Sustainable Biomass Power for Rural India

Case Study: Hosahalli village.

Team

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Sustainable biomass power for rural India

Objectives

- To establish biomass energy plantation on available village common land for power generation.
- To install and operate IISc-type biomass gasifier in the field for power generation to meet all rural energy needs.
- To understand biomass production potential for power generation and technical performance of biomass gasifier in villages.
- To monitor socio-economic relationships of biomass power project in villages.

Reliability of gasifier system

- Sustainable Biomass supply from the energy plantation
- Operation for >75% days/yr on dual mode
- Average of >80% diesel replacement recorded
- Effective system maintenance by operator

Hosahalli system performance

Operation & services	2003	2002	2001	2000	1999	1998
No. of days operated during the year	355	358	347	298	343	349
No. of days on dual fuel mode	287	272	250	162	257	269
No. of days on diesel mode	68	86	97	136	86	80
No of days services provided for lighting during the year	355	349	347	287	310	300
No. of days services provided for drinking water	353	344	339	293	338	295
No. of days services provided for flour milling	162	97	155	92	180	125
No. of days services provided for irrigation water	79	88	39	-	-	-

.....Performance - Hosahalli

Item	2001	2002	2003
% days operated	95	98	97
% dual fuel mode	72	76	79
Units generated	16521	21557	21977
Average load	11	12	12
Average diesel replacement	81	82	85
% domestic tariff recovery	93	99	67
% irrigation tariff recovery	100	100	80
Cost Rs./kWh	4.55	4.67	4.67

.....Performance - Hosahalli

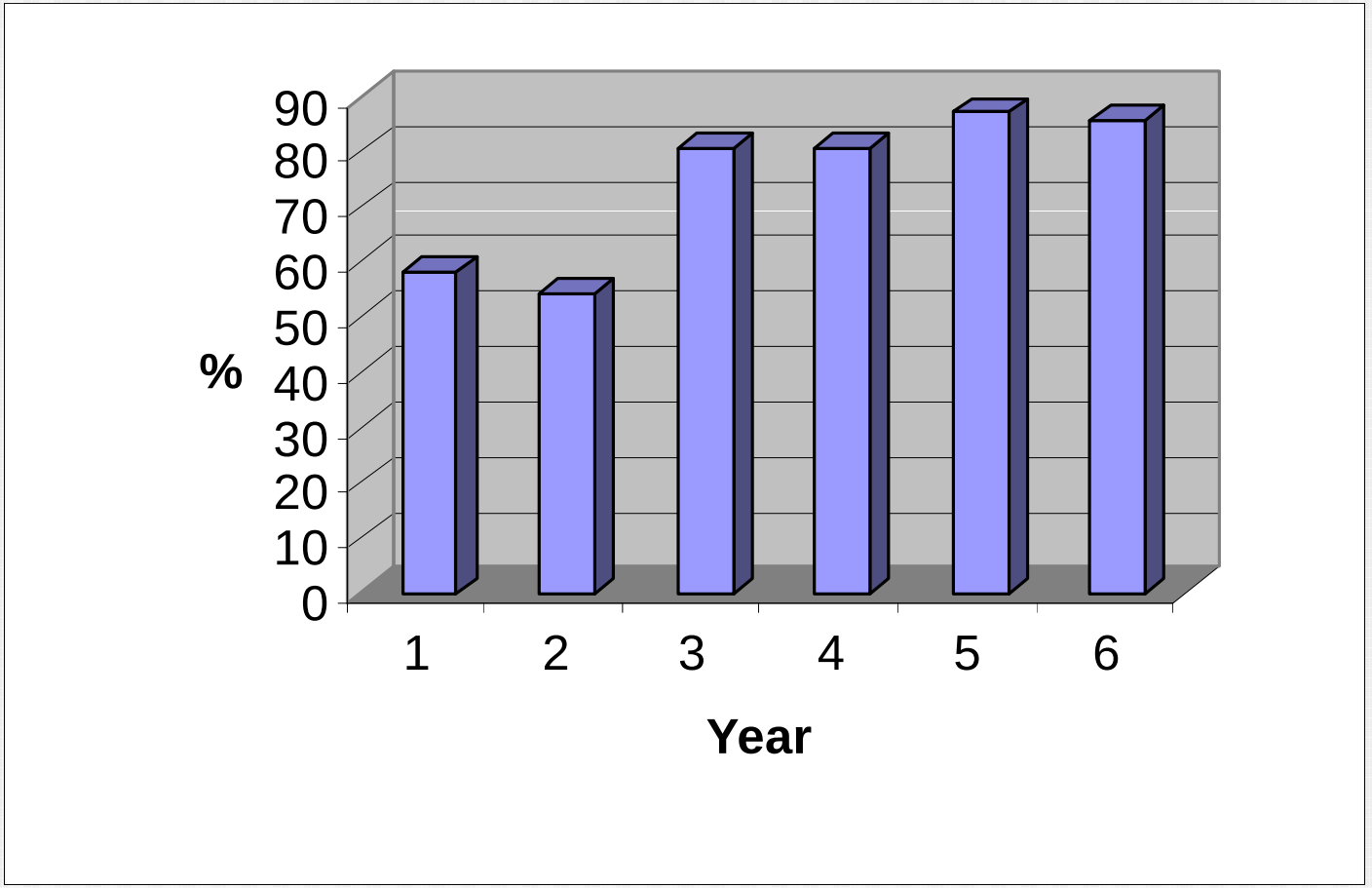
Description	2003	2002	2001	2000	1999	1998
Electricity generated kwh/year (dfm)	18651	17185	12775	7238	9617	9300
Electricity generated kwh/year (dm)	3326	3992	3476	5251	3267	2723
Total Electricity generated kwh/year	21977	21557	16251	12489	12884	12023
Wood consumption average kg/kwh (dfm)	1.80	1.64	2.07	1.28	1.27	1.32
Diesel use in duel fuel mode l/kwh (dfm)	0.063	0.077	0.086	0.109	0.173	0.182
Diesel use l/kwh (dm)	0.567	0.76	0.779	0.564	0.379	0.432
Diesel substitution in %	85.55	87.02	80.69	77.5	54.35	58.33

Hosahalli-Different load, Fuel consumption and Units generated v/s Costs

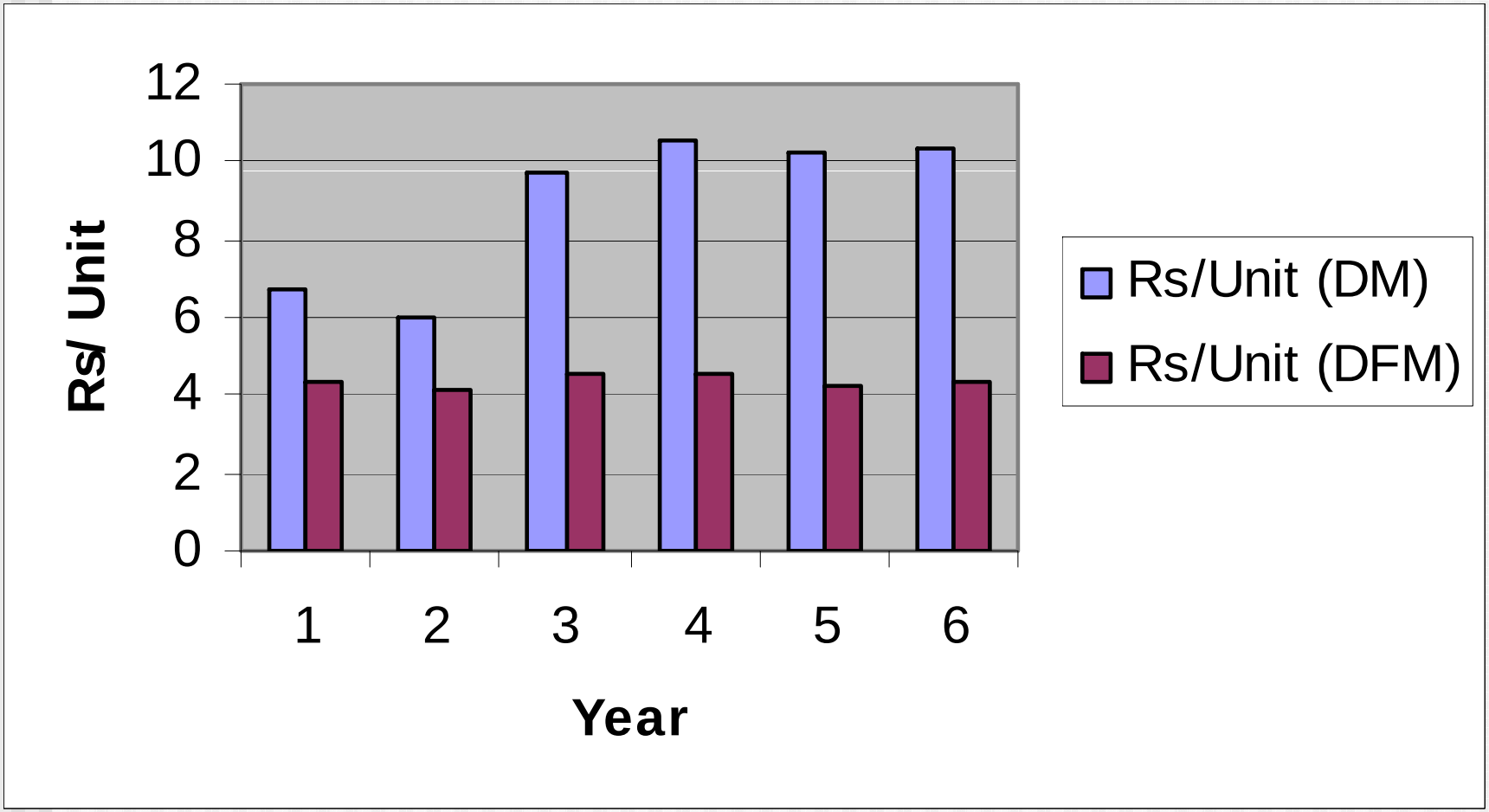
Load	Diesel cost	Biomass cost	Maintenance		Labour Cost	Total cost	Cost/ kWh
kW	Rs/hr	Rs/hr	Engine Rs/hr	Gasifier Rs/hr	Rs/hr	Rs/hr	Rs/kWh
6.0	16.4	9	5.42	0.98	6.25	33.05	5.85
7.0	21.1	10.5	5.42	0.98	6.25	44.25	4.92
8.5	18.74	10.5	5.42	0.98	6.25	41.81	4.65
11.5	22.26	15	5.42	0.98	6.25	49.91	3.56
15	25.77	18	5.42	0.98	6.25	56.42	3.52
20	42.17	25.5	5.42	0.98	6.25	80.32	3.34

Costs(Rs.):wood=0.75/kg; diesel+transport=23.45;engine maintenance=5.42/hr;gasifier maintenance=0.98; operator wage=6.25.

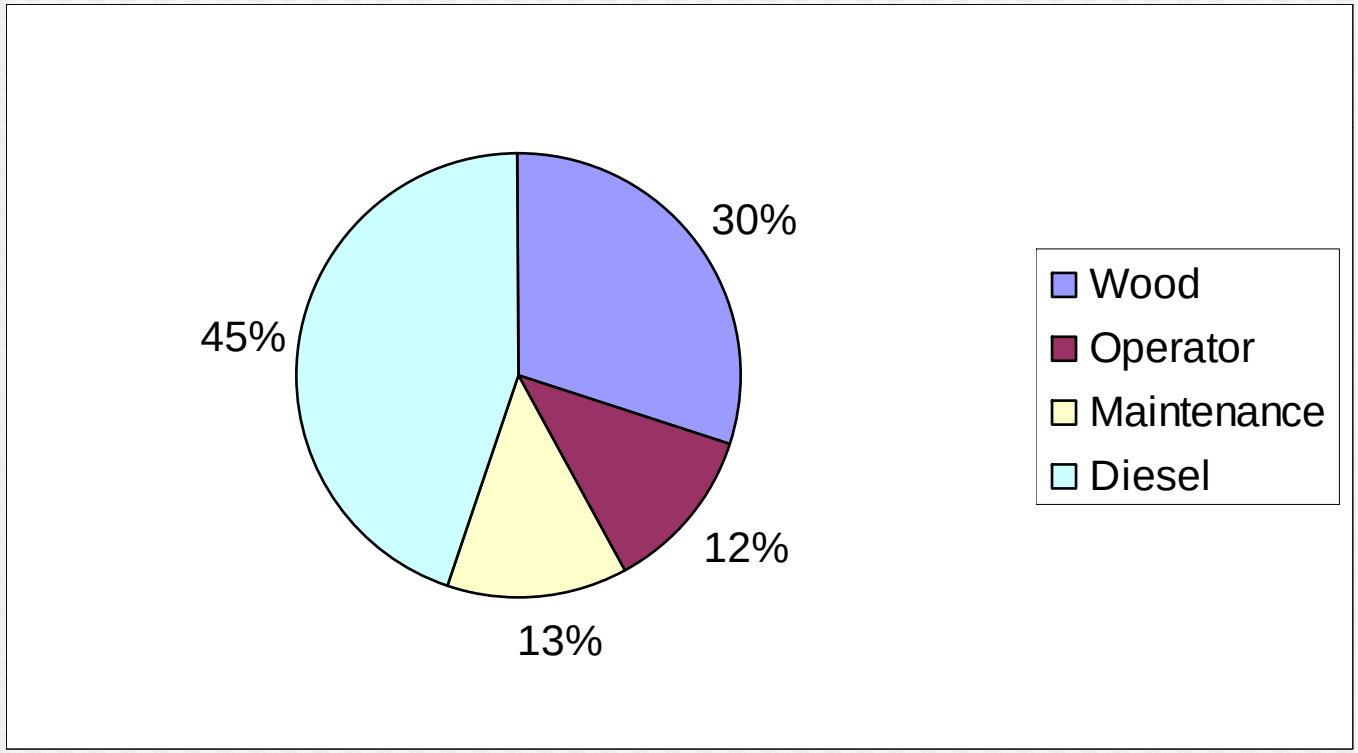
Average Annual Diesel Replacement in DFM



Cost / Unit of Power DM vs DFM

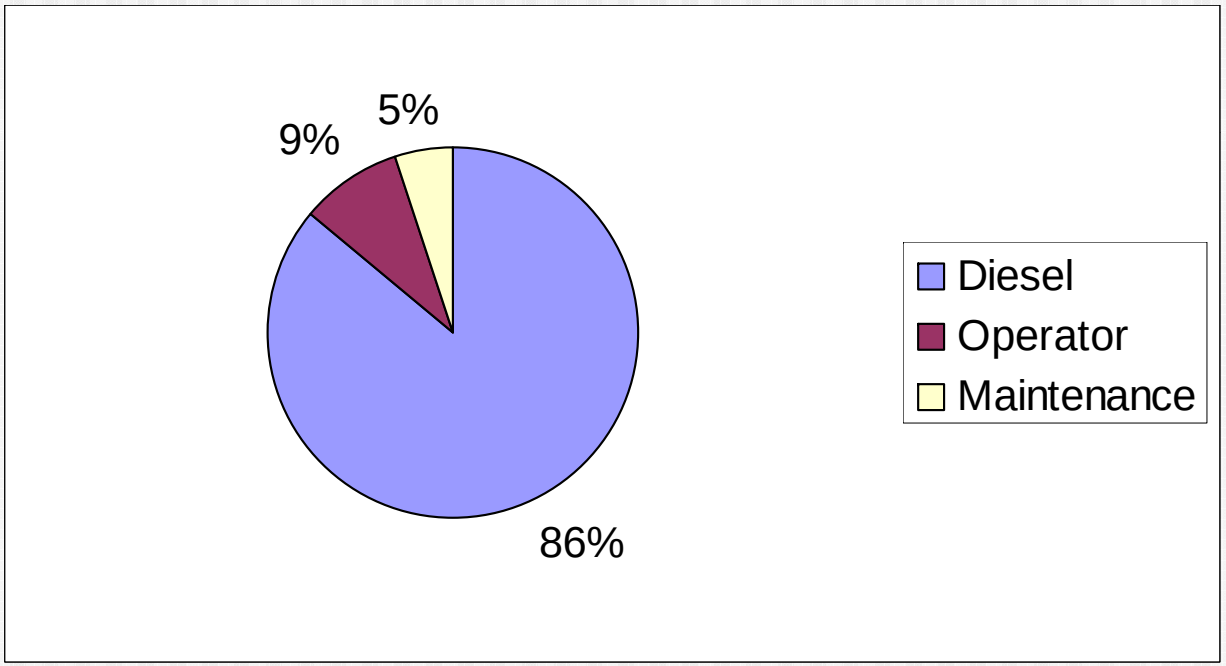


Cost / Unit of Power in DFM



Avg. cost / unit in DFM = Rs.4.32 (2003)

Cost / Unit of Power DM



Avg. cost / unit in DM = Rs.10.33 (2003)

Energy Forest and Biomass Gasifier - Hosahalli

Services Provided- Hoshalli

Services Provided - Hosahalli

Conclusion.

- Decentralised and reliable energy system
- Reliable services to all rural families
- Easy to operate and maintain with high efficiency
- Increased and efficient tariff collection
- Afforestation and sustainable biomass supply
- Increased income & improved quality of life to all
- Generates local employment and skill development