Effect of policy on biogas as a decentralized economic energy source in Maharashtra: case study

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ABSTRACT

The NGO Bhagirath Gramvikas Pratishthan is in Zarap, a village situated at at 10 Km distance from Kudal in Sindhudurh district on Mumbai Goa highway. A survey was carried out in 44 households from eight different villages Zarap, Nivaje, Bimbavane, Naneli (kadamvadi), Narur, Humras and Vetal bambarde during 22nd may, 2017 to 7th June, 2017. The aim of survey was to know the reason behind low failure rate of biogas in Kudal. In these 44 houses biogas plants were installed already. Out of 44 plants 42 plants were installed by Bhagirath. Rest of two the biogas plants were in Janata model made up of bricks. Out of these 44 plants 41 plants are functional. Out of three plants which were not functional one was installed in 2000 by unknown (untraced) installer.

Key Words: DCC –Sindhudurg district co-oprative bank.

1. INTRODUCTION

From survey the average cost of biogas plant is Rs 19246 and its hidden component is cost is Rs 4880. The hidden cost contains work contribution of two labours for digging the land 2000 litre. It takes 4 man days. Which costs 3200 Rs. The labour sent by NGO generally relies upon customer for food of 3 days so it adds 1000 Rs extra. The cost and hidden cost is shown in figure 1.

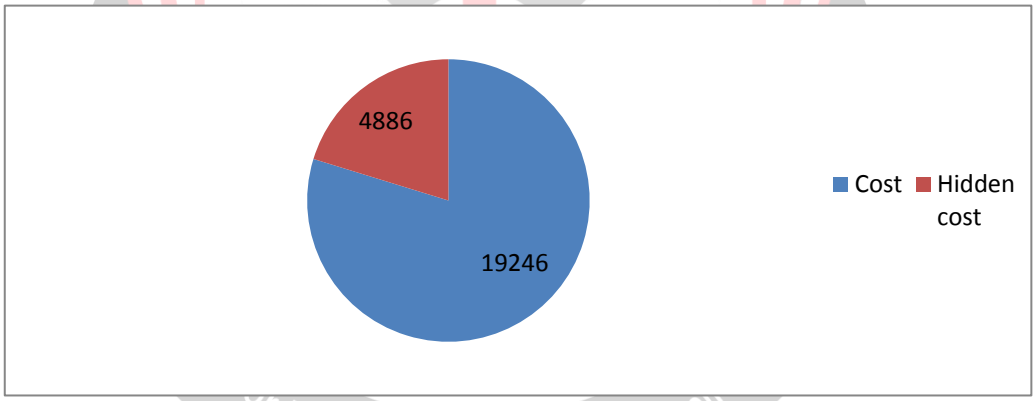

Figure 1 Contribution of hidden cost.

1.1 Incentives and loan.

The NGO helps every person who is prompt in repayment of loan through Sindhudurg district co-operative bank. As indicated in figure 2. It also incentivises the poor people by 3000 Rs and by Rs 6000 to extremely poor people. Out of 44 households 14 hh were beneficiaries of loan by DCC bank which is repaid in 3 years by customers with interest rate of 12%. Total average incentives are 11745

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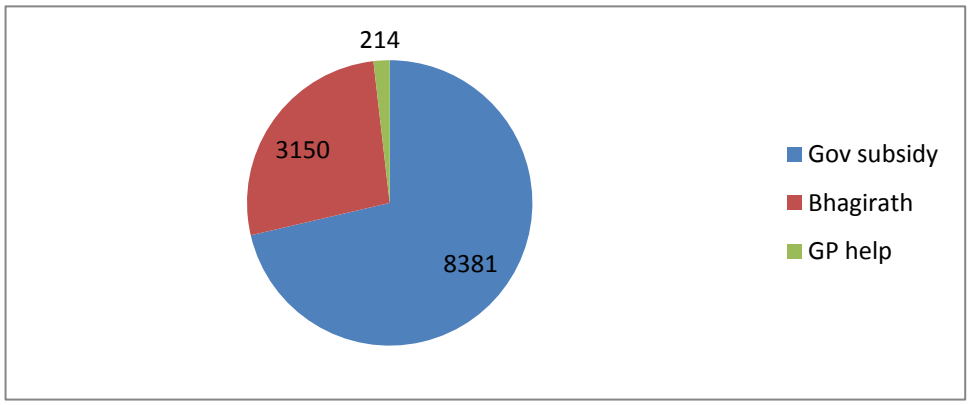

Figure 2 Subsidies from different sources.

1.1 Savings and expenditures in life.

The figure 3 indicates change in consumption of different sources per year of 44 house holds.

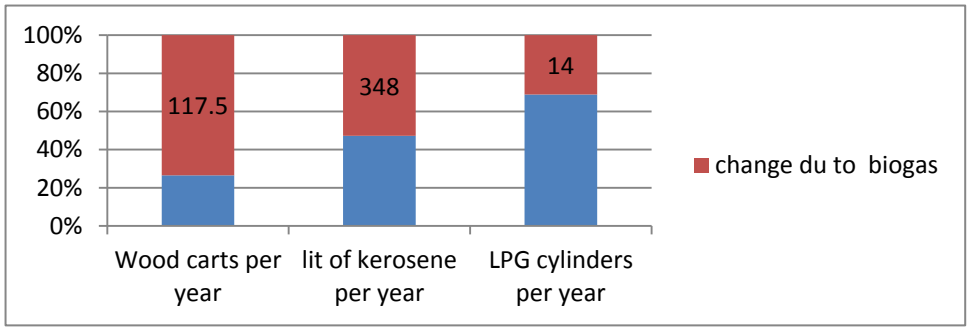

Figure 3 change in consumption of energy due to biogas.

Annual savings of expenditures on various energy sources of total 44 families are Rs 194866 as shown in figure 4. The average savings are 4428 Rs per house hold. The majority of class still depends on forest or trees for cooking energy requirement therefore savings are contributed wood. One bullock cart full of wood costs Rs 1000. Cutting wood in to small pieces and drying costs Rs. 500 or one labour for one day.

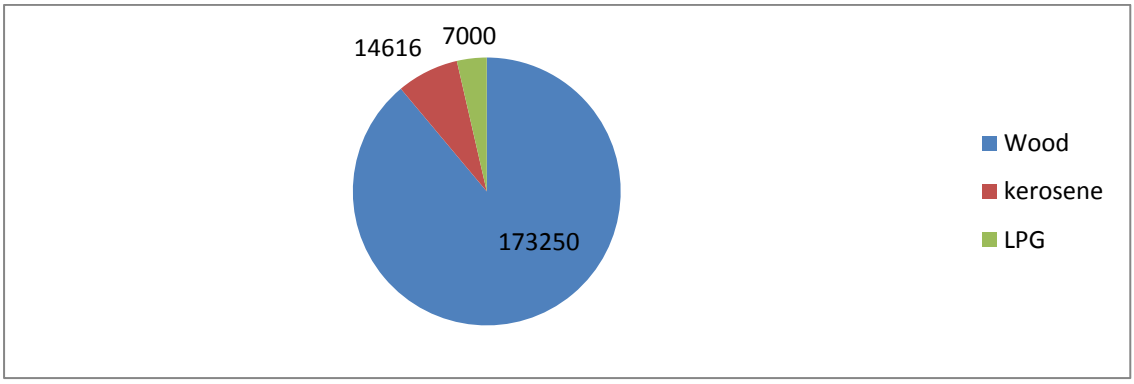

Figure 4 Saving of different fuel sources for 44 families.

In spite of these savings we also have to consider the cost of land and depreciation. If we assume that a coconut tree can be grown in land space occupied by biogas plant then average malnourished tree delivers 40 coconuts which can be sold at 10 Rs per piece. So land cost is 400 per year. The biogas after once installed can't be resold. After its expiry the land becomes dead and to reuse that land one has to dig it again. So ideally digging cost has to be bared twice its salvage value is negative which nothing but amount required to be spent to dig it initially if rate of discounting and inflation are zero. For ideal conditions maintenance is required after every 3 years which costs Rs 500. The annual cash flow for total cost and hidden cost is explained in table 1

Table 1. Annual cash flow without incentives and with hidden costs.

without incentives by considering hidden costs and net discount rate 0.1					
Details	Time (year)	in flow	out flow	annual discounted cash flow	Cumulative
Installation	0		24131	-24131	-24131
	1	4428		4025	-20106
	2	4428		3660	-16446
Maintenance	3	4428	500	2951	-13495
	4	4428		3024	-10470
	5	4428		2749	-7721
Maintenance	6	4428	500	2217	-5504
	7	4428		2272	-3232
	8	4428		2066	-1166
Maintenance	9	4428	500	1666	500
	10	4428		1707	2207
	11	4428		1552	3759
Maintenance	12	4428	500	1252	5011
	13	4428		1283	6293
	14	4428		1166	7459
Digging	15	4428	3200	294	7753
					IRR 15%

Table 2 indicates vartation in payback period and internal rate of return for different combination of costs and incentives. If we increase incentives and neglect hidden costs, irr increase from 15% to 46% and but if we neglect the cost of digging the irr does not increase considerably as digging is at the end. So a person can afford to spend on digging at the end and using the land.

Table 2. Variation in IRR and Payback period with respect to incentives.

Sr No	Case	Cost	Gov subsidy	Bhagirath incentives	Hidden cost	End cost	Total	IRR	Payback period
1	No help	19,261	-	-	4,886	3,200	27,347	15	9
2	Gov help	19,261	8,381	-	-	3,200	14,080	26	5
3	Gov +Bhagirath help	19,261	8,381	3,400	-	3,200	10,680	34	4
4	Extremely Poor	19,261	8,381	6,000	-	3,200	8,080	46	3
5	No final digging	19,261	8,381	3,400	-	-	7,480	46	3
6	MNREGA incentives	16,061	8,381	3,400	-	-	4,280	100	2

Effect of Mahatma Gandhi National Rural Employment Guarantee Act (MGNAREGA) on economy of biogas

MGNAREGA is an act under which government guarantee the job to poor person for at least 100 days every year. To dig the pit for a biogas plant is a task in which family head and two more adults are continuously working for 4 days. If this work is assigned to a professional contract labor then it requires 2 adults for two complete days and expenses are Rs. 3200 for digging 2500 liters of volume. If these human efforts are returning in form of the money to poor person it reduces the initial investment in biogas plant. Du to NAREGA help payback period is reduces to 1 years and internal rate of return shots up to 100% As shown in Table 2.

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2 Effect of annual subsidy disbursement in March.

The subsidy is disburced in month of march so that, demand for biogas installation of biogas is maximum in January February and March month. This is explained in figure 5. During July august and September the frequency of installation is zero because of rainy season.2

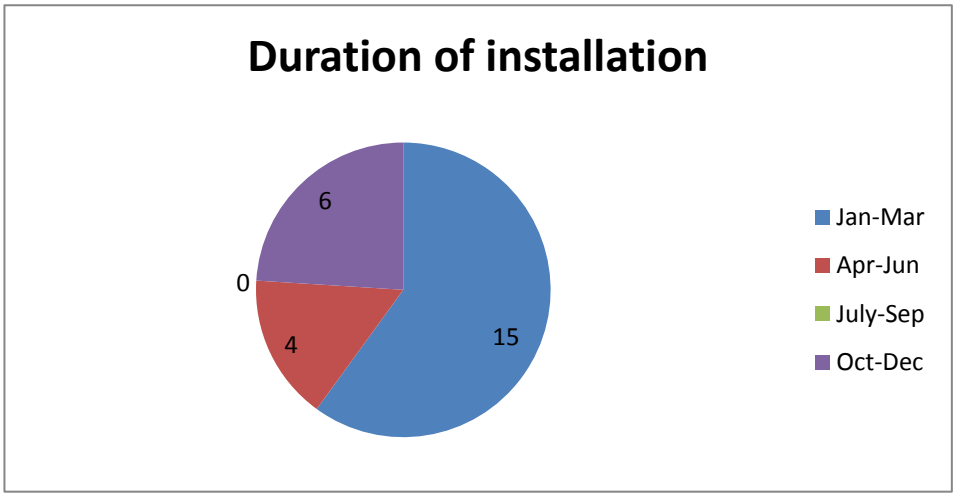

Figure 5. installation in different months of a year.

Result and discussion

The survey carried out in may-june 2017 indicates various things. Most of the biogas plants are less functional during rainy season. The economic feasibility of project increases if the project is incentivized by different institutes like bhagirath pratishthan and Mgnarega. All the returns which are considered are in terms of energy only. This economic analysis does not consider returns from biogas plant in terms of best fertilizer. It is also possible to replace wood and kerosene in remote areas by biogas where wood is cheap source of energy.

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