CHAPTER VI

BENEFITS AND COSTS ANALYSIS

C H A P T E R VI

BENEFITS AND COSTS ANALYSIS

6.1 INTRODUCTION :

Substitution of biogas to traditional sources of fuel consumption for cooking purposes has certain porven benefits. The benefits claimed in favour of biogas could be divided into two categories.

1) Direct Benefits and
2) Indirect Benefits.

These two types of benefits enjoyed by the biogas plant holders have been measured in terms of both physical and monetary values. The Indirect Benefits are those which are available to plant holders in terms of increases in farm production through increase in the quantity of organic manures which are saved after the biogas plants installed and improvement in the contents of the plant nutrients like nitrogen(N), phosphorus (P2 O5) and potash (K2O) . In economic terms these benefits may be described as economies of substituting biogas for traditional fuel materials like cowdung,cake,firewood,agricultural waste and kerosend. During the course of Administration of questionnaire to the biogas plant holders in Murgud town,we made an attempt to estimate the savings of fuel materials in both physical and value terms. The values of material

saved may change from year to year depending upon their respective prices. Whereas the physical quantities of those material saved could not change. In the following paragraph,we intend to highlight the estimate of the savings in cost resulting from substituting biogas.

6.2 DIRECT BENEFITS :

For the purpose of calculating the Savings, we have recorded the consumption of wood,Kerosene and cow dung cake before and after the use of biogas plants. From Table 6.1 it appears that after the installation of gobar gas plants,the consumption of these materials has reduced. But the most significant fact that emerges from the surveyed households with different biogas plant sizes is that the biogas plants are not a perfect substitute in the sence that even after the installation of the plants they do not totally stop the use of traditional materials for cooking and other purposes. However,they get certain benefits direct and indirect from the partial use of the plants. In respect of wood,the average of the all households (56) ,the average cost reduction works out to be Rs.1259,28 ps. In terms of physical values the average of wood saved per family works out to be 31.48 monds. The average cost of kerosene saved in both physical and value terms works out to be respectively 47 litres and the Rs.104.70ps. The most important material

i.e.cow dung cakes saved in terms of physical quantity comes to be 3.23 bul carts per family and its value comes to be Rs.484.82 ps.per family. These benefits in terms of savings of the traditional fuel materials enables the biogas plant holders to reduce their expenditure on domestic fuel consumption. The above averages may not be applicable entirely to all surveyed plant family holders. Because of different sizes of plants and also families,we notice from table 6.1.,that the savings on account of biogas in respect of almost all the sources differ from one another. For instance the biogas plant of 500 Cubic feet the cost saved on account of wood,kerosene and dung cake works out to be respectively Rs.6000/-, Rs.1125/-and Rs.1500/-the sum total of savings for this household comes to Rs.8625/-whereas the total of savings for the families with 105 Cubic feet plants comes to Rs.1035/-per household. For medium size of plant of 210 Cubic feet, the sum total of savings in value terms works out to be Rs.1550.50ps.Again for further categories of plants of 240 and 2.80 cubic feet plants, the average savings per family works out to be Rs.2577.40 and Rs.2414.12 ps. respectively. From the analysis of these savings in terms of values saved after installation of a plant a decisive conclusion as to the relation between the scale of the size of plant and the cost saved can be drawn. Therefore, we can not say that,there exists a linear relationship between the size of the plant and cost saved. The cost saved after

installation depends on the factors other than the size of plant itself. But however, it might be concluded that the use of a biogas for fuel consumption purposes in the rural segment of the population desirable. Lot of economies could be available as far as the traditional sources of fuel for the cooking purposes are concerned.. The benefits that have been calculated in value terms may not be realised in actuality by the household with biogas plants in terms of cash receipts notwithstanding.

6.3 INDIRECT BENEFITS :

As stated earlier, somewhere , the indirect benefits to the farming community are those benefits which result from improvement in the farm yield after installation of the biogas plants. Improvements in farm yields are on account of ,

i) Improvement in the quality of manuers in terms of nitrogen, phosphorus and potash, over the traditional open pit composted manuers and,

ii) also increase in the quantity of organic manures arising out of substitution of gobar gas for cow dung cakes used for cooking food and other purposes.

6.4 IMPROVEMENTS IN CROP YIELD

The households surveyed by us mainly fall under the category of paddy and sugarcane cultivators. Paddy is a rain bed crop. While sugarcane[1] is perennially irrigated plantation crop. The aggregate increase in the paddy yield after installation of plants increased by 252 monds and sugarcane yield by 149 tonnes. As a result monetary value increases worked out at going local prices (1990) amounted to Rs.50,400/- and Rs.59,600/-respectively. Incidentally one should take note of the fact that,these two crops are cash crops in Murgud town and around its adjecent area. The other crops like groundnut,chillies, jawar have shown increasing yields but less than the former crops because of very small area allotted by individual farming households. Anyway ,we may conclude from the consolidated table 6.4[3] that the substitution of biogas for traditional sources helps increase the individual crop yields. From the rural economy point of view and also from the rural development point of view the propriety of substituting gobar gas and its wide coverage in the rural area can not be questioned. For the detailed break up of the crop yields before and after gobar gas use both by individual family size and plantsize (refer table 6.2.)

6.5 COSTS :

As far as the operational costs are concerned they are quite nigligible. The current expenses for funding a plant are only a maintainance cost. Of course,

the capital investment costs are heavy i.e.they are beyond the means of medium,marginal and Sub-marginal farmers. The operational cost in the form of maintainance cost irrespective of size of plants works out to be Rs.44.16ps.per annum for each plant. On the whole the benefits Steaming from biogas used are far in excess of the cost inclusive of capital and operational investment. Refer table 6.4 and 6.5.

6.6 SUBSIDIARY BENEFITS :

In the foregoing paragraph,we have hinted at the principal benefits that, steam from gobar gas both at macro and micro levels. In what follows we give a passing reference to subsidiary benefits that may arise out of gobar-gas used in the rural area.

First,slurry can be used for development of fishery in the rural area.

Second,the biogas can be used for generation of power for lighting purpose and irrigation purpose as well.

Even though,above stated advantages are true at the theoretical plan, but they can not be made available at practical level. The major constraints that hinder the use of gobar gas for the said purposes are,

i) The size of the agricultural holdings of individuals families.

ii) The number of cattle population owned by the individual farm households, these may be described as the structural rigidities which limit the diversified use of gobar gas. For this statement, the supporting evidence could be cited from our field work. Not even a single household among the surveyed households at Margud town has diversified use of gobar gas plants.

6.7 FINDINGS :

In foregoing paragraph, the detailed analysis of the benefits both direct and indirect derived by individual households has been presented by us. The detailed analysis of the benefits leads one to conclude that,

i) The biogas plants are not a perfect substitute for the traditional sources of energy owing to structural limits on individuals households.

ii) The plants installed did not work to the full capacity on account of inadequate number of animal population owned by individual households.

iii) Despite the structural limits, the households (very few) have installed biogas plants under the lure of liberal capital subsidy granted by the State Government and other agencies like KVIC.

iv) Even though the total number of gas plants installed at Murgud town amounted to 66, at the time of field survey 10 were closed and were not in operation. And out of the existing (56) operating plants some are on the verge of closure.

v) Despite all these limits from the macro point of view and also rural development point of view, the substitution of gobar gas for traditional sources is a must.

6.8. SUGGESTIONS :

From our field survey the following suggestions emerge :

i) The collective plants should be installed for the village as a whole in order that, the structural limits on the individual households can be overcome.

ii) The number of animal population each householdwise will have to be increased so as to overcome the problem of partial use of the installed biogas plants. To increase the number of animal population the proportion of reserve lands for grazing and pasture lands will have to be increased. In view of the farm mechanisation, the less possibility of increasing the draught animals is not large. But, there is a possibility of increasing the number of dairy animal population like she buffalos and Miltch cows.

iii) Lastly, under the existing circumstances, the structural limits seem to be difficult to overcome as they require institutional reforms such as land tennure systems, to economise on traditional sources of consumption, the supply of natural gas could be supplimented to the use of biogas plant.

These suggestions are based on the findings of the field research work carried out in the year of 1990. These suggestions are subject to the changed land ownership pattern and also land use pattern, so as to make the installation and spread of biogas plants in the rural sector of the economy a worthwhile & practicable proposition.

Sr.No.	Fue	280 (N=5)	500 (N=1)	Total 4+5+6+7 +8+9
1		8	9	10
1.	Fue	230	150	2005
	(In	25	-	242
	1 M	205	150	1763
	Rs.	41	150	31.48
		8200.00	6000.00	70520.00
		1640.00	6000.00	1259.28
2.	Ker	72	500	2776
	(In	15	-	170
	Rs.	57	500	2606
	Lit	11.4	500	46.53
		128.25	1125.00	5863.50
		26.65	1125.00	104.70
3.	Dun	35	10	204
	(In	5	-	23
	Ca			
	Rs.			
	Bul	30	10	181
		6	10	3.23
		4500.00	1500.00	27150.00
		900.00	1500.00	484.82
4.	Agr	4	-	36
	Was	-	-	-
	Bul	4	-	36
	No	0.8	-	0.64
5.	Tot	2828.25	8625.00	103533.50
6.	Tot	2414.12	8625.00	1848.81

N.

at,total fuel saving is Rs.105093.50ps.

he year 1989-90.

3(A) Be

3(D) Af

TABLE 6.3

CONSOLIDATED FIGURES OF BENEFITS FROM GOBAR GAS PLANTS

(Per year)

Sr.No.	Items	Physical Value (	Monetary Value (In Rs.)
1	2	3	4
	(A) Growth of Agricultural Production :		
1.	Paddy (In Mond)	252	50,400.00
2.	Sugarcane(In Tonne)	149	59,600.00
3.	Groundnut (In Bags)	7	2,240.00
4.	Chillie (In Bag)	1	320.00
5.	Jawar (In Quintal)	1/2	175.00
		Total Rs.	1,12,735.00
	(B) Fuel Saving :		
6.	Fuel wood(in Mond)	1763	70,520.00
7.	Kerosene (In Litre)	2606	5,863.50
8.	Dungcake (In Bullock cart)	181	27,150.00
9.	Agricultural Waste (In Bullock-cart)	36	No sale.
10.	Gas cylinder (Natural Gas)	24	1,560.00
		Total Rs.	1,05,093.50
11.	Manure (In Bullock-cart)	217	No sale.
12.	Availability of Gobar Gas (Per day)	241(hours)	No sale.
13.	Gas used for Food cooking (Per day)	Food of 400 persons	No sale.
14.	Total (A+B) (Monetary Value)		2,17,828.50

TABLE 6.4

CAPITAL COST, MAINTENANCE COST ACCORDING TO SIZE OF THE PLANTS

Sr. No.	Name of the cost	Size of the Plant (In Cubic Feet)					
		105 (N=2)	140 (N=7)	210 (N=36)	240 (N= 5)	280 (N=5)	500 (N=1)
1	2	3	4	5	6	7	8
1.	Total Capital cost	14830.00	75860.00	418211.00	62000.00	53795.00	7000.00
2.	Average Capital cost	7415.00	10837.14	11616.97	12400.00	10759.00	7000.00
3.	Minimum Capital cost	3500.00	8900.00	5425.00	10000.00	5525.00	7000.00
4.	Maximum Capital Cost.	9830.00	12340.00	14900.00	14550.00	19000.00	7000.00
5.	Total Maintenance cost	Nil	325.00	1672.00	240.00	245.00	75.00
6.	Minimum maintenance cost	Nil	20.00	20.00	25.00	30.00	75.00
7.	Maximum Maintenance cost	Nil	100.00	100.00	100.00	100.00	75.00
8.	Average Maintenance cost	Nil	46.43	46.44	48.00	49.00	75.00

N.B.: i) Costs in Rupees.

ii) Maintenance cost for per year.

TABLE 6.5

CONSOLIDATED FIGURES OF CAPITAL COSTS, MAINTENANCE COSTS, LOAN AND SUBSIDY OF GOBAR GAS PLANT

Sr.No.	Item	Amount (in Rs.)
1	2	3
1.	Total Capital cost	6,31,696.00
2.	Average Capital cost	11,280.00
3.	Total Maintenance cost (Per year)	2,557.00
4.	Average Maintenance cost (Per year)	45.66
5.	Total Loan	6,29,070.00
6.	Repaid loan	5,66,231.00
7.	Unpaid loan (Upto June,1990)	2,17,925.00
8.	Subsidy by the Government.	2,02,958.00
9.	Subsidy by Dhdhganga-Vedganga Sugar Factory, Bidri. (Mouninagar)	10,000.00