



## **Management Policy for Organic Waste from Plantation and Plantation Production Factory in North Sumatra**

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**Abstract:** Policy on the management of the living environment in Indonesia changed with the promulgation of Act No. 32 in 2009 on the protection and management of the environment. While Act No. 18 in 2008 specifies the policy on waste and trash management. In accordance with the concept of environmental ethics the application of environmental ethics in North Sumatra is vital to develop good waste management (Keraf, 2012). The concept of environmental ethics reviews human, nature and environmental relationship between people with the natural environment (Keraf, 2004). The purposes of this writing are: (1) to enhance the moral responsibility of society in accordance with environmental ethics on plantation waste management in North Sumatra Province, (2) to enhance the role of community participation in safeguarding the environment by means of management of organic waste from plantation, and (3) to increase the potential and opportunities of managing organic wastes from plantation into valuable products that can benefit the community. The research method adopted is a descriptive analytic method. Thus, the survey was conducted to the plantation communities in North Sumatra. From the results of the analysis, it is found that some estates have been processing organic wastes into alternative Energy, biogas, feed cattle, buildings, raw materials and ingredients for compost. However, the local community has yet to feel the benefit from this progress, while there are still many estates that have not done much in terms of waste management. It decreases the aesthetic and contribution to environmental pollution around the area. Only a very small number of the community members (0.35%) have conducted sustainable waste management, which in fact has a high economic value (90%). Some recommendations for plantation waste management policy in North Sumatra are: (1) the role and support of the community and the Government in the management of organic wastes in accordance with moral responsibility in safeguarding the environment refers to the ethical environment that supports sustainable development (2) waste management of plantations should consider the participation of the local community, as well as the socio- economic condition of the local, traditional people, and (3) unlock the potential and the opportunities of the management and utilization of plantation and agriculture waste into renewable energy.

**Keywords:** Environmental Policy, Ethical, Organic waste, Renewable energy.

### **1. Introduction**

Recently environmental issues have become a global concern in terms of peoples' lifestyle needs. A group of peoples' concerns is not enough for the environment because the change in an environment has a significant impact either locally or globally. Hence the "United Nations Conference on the Human Environment" which was held in Stockholm in June 1972 determined that waste management is vital for the preservation of the environment. Furthermore, it was stated that it is the responsibility of the whole human race and their governments.

Awareness of the need for environmental management is for the sake of the preservation of a balanced environment in order to support sustainable development. Hence the need to increase the utilization of the potential of natural resources and the environment by doing the conversion, rehabilitation and the use of savings. It could be done through the implementation of eco-friendly technologies, as well as by utilizing natural resources for the prosperity of people to pay attention to the sustainability of the function and the balance of the environment which is set by the law.

Act No. 32 of 2009 is about the protection and management of the environment. The discharge of this legislation is due to perceived environmental damage which was further subdivided, so there is a need for a policy to be issued. It is not only concerning the management of the environment but also the protection of the environment and its utilization for the community. Moreover, the legislation of the Republic of Indonesia number 18 in 2008 is about waste management. It states that the waste management methods and techniques today have not met the criteria of the eco-friendly waste management system, which in turn causes a negative impact on public health and the environment. Furthermore, garbage has become a national problem, so comprehensive management needs to be done. Additionally, integrate waste from upstream to downstream in order to gain benefits in terms of economy, healthy, and environmental safety as well as changing the behavior of the community.

Garbage and organic wastes, based on research results, have the potential for renewable energy and enhance the welfare of society in general. According to Haryanti et al. (2014) a ton of oil palm produces waste in the form of the empty Palm bunches as much as 23% or 230 kg, shell waste as much as 6.5% or 65 kg, husk 13% or 130 kg. Oil palm industry solid waste which contains organic materials are high so that if the handling of waste is inappropriate, it will pollute the environment. The empty Palm bunches

(TKKS) can be used as fertilizer, biomass and PLT bioethanol. Oil palm shells can be utilized as active carbon/charcoal liquid fertilizer in manufacturing, potassium sulfate, natural preservative know, fuel (biomass), briquettes. The coco palm oil can be used as material for amplifiers mechanical properties of composite, fiber glass, liquid waste processing, manufacture of pulp, alternative crop, alternative media replacement for solar and coal as a fuel for electricity generation. Oil Palm wastes can be utilized according to the Hidayanto (2010), organic growth which may increase crop production and as an alternative feed fodder. PPKS North Sumatra (2012) issued a cow feed formulation of a waste stem of palm oil and managed to improve cow weights by 1.2-1.4 kg/day and the utilization of waste biomass and biogas as a Palm power plant Steam.

North Sumatra Province itself has plantation and agricultural areas from the upper to the lower reaches of both community activities as well as companies in North Sumatra. It generates the amount of waste which negatively affects the aesthetics of the environment and public health. Especially the plantation and agricultural waste, which is not yet used to enhance the social economy of the surrounding communities. Moreover, environmental management in Indonesia is still surrounded by complexities. In the regulations of the President of Republic of Indonesia No. 7 in 2005 mainly Chapter 32 regarding improvements to the management of natural resources and the preservation of Environmental Functions, addressed the problem of principal in the management of the environment in Indonesia, by Hardjosoemantri (2006:57-58). It says: 1. Continue to decrease in the condition of forests in Indonesia. 2. Damage watersheds 3. Coastal ecosystems and habitats of the sea is getting damaged. 4. High threats to biological diversity (biodiversity). 6. Water pollution increases. 7. Air quality, especially in the big cities, decline. 8. The decline of oil and gas and mining results contributions to the acceptance of the State. 9. The high level of pollution and have yet to tackle waste management in an integrated and systematic way. 10. Policy adaptation to climate change (climate change) and global warming (global warming) have not been implemented. 11. global environmental issues are not yet fully understood and applied in the development of national and regional. 12. Legal regulations for environmental harmony. 13. Still limited awareness of society in the maintenance of the environment.

Those problems also occur in North Sumatra, so something needs to be done to overcome the material impurities in the streams. For instance, forest encroachment is often an expansion of plantation and agricultural waste, the problem which caused the methane gas (NH<sub>4</sub>) so aggravating global warming. Air pollution either in the town and the village environment, problems of health and welfare of the community especially in the area of plantation, non-plantation workers, and issue of environmental damage because of the company's activity in this aesthetic environment is deteriorating. Research and policy on the extent of agricultural waste management and estates in the area of plantations in North Sumatra Province are needed. Waste management in agriculture and plantations has potentials in creating economic value products as well as benefit the society and improve the aesthetics of the surrounding environment. Understanding environmental ethics in the policy of keeping the vagaries of behavior to be more discerning and thoughtful in addressing concrete issues happening in the surroundings.

## 2. Research Methodology

Research methods used are a qualitative descriptive method and a survey to the plantation communities in North Sumatra. The research was conducted in Sampali and palm oil plantation Pagar Merbau PTPN2, Adolina PTPN4, PT Buana Private Estate Plantations, PT London Sumatra, Aek Pancur PPKS and sugar cane plantations Kuala Madu PTPN2 as well as agricultural areas (Tiga Binanga, Karo Land Percut Sei Tuan Binjai and Deli Serdang).

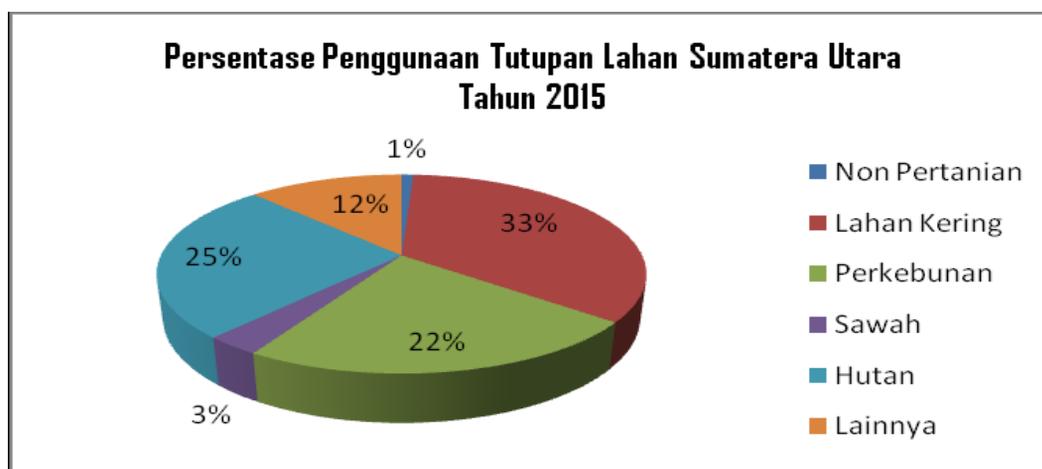
Types of data used consisted of primary data and secondary data. Primary data obtained from direct interviews with the use of questionnaires and surveys directly to areas in the samples regarding waste management of plantations and farm community. Secondary data were obtained from the environmental status report of North Sumatra by 2015, Statistical Data of Sumatra in numbers, government regulations, reports of cooperation company (CSR) to the community in improving the welfare of the surroundings the estate, law and Government regulations, the results of the research on the management of organic wastes, reference books and agencies involved in the research.

Sampling techniques for the community by using purposive sampling methods i.e. by choosing people who live in the neighborhood of plantation as well as the perpetrators of the community feel the estate of operational activities and agriculture. The number of respondents who were interviewed from each research location is 20 heads of households are either employees or community public garden outside the estate. Methods of Data analysis that is done in the processing and analysis of data with the help of the program Microsoft Office Excel 2007. Parameters of observation in the research community's Assessment of them against the environmental management program by the Government, the assessment of the community's response to the cooperation company (CSR) to the community, the identification of environmental management activities by people in and outside the plantation estates.

## 3. Result and Discussion

### 3.1 The situation of North Sumatra plantation

Result of the broad land cover data inventory in North Sumatra Province National Land Agency of the region of North Sumatra by 2015 showed that dry land and forests dominated land use in North Sumatra Province with an area of dry land 2,363,064.35 Ha or 32.94% of the broad coverage of the entire land area of 1,769,758.11 Hectares or 24.67% of the whole vast land cover, non-farm land area 63,595.09 Ha or 0.86% of the broad coverage of the entire land. 1,488,728.53 acres of plantation or broad coverage of 21.89% of land. 212,271 acres of rice paddies or 2.96%. Description of the land cover shown in graph 1.



**Graph 1.** Land and forests in North Sumatra Year 2015

Based on the above graph it is visible that there is only a 3% difference in the area of plantation and forest in North Sumatera. Based on the area of the land shows that organic biomass is very abundant and economical utilization of possibilities and potential. The population of North Sumatra's own 2014 numbered 13,766,851 inhabitants which consist of 6,868,587 males and 6,898,264 females. Comparison of plantation area by population shows the potential biomass of plantation management, so biased met zero waste or absence of sewage posed by plantations.

The environmental policies supported by the North Sumatra Government are: 1. the protection and conservation of natural resources, 2. impurities and the destruction of the environment control programs, 3. Environmental Management Programs and rehabilitation of coastal and marine ecosystems. 4. Quality Improvement Program and access Information of natural resources and the environment (Report SLHD of North Sumatra 2015). But based on survey results obtained, the four programs have yet to be felt by the community, especially in improving the quality of the environment and environmental management in North Sumatra.

### 3.2 Assessment of the community towards environmental management programs by the government

The assessment identified in this research is the environmental management programs in particular management of organic wastes that can lower aesthetic environment. Courses conducted which made parameters in the question form on the basis of the report of the SLHD of North Sumatra by 2015. Based on the results of the survey data and the obtained data on the suitability of the program to the community surroundings about Sampali and palm oil plantation Pagar Merbau PTPN2, Adolina PTPN4, PT Buana Private Estate Plantations, PT London Sumatra, Aek Pancur PPKS and sugar cane plantations Kuala Madu PTPN2 can be seen in table 1.

**Table 1:** Community assessment of government programs

Community perception	Natural Resources conservation program		Environment pollution control program		Waste management program		Environmental quality development program	
	Σ	%	Σ	%	Σ	%	Σ	%
Did not know	79	32.92	75	31.25	76	31.67	70	29.17
Did not implemented	98	40.83	98	40.83	99	41.25	112	46.67
Implemented	63	26.25	67	27.92	65	27.08	58	24.17
Total	240	100.00	240	100	240	100	240	100

Based on Table 1, it can be seen there are four courses conducted by the government in an attempt to control, protect, manage and enhance environmental quality. Four programs based on Regional Environmental Status Report (SLHD) of North Sumatra 2015 have the purpose to know the environmental conditions in North Sumatra; to find out the sources of contamination and the magnitude of the pressure on the environment; to know the data related to the rehabilitation of the environment, AMDAL, law enforcement, community participation and the rule of law; to know the environmental management efforts already undertaken; as well as to find out the main environmental issues that happened in North Sumatra, so that it can attempt formulated policies to manage them.

The goal of the Program is still to collect data but the program has not yet been implemented and the benefits felt by the community. Survey results on chart 1 shows assessment of society against government programs, respondents answered more than 40% of the resources were not answered. It is due to new program to obtain data and its realization is yet to be implemented until the interview takes place.

### 3.3 Assessment of the community on the Company's Cooperation Program (CSR) with the community

The company not only aims to maximize the profit gained, but in running its travel business survival required a social responsibility and increased social welfare so that the company is not only being responsible to its owner, but also to the surrounding community (Soraya, 2011). Society and the natural environment is the main source of production of the most important factors for the activities and existence of the company. Without society and the natural environment, the company will never exist and are able to thrive. Businesses can grow and flourish due to factors of production. That's why companies have a social responsibility or Corporate Social Responsibility (CSR) to the existence of the society and the natural environment (Marlia and Hidayat, 2008).

CSR (Corporate Social Responsibility) is a concept or action carried out by the company (as the ability of the company) as a form of social responsibility/environment where the company is located. Examples of this form of liability are varied, from conducting activities that can enhance the welfare of society and the improvement of the environment, granting scholarships to children, the granting of funds for the maintenance of public facilities, donation to the village/community facility that is both social and useful for society, especially communities that are around the company is (Akbar, 2012).

Corporate Social Responsibility (CSR) has become part of the strategy's efforts in increasing profits and steady business growth. The concept and practice of CSR is already showing symptoms of a new corporate strategy that can spur business growth and stabilize in the long run (2008,2009,2010 Asniwaty). Corporate Social Responsibility (CSR) is also often interpreted as the relationship between decision making with ethical values, the fulfillment of the norms of the law and appreciate the dignity of man, society and the environment (harmony and Andriyani, 2008).

Based on the survey results, obtained data on the suitability of the program to the community surroundings about Sampali and palm oil plantation Pagar Merbau PTPN2, Adolina PTPN4, PT Buana Private Estate Plantations, PT London Sumatra, Aek Pancur PPKS and sugar cane plantations Kuala Madu PTPN2 that can be seen in table 2.

**Table 2.** Assessment of the community on the Company's Cooperation Program (CSR) with the community

Community assessment	Cooperation in environmental management		Community prosperity development program	
	∑	%	∑	%
Did not know	69	28.75	75	31.25
Did not implemented	112	46.67	110	45.83
Implemented	59	24.58	55	22.92
Total	240	100.00	240	100

Based on the assessment of the community regarding the cooperation of a business entity to the public votes have yet to be implemented to its full potential. It can be seen from the value to cooperation in the management of the environment, is not done by 46.67%, while for the enhancement of the well-being of the community of 45.83%. We know that sustainability CSR program is the sustainability and stability of the company. Sustainability and stability of the company must be supported by communities surrounding the company. Therefore sustainability is inseparable from the wellbeing of the communities surrounding the company. There are at least three important reasons why the corporate world should give responses to CSR in order to be in line with the guarantee of the sustainability of the company's operations, as well as advanced Wibisono (2007), namely: the company is a part of the community and therefore it is natural when the company pays attention to the interests of the community as compensation or reciprocal efforts over mastery of natural resources or economic resources on the side as compensation arise because of social discomfort (discomfort) in the community; The company and the community have a relationship that is symbiotic mutualism, respectively to contribute positively to the relationship harmonization of imagery and the performance of the company towards the community; CSR activities is one way to dampen or even avoid social conflict due to structural and economic disparities that arise between society and the components of the company.

Own CSR benefits to society in the running of its social responsibility, the company is focusing its attention to three things, namely the profit, social (people), and environment (planet) (Anerih, 2012). The difficulty of implementing CSR is currently the existence of land tenure conflicts between the company and the community so that the relationship became stormy is causing companies reluctant to disburse the CSR. Attention to the community can do with the way companies conduct as well as the creation of policies that improve well-being, quality of life and Community competence in various areas. In particular, with attention to the environment, the company can participate in environmental preservation efforts

for the sake of humanity's quality of life the rights protected in the long term. The company's involvement in the maintenance and preservation of the environment means that the company participated in an attempt to prevent the occurrence of the disaster and minimize the impact of the disaster caused by the damage to the environment. By running a social responsibility, the company is expected not only to pursue short-term profits but also contribute towards the improvement of the quality of life of society and the environment (especially the environment) in the long term (Asih, 2012).

According to Syafputri (2011), help with the company's corporate social responsibility (CSR) that channeled the company highly expected to cause an increase in welfare of society. It will accelerate around the company, with the help of the CSR, the company helps government programs in poverty reduction, environmental problem solving, open work space and opportunities to improve communities through community involvement in the management of the environment, this organic biomass management made the product economically.

### 3.4 Identification of environmental management activities by community outside the estate

**Table 3.** Organic Waste Management Activities by Community

Community	Code		Organic Waste Management				Total
	Location	Statement	Solid		Liquid		
			Σ	%	Σ	%	
Oil Palm Plantation	P1	Yes	14.00	5.83	0.00	0.00	5.83
PTPN 2		No	6.00	2.50	20.00	8.33	10.83
Oil Palm Plantation	P2	Yes	16.00	6.67	15.00	6.25	12.92
PTPN 4		No	4.00	1.67	5.00	2.08	3.75
Oil Palm Plantation PT	P3	Yes	16.00	6.67	0.00	0.00	6.67
Lonsum		No	4.00	1.67	20.00	8.33	10.00
Oil Palm Plantation PT	P4	Yes	13.00	5.42	12.00	5.00	10.42
Buana Estate		No	7.00	2.92	8.00	3.33	6.25
Oil Palm Plantation	P5	Yes	16.00	6.67	16.00	6.67	13.33
PPKS		No	4.00	1.67	4.00	1.67	3.33
Sugar Pane Plantation	P6	Yes	12.00	5.00	0.00	0.00	5.00
PTPN 2		No	8.00	3.33	20.00	8.33	11.67
PKS Sei Mangke	P7	Yes	12.00	5.00	10.00	4.17	9.17
		No	8.00	3.33	10.00	4.17	7.50
PKS Adolina	P8	Yes		6.25	14.00	5.83	12.08
PTPN 4		No	5.00	2.08	6.00	2.50	4.58
PKS Pagar Merbau	P9	Yes	15.00	6.25	0.00	0.00	6.25
PTPN 2		No	5.00	2.08	20.00	8.33	10.42
Sugar Factory Kuala	P10	Yes	15.00	6.25	0.00	0.00	6.25
Madu PTPN 2		No	5.00	2.08	20.00	8.33	10.42
Non Plantation Workers	P11	Yes	0.00	0.00	0.00	0.00	0.00
		No	20.00	8.33	20.00	8.33	16.67
Non-factory Workers	P12	Yes	0.00	0.00	0.00	0.00	0.00
		No	20.00	8.33	20.00	8.33	16.67
Total Respondents			240		240		100%

The identification of environmental management activities in this research based on a policy of environmental management in Indonesia based on Act No. 32 of 2009 on the protection and management of environment and waste management policy based on the provisions of the ACT or trash RI number 18 in 2008. To make the management and protection of the environment as well as the need for waste management the application of environmental ethics in North Sumatra, according to the concept of environmental ethics (Keraf, 2012). The concept of environmental ethics review of human, nature and environmental relationship between man and natural environment (Keraf, 2012) environmental management especially organic waste management generally lowered the environmental aesthetics. Based on search

results and data obtained from the survey of the suitability of the program to the community surroundings about Sampali and palm oil plantation Pagar Merbau PTPN2, Adolina PTPN4, PT Buana Private Estate Plantations, PT London Sumatra, Aek Pancur PPKS and sugar cane plantations Kuala Madu PTPN2, as seen in table 3.

Table 3 indicates that the highest percentage in the processing of solid organic wastes of palm plantations in PTPN XIV there were 4, PT Lonsum estates, palm plantations and PPKS i.e. each of 6,67%. Next up for the processing of liquid waste obtained the highest percentage of palm oil plantations is PPKS i.e. 6,67%, while the lowest percentage of organic solid waste processing found in non-plantations and non-factory communities is 0.00%. The existence of a different high percentage of organic waste processing on all categories of palm plantations, the community, and the community estate non-standard nonfactory caused by organic waste management activities performed by the business activity itself (factory and plantation). Next on the processing of liquid organic waste found on the palm plantations of PTPN XIV 2, PT Lonsum plantations, sugar cane plantations PTPN XIV 2, MCC Pagar Merbau PTPN XIV 2, sugar factory Kuala Madu PTPN XIV 2, plantation, non-plantation and non-factory communities that is 0.00%. The low utilization of organic waste liquid is due to a concern of still contained pollutants and need surveillance authorities in accordance with the decision letter of the management of the environmental permit and the documents passed by the local government (BLH or BAPEDALDA).

Based on secondary data analysis, solid and liquid waste management is already done by the factory or plantation management itself in reducing material contamination. One of them is the oil palm factory Adolina and MCC Sei Mangke that conduct organic biomass utilization as a steam power plant and compost Material. MCC factory Pagar Merbau which has leveraged Sluged Biogas and then into biogas which is produced in the conversion operations do become power plants; the results retrieved 1 Mega Watt (MW) in one day. Unlike the palm plantations, PPKS has done managing the biomass material into animal feed a cow from stem of palm oil waste and succeeded in raising cattle weights added 1.2-1.4 kg/day as well as biogas as an ingredient for the local community.

Results of surveys and questionnaires against waste management activities, currently performed to its full potential because it is still remembered by some Garden trials. Utilization of waste agriculture and plantations during this insufficient are used only as mixed animal feed and fuel so that it becomes a source of environmental pollution. In Indonesia itself particularly in North Sumatra Province is the province that has the total area of plantations and farm acreage large enough that is 410,400.42 ha of agriculture and plantation. While the land utilized PTPN XIV and private estates as PT 329,589.89 ha, total area of plantation and agriculture in its own 739,990.31 ha Sumatra (Sumatera in numbers, 2013).

Waste management of plantations and factories still has yet to be felt by the public good benefits of plantations as well as outside the estate. Improvement of environmental quality and the application of environmental ethics by the community has not woken up in North Sumatra. Biomass utilization of organic wastes as an alternative fuel and household energy communities surrounding the garden has not been made with optimal utilization of waste, but it can improve the well-being of the community. This happens due to the existence of an integrated cooperation between companies with energy provider company (PLN and PT Gas Negara), so that the distribution of the excess energy the plant cannot be utilized optimally by society.

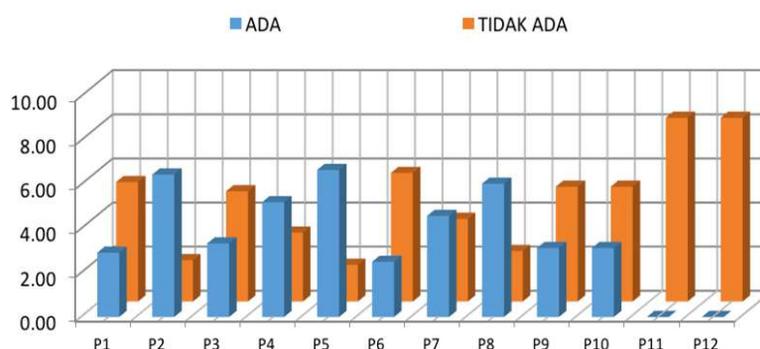


Figure 2. Percentages of communities doing organic waste management

As seen from figure 2, the location of P2 (PTPN XIV Adolina 4), P3 (PT Lonsum estates) and P5 (plantation PPKS) highest percentage i.e. 6.67%. The average percentage of the overall sampling locations retrieved 4.17% of society that performs processing of organic wastes continuously for the entire province of North Sumatra. The figure shows the level of managing organic wastes has not performed to the maximum by the community in the province of North Sumatra. Based on the area of plantation Area shows the utilization of organic waste potential in improving the welfare of the communities surrounding the estate and outside the plantations in Sumatra. Research results from Piwowar et al. (2015) stated that renewable energy in Poland is the biomass from waste from a farm. The total capacity of biogas in Poland was 244, 156 million cubic m per year that could potentially be used as a renewable energy. In Indonesia, this potential can be obtained from the estate of waste as renewable energy.

It is suitable according to Haryanti et al. (2014) in the results of his work in oil palm produces 1 ton of waste in the form of the empty Palm bunches as much as 23%, shell waste as much as 6.5%, Coco 13%. Generally, oil palm industry solid waste containing organic materials are high so that if the handling of waste inappropriately will pollute the environment. Empty Palm bunches (TKKS) can be used as fertilizer, biomass and PLT bioethanol. Oil Palm shells can be utilized as a carbon/charcoal liquid fertilizer manufacturing active, potassium sulfate, natural preservative know, fuel (biomass), briquettes. Coco palm oil can be used as material for amplifiers mechanical properties of composite, fiber glass, liquid waste processing, manufacture of pulp, alternative crop, alternative media replacement for solar and coal as a fuel for electricity generation. Oil Palm wastes can be utilized according to the Hidayanto (2010), organic growth and may increase crop production and as a feed alternative fodder. While according to Budiarto and great (2009), Palm Oil Mills with a capacity of 100 thousand tons of TBS/year with generation efficiencies around 25% can obtain electric energy 7.2-8.4 GW (e) h for shell; 9.2-15.9 GW (e) h for fibers and 30 GW (e) h for tankos. Through a typical analysis for digester anaerobic biogas can be obtained from liquid waste with the capacity and the same assumptions, electricity can be resurrected at least 1.32 GW (e) h. for this condition need electricity for production of 1.4-1.6 GW (e) h. waste Handling well will be capable of tapping the potential of environmental pollution and generate electricity for operation MCC and to the area around the Waste management of the sugar cane plantations also have not been fullest which is only removed and piled in the neighborhood around the plant and utilization of the waste itself also has yet to be felt in society. Based on the research results Mardiana et al (2016) describe organic wastes either sugar cane husks, sugar cane trunk, oil palm stem of powder and waste tea plantations can be used as oyster mushroom growth medium. Oyster mushrooms in Indonesia can be made into products of commercial value, edible mushroom economic value is high, and a prospective as a source of income. Currently, Oyster mushrooms have become the raw material required for processed into healthy food (Suharnowo, 2012).

## **4. Conclusions**

From the results of research conducted can be inferred:

1. North Sumatra has the potential to waste a high plantation which can be utilized in society and have a high economic value.
2. Government programs in waste management of plantations are not yet fully accomplished in the implementation of environmental policy in North Sumatra.
3. Inadequate waste management organic plantations and factories in improving the well- being of the society with the obtained average value of management by the public and non-plantation estates neighborhood of 4.17%
4. The corporate social responsibility (CSR) program has not yet been felt by the communities surrounding plantations in increasing economic prosperity.

## **5. Policy Recommendations**

1. Enhancement of the role of Government, companies, and communities in the utilization of organic wastes in keeping the environment refers to the ethical environment that supports sustainable development
2. Enhancement of the socio-economic condition of the community around the estate with the utilization of factory waste into electrical energy by utilizing excess electrical energy to the communities surrounding the estate
3. An increase in the potential and opportunities of processing and utilization of waste biomass plantations replacement fuel for domestic purposes the communities surrounding plantations.

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