Independent Study Title A Financial Cost-benefit Analysis of Electricity Generation from Wastewater Treatment of Palm Oil Crushing Mill

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ABSTRACT

This study has three objectives. First is to understand the process of electricity generation from wastewater treatment activities of a palm oil crushing mill. Second is to perform cost and benefit analysis of the investment in electricity generation system from wastewater treatment activities in palm oil crushing mill. And, third is to undertake a sensitivity analysis of such investment project.

The palm oil crushing mill under study basically produces crude fresh palm oil and has a production capacity to handle 45 Tons of fresh palm fruits per hours. The crude oil will be sold to vegetable oil refineries for further processing into cooking and edible oils. The crude palm oil extraction process at the mill generates on the average 300 cubic meters of wastewater daily from the stage of steaming oil palm fruit bunches and the stage of fractionation. The wastewater will then enter the Completely Stirred Tank Reactor (CSTR) which is an anaerobic or closed treatment system suitable for industrial wastewater containing high suspended matters content like that from crude palm oil extraction process. The treatment process generates about 6000 m^3 per day of biogas of which 67% is Methane, as well as reduces BOD and COD contents in the treated wastewater by 96% and 65%, respectively. The biogas is then used to fuel the operation of a 500

kilowatts electricity generator which produces on the average 2880000 units of electricity per years.

The project on investment in electricity generation system using wastewater treatment by-product in palm oil extraction plant has the following facts and assumption. The project life is 20 years given the discount rate of 4%. The establishment cost will require an initial investment at 21,800,000 baht. The first year operation cost is 2,621,000 baht with 7,765,714.29 baht return. The salvage value at the end of the project is 766,666.67 baht. The financial analysis of this project revealed the Net Present Value (NPV) to be 76,785,186.76 baht, the Internal Rate of Return at 26.30, and the B/C ratio at 1.84 with 4 years and 204 working days payback period (1year = 300 working days) and therefore this project is worth investing. The sensitivity analysis was undertaken under there scenarios: when return is unchanged, cost can be increased as high as 83.68% ; when cost remains constant, return can be lowered down to 45.56%; and if cost increase and return decrease take place simultaneously, a maximum 29.50% change can be allowed for economic feasibility.