Topic: Life Cycle Cost Analysis of Upgrading Brown Coal (UBC) Process in Indonesia

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ABSTRACT

International Energy Agency (IEA) has forecasted in that the demandfor coal would increase by 59 % between the years 2010 and 2035. In Indonesia, coal is expected to become a major energy source to replace oil as set on The National Energy Policy of Indonesian Presidential Decree No. 5, 2006. Indonesia which is one of the top 5 of coal producers mostly concern to fulfill the domestic needs and exporting to other countries in order to increase the income from the energy sector.The potential of Indonesia's coal are low and moderate calorific coal which classified as brown coal. Due to the low heating value, high moisture content and the trend towards higher emissions, brown coal is difficult to be applied directly.

Improving the quality of brown coal, known as Upgrading of Brown Coal (UBC) process is a way out of this issue. The UBC process increases the added value of brown coal so that it is able to meet the coal needs of domestic energy sources and can be exported at a higher price. This study provides an overview of the opportunities of UBC implementation projections based on its life cycle cost (LCC) then make energy policy recommendations. LCC method was conducted to investigate the UBC plant with capacity of 5,000,000 tons/year. The investment costs of UBC plant is USD557.05 million with production costs of USD 92.35/ton. In this study, the UBC product prices selected was USD 93.94/ton (the average coal prices with calorific value of 6,052kcal/kg in 2010 – 2014). The prices of brown coal as feedstock highly influenced, more than half, the net production costs of UBC product.

In terms of economic performance, annual cash flow (ACF) and net present value (NPV) were positive after the production process.The internal rate of return (IRR) is 9.36 % and the payback period (PBP) is 9 years of 20 years of lifetime project. In summary, the analysis showed that the UBC plant is most likely to be feasible.

The total greenhouse gas emission potential, which occurs in the transport section, is divided into two parts: UBC feedstock distribution and product distribution in both the domestic and export sales, 0.059 kg CO_2-eq/ton UBC product, 2.112 kg CO_2-eq/ton UBC product and

1.692 kg CO_2-eq/ton UBC product respectively. While at UBC process, emissions that occur during the process of power generation asenergy source to run the process at UBC 74.454 kg CO_2-eq/ton UBC product or 372,268,800 kg CO_2-eq/year. The UBC process itself takes place in a closed and recycled system, so it can be assumed that almost no emissions form during the process. In terms of UBC product competitiveness, it can reduce feed consumption were used by 50% compared to brown coal in mass basis. Furthermore, the greenhouse gas emission potential which occurs between the two scenarios is 1.141billion kg CO_2-eq/year as net saving.

The Government of Indonesia should pay attention to the mining sector and the UBC process development sector to support the Energy Mix target for 2025. Only by the reduction in feedstock price, improvement in UBC product conversion and also the prevention direct sales of brown coal, UBC process can be developed so that Indonesia can benefit greater in the long term. Coal policy is needed for UBC process development and to prevent direct sales of brown coal to keep coal prices remained stable.

Keyword: Brown coal;Upgrading brown coal; UBC; Life cycle costs; Economic Feasibility; Energy Policy; UBC product competitiveness;