



A REVIEW OF MUNICIPAL SOLID WASTE MANAGEMENT IN INDONESIA

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Abstract

The article is focused on the description of situation of Municipal Solid Waste Management in Indonesia from the perspective of the law and regulations as well as supporting governmental programs and with regard to the potential business in the near future. It was found that waste management in Indonesia is regulated by the following laws: Law Concerning Environmental Management; Waste Law regarding waste management; Presidential refers to energy, sustainability and environment protection and gives to all levels of Government responsibility for energy conservation; Presidential Regulations includes the targets for an energy mix by 2020. The government of Indonesia have also implemented some follow up programs such as: PROPER, a business performance-rating program is an alternative policy instrument to encourage compliance by companies; ADIPURA is a program for cities in Indonesia which succeed in maintaining the sanitation and environment management.

Key words: PROPER, ADIPURA, law, act, regulation, energy, strategy, government.

INTRODUCTION

The main factor influencing the waste production is the population of Indonesia, its growth and density. Indonesia is the most populous country in Southeast Asia with the total population amounting were 255 587 718 in 2012 with annual growth around 1.49 %. The population growth will bring problems faced by the government (KIS-KATOS & SPARROW, 2015A; LEHKONEN & HEIMONEN, 2015; LIU & YAMAUCHI, 2014). In 2010 the average waste produced in Indonesia was about 200 000 tons per day and the production is rapidly increasing (APRILIA, TEZUKA, & SPAARGAREN, 2013; S M KERSTENS, LEUSBROCK, & ZEEMAN, 2015; S.M. KERSTENS, SPILLER, LEUSBROCK, & ZEEMAN, 2016). Indonesian cities are facing serious issues concerning municipal solid waste (MSW). The issues occurred in all steps of waste management such as storage, collection, transferring, transportation, treatment, with the end point in the landfills. Problems are appearing not only with the waste from the households, but also from industrial processes. In a 2009 study conducted by the Bandung Institute of Technology's Centre for Research for Energy Policy (LPPM 2008), it was reported that 16.4 % or approximately 1.15 million tons of scheduled industrial waste generated annually goes unmanaged. Composition of MSW is as follows: household waste 48%, market waste 24%, commercial waste 9%, street and public facilities 5% and others 14%. From these facts it is evident that municipal solid waste management plays key role in development of the Indonesian cities as well as industrial

areas and it is integral part of several supported programs initialised by new government of Indonesian president Joko Widodo. From the point of view of the import of municipal solid waste technologies to Indonesia it is currently supported by the fact that based on the stable economic growth Moody's Investors Service raised Indonesian investment rating to Baa3 (NACIRI, 2015). This value represents Indonesia as the best country of investment evaluation from financial crisis during years 1997 and 1998. Another rating company, Standard & Poor's raised investment rating of Indonesia to BB. This company also raised long-term rating of Indonesian rupiah to BB+ (HASPOLAT, 2015). In accordance with current Indonesian investment rating, some Czech financial institutions - ČRB and EGAP decided to change territorial risk qualification of Indonesia from category 5 to category 4 (BINH, 2015; RICHTER, 2015). For comparison of investment ratings, similar rating values are currently assigned to Turkey (KRIYANTONO, 2015; MOELIODIHARDJO, SOEMARDI, BRODJONEGORO, & HATAKENAKA, 2012; NIJMAN, 2015; RACHMAN, RIANSE, MUSARUDDIN, & PASOLON, 2015; RUDITO, 2014; SINGH & SETIAWAN, 2013; SIRINGORINGO, MARGIANTI, KOWANDA, & SAPTARIANI, 2013; WIHANTORO, LOWE, COOPER, & MANOCHIN, 2015). Therefore the aim of this study is to describe situation of Municipal Solid Waste Management in Indonesia from the perspective of the law and regulations as well as supporting governmental programs and with regard to the potential business in the near future.



MATERIALS AND METHODS

Primary data was collected from Ministry of Energy and Mineral Resources (Indonesia), Directorate General of Renewable Energy and Energy Conservation (Indonesia), United Nations Centre for Regional Development (Indonesia), Cleansing Department of Jakarta Province (Indonesia), World Bank (Indonesia), CekIndo (Indonesia) in period from 2010 until 2016. Methods used for the data collection varied according to the target groups, semi structured personal interviews, focus group discussions and analysis of internal

documents were the most frequent. Most beginnings and termination parts of the interviews were informal, and many insights were obtained during casual conversations. Secondary data was gained by analysis of published materials of Statistical office of Indonesia (Badan Pusat Statistik Indonesia), analysis of law and regulations of Indonesia (Penelitian Hukum Indonesia) and by analysis of presidential directives (Direktif President RI).

RESULTS AND DISCUSSION

Waste management in Indonesia is regulated by the following laws:

1. Law Concerning Environmental Management No. 32 of 2009

It sets a mandatory utilization framework in the transportation, industrial, commercial and power generation sectors for biodiesel, bioethanol and bio-oil from 2009 to 2025

2. Waste Law No.18/2008 regarding waste management

According to Law No. 18/2008, waste generation must be minimized from the source to reduce the burden of waste transport and disposal. The law also highlights the importance of community in undertaking measures for waste reduction to minimize the burden of management and treatment. However, as these initiatives are still voluntary, not many communities are willing to apply the initiative. As the follow up of waste law no. 18/2008, the Ministry of Environment release waste law no. 81/2012. There are 3 main important issued in this law which are the first is starting in the year of 2013, every government reGENCY/town have to change the open dumping system in landfill to be environment friendly. Second, in the industries business (producer, importer, distributor, retailer, etc) along with the government have to realize the application of extended producer responsibility in waste management. And the third is the administrator of the residential area, industries area, commercial area, public facilities, special facilities, and other facilities, have to sort, collect, and manage the waste in each area (APRILIA ET AL., 2013; S M KERSTENS ET AL., 2015; S.M. KERSTENS ET AL., 2016; KIS-KATOS & SPARROW, 2015B).

3. Presidential Law No. 30 2007 refers to energy, sustainability and environment protection and gives to all levels of Government (central and regional) responsibility for energy conservation.

4. Presidential Regulations No. 5 2006 include the targets for an energy mix by 2020 which includes at least 15 % of national energy consumption to be generated from renewable energy, including biofuel, geothermal and other renewable sources.

Despite the available local regulations, the enforcement is still low. To implement the waste law No. 18/2008 regarding waste management, the Ministry of Environment formulated 3 drafts of regulations including waste minimization, waste handling and waste specific management (LAW ACT, 2008). From these drafts, the Ministry of Environment forms the program to handle the waste management called 3R - reduce, reuse and recycle. Since 2007, the 3R program was initiated in 33 provinces as pilot subject of segregation, composing and recycling in about 300 locations in 2010. By 2014, it is expected that the implementation of 3R program will reduce the amount of disposed waste to landfill by 20% (GARCGIA, AFSAH, & STERNER, 2009).

Based on the 3R program, the government in their efforts to improve the waste management practices implemented some follow up programs such as:

1. PROPER, a business performance-rating program is an alternative policy instrument to encourage compliance by companies (Fig. 1; Fig. 2). PROPER is aimed to:

- Improve compliance of companies in environmental environment;
- Improve commitment of stakeholder in creating environment sustainability;
- Improve sustainable environment management performance;
- Increase awareness of business player to comply with environment legislation;
- Reinforce principles: reuse, recycle and recovery in waste management (3R).

2. ADIPURA is a program for cities in Indonesia which succeed in maintaining the sanitation and envi-



ronment management. The strategies for the implementation of Adipura program are:

- To motivate local government by providing incentive and awards;

- To motivate the competition among local government;
- To apply local specific of each area with their own specific trademark.

GOLD	For businesses/activities that have successfully perform environmental management effort and achieved satisfactory result.
GREEN	For businesses/activities that have perform environmental management effort and achieve better result set forth in the regulation requirements.
BLUE	For businesses/activities that have perform environmental management effort, and have achieved the minimum standard of regulation requirements.
BLUE MINUS	For businesses/activities that have performed environmental management effort, but have not achieved the minimum standard of regulation requirements.
RED	For businesses/activities have performed environmental management effort, but have achieved a part of the minimum standard of requirement as regulated.
RED MINUS	For businesses/activities have performed environmental management effort, but have achieved a small part of the minimum standard of requirement as regulated.
BLACK	For businesses/activities that does not perform environmental management effort significantly.

Fig. 1. – Colour indicator and colour specification in PROPER program

The already published research (GARCIA ET AL., 2009) supported the fact that foreign owned companies were more sensitive to the PROPER program and worked hard to meet the criterion of the ranking to ensure a good standing in the rankings each year (Fig. 2). One would expect the foreign owned and large local firms sensitive to achieving a good rating to also focus on the evolving criterion for PROPER; including waste management aspects. Companies embracing the newly introduced criterion on 3R alternatives for management of waste stand a chance to be rewarded with a desirable rating should they also fulfil all other requirements (WIBOWO & GIESSEN, 2015). Municipal Solid Waste (MSW) handling based on 3R program looks as shown on the figure. The majority of the waste was collected (69%), another part was buried (10%), composted & recycled (7%), burned (5%), or remained unmanaged (10%) (SME, 2008). In 2010, the Directorate General for New and Renewable Energy and Energy Conservation was established under the Ministry of Energy and Mineral Resources to promote demand-side energy management (conservation) and sustainable supply-side energy management (diversification away from fossil fuel sources). The National Energy Council secretary general, Hadi Purnomo, said that with the rise in fuel consumption and a decline in fossil energy reserves, renewable energy

must be utilized and stop export of gas and coal, which can be used as alternatives to oil (which is imported since 2006). One of the strategies to produce more energy from renewable sources is to start using biofuel, which should contribute to the energy production mix by 5 % in 2025, according to the National Energy Strategy. Municipal Solid Waste (MSW) handling based on 3R program looks as shown on the figure. The majority of the waste was collected (69%), another part was buried (10%), composted & recycled (7%), burned (5%), or remained unmanaged (10%) (SME, 2008). In 2010, the Directorate General for New and Renewable Energy and Energy Conservation was established under the Ministry of Energy and Mineral Resources to promote demand-side energy management (conservation) and sustainable supply-side energy management (diversification away from fossil fuel sources). The National Energy Council secretary general, Hadi Purnomo, said that with the rise in fuel consumption and a decline in fossil energy reserves, renewable energy must be utilized and stop export of gas and coal, which can be used as alternatives to oil (which is imported since 2006). One of the strategies to produce more energy from renewable sources is to start using biofuel, which should contribute to the energy production mix by 5 % in 2025, according to the National Energy Strategy.

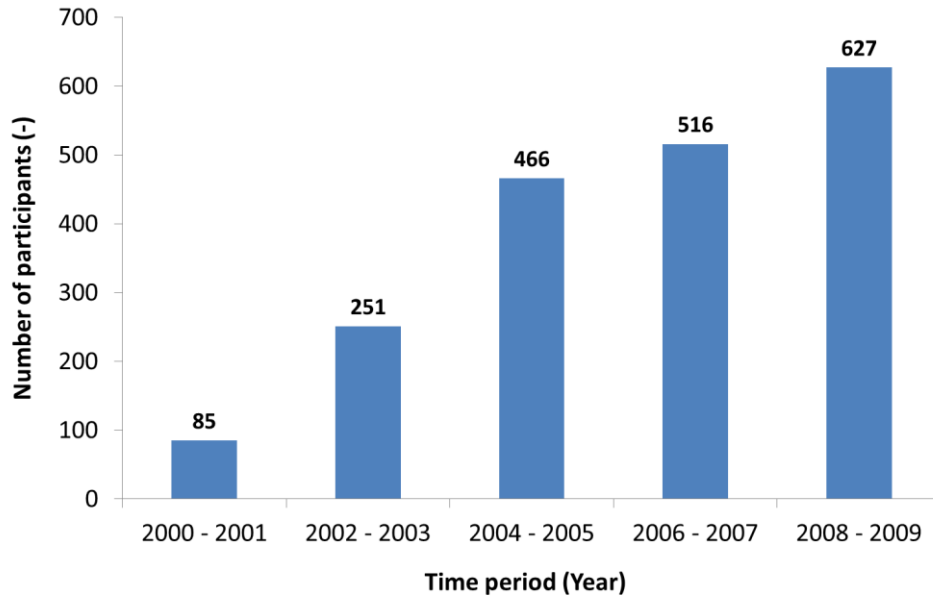


Fig. 2. – Number of Companies Participating in PROPER program

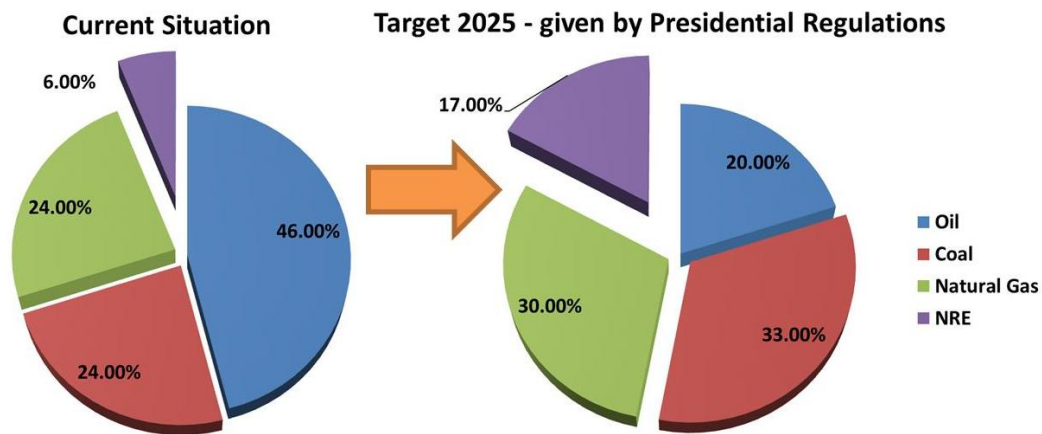


Fig. 3. – National Energy Strategy

Data from the Energy and Mineral Resources Ministry show that currently only 5 % of energy supplies in the country come from new and renewable energy (APRILIA ET AL., 2013; S M KERSTENS ET AL., 2015; S.M. KERSTENS ET AL., 2016). The energy sector ranks as the second biggest emitter after the forestry sector, which accounts for 65 % of total carbon emissions (BPS, 2014; BPS, 2015). Emissions from the energy sector are projected to continue to grow. Arief Heru Kuncoro, the ministry's new renewable energy and energy conservation director general said "The energy sector may become the largest emitter. We still have more renewable energy potentials, such as geothermal, micro hydro and biomass, as well as solar and wind." To reduce greenhouse emissions, the ministry plans to increase the share of new and renewable energy to about 17 % by 2025 from the current 5 % (SINGH &

SETIAWAN, 2013) (Fig. 3). In Indonesia only a small portion of solid waste is recycled, in spite of the existence of a relatively large market for used products made from recycled materials, such as plastics, glass bottles, scrap paper and scrap metal. This view is difficult to substantiate since recycling is done mainly by the informal private sector, especially scavengers, itinerant buyers, and garbage truck helpers. It occurs at four points: the household level, during collection, at temporary transfer points and at the final disposal site. In all councils and municipalities, the scavengers play an important role within the system, where they reduce as much as 15% of the total waste generated daily, even though their activities generally interfere with the safe and efficient operation of the sites. Given the high content of compostable materials, solid waste composting was started in 1991 and it reached



the maximum capacity of 24.2 tons/day in 2000 at 14 composting facilities using windrow systems. At the time of writing, there are only around four composting facilities in operation, including a new one at the landfill site with a design capacity of about 50 tons/day. As is common with other parts of the overall MSW system, a lack of strategic development for composting has led to poor performance. Problems that have been encountered but not solved include:

- Lack of market development;
- Lack of environmental guidelines to deal with odours, rodents and other environmental impacts;
- Contaminated feedstock;
- Insufficient provision of space to operate and expand;
- Lack of quality control by untrained staff.

More important is the lack of community participation in any initiative and poor local government manage-

ment, especially in providing tool kits and guidance on how to make a better compost product at household and community level. It is clear that an insignificant reduction in the quantity of waste going to final disposal through recycling and composting or other means is not only due to collection problems, but also lack of commitment to introduce an appropriate system that fits with the characteristics of the waste and the community. To change this, a completely different approach is advocated. The Ministry of Finance set Law No 101/PMK.04/2007 which gives exception for the import duty for materials and equipment use to prevent environment pollution. This duty exception is given for industrial companies or waste management companies. No import duty or tax for importing EWA aerobic fermenter is therefore currently known.

CONCLUSIONS

Indonesia is the fourth most populous country in the world, currently reaching 250 millions inhabitants with its prospective to hit 450 million by 2045 if the trend did not change. It is one of the most protected markets in the world, together with countries like China, Russia or Brazil. Indonesia is on its way to stable democracy. Indonesia regained its investment ratings Baa3 by Moody's and BBB- by Fitch lost during the Asian financial crisis in 1998. The GDP growth is topping 6 % already since 2007 with the only exception in 2009.

Waste management in Indonesia is regulated by the following laws: 1. Law Concerning Environmental Management No. 32 of 2009; 2. Waste Law No.18/2008 regarding waste management; 3. Presidential Law No. 30 2007 refers to energy, sustainability and environment protection and gives to all levels of Government (central and regional) responsibility for energy conservation.; 4. Presidential Regulations

No. 5 2006 includes the targets for an energy mix by 2020 which includes at least 15 % of national energy consumption to be generated from renewable energy.

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2. ADIPURA is a program for cities in Indonesia which succeed in maintaining the sanitation and environment management.

Industrial areas are still open for possible future participation of Czech exporters in energetics, infrastructure and environmental technologies and it is supported by The Ministry of Finance which set Law No 101/PMK.04/2007 that gives exception for the import duty for materials and equipment use to prevent environment pollution.

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