



## How Should Waste Management Be in Tangerang Regency?

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## How should waste management be in Tangerang Regency?

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### Abstract

Everyone wants a healthy environment but, the waste in Tangerang Regency during 2021 will reach around 820,000 tons with an average of 2,250 tons to 2,500 tons per day. The volume of waste continues to increase every year if it is not immediately handled by all parties, including simple and effective technology, the laws, and regulations, that is Regional Regulation of Tangerang Regency, Number 6 of 2012 concerning Waste and Sewage Management. The current concept of waste management needs to be changed. The problem under study is how should waste management be in Tangerang Regency. This problem is deepened by two questions, namely: 1. How does Tangerang Regency Regulation Number 6 of 2012 regulate waste management? 2. How to use waste using processing technology? This study uses a qualitative method with a socio-legal approach. This study found that several articles of Regional Regulation Number 6 of 2012 concerning the management of waste and sewage have weaknesses so they are not effective in their implementation. These articles are Article 20, Article 31 paragraph (1), and Article 35. Apart from that, this study found that waste management in Tangerang Regency has weaknesses in processing waste. Even though the waste processing by the community is very helpful for the level of villages/Kelurahan, subdistricts, and Regency. The concept of waste management must be independent and sustainable; therefore, technology is needed that is able to convert waste into economical products that the market needs. For that Regional Regulation of Tangerang Regency, Number 6 of 2012 concerning Waste and Sewage Management must be changed.

**Keywords:** Waste management, waste processing level, Tangerang Regency.

### A. Introduction

Good waste management is needed to create a healthy city. On the other hand, waste management in Tangerang Regency does not solve the problem and still creates new problems, because it still leaves piles of garbage at the final disposal site, namely the Jatiwaringin TPA (News, 2022).

In terms of health, the process of burning waste and littering has a bad impact because it can cause pollution environment for the local community. The solutions offered by this Community Partnership Program are by providing counselling related to waste management, borrowing organic waste chopping machines and inorganic, and supervision in the utilization of the machine. Lengkong Kulon Village has a waste bank that will be managed by the youth. This Waste Bank is a place for people to change the waste they have into money. With the waste processing machine, the selling price of the waste will be higher than if the sale of waste before processing (Dyah Ayu Anggreini Tuasikal, 2019).

There are 3 (three) alternative locations potential as a regional waste landfill in Tangerang Regency, namely Desa Ranca Gede in Kec. Mount Kaler, Waliwis Village in Kec. New Blooms and Village Karang Anyar-Patramanggala in Kec. Candlenut, and based on the results of the scoring feasibility class at the three locations, namely the most potential

location as a location for the construction of the Tangerang Raya regional waste landfill, namely Waliwis Village, Kec. Mekar Baru and the surrounding area (310.12 Ha). As well as efforts to improve community perceptions and attitudes, including collaboration between regional landfill management government and community leaders to form team socialization, consultation and negotiation to the community in Waliwis Village, carried out negotiations to fulfil the requirements of the community including improvement of road network infrastructure and public transport transportation, convince the public that spatial planning of the surrounding area will be carried out Garbage TPA (5 Ha) from regional TPA locations, as well as convincing the community that there will be regular inspections of soil, water and once a month, monitoring and evaluation of the landfill is carried out every 6 months and establish and realize intensive programs for the community in the form of: free of retribution for waste, arrangement of scavenger houses, procurement of electricity, gas, and free fertilizer, monthly tariff compensation to affected communities impact of regional landfill development increased employment opportunities (permanent workers and casual daily workers) (Assagaff, 2017).

The population of Tangerang Regency in 2015 was 3,372,749 people total waste generation per day is 16,731,558.92 l/person/day. percent service 34% then only 820,000,6 l/person/hr of compaction goes to the TPA. Garbage composition The dominant ones are 56.65% organic waste, 15.81% plastic waste, 9.47% paper, and cloth 10.09% styrofoam 1.3%, glass 0.18%, building residue 0.26%, and other waste 6.25%. Handling of waste carried out in Tangerang Regency is currently very minimal in terms of existing facilities and infrastructure. The handling that occurs is only collection and disposal without there is a reduction. The mode of transportation is minimal, the TPA is still an open dumping method, and the facilities are there not in accordance with the existing rules. To achieve universal access 100-0-100 then on In 2019, the procurement of 760,928 sets of bins, 159 TPST, the addition of 487 garbage trucks, and optimization of TPA by referring to the regulation of the minister of public works regarding the management of waste infrastructure and facilities in handling household waste and other types of household waste. With the procurement of these infrastructure facilities, the service life of the Landfill increased by 1 year 26 days. In addition to technical recommendations for handling existing waste, supported by various aspects, namely financing with the concept of cross-subsidies, related regulations waste management regulations, cooperation, and coordination between relevant agencies, as well as community participation and participation. The unit cost of waste management required to the improvement of waste handling in Tangerang Regency amounting to Rp. 439,381/ton (without depreciation) (I Made Wahyu Widyarsana, 2015).

Zero waste organic waste processing system is a waste processing system that does not produce waste again. So it is expected that the amount of organic waste will decrease gradually. Organic waste can be converted into biogas through a fermentation process assisted by anaerobic bacteria in the biodigester reactor. The rest of the biogas processing can be converted into liquid fertilizer and compost which are economically valuable (Abdul Muis L.S., 2017).

The technology used in waste processing at PLTSa Penujah is Biodigester technology, RDF, and Pyrolysis. Biodigester technology treats organic waste to produce gaseous products methane, solid and liquid fertilizers. Technology RDF to treat inorganic waste (paper, cloth, leather, rubber, and wood) produce RDF products and Pyrolysis technology treats plastic waste that produces products in the form of gas, diesel, and gasoline (Maulana, 2021).

Viewed from the financial aspect using several methods, namely Net Present Value (NPV), Internal Rate of Return (IRR), and Payback period. NPV value of this project is positive Rp 1,778,608,611, according to the existing criteria A positive NPV is said to be the project worthy. IRR of this project is 19.35%, the project is said to be feasible because it is

more the size of the bank's Discount Factor, namely 10%. The payback period for this project is 4.7 years, said to be worthy because smaller than the age of the business, which is 15 years. For the product market aspect, it will be more attractive to customers because of the price 30% cheaper than the one in market but the quality remains the same. From social & environmental aspects said worth it because with Power Plant construction This Garbage Power gives an impact on the surrounding community, namely creating jobs and animating the surrounding area. Environmental aspects can make the ecosystem improves because of using waste fuel (Nurul Ashari Oktaviani, 2021).

According to the Environment and Hygiene Service (DLHK) of Tangerang Regency, Banten, noting that the waste in the area reached 2,250 tons per day, bringing the total for one year in 2021 to around 820,000 tons (Ma'arif, 2022). The waste problem is exacerbated by rapid population growth and the development of growth centres, housing, trade, education, and industry-leading to an increase in the volume, type, and characteristics of increasingly diverse waste and faces that have an impact on health and the environment (DPRD, 2012).

The problem under study is how should waste management be in Tangerang Regency. This problem is deepened by two questions, namely:

1. How does Tangerang Regency Regulation Number 6 of 2012 regulate waste management?
2. How to use waste using processing technology?

This is important considering that Tangerang Regency already has a Regional Regulation on Waste and Sludge Management, but there is still a lot of waste in landfills.

## **B. Methods**

This study uses a qualitative method (Martens, 2010) with a socio-legal approach (Reza Banakar and Max Travers, 2005). The focus is on how legal texts are studied from the perspective of community justice and how the law is responded to and works in society (Indonesia, Pedoman Evaluasi Perundang-undangan Nomor PHN-HN.01.03-07, 2019). This research uses interdisciplinary techniques, where team members consist of two disciplines, namely constitutional law and engineering. The data analysis used is qualitative analysis (Creswell, 215).

## **C. Result**

The results of this study indicate that the Tangerang Regency Government must delegate waste management to the local government under it, namely sub-districts, villages/kelurahan. This is done by First; the Tangerang Regency Government must revise Regional Regulation No. 6 of 2012 concerning Waste and Sludge Management. Because in the Regional Regulation there are several articles that are left behind from the progress of society. In addition, Second, the Tangerang Regency Government can carry out waste processing which produces several products.

## **D. Discussion**

### **1. Waste Management in Tangerang**

Tangerang Regency is an area with a high between 0-85 meters of sea surfaces, it is located between 6°00'- 6°20' south latitude and between 106°20'-106°43' east longitude. Tangerang Regency area is shaped in land by 959.60 km square. *In terms of geographic position*, Tangerang Regency has boundaries as follows: North – Jawa Sea; South – Bogor Regency; West – Serang Regency and Lebak Regency; East – Tangerang Selatan Municipality, Tangerang Municipality, and West Jakarta Municipality. Tangerang regency consists of 28 subdistricts (Indonesia, Tangerang Regency in Figures, 2020). Here is a map of Tangerang Regency.



Sources: Tangerang Regency in Figures 2021

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Waste is the residue of human daily activities and/or natural processes in solid form. Organic waste is waste whose original material is living things and is easily biodegradable (easy to decompose). Inorganic waste is a type of waste whose original material is inanimate objects and is difficult to decompose naturally (hard decompose). Source of waste is the origin of the generation of waste and/or because of natural processes that produce waste generation. Household Waste is waste originating from daily activities in the household, excluding fecal waste and specific waste. Garbage Similar to Household Waste is waste that does not come from households including commercial areas, industrial areas, social facilities, public facilities, and/or other facilities. Specific waste is waste that due to its nature, concentration, and/or volume requires special management. The residential area is a residential area in the form of clusters, apartments, condominiums, dormitories, and the like (Tangerang, 2012).

The Tangerang Regency Government has had Regional Regulation No. 6 of 2012 concerning Waste and Sludge Management which was stipulated on October 30, 2012 (Indonesia, 2012). Waste handling is regulated in article 20 which stipulates that the Regional Government in handling waste is carried out by:

- a. Sorting.
- b. Collection.
- c. Transportation.
- d. Processing; and
- e. Final processing of waste.

The provisions of Article 20 indicate that first, the management of waste and waste is only carried out by the Tangerang Regency Government alone, without delegating to the Regional Government at the District and Village/Village levels. This is a burden for the Regional Government of the Regency. Article 20 is reinforced by Article 5 (Indonesia, Peraturan Daerah Kabupaten Tangerang Nomor 6 Tahun 2012 tentang Pengelolaan Sampah dan Limbah Tinja, 2012) which stipulates that the Regional Government has the task of ensuring the implementation of good and environmentally sound waste management. This is also emphasized in Article 9 letter d which stipulates that the Regional Government is obliged to carry out waste processing at the regional scale and or Regency scale safely for health and the environment. Second, all stages of waste management are carried out by the Tangerang

Regency Government, including sorting, collection, transportation, processing, and final processing of waste.

Article 31 stipulates that (1) the final processing of waste is carried out using Environmentally Friendly Technology by:

- a. sanitary landfill (lahan urug saniter);
- b. Sanitary landfills;
- c. Composting.

(2) Waste that has been processed through the final waste processing method as referred to in paragraph (1) can be used as an energy source.

In paragraph (1) letters a and b have the same meaning, namely Sanitary landfill is a term related to waste management systems. This method is carried out by disposing or piling garbage in a sunken location, then compacting it, then filling it with soil.

Article 35 paragraph (1) stipulates that specific waste handling will be regulated separately in accordance with the provisions of the laws and regulations (Tangerang B. d., 2012). The provisions of the article are not appropriate because Regional Regulations according to the hierarchy of Indonesian laws and regulations are in the lowest position (Indonesia, Undang Undang Nomor 12 Tahun 2011 tentang Penyusunan Peraturan Perundang-undangan, 2011). The provisions of Article 35 paragraph (1) should be that specific waste handling will be regulated by a Governor Regulation.

## **2. Technology support**

The Tangerang Regency Government should carry out more environmentally friendly waste processing, which can turn waste into several products.

The volume of uncontrolled waste generation will disturb the beauty and health of the environment because some people still view waste as useless goods and waste management still relies on the final approach, namely, waste is collected, removed, and disposed of in the Final Disposal Site (TPA) even though the large volume of waste at the location of the final waste processing site has the potential to release methane gas which can cause greenhouse gas emissions and contribute to global warming. The waste management paradigm that relies on the final approach needs to be improved and replaced with a new paradigm in waste management. The new paradigm views waste as a resource that has economic value. Waste management with the new paradigm is carried out by reducing waste and handling waste. Waste reduction activities include restriction, reduction, and recycling. Meanwhile, waste handling activities include sorting, collecting, transporting, processing and final processing (Tangerang B. d., Peraturan Daerah Kabupaten Tangerang Nomor 6 Tahun 2012 tentang Pengelolaan Sampah dan Lumpur Tinja, 2012).

All household waste (Mariana Gilli, 2018) can be processed into various products that are useful for human life, namely compost, liquid organic fertilizer, oil, gas, bricks, and power plants. Waste processing cannot be separated from the support of technology namely machines.

### **a. Compost**

Composting is nature's way to recycle (Recycling, 2018). The efficiency of composting technique also depends on the type and number of the substrate(s) and the rearing techniques (Niladri Paul, 2019). Waste that has accumulated must first be separated between organic waste and other waste. Garbage sorting can be done manually or using a sorting machine. Manual waste sorting is done by hand, without a machine, while machine assistance is carried out by sorting machines and/or conveyors. The collected organic waste is then chopped using a chopping machine. This is done to reduce waste material. Small waste material will facilitate decomposition.

Integration of various processes is a necessity to meet high levels of waste diversion and reduce our reliance on land disposal. A relatively large quantity of solid wastes consists of organic materials. Collection and treatment of the organic fraction of municipal solid waste (MSW) can help meet regulatory and other requirements associated with reduction of the quantities of waste reaching the landfill. Composting is a relatively simple and cost-effective method of treating organic wastes. In addition, composting offers several benefits among which are: an increase in the lifespan of the disposal site, a reduction of the quantity and quality of leachate produced in a landfill, and a reduction in the quantity of gas produced in the landfill.

Composting is very easy, there is nothing wrong with the process. Just pile the organic waste somewhere, wait, it will compost itself. Even if you do everything wrong, you'll end up making decent compost at the end (Thompson, 2007). Compost is good for the earth. Composting also helps us make less garbage (Glaser, 2010).

Trends in organic farming and demand for organically produced vegetables are increasing consistently over the last 40 years. The link between compost and organic farming is simple in theory since the limited economic proof is available to support or encourage this link. The number of benefits associated with the addition of compost to horticulture fields appears to far outweigh the extra effort and costs associated. However, an educational system is needed to light the way for market development in large horticulture areas. By exploring compost products as natural resources that can be utilized to assist offset losses of soil erosion, we cannot forget that soils that receive compost applications are one of our largest natural resources. Soil permanent damage or contamination to these vast resources should lead quality control planners to stand strong on high-quality standards to ensure adequate land is available for application indefinitely to future generations (Ozores-Hampton, 2021).

Composting on a large scale is carried out by composting factories that know how to compost products that meet the needs of the horticultural industry. The combination of research and practical experience demonstrates the benefits, cost savings, and sustainability of using compost in horticulture (Peter J. Stoffella, 2001).

Composting education should be carried out to the younger generation, not limited to at home, but carried out in various community groups such as youth organizations and schools. Composting in schools is an idea whose time has come. Jeanette Orrey and Jamie Oliver have started a food culture revolution in schools, and more and more schools are starting to create gardens. If we constantly remove plants from the soil without returning anything, the humus in the soil will gradually be depleted. With composting, the entire fertility cycle is maintained, with compost being returned to the soil to feed the plants and to build humus – which is why it is so important to compost everything we can (Scott, 2009).

Mature compost produced by an optimal process has a crumbly structure and no recognizable starting material except for some wooden pieces. The presence of much fibrous material is a sign that the compost is not sufficiently mature. This can happen if the humidity content of the compost pile was too low, especially in the hot phase. The ammonium present in the pile would therefore be lost as ammonia, leading to a shortage of N for the microorganisms and insufficient decomposition, even when water is available. When such a fibrous compost is applied, there is a risk of nitrogen immobilization in the soil (André W.G. van der Wurff, 2020).

#### **b. Liquid organic fertilizer**

One of the waste products is liquid organic fertilizer. Household wet waste is a variety of materials that are disposed of from the remnants of household activities such as

food scraps, vegetable residues, and fruit residues. Household wet waste which is dominated by organic waste in the form of vegetables and fruits must be transported to the final disposal site every day. Organic waste of vegetables and fruits should be collected in a special place. After the process of sorting between organic and non-organic waste, the pile of organic waste can produce leachate, namely liquid organic waste.

The manufacture of liquid organic fertilizer does not require technological support in the form of a complicated machine, only a stirrer. If there is none, it can be stirred manually using human power with a stirrer made of bamboo or something else. The waste can be processed into liquid organic fertilizer which is rich in nutrients. Liquid organic fertilizer from wet waste can be used as leaf fertilizer and watered into the planting media around the roots. An easy way to make liquid fertilizer is to put all organic organic matter into a 20-liter bucket. Add the decomposer or starter solution into all the organic materials and stir until evenly distributed. Cover tightly and let stand for one month for the fermentation process, during the fermentation process do regular stirring at intervals of three days. Fertilizer from kitchen waste that has been marked by no longer smelling rotten from the fermentation of organic materials, and liquid fertilizer from kitchen waste is ready to be used (Pratiwi, 2022).

### c. Oil

The increasing use of fuel oil requires a thought and idea to explore and develop the potential to produce alternative energy sources. By utilizing waste or plastic waste as raw materials that are processed by pyrolysis into fuel oil so as to reduce environmental pollution.



Inorganic Waste Oil Product from Pancasila University, Jakarta

Judging from the nature of the plastic constituents of petroleum hydrocarbon components, waste or plastic waste has the potential to be converted into fuel oil. The technique used to restore the plastic material is by breaking the carbon chain or polymer so that it becomes a hydrocarbon. In this study, the pyrolysis technique was used for the decomposition. Pyrolysis itself is heating in oxygen-free conditions. In the pyrolysis process the organic components in the material can be useful as fuel or a source of chemicals. The increasing use of fuel oil requires a thought and idea to explore and develop the potential in order to produce alternative energy sources.

With the discovery of plastic waste that can be used as fuel oil by pyrolysis and has the potential to reduce environmental pollution which is currently in critical condition. In addition, the use of plastic waste in fuel oil by means of pyrolysis can be used as an alternative energy source to used as fuel. In the future, to continue to develop this invention, more precision is needed to make and assemble the tools used, therefore experts



in their fields are needed to be able to design pyrolysis equipment so that it can be used permanently in future. Further research is needed to be able to follow up on the results of processing plastic into crude oil through the pyrolysis process so that the results can be used for everyday life (Wonogiri, 2019).

#### d. Gas

Another product of waste is gas. Recently, the use of biogas is very popular among the community, especially the use of fuel oil for cooking has been abandoned. Who knows maybe in the future Biogas energy can completely replace fuel oil. Besides being more efficient, biogas is much cheaper and friendly to the environment. If the above experiment has not been successful, it is possible that the number of bacteria present in the organic waste is still small. So it is advisable to use a lot of organic waste and completely decompose. The pungent smell indicates that the methanogen bacteria that produce methane  $CH_4$  are in the process of fermentation. Even without the addition of bacteria, it can produce biogas. Warning: it is best not to allow children to do this experiment alone. Need supervision from an adult or schoolteacher. Do not let the intention to experiment endanger yourself and the environment.



Waste processing equipment into gas, Faculty of Engineering, Pancasila University

Methane gas contained in piles of garbage is channeled to residents' homes through pipes, as an alternative energy substitute for LPG which is given free of charge. In addition, the process of making methane gas also reduces the stench caused by mountains of garbage (Detikcom, 2012).

#### e. Bricks

Plastic waste can be recycled into bricks and paving blocks. This is done so that people can use waste as additional income as well as being environmentally friendly. Plastic waste is often troubling because of improper handling, even garbage is one of the causes of flooding during the rainy season. In fact, plastic waste can be used as a means of innovation that has economic value. One of them is by recycling plastic waste into bricks and paving blocks. The goal, in addition to having high economic value, recycling this waste makes the surrounding environment friendly.

Brick is a construction material that is still widely used, especially as a wall-forming element. Bricks are made of clay plus water with or without a mixture of other ingredients. PET stands for Polyethylene Terephthalate, usually used for clear/transparent/translucent plastic bottles such as mineral water bottles, juice bottles, and almost all other beverage bottles. Brick making can be done by mixing PET recycled plastic with clay brick waste. The bricks that were a mixture of recycled PET and waste plastic, as well as pure plastic were not found to be mouldy. In general, the physical properties of bricks are good (Anis Rakhmawati, 2018).

How to make it very easy. The plastic waste that has been collected is then put into a heated smelter. Then the waste is burned while stirring so that the plastic melts and becomes a liquid. This soft mixture will be compressed to form a brick (Ruhullessin, 2021).

Sawdust is one of the sources of organic waste that has not been widely used. Its existence is not far around us, relatively cheap, and easy to get. In some foreign countries such as Uganda, Algeria, India, and others use this sawdust for various purposes including as a mixture of bricks, forming cellulose nitrate polymers, and adsorbents of phenol organic pollutants. Previous studies have used sawdust as an additive to the mixture of bricks. The burning time of bricks with sawdust additives is more efficient than without sawdust so costs are more efficient (Sri Slamet Mulyati, 2017).

#### **f. Power plants**

One solution to the accumulation of waste is to reduce it through an incinerator. Then, use it as a waste power plant or PLTSa. The discourse on the procurement of PLTSa itself has existed since several years ago through several Presidential Regulations (Presidential Regulation) No. 18 of 2016 (Indonesia, Peraturan Presiden RI Nomor 18 Tahun 2016, 2016), and Presidential Regulation No. 97 of 2017 (Indonesia, Peraturan Presiden Nomor 97 Tahun 2017 tentang Kebijakan dan Strategi Nasional Pengelolaan Sampah Rumah tangga dan Sampah Sejenis Sampah Rumah tangga, 2017). The government plans to procure 12 power plants in various regions and some of them have started operating. The working principle of PLTSa is the use of waste through certain steps to be used as electrical energy. Here are the steps (Aulia, 2021):

##### **1. Garbage classification**

Some sources or piles of waste have already been classified, but some need to be reclassified before being processed. Recyclable waste is set aside.

##### **2. Garbage Burning Process**

The rest of the waste that cannot be recycled is put in incinerators to be burned at high temperatures. Additional processes or tools are needed to ensure no hazardous gases leak.

##### **3. The process of converting steam into electricity**

The hot steam generated by the combustion process is then used to turn a turbine generator that produces electricity.

##### **4. Advanced Processing**

Ash from the combustion process and gases containing harmful pollutants are collected and processed with a pollution control system for further use, thereby minimizing environmental pollution

The waste power plant (PLTSa) can be an alternative way that can be applied to reduce the volume of waste. However, a system and standardization of operations is needed so as not to cause other environmental damage so that it can work properly and efficiently (Toha Nurdiansah, 2020).

## **D. Conclusion**

Everyone wants a healthy environment, including the people in Tangerang Regency. Currently, the Tangerang Regency Government has a Regional Regulation No. 6 of 2012 concerning the Management of Waste and Sludge. However, the Regional Regulation has weaknesses and has been left behind with the times and technology. Efforts to achieve a healthy environment must continue. Revising Regional Regulations is a wise step to obtain a healthy environment. Apart from that, waste processing with the help of technology is also very effective in getting a healthy environment. Waste that is not useful and accumulates can be processed completely into several products with high economic value.

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