

A Block and Capacity Wise Status of Biogas Plants of Chhattisgarh Plains in India

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Abstract

A field study was carried out in year the 2008 with a questionnaire and by visiting selected areas of Chhattisgarh Biogas plants covering districts Mahasamund, Raigarh, Raipur and Janjgir-Champa of Chhattisgarh plains. Some floating drum biogas plants were also found in the surveyed area, which are reported to be fabricated by KVIC and other agencies. The feed back about the type of biogas plants, working and non-working conditions were noted. The trend of biogas installation among the blocks was found maximum in (Pithoura > Mahasamund > Chhura) having quantity unit per year 198 > 169 > 77 of Raipur districts. The installation rate is found less than 100 units per year in other blocks of the surveyed areas.

Keywords: - Biogas plants, block and capacity wise, Chhattisgarh state.

1. Introduction

In general it is estimated that India can produce power of about 17000MW using Biogas, which is over 10% of the total electricity in India (Chauhan, 2009, Ranga Nathan, 2010). Moreover, producing heat using biogas is more efficient than the producing heat using combustion. Use of Biogas in Chhattisgarh is limited to only cooking purpose. It is imperative to know the working status of biogas plants under different blocks and districts. If the Plant does not perform satisfactory it should be treated as national loss. Because huge number of biogas plants are installed annually, in the villages under government subsidy program, by various agencies (Shailendra, 2008).

In Chhattisgarh the installation of Biogas plants are carried out by the Chhattisgarh State Renewable Energy Development Agency (CREDA) under the Department of Energy, Govt. of Chhattisgarh from 25th may 2001.

The study was conducted in different blocks of Samastipur district of Bihar state to find out the present status of the installed biogas plants, socio-personal characteristics of biogas plant owner and the constraints perceived by them (Ranjeet and Chaudhary, 2002).

Energy play key role for the socio-economic development of any nation. Industrialization, urbanization and mechanized agricultural techniques have generated a high demand of energy in all forms i.e. thermal, mechanical and electrical. To meet this enhancing demand, fossil fuels such as coal, oil and natural gas have been exploited in an unsustainable manner. This

exploitation has been posing serious environmental problems such as global warming and climate change. While we have shortage of energy and are dependent on imports in case of petroleum, we are boon with plenty of natural sources of energy such as solar, wind, biomass and hydro-power. These sources are environmentally benign and non-depleting in nature and are available in most parts of the country throughout the year. Biomass resources such as cattle dung, agriculture wastes and other organic wastes have been one of the main energy sources for mankind since the dawn of civilization. There is a vast scope to convert these energy sources into biogas. Biogas production is a clean, low carbon technology, useful for the efficient management and conversion of organic wastes into clean renewable biogas and organic manure/fertilizer. (Bamboriya, 2012)

Yearly statistical data of Chhattisgarh state indicates that the biogas plants are getting popularity among the farmers of Chhattisgarh, which indicate the satisfactorily performance and level of technical know how of biogas plants in the region (Kumar S. et al 2013).

Present Study and analysis were carried out to know the working status of the installed plants in the selected areas with following objectives, to study the block and year wise installation of biogas plant in the selected districts of CG Plains.

2. Material and Methods

Chhattisgarh state (CG) is comprises with three agro

climatic zones, Chhattisgarh plains, Baster plateau and Northern hills of CG. In which the maximum number of districts (11) and geographical area is covered by the Chhattisgarh plains. Therefore detailed study about biogas plants was carried in these plains. An analysis was needed for further effective planning and implementation of the program. It is imperative to know that in which block and district of Chhattisgarh its adoption is more or poor. In which district / block the adoption reached to its final level and further no adoption is seen? What are the factors governing the adoption of biogas technology? What is the impact of adoption in agricultural production? What is its socio economic impact? Which size is more popular and why? The failure plants belong to which size and model? Therefore in order to determine the answers of all such queries present analysis was carried out at random field survey.

3. Results and Conclusions

The results obtained for the objectives of the study with detailed discussion are presented in this paper.

Following aspects were considered in reference to area selected for the study.

3.1 Block wise status and growth of biogas plants in district Mahasamund

Block wise status and growth of biogas plants in Mahasamund district is given in Fig.1, which revealed that biogas plants are getting popularly and being installed in all its blocks. The average plants are installed annually is about 132 units / year, which is comparatively highest among other districts. The installation of biogas plants, among the blocks varied from 71 to 197 units / year. The farmers of Pithoura and Mahasamund blocks have shown keen interest where biogas plants installed maximum (1383) and annual growth was noted about 198 units / year, followed by block Mahasamund (1181) having annual growth about 169 units / year.

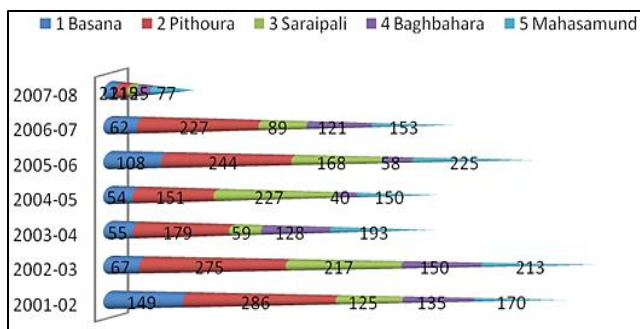


Fig. 1 Block wise status and growth of biogas plants in district Mahasamund

3.2 Block wise status and growth of biogas plants in district Raigarh

Block wise data of district Raigarh is available from 2002-2007 and shown in Fig.2 which indicates that maximum number of biogas plant is in block Raigarh > Pusera > Baramkela (538 > 287 > 231). Whereas minimum numbers of plants are installed in block Gharghora and Tamnar 74 and 93 respectively. Adoption of biogas technology in the district is said to be progressive among in the blocks. The annual average growth of the blocks comes about 40 units per year. The average annual growth was observed maximum in block Raigarh (108 units / year) followed by Pusera (57 units / year). It is due to more number of cattle with the farmers and remote location of villages. The minimum annual growth was found in block Gharghora (15), and Tamnar (19).

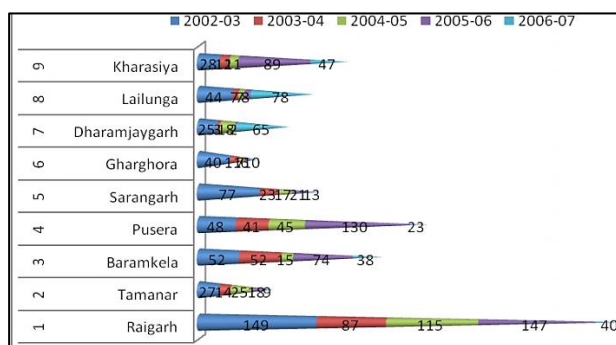


Fig.2 Block wise status and growth of biogas plants in district Raigarh 2002-07

3.3 Block wise status and growth of biogas plants in district Raipur

Block wise data on biogas plant of district Raipur is available from 2002-2007 only and presented in Fig.3 which indicates that maximum number of plants is in block Chhura > Manipur > Gariaband > Fingeswar; (386 > 277 > 271 > 228) and minimum numbers of plants are installed in block Devabhog (15) and Tilda (33).

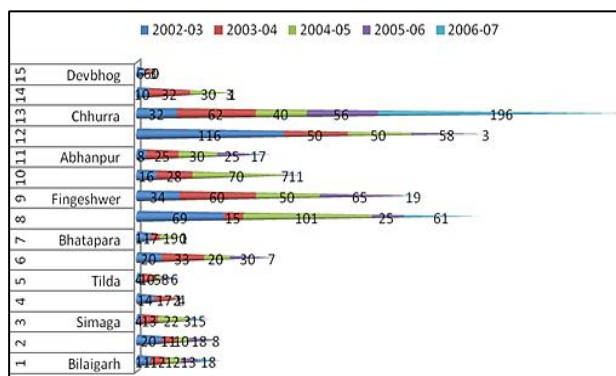


Fig.3 Block and year wise status /growth of biogas plants in district Raipur in 2002-07

Adoption of biogas technology in the district is said to be satisfactory and progressive in most of the blocks. The

annual average growth of the blocks comes about 26 units per year. The average annual growth was noted maximum in the Chhura block (77 units / year) followed by Mainpur (55 units / year). It is due to more number of cattle with the farmers. The minimum annual growth was found in block Devabhog (3), and Tilda (7).

3.4 Block wise status and growth of biogas plants in district Janjgir-Champa

Block wise data on biogas plants of district Janjgir Champa were available from 2001-2008 only and presented in Fig.4 which indicates that maximum number of plants is in block Sakti > Navagarh > Dabhara > Pamgarh; (230 > 135 > 111 > 84) and that of minimum numbers of plants are installed in block Bamhandeesh (46) and Balouda (53). Adoption of biogas technology in the district is found to be satisfactory for these blocks. The annual average growth in the blocks comes about 17 units per year, whereas average annual growth was noted maximum in the Sakti block (30 units / year) followed by Dabhara (22 units / year). It is due to more interest shown by farmers and extension workers.

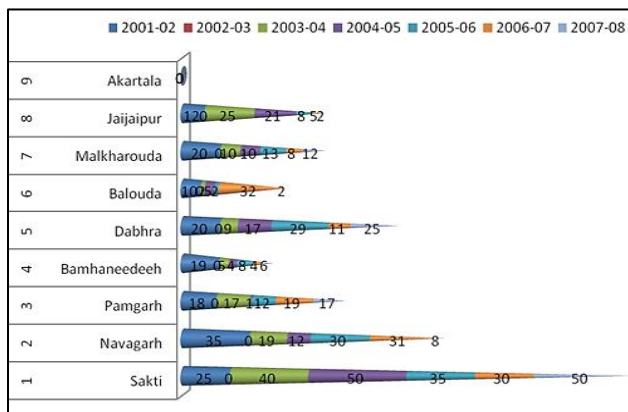


Fig.4 Block wise status and growth of biogas plants in district Janjgir- Champa 2001-08

3.5 Capacity wise status of biogas plants in the selected district of Chhattisgarh Plains

In order to determine the popular size of biogas plants the data were analyzed. The capacity wise number of biogas plants, installed in following districts of Chhattisgarh plains is presented in Fig.5.

It is revealed from the above figure that maximum number of biogas plants belong to 3 m³ size which contributed maximum about 51% of total installed followed by 2 m³ (36%). Whereas minimum adoption seen for size 1 and 5 m³ (7 %). The picture of Raipur and Janjgir-Champa is different. In Raipur and Janjgir-Champa district, the maximum number of biogas plants belongs to 2 m³ size 58% and 53%, respectively, followed by 3 m³ size (37%) and (41%), respectively.

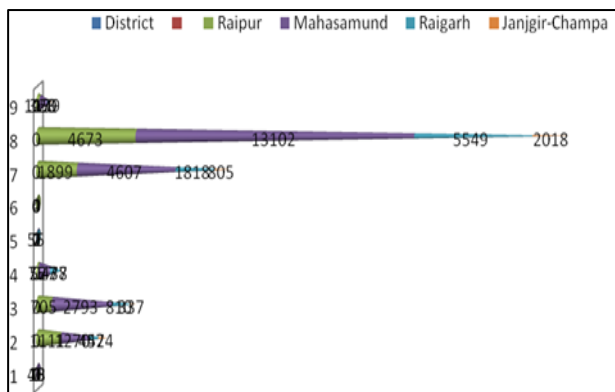


Fig.5 Capacity wise (m3) Number of biogas plants installed in selected districts of CG Plains 2001-08

3.6 Capacity wise status of biogas plants in different blocks of district Raipur

It showed that on an average, in district Raipur, the maximum number of biogas plants belong to 2 m³ size (58%) followed by 3 m³ (37%), whereas there are some blocks like Bilaigarh where 3 m³ size plants are more in number, 40 (61%) than that of 2 m³ size, 24 number (36%) and Dharsiwa also the 3 m³ size plants are more 62 number (56%) are Similar trend is found in the Kasdol and Abhanpur where 3 m³ size plants are more in number than that of other sizes, constructed in the blocks. Biogas plants of size 4 and more than 4 m³ found very less (about 4%) Fig.5.

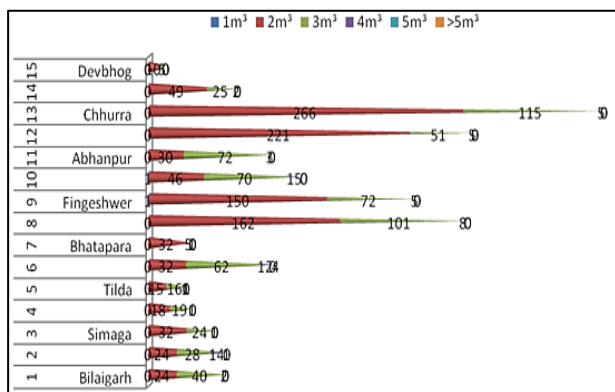


Fig.6 Capacity-wise status of biogas plants in different blocks of district Raipur

3.7 Capacity wise status of biogas plants in different blocks of district Mahasamund

In this district of Mahasamund, the 3 m³ size plants have been more constructed (60%) than the two (27%) and four m³ size (11.4%). Unlike Raipur district, it is clear from the Fig.6 that five m³ size plants are found in Basana block only (07). In other blocks, the biogas plants were constructed up to 4 m³ size only.

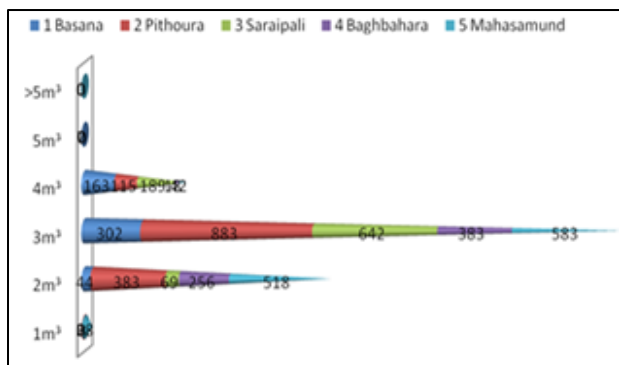


Fig.7 Capacity-wise (cum) status of biogas plants in different blocks of District Mahasamund

3.8 Capacity wise status of biogas plants in different blocks of district Raigarh

In this district of Raigarh, the three m³ size plants have been constructed maximum (45%) than that of four m³ size (26%) and two m³ size (25%). Unlike the district Raipur, It is clear from the Fig. 8 that five m³ size plants are also constructed in good number (55) but only in one, Pusera block which contributed about 19% of the total plants fabricated in the block (287 numbers).

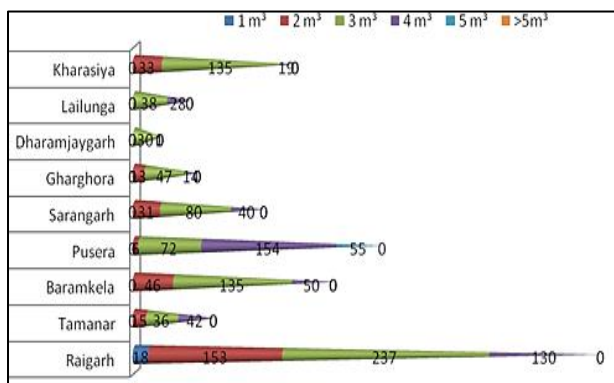


Fig. 8 Capacity wise status of Biogas plants in different blocks district of Raigarh

3.9 Capacity-wise status of biogas plants in different blocks of district Janjgir-Champa

As shown in Fig. 9 that in district Janjgir-Champa, the two m³ size plants have been constructed more (53%) followed by the three m³ size (42%). Similar trend was found in district Raipur and unlike districts Raigarh and Mahasamund. The four and five m³ size are less installed this may be due to non-availability of subsidy in the larger plant beyond 4 m³ size. It also indicates that merely one plant of size five m³ was constructed in the district that is in block Dabhra.

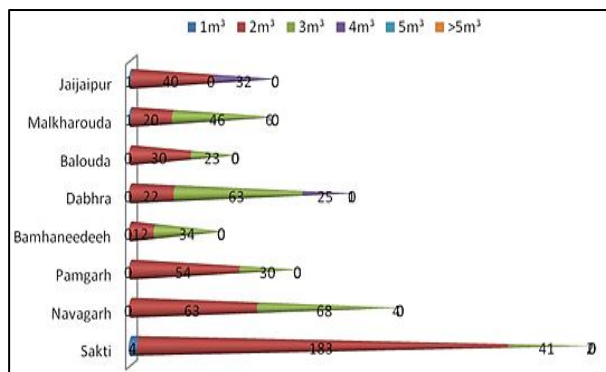


Fig.9 Capacity-wise status of biogas plants in different blocks of district Janjgir-Champa

5. Conclusions

A field study was carried out in year 2008 with a questionnaire and by visiting 117 Biogas plants covering 11 district of Chhattisgarh plains. Floating drum biogas plants also found in the surveyed area, which were reported to be fabricated by KVIC and other agencies. The feed back about the type of biogas plants, working and non-working conditions were noted.

The progress of biogas installation among the blocks was found maximum in Pithoura block (198 unit/year) and Mahasamund block (169 units/year) of district Mahasamund followed by Chhura block (77 units /year) of Raipur district. The installation rate is found less than 100 units in other blocks of the state.

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