Biogas technology utilisation in Sri Lanka

Biogas technology was first introduced to Sri Lanka in the 1970s. It was mainly on a research basis. Chinese and Indian experience influenced Sri Lanka to test this technology in local applications

Since this technology was new to Sri Lanka, only the state sector institutions moved into test this facility within their premises. Further some schools incorporated biogas units for their own use at the science laboratories. These served as demonstration too.
Unlike in the case of neighbouring India and other Asian countries such as Nepal & China, the state sector participation in promotion of biogas systems in Sri Lanka was very poor. Earlier interventions by the state institutions were limited to pilot testing and did not go beyond as a comprehensive promotional programme.

A study carried out on the current status of the biogas sector in the latter part of 1990s, that is 25 years after introducing biogas into Sri Lanka was shattering. Most of the biogas units already installed were abandoned mainly due to poor (absence in most cases) maintenance mechanisms and in some cases due to technical failures. Over 60% of the units surveyed fell into this category. University of Moratuwa & University of Ruhuna of Sri Lanka carried out this study with the Intermediate Technology Development Group.

In the mean time, National Engineering Research & Development Centre (NERD) invented its batch processing biogas technology. Instead of using animal dung as in the case of Chinese and Indian models, the model invented by the NERD (Sri Lankan Model) produces biogas using solid material getting anaerobically fermented as a batch. This technology was very useful to most of the subsistence farmers who grow paddy, as its straw is used to charge the batch type biogas units.

Upto the late 1990s, the use of biogas dominated being accepted as an alternative form of energy. Lighting and cooking were the main applications. Cow dung and paddy straw were the main raw material used. The existing petrol-max lamps were converted into the biogas mantle lamps. The cookers were available in the domestic markets which were imported from India and China.

In the late 1990s, a propagation of biogas technology programme among the communities and provinces was led by the ITDG. Initially, those who were trained in China and India were consulted and a series of training programmes conducted. This included the technical officers, field officers and masons. Department of Animal Production & Health of different provinces (DAPH) who deal extensively with the dairy farmers got their Livestock Development Instructors (LDI) trained in the biogas technology. Both the DAPH and the Ministries responsible for Energy of the Provincial Councils commenced providing incentives to farmers to set up biogas units. After Sri Lanka’s Central Environmental Authority (CEA) commenced strict scrutinisation procedures when approving piggeries, the piggeries started setting up of biogas units to keep their environments clean and healthy.

Since there was no state sponsored mechanism to promote biogas in Sri Lanka, the approach adopted by the ITDG was to build the capacities of the provincial institutions. These institutions are able to provide all the biogas related services from selection & designing of the sites, construction, operation, maintenance & troubleshooting of biogas units. In order to be sustainable, they were trained on delivery of biogas related services on a commercial basis. These business units were further strengthened by initially creating awareness among the general public and school children on biogas and then training of field officers, technical officers, masons, and biogas appliances manufacturers. This was strengthened at the provincial level so that there is a set of independent service providers strongly affiliated to the provincial biogas institutions.

In a study carried out in Sri Lanka in the year 2003, it was revealed that 76% of the biogas units constructed in association with the ITDG from a sample of 350 spread in 5 out of the 9 Provinces in Sri Lanka were in the operating condition. This is a remarkable improvement from 40% within 7 years. Further, within the same period, the spectrum of use of biogas has widened significantly. While the basic application of biogas was still at the primitive stage where the application of biogas was limited to cooking and lighting directly burning the biogas, now the use of biogas is expanded and visualised from 5 dimensions. This is as against the 67% households relied on fuel wood and the other 33% on LP gas for cooking and 25% who relied on electricity and 75% on kerosene for lighting, before a biogas units was established.

- Alternative source of energy – lighting, cooking, water pumping, heating, electricity generation etc). 25% of those who own domestic biogas units were encouraged to have a biogas unit to serve them from an energy perspective for cooking and lighting.
- Input into agriculture – biogas sludge & slurry using as a fertiliser, pesticide, weedicide, soil conditioner etc). 34% of those who own biogas units wanted a biogas units to use the by-products in their agriculture as inputs.
- Value addition for dairy & paddy farmers – the small scale dairy industry in Sri Lanka is threatened as the price of cow's milk is even less than mineral water. (Rs 16.00-20.00 Vs Rs 30.00). Multiple use of biogas is an incentive for them to continue with the diary industry. Further, those who burn their paddy straw, now use them to produce biogas. 25% of those who own biogas units wanted their biogas units to help them in additional benefits of biogas systems other than energy and agriculture.
- Livelihood improvement – More than 90% of the biogas unit owners are engaged in home gardening or farming. The cost of imported chemical fertilizer is remarkably reduced by using biogas by products. Further it helps them to grow their own crops so that cost of purchasing vegetables, fruits etc is reduced. There are occasions where additional produce is sold generating an additional income from unused land earlier.
- A small number of owners of biogas units owned them to improve the environmental sanitation while another 8% went for biogas units due to legal requirements (piggeries)

In addition to the above, the users of biogas sell the gas to the neighbours or process the slurry & sludge and sell them. Gas is sold at an estimated price of Rs 300 per cubic meter per day for a period of 1 month. The processed sludge is also sold for a price. The price of a kg of processed sludge is around Rs 5.00 to Rs 8.00 and a bottle of slurry is sold at around Rs 50.00 per bottle.

As in the case of other countries, even in Sri Lanka, the benefits reaped by housewives is enormous. In a typical Sri Lankan household cooking is largely carried out by females while firewood is the most widely used energy-source for cooking Time spent on firewood collection, washing kitchen utensils and use of water for cleaning is reduced. Further they now can maintain their nails clean & tidy where as otherwise the carbon soot of the pots and pans settle under the nails and within the cracks of the fingers when the utensils are leaned. Reduction in hazards of kitchen smoke leading to an improvement in health is another benefit. Expenses incurred on fuel are decreased giving them economic benefits leading towards enhanced savings. Visits by the villagers and outsiders boost the image of biogas users with enhanced social acceptance. School & university research students are quite accepted with a higher recognition by the biogas unit owners.

According to a study carried out by the ITDG, it was revealed as follows (the time savings the men and women get from biogas units)

Women saved their cooking time by 96 minutes/ day, which is 31% less than an average household. The time spent on fuel wood collection reduced due to use of biogas units by 2-3 days per month and there was a reduction of 56% of time on cleaning of utensils (33 minutes a day). Where the men were concerned, they too demonstrated a reduction of 1-2 days of fuel\el wood collection per month while the children too showed the same result on fuel wood collection.

Use of biogas technology as described above limit mainly to stand-alone domestic biogas units. Due to obvious reasons there are hardly any biogas unit in the cities. Due to social benefits night soil (human excreta) is hardly used to produce gas for domestic consumption. The experience with large scale biogas units in Sri Lanka is shocking. Municipal solid waste, market garbage and community based biogas units have still not shown signs of success or sustainability. Only one major intervention by the NERD Centre is in place in the country now in this category. That also is in the research (observation) phase not matured enough for replication. Some research has taken place on producing gas from water hyacinth & sugar cane molasses. Storing gas and comprehensive analytical data on use of biogas by-products on crops are still absent. These are some of the concerns for the future. Indian origin floating drum type biogas units are only less than 10. As in other countries, this type is not promoted further mainly due to the difficulty in getting, maintaining & replacing the metallic drum. Chinese continuous type and Sri Lanka batch type biogas units have shown full inter-phasing with the Sri Lankan conditions. Awareness and service providers are in place distributed across the country. Accordingly, the domestic stand-alone biogas systems in Sri Lanka are suitable for replication and wider scaling up.

However, lack of proper financing (or even a subsidy) system hinders biogas propagation. The benefits described above and the direct and indirect environmental benefits of biogas are well understood in the country.

The Biogas Developers' Collective (BDC) which is a network of Provincial institutions was established in order to coordinate and share / disseminate resources and experiences among them. Further a recent move taken place in Sri Lanka by the leading institutions engaged in the sector is to commence standardisation of biogas systems. ITDG, NERD, DAPH, Energy Forum, Universities and Provincial Councils' & pioneers in the sector have got-together with the Sri Lanka Standards Institution (SLSI) to set up National level biogas standards as a code of practice. Domestic stand alone continuous & batch type biogas systems are expected to be detailed out in this code of practice. It is envisaged that these standards would act as a guide for any person to access to necessary information and set-up biogas systems while getting the confidence among the communities and decision makers. This is anticipated for biogas systems to go a long way despite lack of direct government incentives (subsidies) , but financial institutes to extend micro credits (total cost per a domestic biogas units is about US$ 350) to spread use of biogas technology in Sri Lanka.

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