

VIETNAM

Lack of overall strategy on the expansion of biogas production

Biogas technology has been explored and applied in Vietnam since the 1960's. About 500,000 biogas plants have been constructed in the country to date, but most of them are small-scale (the capacity less than 50 m³) and do not have any grid connection.

By Ms. Le Thi Thoa

Biogas technology has brought great advantages to local people to improve their life quality. For example, biogas plants can successfully treat the organic fraction of waste such as crop waste, municipal waste, sewage sludge etc. When used in a fully engineered system, biogas technology not only prevents pollution, it also allows energy, compost and nutrient recovery. Due to environmental protection and an ambition for clean energy development, the Government of Vietnam has recently placed greater focus on biogas technology. The Government had set up its objectives to 2025 in the revision of *“The National Strategy on Integrated Management of Solid Waste, with a vision to 2050”*. This strategy is known as Decision No. 491 issued by the Prime Minister on 7th May 2018. According to the decision, 80% of waste generated from livestock, cattle and poultry activities and food processing should be collected, reused or recycled as compost and biogas as well as treated to meet environmental protection requirements.

Although the biogas technology in Vietnam was introduced more than 50 years ago, the number of large-scale biogas plants is still limited in terms of quantity. Only 0.3% of total installed biogas plant have a capacity of more than 1,000 m³. The current development of biogas plants is far below the real demand on organic waste treatment that has increased significantly.

As a developing country with a strong agricultural sector, Vietnam has significant potential in livestock, food-stuff and municipal solid biowaste to produce biogas. However, most of the large-scale biogas projects are just concentrating on waste water treatment to meet the Government's environment protection requirements. At present, the most common biogas technologies in Vietnam are:

- a. high-density polyethylene (HDPE) covered biogas lagoons,
- b. plug flow biogas digesters and
- c. upflow anaerobic sludge blanket (UASB).

a. HDPE covered biogas lagoon

This is the most common type of biogas technology in the country at present because of its low cost and because it is easy to install in terms of time and technology. It has several variations of design that have been “imported” from Thailand and some other countries. As the technology is more economical and more easily operated than other anaerobic digester systems, in many provinces it has been installed mainly in livestock farms, milk and cassava processing plants with 1,000-50,000 m³ per lagoon. However, despite its simplicity, HDPE has several drawbacks such as poor bacteria-to-feedstock contact with low loading rate and low

In Vietnam, biogas is used on a small scale for heating, cooking and to generate electricity.



PHOTO: GIZ



Gastight underground tanks for the production of biogas.

methane production due to lower efficiency (less than 60%) of an anaerobic pond system and lack of operation control.

b. Plug-flow biogas digesters

The plug-flow biogas tank has been designed and distributed to several breeding farms in Vietnam by the National Institute of Energy. This type of biogas plant can scale up to a digester volume of 1,000 m³. The plants were constructed at 20 livestock farms with capacity of 150-500 m³ in some provinces, which have large-scale livestock potential. The tank is divided into three units, which is suitable for the fermentation and producing biogas period, and therefore, the removal efficiency of organic substances (COD, BOD₅...) is quite high, about 75-85%.

c. Upflow anaerobic sludge blanket

This technology is very popular and is installed on a large scale in Vietnam. It has been applied at some food processing factories such as cassava, wine and beverage ones, but the investment cost is often high. Thousands of cubic meters of wastewater can be processed a day while 80-90% of organic matters can be removed.

Barriers in the development of biogas projects

Although Vietnam has approved policies on renewable energy development, green growth, livestock development strategy, and greenhouse gas (GHG) emission reduction, there continue to be significant gaps in policies and regulations, which have not supported the electricity generation with biogas technology. These key barriers are related to (a) technology; (b) legal and regulatory framework; (c) economic and financial issues and (d) awareness and capacity.

a. Technological barriers

While proven and high efficiency large scale biogas technologies have been common in many countries in

the world, they are almost unknown in Vietnam. At present, no local companies are providing complete modern biogas plants as well as biogas generators. Most of the biogas technologies are imported from China, Thailand and the EU, which has resulted in higher investment and costs for operation and management (O&M). Even worse, there are still no regulations for testing and quality control of the equipment.

Infrastructure such as the availability of feedstock is also an issue because biogas production mostly comes from energy crops, livestock farms and processing of agricultural products, etc. These crops were primarily cultivated for food and fodder production. For example, lack of vehicle and inadequate waste transportation increase the risk of supply chain disruption and create a barrier for utilizing waste in biogas production.

b. Legal and regulatory framework barriers

At present, there are no concrete, comprehensive policies for investment, management and operation of biogas projects. Main legal shortcomings are:

- ▶ *No feed-in tariff (FIT) for biogas electricity:* FIT has not been implemented, although the Government of Vietnam has announced tariffs for small hydro, wind, solar and biomass (co-generation) power. As a result, biogas developers and investors are reluctant to implement their projects. Without financial support mechanisms, biogas electricity is unable to compete with other renewable energy sources.
- ▶ *Inadequate standards and codes:* The lack of technical codes for the manufacturing, installation and maintenance of renewable energy technologies is one of the key barriers for technology transfer of biogas equipment. The absence of the technical standards leads to uncontrolled quality variations of products.

c. Economic and financial barriers

Economic considerations play a major role in the choice of renewable energy sources, so Vietnam faces the following economic and financial barriers:

- ▶ *High operating costs:* While with solar and wind energy, the input resources are stable and free, biogas plants depend on feedstock and its cost which varies by years and seasons. This has made up the high operating cost of biogas electricity projects.
- ▶ *No incentive for credit policy:* biogas generators and relevant equipment require large investment capital while there are no biogas specific green credit lines that offer lower interest rates specifically for biogas. From an international perspective, biogas projects are considered Clean Development Mechanism projects, so the incentive scheme is crucial. In Vietnam, however, banks have not made any loan incentive policies to support biogas electricity projects.

d. Awareness and capacity barriers

Lack of skilled and experienced technicians and workers to undertake the design, construction and maintenance of biogas plants is hindering the full dissemination and adoption of biogas production in Vietnam. In fact, most of large biogas plants have been constructed with poor-quality building materials in the country. The plants are not well operated because they lack the know-how required to repair and maintain biogas digestion. Meanwhile, the lack of awareness of the benefits of biogas technology in the country and the government’s lack of incentive mechanisms for the sector are considered to be the main reasons for low use of biogas.

Recommendations for sustainable biogas development in Vietnam

To encourage developers/investors to install biogas digestion for reduction greenhouse gas emissions, there are major recommendation as follows:

1. Development and improvement of policies and mechanisms

Experience shows that the introduction and success of any technology, to large extent, is dependent on the government’s policy framework. Policies are important because the government is the actor to enable an environment to mobilize resources and encourage private investment. Therefore, the Vietnamese Government should develop supporting mechanisms for biogas power plants. For example, besides subsidies or an attractive FIT, the government should further promote its tax policies (current tax exemption is shown not to be sufficient), create investors’ access to green loans and develop favorable loan mechanisms, including grace periods, longer timelines and favorable interest rates. The government can also mobilize capital through Official Development Assistance (ODA) and/or bilateral foreign loans as well as develop testing and standards of biogas technologies to improve the reliability of biogas technologies.

2. Financing mechanism

A specific funding line needs to be introduced for biogas power plants, which includes sub-solutions such as providing easier access to soft loans and support by local banks, and introducing tax incentives consisting of reduced import taxes and partial exemption from value-added tax for biogas equipment.

3. Structural development for stakeholders

The structural development should include the dissemination and update of policy to maintain transparency and credibility for attracting potential domestic investors. Training courses should be provided to technical staff of biogas power plants

on operation and maintenance, as well as to bank staff on financing biogas plants and procedures for managing/implementing the credit line created for support biogas owners.

To support the Vietnamese Government in implementing the above-mentioned solutions, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is partnering with the Ministry of Industry and Trade to carry out the “Climate Protection through Sustainable Bioenergy Markets in Vietnam (BEM)” project. The project aims at improving the preconditions for a sustainable use of bioenergy for electricity and heat generation in the country. The project is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative (IKI).



Model of a plug-flow biogas digester system in Vietnam.

The project will enhance the capacities of relevant Vietnamese institutions and promote the application of the state-of-art technologies when implementing its three action areas: 1. legal and regulatory framework, 2. capacity development and 3. technology cooperation. In the first area of action, BEM is supporting the Ministry of Industry and Trade to develop mechanism to support feed-in tariffs for biomass (co-generation) and biogas power projects and to facilitate their development. ◀

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