 2.56 M PKR

Per Cow Manure: 20 KG/DAY

Average Daily Manure: 3500 KG

Daily Dung Feeding: 2 Ton
### 200 Cum Biogas Plant

<table>
<thead>
<tr>
<th><strong>AVERAGE GAS PRODUCTION</strong></th>
<th><strong>79 M3 / DAY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL HEATING VALUE</td>
<td>575,386 MJ/ ANNUM</td>
</tr>
<tr>
<td>ELECTRICITY PRODUCTION POTENTIAL</td>
<td>159,829 KWH/ ANNUM</td>
</tr>
<tr>
<td>BIOGAS EARMARKED FOR THERMAL USE PER YEAR</td>
<td>2190 M3/ ANNUM</td>
</tr>
<tr>
<td>HEATING VALUE OF 2190 M3 BIOGAS</td>
<td>83800 MJ/ ANNUM</td>
</tr>
<tr>
<td>EFFICIENCY OF GAS STOVE</td>
<td>60%</td>
</tr>
<tr>
<td>NET HEATING VALUE</td>
<td>26,289 MJ/ ANNUM</td>
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Purpose

Electrical Power Generation (milk chiller, barn fans, lights)

House Hold Usage of Biogas

Organic Fertilizer

1Generator 100 KVA, Mainly On Biogas mixed with diesel

Compressor Capacity Maximum 150 PSI
Sukheki Gen set Consumption 2012 Vs 2013

Fuel 2012: 28809 lit
Fuel 2013: 14048 Lit
Saving: 14761 lit
Saving in PKR: 1.4465 Mi/

- Feb: 2012: 1200, 2013: 1000
- Mar: 2012: 1500, 2013: 1300
- May: 2012: 1800, 2013: 1600
- Jun: 2012: 2500, 2013: 2400
- Jul: 2012: 3000, 2013: 2800
- Sep: 2012: 3000, 2013: 2800
- Oct: 2012: 1500, 2013: 1400
- Nov: 2012: 500, 2013: 400
- Dec: 2012: 1000, 2013: 900
Operational Cost

Operators Salary: 12000 PKR/ Month
Pit Cleaning: 5000 PKR/ Month
Repair & Maintenance: 6000 PKR/ Month

Total O&M Cost: 23000 PKR/ Month
## Cost Benefit Analysis

### Saving:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>1,440 M/Annum</td>
</tr>
<tr>
<td>LPG</td>
<td>0.0984 M/Annum</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>0.100 M/Annum</td>
</tr>
<tr>
<td><strong>Total Saving</strong></td>
<td><strong>1.638 M PKR/Annum</strong></td>
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</table>

### O&M Cost:

<table>
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<th>Cost</th>
<th>Amount</th>
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<tbody>
<tr>
<td><strong>O&amp;M Cost</strong></td>
<td><strong>0.276 M PKR/Annum</strong></td>
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</table>

### Net Saving Per Year:

1.362 M PKR
Cost Benefit Analysis

Net Saving: 1.362 M PKR/Year
Cost of Plant: 2.56 M PKR
Pay Back Period: 1.88 years
Plant Status Today

- Plant Was Commissioned in Jan 2013
- Operated Normally until October 2015
- Storage Vessel Leaked in September 2015,
- Feeding was stopped for 2 months resulting in solidification of slurry inside the digester.
- Storage Vessel repaired
- Portion of Digester wall removed, Digester and out let emptied
- Wall Rebuilt and the plant operation Restarted in February 2016
Beyond Sukheki

- Successful Performance of Sukheki plant Enabled WI in Getting USAID Grant for "Pakistan Commercial Biogas Project (PCBP)"

- Objectives and Achievements of PCBP

<table>
<thead>
<tr>
<th>Establish Construction Standards for Biogas Plant</th>
<th>Developed Construction and Operational Manual and Established Quality Standard</th>
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<tbody>
<tr>
<td>Develop Capacity of Biogas Plant Construction Companies (BCCs)</td>
<td>Trained CEOs, masons and supervisors of 23 BCCs</td>
</tr>
<tr>
<td>Facilitate Installation of 300 medium size Biogas Plants in 3 years for energy generation</td>
<td>216 Plants for electrical, thermal and mechanical energy generation Installed in 1 year 8 months</td>
</tr>
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<td>Provide Technical Advisory to the Dairy Farmers on Using Efficient Appliances</td>
<td>Trained the BCC, farmers and Plant supervisors on using EE appliances</td>
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<tr>
<td>Monitoring, Evaluation, data base management and Information dissemination</td>
<td>Monitored quality of construction, managed plant data, used personal meetings, TV shows and Exhibitions for Marketing of biotechnology</td>
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Thank you!