

Final Barriers for Developing the Biogas Power System at Pig Farms in Taiwan

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Before 2016, the installed capacity of biogas power generation was 19 MW in Taiwan, including 4 landfill sites, 31 pig farms (0.32 MW), and other industrial waste treatment sites¹. Since the feed-in tariff (FIT) for electricity generated from biogas with the anaerobic digestion system increased from NT\$ 3.9211/kWh to NT\$ 5.0087/kWh in 2017, the biogas industry became more prosperous².

According to statistics from Taiwanese Department of Animal Industry at Council of Agriculture in 2016, there are totally 7,612 pig farms with about 5.5 million pigs³ in Taiwan. It is estimated that 91.25 GWh can be generated via biogas power generation systems using pig manure from 2.5 million pigs by 2020⁴. The total power generation from biomass energy was 357.4 GWh in 2015⁵, and the target of the installed capacity of the biogas generation is 30 MW by 2025⁶. Therefore, promotion of biogas generation from pig farms is one of the important policies for achieving the renewable energy target by 2025 in Taiwan.

However, although the FIT has been increased, the promotion of biogas power generation system is still difficult to implement in Taiwan. It seems that the financial support became an important issue for pig farm owners and ESCOs (energy services companies).

ESCOs promoting solar PV installations are easy to receive financial supports from financial institution (e.g., bank), because power generation from the PV system is more stable compared to other renewable energy systems. The operation and maintain of the PV generation system is also predictable.

Currently 16 banks in Taiwan can provide the financing support for PV-ESCOs, and the total investment increased from US\$ 1.6 to 222 million from 2011 to 2013⁷. Now PV-ESCO system is the most important mechanism to promote PV installation in Taiwan. The annual increase rate of the PV installed capacity was from 48% in 2012 to 80% in 2014⁸.

However, the ESCOs for biogas generation are not easy to receive the financing support compared to PV-ESCOs. The major barrier of financing support for biogas generation ESCO is that pig farming is not a stable business. Pigs are alive, so they will be affected by disease, e.g., swine vesicular disease (SVD), foot and mouth disease (FMD), vesicular stomatitis (VS), classical swine fever (CSF), etc. Afterwards, the death of pigs will affect the production of biogas. Once the biogas production is not stable, the supply of the power generation is also not stable. It is difficult to sell electricity to the power company at a steady state output. It

¹ Bureau of Energy (2016) Bioenergy Applications in Chinese Taipei, APEC EGNRET 47 Meeting, Taichung, Taiwan.

² Bureau of Energy (2017) Feed-in Tariff for Electricity Generated from Renewable Energy and Its Calculation Formula in 2017, Taipei, Taiwan.

³ Department of Animal Industry, COA (2016) Suggestions of FIT of Biogas Power Generation for Animal Husbandry, Taipei, Taiwan.

⁴ *Ibid.*

⁵ Bureau of Energy (2016) Energy Statistical Annual Report 2016, Taipei, Taiwan.

⁶ *Supra note 1.*

⁷ Bureau of Energy (2014) Strategy and Roadmap for PV Systems in Chinese Taipei, APEC EGNRET 47 Meeting, Laoag, Ilocos Norte, The Philippines.

⁸ *Ibid.*

means that the financial planning for biogas generation from a pig farm becomes more difficult. In addition, the demand of pork in the food market is also not stable, and it will affect the amount of pig supply.

Moreover, the pig farm owners are not familiar with the biogas generation technology. Although they can receive the financing support from the state-owned Agriculture Bank of Taiwan, the investment of a biogas generation system is full of risk. On the other hand, the Agriculture Bank of Taiwan does not provide the financing support to ESCOs. Also, it is difficult to persuade other commercial banks to support ESCOs for installing the biogas power generation system.

Therefore, a new mechanism such as the financial foundation funded by the government for promoting biogas generation systems in pig farms should be established in the near future.

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