Study The Application of Cleaner Production at Bukit Asam (Corporation) Tarahan Coal Terminal

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Abstract
The process of accumulation (stockpiling) and mixing (blending) of coal will produce coal quality in accordance with the specifications you want, but as a byproduct of coal sludge typically generated, air pollution, water pollution, self combustion and others. Efforts in maintaining the quality of the coal in the process of stacking and blending of coal is by revamping operations in unit coal loading port. Approach to the prevention of waste offers the highest level of protection to workers and public health, including the protection and conservation of the environment both locally and globally. The research was conducted in two stages: (1) the observation and study of the cleaner production of coal at the terminal level, and (2) study the implementation of cleaner production and recommended for coal terminal. The results get 14 cleaner production options that can be implemented in Bukit Asam (Corp), Tarahan Coal Terminal 1). Garbage collection on each carriage. 2). The use of water from the inlet / sea water using water tankers. 3). Returns coal to stockpile. 4). Repeated use of water for watering the operational area. 5). Watering the carriage before the reversal process. 6). Installation of water spray / sprinkle. 7). Returns runoff water which still contains coal to the stockpile. 8). Make a wall in the dock. 9). Use a vacuum cleaner cars. 10). Collecting coal before the reversal process then sold to be used again as a raw material coal briquette plant. 11). Making holes biopori. 12). Soon handle spontaneous combustion. 13). Using mask and ear plugs. 14). The use of air monitoring equipment. The investment costs required for the implementation of cleaner production Rp. 2. 677.000.000, - which payedback period for 1 month.
Key words: *Coal, Waste, Cleaner Production.*

I. Introduction

a. Problem

The process of stacking (stockpiling) and mixing (blending) of coal will produce coal quality in accordance with the specifications that you want, but as a byproduct usually generated silt coal, air pollution, water pollution, self combustion and others. Efforts in maintaining the quality of the coal in the process of stacking and blending of coal is by revamping operational activities at the coal loading port unit [1]. With the ever increasing global sensitivity to environmental issues, clean production offers a solution that is economically, the most good and logically. Prevention approached of waste offer the highest level of protection to workers and the public health, including the protection and conservation of the environment both locally and globally. Another

advantage other than its environmental benefits are economic benefits that could be a reduction in the cost of raw materials, as well as the development of new products from waste recovery [2].

b. Purpose

Purpose of this reasearch are :

1. Identify the stage of processing coal at PTBA Tarahan Coal Terminal potential for the application of cleaner production based on the use of raw materials, energy, and the characteristics of the waste generated.
2. Design process improvement in PTBA Tarahan Coal Terminal through a strategic approach to cleaner production to minimize waste and energy use efficiency.

II. Methodology

a. Time and Place of Research

This study was conducted in April 2012 to May 2012. Research located in PTBA Tarahan Coal Terminal, Bandar Lampung, Lampung Province, Indonesia.

b. Research Implementation

Research was conducted by collecting primary and secondary data related to the implementation of cleaner production which has been and will be applied to the PTBA Tarahan Coal Terminal. Then to identify the application of cleaner production and identification of alternative solutions problems.In addition, this study analyzed the problem and constraint application of cleaner production. This research was conducted in two stages: (1) the observation and study of clean production at the level of the coal port; and (2) study of implementation of cleaner production application of the coal port recommended

III. Result and Disscussion

a. Feasibility Study Options of Clean Production at Tarahan Coal Terminal

The feasibility study carried seek alternatives or options for net production is given to solve the problems facing company. Feasibility study evaluated include technical feasibility studies, economic feasibility studies and environmental feasibility study. The purpose of the feasibility study is to determine the options that may be applied cleaner production or in the production

process, when viewed from the ease of implementation, costs and benefits of the options when the option is implemented and their impact on the environment after the option is applied. The results of the feasibility study of cleaner production options are presented in Table 1. Base in Table 2. can seen that the foreign material retrieval option on each carriage Babaranjang, the reuse of water for watering the operational area, the use of water from the inlet (channel) / seawater using water tankers and the return of coal stockpile to occupy the first priority with a number scale respectively 9, the judgment was based on:

1. Technically, for the retrieval of foreign material, the use of water from the inlet (channels) or seawater using water tankers, water reuse of a sludge pond can use a portable pump, water tank and truck, and return to the coal stockpile can use wheel loader and the truck easy for companies to implement, therefore the company can apply the cleaner production options directly on the production / operations.
2. Economically, making foreign material can improve the quality of products that get high selling price. The existence of material other than coal can cause a complaint (complaint) from the customers so that the company should compensate the form finalty in accordance with the purchase contract. Because the 9001 Quality Management System which has been applied to the PTBA Tarahan Coal Terminal require products sold must clean coal (clean coal) [3]. Economically, the use of water from the inlet (channels) or seawater using a water tank can save expenses for the purchase of clean water. Economically, the reuse of water from the sludge pond can reduce the use of water, so it can save costs for the purchase of water. Economically, the return to stockpile coal can reduce the amount of coal that is lost in the production process.
3. Based on the viewpoint of the environment by making these wastes are not discharged into the environment can reduce pollution. Garbage can be sorted by type, whether organic, inorganic, and hazardous material so that it can be reused. Based on the standpoint of the environment by the use of water from the inlet (channels) and the reuse of water from the sludge pond with no discharge to the environment can reduce water pollution to the sea. Based on the environmental point of view to returning to stockpile coal with no discharge to the environment can reduce pollution.

Table 1. Study The Application of Cleaner Production at PTBA Bukit Asam (Corporation) Tarahan Coal Terminal

Process	Problem	Cleaner Production Solutions	Economic value	Environmental value
Coal Receiving	Foreign material in the hopper of transporting coal	Intake of foreign material on each carriage/ container	Increase product quality so can improve price	Minimize polution from foreign material
	Dust when dumping coal container	Water spraying before dumping process Making Buffer zone		Reduce air polution
	Fine Coal (Coal which already polluted by oil)	Collecting coal and sell for reuse again as raw material for coal briquette	Improving income	Minimize polution
	Coal which have potential Batubara yang berpotensi tercecerkelautsaatbongkar Muat	Make dividing wall in the jetty	Minimize coal loss	Minimize Pollution
Coal Processing	Coal loss(such as dust and noise because coal crushing)	Wear mask and ear plug	Reducing employee health cost	Safety and health
Coal cumulation	Dust from stacking and reclaiming	Installing Water spray/ Sprinkler		Reduce air pollution
	Run off when rainy seasons	Restore run off which contain coals to stockpile Making biopori holes	Minimize coal lossing Water eficiency	Reduce water pollution Reduce air poluution
	Water in Sludge Pond (KPL)	Water reuse for spraying operasional area		

	Dust in mining road or operasional road	Reuse water from inlet/ sea water by water tank	Water eficiency	Reduce air pollution
	Dust in operasional area	Use Vacuum cleaner car		Reduce air pollution
Maintenance	Coal from sampling	Return coal to stockpile	Minimize coal lossing	
	Self combustion causing reduce coal quality	Immediately handling self combustion	Keeping coal quality	Reduce air pollution (smell of burning)
Shipment	Dust in distribution process from stockpile to barge	Use water spray		Reduce air pollution
	Coal from *vibrating* Screen process	Return coal to stockpile	Minimize coal lossing	

Table 2. Determining Scale Priority of Cleaner Production Options (Based on Tabel 1.)

No	Option	Appraisal			Total	Scale Priority
		Technically	Economicallay	Environmentally		
1	Intake of foreign materialon each carriage/ container	3	3	3	9	1
2	Water spraying before dumping process	3	2	3	8	2
3	Collecting coal and sell for reuse again as raw material for coal briquette	3	2	2	7	3
4	Make dividing wall in the jetty	3	2	3	8	2
5	Wear masker and ear plug	3	2	2	7	3
6	Installing water spray/ sprinkler	3	2	3	8	2
7	Restore run off which contain coals to stockpile	3	2	3	8	2
8	Making biopori holes	3	2	2	7	3
9	Water reuse for spraying operasional area	3	3	3	9	1
10	Reuse water from inlet/ sea water by water tank	3	3	3	9	1
11	Use Vacuum cleaner car	3	2	3	8	2
12	Use Ambient Air Sampler	2	1	1	4	4
13	Return coal to stockpile	3	3	3	9	1
14	Immediately handlingself combustion	3	2	2	7	3
15	Use *water spray*	3	2	3	8	2
16	Return coal to stockpile	3	3	3	9	3

Table 3. Remarks of Priority Scale [4]

Scale	Technially	Economically	Environmentally
3	Very easy to be applied	Give value significantly	Give significantly effect to repairing environmental.
2	Relatively easy to implement	Little economic value added	Little effect to repairing environmental
1	Difficult to be implemented	No added value	No effect to repairing environmental

Table 4. The Calculation of the Feasibility Study options Ports Clean Coal Production

No	Option	Need	Cost Unit(Rp)	Total (Rp)
1	Intake of foreign materialon each carriage/ container	20 Person	2,500,000	50,000,000
2	Reuse water from inlet/ sea water by water tank			
	Company saving budget to buy water	180 Water Tank	100,000	18,000,000
3	Return coal to *stockpile*	1 *Truck*	17,000,000	17,000,000
4	Water reuse for spraying operasional area			
		1 *Wheelloader*	25,000,000	25,000,000
5	Water spraying before dumping process			
	Clean water used	1200 Water Tank	100,000	120,000,000
6	Installing*water spray/sprinkler*	1 Packet	10,000,000	10,000,000
7	Restore run off which contain coals to stockpile			
		3 *excavator*	25,000,000	75,000,000
8	Make dividing wall in the jetty	1 Packet	10,000,000	10,000,000
9	Use vacum cleaner car			
	Invest vacum cleaner car	1	2,000,000,000	2,000,000,000
10	Collecting coal and sell for reuse again as raw material for coal briquette			
	Company get budget added	560 Ton	700,000	392,000,000
11	Making biopori holes	30	500,000	15,000,000
12	Immediately handling self combustion			
	(Can use *excavator* point 7)			0
13	Wear masker and*ear plug*	200 Orang	125,000	25,000,000
14	Use Ambient Air Sampler			
	Investing Ambient Air Sampler	2	165,000,000	330,000,000
	Total Biaya			2,677,000,000

Based on the calculation of economic feasibility studies of industrial cleaner production options Tarahan Port Table 4, with 14 options apply the net production will require an investment cost of Rp. 2.677 billion, - for a period of one month with a payback period of one month. Coal port is considered very advantageous economically if it can apply to both cleaner production options are recommended, so that the impact of pollution on the environment can be minimilized. Pay Back Period (PBP) is the time required by a project to restore the initial investment with returns certain.

$$PBP = \frac{\text{Invesment Value}}{\text{Benefit}}$$

PBP = Rp.2.677.000.000,- = 1 month
Rp.7.000.000.000,-

IV. Conclusions and Advice

a. Conclusions

Based on the research results can be summarized as follows:

1. The processing of coal at PTBA Tarahan Coal Terminal has the potential to be applied cleaner production based on the use of raw materials, energy, and the characteristics of the waste generated.
2. Repair process in PTBA Tarahan Coal Terminal through a strategic approach to cleaner production cleaner production there are 14 options, namely: 1). Trash collection in each carriage. 2). Use of water from the inlet / sea water using water tankers. 3). Returns to stockpile coal. 4). Repeated use of water for watering the operational area. 5). Watering carriage before the reversal process. 6). Installation of water spray or sprinkle. 7). Returns runoff water that still contains coal to the stockpile. 8). Creating a barrier wall in the dock. 9). Use of a car vacuum cleaner. 10). Coal recovery before the reversal process are then sold to be reused as raw material for coal briquette plant. 11). Making holes biopori. 12). Immediately handle self combustion. 13). The use of masks and ear plugs. 14). Budget for usage monitoring tool investments required for the implementation of the cleaner production optionsRp. 2.677 billion, - with payback period for 1 month.

b. Advice

PTBA Tarahan Coal Terminal should invest one unit of a vacuum cleaner car, so to preventing dust in the area of operational leverage and reduce air pollution.

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