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Increasing the Capacity of the Power House of a Palm Oil Mill

OOI HO SENG AND KUMAR SUBRAMANIAM

SGT Konsult Sdn Bhd, E3303, 3 Two Square, 2 Jalan 19/1, 46300 Petaling Jaya, Selangor Darul Ehsan, Malaysia

The new regulations of the Department of Environment (DOE) have created the need to increase the power generated at the mill. According to the Clean Air Regulations 2014, the boiler emission levels for existing mills must be less than 150 mg per m³ of particulate matters in the flue gases by 2019. For the mills which are located close to population centres, such as in Sandakan, Sabah, the treated POME (palm oil mill effluent) at the final discharge must be below 20 ppm (parts per million) in biological oxygen demand (BOD). In addition, the treated POME must be used for land application. The DOE regulations have created operational problem for the existing mill as additional power is now required by the mill to operate the boiler emission control and monitoring devices to operate the POME polishing plant and to pump the treated POME for use in land application. Technology and literature reviews were carried out on the use of palm oil mill wastes for power generation, on boiler design and emission reduction and on turbine design and power generated. Four technology options for increasing the capacity of a 45 tph (ton per hour) mill powerhouse from 1.2 MW to 1.8 MW were developed and evaluated. Option 1 is to use the existing boiler and installing a new 1.8 MW multi-stage turbine. Option 2 is to install a new 1.8 MW backpressure turbine and a new 50-tonne per hour biomass boiler. Option 3 is to use the existing boiler and turbine and connect the mill power system to the national grid to top up the required power. Option 4 is to generate the additional power using the existing diesel generator sets (200 kW and 400 kW). Financial cashflow analyses and sensitivity analyses were carried out on the four technology options. The most feasible technology option to increase the capacity of the mill power house from 1.2 MW to 1.8 MW is to use the existing boiler with the new 1.8 MW multiple stage turbine.

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