



Technical visit to 3.3 MW Ulu kanchung biogas power plants in Rembau, Negeri Sembilan

by Ir. Hor Kok Luen

Ir. Hor Kok Luen is currently the Deputy Chairman in Agricultural and Food Engineering Technical Division (AFETD).

Under the **National Key Economic Areas (NKEA)** plan by the Government in the **10th Malaysia Plan (2010-2015)**, the importance of biogas trapping is evident from its inclusion as one of the Eight Entry Point Projects (EPPs) of the palm oil sector. The biogas capturing project from **Palm Oil Mill Effluent (POME)** is a good source of renewable energy for various utilizations and applications, inclusive but not limited to, power generation.

The site technical visit was successfully organized on **12 September 2019** by AFETD effort at the Ulu Kanchung biogas power plant in Rembau, Negeri Sembilan with 31 participants in total (IEM members and non-IEM members). The visited biogas power plant is a green energy power plant integrated with palm oil mill which process oil palm fresh fruit bunches (FFB) and produce crude palm oil (CPO) and palm kernels (PK). The palm oil mill Effluent (POME) which is the by-product of the milling process which contain high chemical oxygen demand (COD) has become the raw material for the biogas (methane at concentration 60 % approximately) formation. The biogas that formed will be captured, treated and utilized, of course in this context for power generation.

Full Scope of Biogas project





Group photos of participants and the biogas plant manager Mr. YC Tan cum palm oil mill manager



Biogas power house- power generator- Gas engine

The power generated is mainly for grid connection Feed-in-Tariff (FiT) purpose. This is a positive move for environmental concerns whereby Green House gas (methane) is captured and prevented from escaping to the atmosphere. As we are aware, the Green House effect of methane gas is 25 times more than carbon dioxide. So methane should be captured and converted to something commercially beneficial beside environmentally friendly.

From the closer exposure during these two technical visits, participants were given the opportunity to understand more about biogas plant's operation. According to Mr. Tan, The mill manager cum biogas plant manager, the setup of the biogas plant basically comprises of three stages; mainly the biogas capturing, biogas treatment and utilization stages. In this context, the biogas capturing stage refers to the intake of raw material, POME. The biogas treatment stage refers to the de-sulphurization and de-humidification of the raw biogas. Lastly, the biogas utilization in this plant is connected to the FiT grid injection. The plants' control and monitoring system are brief and accurate, supported by the SCADA system, to ease their everyday operations and maintenance.



More detail sharing and technical discussion among the participants on the biogas plant operation as well as the sustainability concern

Alongside the site technical trip, many curious and technical questions were being raised to the plant engineers. Answers were provided with good, patience and technical competence. The plant engineers and supporting staff answered all the questions based on site experience. After the technical site visit, the participants had better exposure and knowledge on POME biogas power plants. From the biogas capturing stage, the beauty of the biogas capturing plant is that alongside the capturing of methane gas, the wastewater treatment of the POME, reduces the BOD and COD significantly, by 85% and 90% respectively. Hence it is more environmentally friendly.



Closer look and site experience at biogas (capturing) anaerobic lagoon



Biogas treatment (de-sulphurization and de-humidification) and treated biogas utilization (power generation for Feed-in-Tariff)-2MW (phase 1) and 1.3 MW (phase 2)

Raw biogas composition

Compositions	Typical	(UAC)
Methane	50-60%	60-72%
Co2	25-40%	25-35%
water	0-5%	0-3%
N2	0.01-2%	0.01-0.5%
O2	0.01%-0.6%	0.01-0.2%
H2	0.1%	-
H2S	3000ppm	8000ppm