India's Biogas Promise: Does it Have a Future?

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India's quest for biogas technology dates back to 1897, when the Matunga Leper Home in Mumbai utilized human waste to generate gas for meeting its lighting needs. Recognising the efficiency of biogas, the Matunga Home used biogas for cooking and running an engine generator from 1907 until 1920. Apparently their sewage drain became connected to the city sewers in 1920.

In the decades to follow, biogas research and development occurred at various levels. At one level, the Khadi & Village Industries Commission (KVIC), a government-sponsored umbrella organisation for rural industrialisation, was engaged in developing new efficient models for biogas generation from biodegradable waste. At another level, researchers at the Indian Agricultural Research Institute (IARI) in Delhi were developing efficient systems for anaerobic digestion of cattle dung. Several models were developed by 1950, the most notable being Grama Laxmi III, which became the prototype of the KVIC floating dome model. With this successful design, KVIC began field implementation in 1961 and installed over 6,000 biogas plants around the country by 1973.

But the biogas programme got a real fillip in 1973 when Dr. E. F. Schumacher, the doyen of the appropriate technology movement who was then adviser to the Government of India, took notice of the successful biogas plants during his travels and informed Prime Minister Indira Gandhi. This came at a time when petroleum prices were increasing and deforestation was damaging India's resource base. Mrs. Gandhi saw biogas as an answer to these twin problems and promised in her Independence Day address to the nation in 1974, that solutions to solve the crisis were in sight. She later inspired the launch of the National Project on Biogas Development (NPBD).

The biogas project

In 1974, the Government initiated a field dissemination programme to test the performance of biogas under diverse conditions. The project was later formally launched by the Ministry of Agriculture with an outlay of US$10 million in late 1981. After a few months the project was transferred to the newly created Department of Non-conventional Energy Sources. The project focused initially on 100 selected districts, and a modest target of 400,000 biogas plants was set for the Sixth Five-Year Plan period. The average success rate of the plants was close to 85 percent.

This pilot project paved the way for a nationwide programme. Studies were first conducted to estimate the potential of biogas. Based on the 1961 livestock census, it was estimated that biogas could generate 195 billion kWh of energy annually, equivalent to 24 billion litres of kerosene and 236 million tonnes of manure. A total potential of 18.75 million family-size biogas plants (1.7 cubic metre average capacity) and 560,000 community plants (142 cubic metre average capacity) was calculated based on the available dung in the country. The estimated potential number of family-size plants was later trimmed to 12 million.

The initial success of biogas dissemination encouraged the government to set ambitious targets for the subsequent plan periods. For instance, the 7th Five-Year Plan had an ambitious target of installing 1.5 million biogas plants by extending the project to cover all the districts. However, only 0.89 million were actually erected. During the 8th Plan a total of 0.96 million plants were actually installed. The 9th plan which extends from 1997 to 2002 aims to erect some 1.2 million family-size biogas plants. Nearly 20 years after the project was launched, 75 percent of the estimated potential is still unrealised.

The approach

Being a welfare state, the approach adopted for biogas dissemination was subsidy driven. Till mid-1990, the entire project was subsidised, meaning that the total cost of construction of each biogas plant was borne by the State. Even higher subsidies were given for mountainous, desert and tribal areas. Although cost varies from place to place, a 2 cubic metre family-size biogas plant costs anywhere between US$ 133 to 155. After 1990 the government reduced the subsidy component to ensure that the intended beneficiary families do contribute. On average, each family now contributes US$ 55 to 77 per plant.

There is a large bureaucratic structure that ensures dissemination of renewable technologies to rural areas. Based on the previous year's performance and the target for the entire period of five years, a target is set for the following year. The Project ensures that each State gets its own independent target and budget allocation. However, the entire machinery of implementation acts at three levels. First, the centralised control from where the targets are allocated and the subsidy is doled out. Second, the non-government services delivery channel that ensures community level participation and the implementation at the local level. And third, the research back-up institutions that are supposed to conduct research to improve upon the efficiency of the biogas system and provide necessary capacity-building support. Implementing agencies, however, get a service charge (called turnkey fee) for ensuring that the plants function to their capacity for the first 3 years.

Despite such well-laid out mechanisms for biogas dissemination, the performance of the project is disappointing. According to an evaluation of the biogas project conducted by the National Council of Applied Economic Research (NCAER) for the period 1985–1990, out of the commissioned biogas plants in the states of Rajasthan and Uttar Pradesh, only 45 percent were found to be working. This was considered impressive when compared to the dismal national average of 37 percent. The study further reported that some 1.84 million installed biogas plants were not functioning at that time. Since then, the situation has not changed much. Thus, the overall picture of the performance of the programme is mixed.