



Technical Visit to Malaysia's first floating solar system in Sungai Labu Water Treatment Plant (WTP) at Sepang, Selangor

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In conjunction with the AFEO Energy Tour 2016, a technical visit to Malaysia's first floating solar system in Sungai Labu Water Treatment Plant (WTP) at Sepang, Selangor was successfully organized by the Electrical Engineering Technical Division, The Institution of Engineers Malaysia on 23rd September 2016. The visit started with a safety briefing through a short video presentation. Subsequently, the Plant Manager, Mr. Khairul Nidzham Zainal Abidin presented the overview of Sungai Labu Water Supply Scheme which is operated by Konsortium Air Selangor Sdn Bhd (KASB) since June 2012. KASB is 100% owned by Kumpulan Darul Ehsan Berhad and was incorporated on 13th April 2007. The construction of WTP completed in 2011 and has since then been the dedicated water treatment plant for KLIA with a treatment capacity of 105MLD. The main dam is 37m high, located off Sungai Labu and has a storing capacity of 90 days. This Sungai Labu WTP has a stringent water quality standard to adhere to which includes:

1. Turbidity of less than 0.4 NTU
2. Colour of less than 5 HU
3. pH of between 5 to 8.5
4. aluminium concentration of less than 0.1mg/L
5. iron concentration of less than 0.1mg/L
6. manganese concentration of less than 0.05mg/L
7. residual chlorine concentration of between 1.5 to 2.5mg/L

The briefing ended with a token of appreciation being presented by EETD Chairman, Ir. Yau Chau Fong to Mr. Khairul as shown in Figure 1.



Figure 1: A token of appreciation being presented by EETD Chairman, Ir. Yau Chau Fong to Mr. Khairul

After that, a presentation titled “Pilot Grid-Connected Floating Photovoltaic System” was delivered by Mr. Mohd Razwan Rusli from TNB Research Sdn. Bhd. This floating photovoltaic system is a pilot research project of TNB Research. It is the pilot grid-connected floating PV system in Malaysia with research and development project duration of between 16th March 2015 and 16th November 2016. A total project cost of RM3.95 million was required. This project’s primary motivation is to reduce consumption of land’s surface areas by installation of solar PV. As development paces, agricultural and economical needs of the land will increase significantly and this pilot project aims to study the feasibility of installing solar PV on water surface to address the aforementioned issue. It has 12 PV arrays rated at 9kWp each thus contributing to a total solar capacity of 108 kWp. A total of 532 primary floaters and 758 secondary floaters were installed with 4 pieces of 4 tonne bottom anchors and 2 pieces of 4 tonne bank anchors. A 50m floating bridge required an additional 192 secondary floaters. As for the electrical interface, 12 pieces of 9kWac string inverters and one 300kVA step-up transformer were used.

With a total yield of 83.82kW from February till July 2016, the actual yield is 10.6% more than projected due to higher amount of sunlight received for February-March caused by El-Nino. The capital expenditure (CAPEX) exceeds that of ground mounted PV system owing to anchoring, floating device and submersible cable costs. A significant chunk of cost goes to the floating device which was fully imported. Mr. Razwan then highlighted the challenges faced in constructing the floating solar plant which includes:

1. the fluctuating water level of more than 20m per year mandates a highly flexible and adaptive anchoring and mooring system design
2. the drop in water level which complicates the installation of anchors using crane
3. low availability of nonstandard components required which includes submersible DC cable, PV modules, and aluminium frames
4. unpredictable weather conditions which changes rapidly further complicates the construction process which takes place in the middle of a lake
5. weakening of ringgit against USD and Euro increased the system cost by about 25%

The presentation is then followed by a tour to the floating PV system at the lake. The photos below illustrate the site visit:



Figure 2: Floating Solar System in Sungai Labu Water Treatment Plan



Figure 3: Group photo of all participants