

## CASE B: Swargadwari Biogas Plant: A Case at Higher Altitude

Swargadwari is a religious place located at an altitude of 7,500 ft (approx) in Pyuthan District. Thousands of pilgrims visit Swargadwari temple on special occasions, particularly during the full moon of Baisakh and Kartik. This temple is managed and supervised by *Mathadhish* Narmananda Giri.

With the persuasion of the Agricultural Development Bank and the Biogas Company, a 10m<sup>3</sup> fixed dome biogas plant was installed in *Baisakh* 2045. The full cost of installation was subsidised by the Agricultural Development Bank. Bhingari, the nearest marketing centre from Swargadwari in Pyuthan, is accessible by a dirt road from Dang, but only in the dry season. The temple of Swargadwari is located about six to seven hours walk from Bhingari. Hence, almost all the construction materials; cement, sands, and stone were carried by porters from the Bhingari area. Therefore, the cost exceeded by 40 per cent the normal cost of installation.

The *Mathadhish* of the temple manages a herd of 200 cows. The prescribed quantity of cattle dung is 60kg to be mixed with 60 litres of water daily. About 40 to 50 saints and hermits stay there during most of the year. Before the installation of the biogas plant, cooking was done by fuelwood collected from the surrounding forests.

The biogas plant has the capacity to produce (optimum) 105ft<sup>3</sup> daily, if everything (temperature, raw materials, and moisture) is favourable for fermentation. The gas produced from the plant is used for illumination and cooking. Four lamps were installed in the *Mathadhish's* residence, cowshed, and the student hostel. Cooking was done by gas in the kitchen of the *Mathadhish* only. Gas production has varied. In the three month winter season (from *Marg* to *Magh*) gas production varied from 57 per cent to 79 per cent of optimum capacity, despite feeding the prescribed quantity of dung. The following result was based on a one time observation, and the estimation of gas production was based on the consumption of the lamps and the cooking stove.

### Daily Consumption of Biogas

Items	No.	Winter	Total cft	Summer	Total
Lamps	4	9hrs	45	12 hrs	60
Stove	1	1 hr	16	1.5 hrs	24

The temperature was recorded at different times in the day for different items (see table below). It was observed that the ambient temperature (open air) was higher than the room and pond water temperature (water is used to mix with the dung). Similarly, the slurry at the bottom has a higher temperature than the slurry on top.

Time/ Temperature °C	7.30 (a.m.)	9.30 (a.m.)	11.30 (a.m.)	1.30 (p.m.)
Room Temperature	14.0	17	17	16
Ambient Temperature	13.5	18	22	19
Pond Water Temp.	11	12	15	11
Slurry Temp.(at bottom)	17	17	17	17
Slurry Temp.(on top)	10	13.5	15.5	15

In spite of the fact that the bottom slurry has a lower than ambient temperature, gas production did not decrease substantially.

The experience of Swargadwari's biogas plant has proved that biogas plant operation at higher altitudes is possible in Nepal.