**Emerging biogas**

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The importance of local energy/gas resources should be realised in these days of rising oil and gas prices, which may take the shape of a major crisis if the international political climate remains unchanged. Local oil and gas production is so important for energy security.

For a variety of reasons, no significant success could be made over the last two or more decades with regard to oil or gas discovery. It is now time to use some other source. It is estimated that biogas can provide 600-1200 mmcfd of gas and will be in a ready-to-distribute form in most parts of the country, where biomass is available.

In order to comply with the Paris Agreement, all gas supplies in Europe must be renewable or decarbonised by 2050. In addition, the transport sector has to reduce its greenhouse gas emissions. Biogas has been declared as an important agent for achieving the climate-related 2050 objectives by credible sources. A 2018 study organised by six major gas companies of the EU concludes, “it is possible to scale up renewable gas (bio-methane and renewable hydrogen) production to a quantity of 122 bcm by 2050 in [the] EU. We also conclude that using this gas with existing infrastructure… can lead to Euro 138 billion annual societal cost savings compared to a decarbonisation framework without a role [for] renewable gas.”

In Pakistan, biogas has been underestimated, neglected and even dubbed as ‘gobar gas’, limited to providing cooking gas in rural areas. Only a few thousand household plants have been installed as opposed to 931,000 in India and 43 million in China. India also plans to install 5,000 bio-CNG plants in the next five years. Germany has more than 10,000 big biogas plants, and several hundred of them produce biomethane. Global biogas production in 2018 stood at 59.3 billion cubic metres (bcm) per year, about half of which was produced in Europe.

Biogas is not only a source of energy but also part of the circular economy concept, providing many services and functions including environmental management, solid waste disposal, waste water treatment, safe dairy hygiene and practices, natural fertiliser production, smog control and protection of freshwater resources. A circular economy targets zero waste and pollution throughout the full life cycle of materials. The conventional linear economy relies on the take, make, use, and dispose principle. The circular economy, on the other hand, involves a framework of production and consumption that consists of sharing, reusing, repairing, refurbishing and recycling.

Waste – sewerage – water remains untreated in most areas of the country, polluting fresh water resources and resulting in the outbreak of several diseases. Biogas plants can use waste water to produce gas and fertilisers, subsidising waste water treatment capital and operating costs. Similarly, municipal solid waste (MSW) can be disposed of in the biogas plant system by first separating and recycling inorganic materials like paper, textiles, metals, plastics etc, and then digesting organic biomass to produce biogas.

Every year, we deal with the problem of smog, largely due to rice stubble burning by farmers. This rice stubble along with other agro waste can be processed in biogas plants, subsidising the overall rice stubble collection in a smooth and mechanised system. Cow dung is spread in our rural areas, deteriorating air, water and food quality. It can be collected through a scientific method, giving income to cattle owners and farmers. ‘Sabzi mandis’ – wholesale vegetable and fruit markets – and food streets produce a lot of waste, which can be diverted and processed in biogas plants. In addition to gas production, digestate water is produced, which contains useful nutrients. Farmers can avail this cheap fertiliser and save some cost in buying expensive urea and diammonium phosphate (DAP).

There are all kinds of biogas plants – household drums or a cavern; mid-sized plants for individual industrial and commercial consumers; large plants for producing CNG for vehicles; and even larger plants for producing clean and processed gas for injection into the gas grid. Small household plants can be made underground by sand, mud or cement. These days, plastic drums or rubber containers are also made in factories and supplied to the market for ready installation – although this has not been initiated yet in Pakistan. It can be made available in less than Rs10,000 without any subsidies, and last a decade.

Household food waste, human and animal excreta can be used, solving the waste disposal problem and producing gas and fertilisers in small quantities. Community-sized plants can also be made in areas where agro and dung waste is available. Make–do distribution pipes and small compressors can provide for the population clusters of 50-200 people. Dairies with 1,000 cattle in and around can install a reasonably sized plant. In earlier times, electricity production with biogas used to be quite popular, which is being increasingly replaced by solar panels.

Biogas is made in two forms – unprocessed as produced and processed gas. Unprocessed gas contains 50-60 percent methane and the rest is CO2 and H2S. For cooking and even electricity production, unprocessed biogas is good enough and is used abundantly. For vehicle use as CNG and for injecting into the standard pipeline system, biogas has to be processed and cleaned of CO2, H2S and water vapour, etc. This adds to the cost. Processed biogas may cost between the prices of normal fossil gas and LNG and much cheaper than LPG prices.

Clean cooking fuel is a basic requirement of people. Only 30 percent of the population is getting clean piped gas and 70 percent of the population relies on burning smoke-emitting biomass. Better biomass fuel and stoves can also be provided where biomass resources may not be available in some areas like non-agricultural or urban ‘katchi abadis’. Community biogas plants would be much cheaper and affordable than LPG-Air mix plants that have been installed, and the demand from certain quarters, especially Balochistan, continues to be there. In Balochistan, cattle farming is a significant activity where community-based biogas plants can be installed at much reasonable costs.

It should be noted that a power plant project based on solid waste incineration has been approved. It is a highly undesirable project, causing pollution and producing expensive electricity. Fortunately, it has not been installed – possibly due to the later evaluation by stakeholders. Burning solid waste directly is archaic and outdated technology having air pollution risks.

If air pollution control equipment is installed, the cost becomes prohibitive. It would be much preferable to separate in organic and organic materials, sell inorganic materials like glass, plastic, paper, etc, and produce biogas for injection into the gas grid or use it in the CNG form to run local government vehicles, including waste collection trucks.

Several biogas (biomethane and bio-CNG) projects are being studied. In Karachi, a bio-CNG project is being planned in Landhi Cattle Colony, which will supply bio-CNG to the Green Line bus project. The SSGC and SNGPL have invited proposals for build-own-operate (BOO) projects to buy biomethane from the projects for injecting into their grids. A biogas policy is now required to provide a satisfactory framework in this respect.

For biomethane injection and bio-CNG stations, Ogra may have to devise some standards and rules. A digestate fertiliser policy specifying standards and a feedstock supply contract on the lines of the fuel supply agreement (FSA) for IPPs may be required as well. Such policies and rules are usually developed interactively with consultations among stakeholders as it happened in the case of IPPs. For community projects, a cooperative framework for owning and managing community plants may be required as well.

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