

Our-Future-Challenge-Change-the-Waste-Into-Energy.

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Our Future Challenge: Change The Waste Into Energy

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Abstract

Waste is referred to as rubbish, trash, garbage or junk is at present classified as green energy and also called a renewable energy. Waste has become problems faced by the cities in the world in relation to negative impacts on environment and society. This paper is discussing some aspects of waste management aimed to simplify the recycling process and referring the afford have been done by nations all over the countries in changing the waste into useful energy.

Introduction

Waste has become problems faced by people worldwide long time ago. The composition of waste is varied over the type and location of waste which is linked to economic development, including industry and technology around it. Waste could classified in many types. On based of source, waste could includes municipal solid waste, commercial waste and hazardous waste. In average, 55% of waste in America is residential garbage, the remaining 45% is coming from manufacturing, retailing and commercial trade. In developed countries such as America and Canada, every person generate 4.5 – 5 pounds waste per-day. The continuity of garbage produce by human has brought the waste classified as renewable energy. Most waste is mainly consist of the

biodegradable and non-biodegradable materials. Biodegradable waste such as food or sewage, is broken down naturally by microorganism either aerobically or anaerobically. And non-biodegradable such as glass, metals and plastics can remain in landfills for million years before they break down. Biodegradable waste should be controlled in order to prevent the contribution of greenhouse effects and pathogens grows and spread. Some components of waste have economical value and is could recycled.

It is widely recognized by nations all over the world that waste management improvement is urgent. Every effort should be made to minimize the negative effect of waste dumped in open area of ground. A legal practices is required to control waste from being polluting and threatening the live organism and human

life. Converting waste to energy has become trends in research and technology. Some places on earth has shown that a well managed landfill gas can be collected and processed to become friendly fuel and home energy . A well managed landfill can succesfully convert the waste into electric energy, steam energy, vehicle fuel and natural gas. By doing so, changing the waste into energy become most reliable way to create energy and finding solution of waste problems in cities all over the country.

Energy hidden in waste

In fact, changing waste into energy has implemented succesfully by some countries. A trash-generated power plant has been built in Shanghai in December 1998. This plant has garbage burnt capacity of 1.100 – 1.200 tonne/day.

This capacity consume up to 90% of trash produce by 1.3 – 1.5 million houses in Shanghai. By this trash burnt capacity Pudong City Heat Energy produce 35.000 – 40.000 kW electric energy. This is the one of electrical plant which convert rubbish into green energy created in Shanghai.⁽⁴⁾

In Britain, a first garbage truck powered by trash it collects has run at a maximum speed of 50 miles/hour. This power is coming from a 40 kWh lithium-ion battery. This battery is charged by the electricity coming out from rubbish that burnt in Waste Power Station in Huddersfield city where this truck is operated. This phenomenon is a successful effort of converting the dirty garbage into useful energy in our daily life⁽²⁾

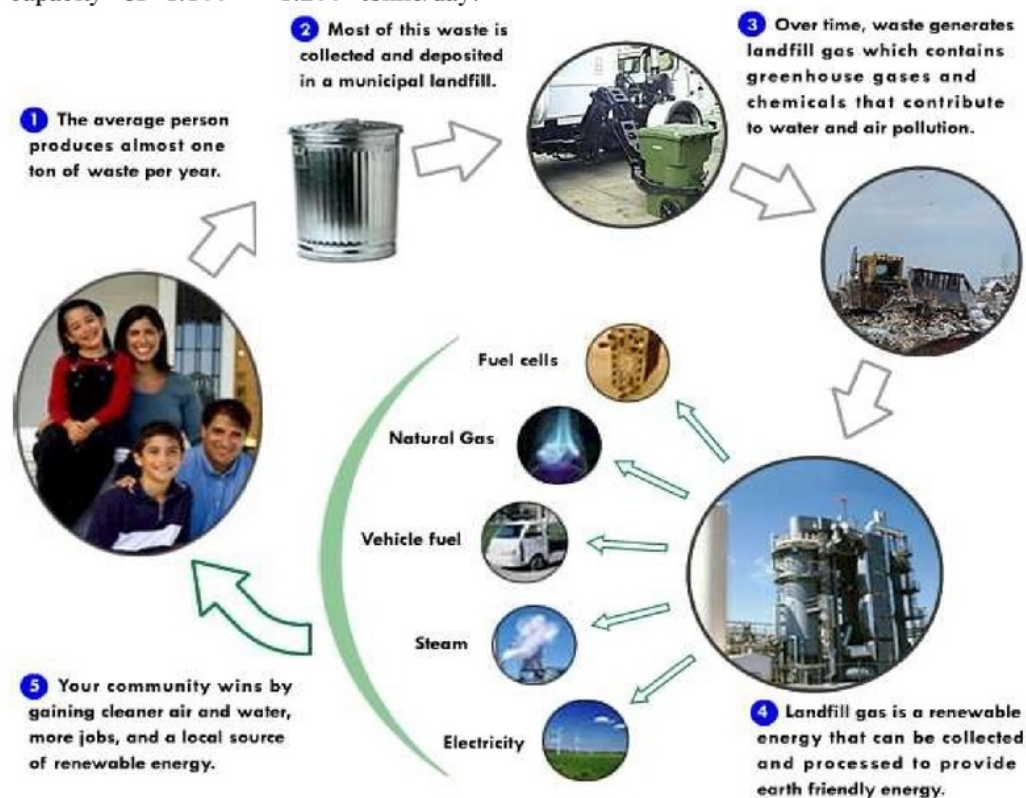


Fig 1: Waste management cycle as a clean energy

Source: Graphic by FirmGreen™ (http://firmgreen.com/tech_main.htm)⁽⁵⁾

Commonly, waste is composed of materials, such as papers (newspaper, office paper, packing materials and cardboard); plastic (beverages containers); metals (cans, high tech waste, appliances, building and engines materials); glass (windows, bottles, car glass); food waste and organic materials; woods and human-animal waste.

According to the research has already conducted on Jakarta garbage. The trash in Jakarta consist of about 25 kind of materials, e.g. vegetables, fruit, papers, plastic, wool, woods, nylon, leather, rubber, glass and some kind of metals. The chemical composition of burnt rubbish consist of: Carbon 45.8% ; Oxygen 44.35% ; Hydrogen 6.48% ; Nitrogen 1.75% ; Chloride 1.03% ; Phosfor 0.02%. Fe and Al also found in small amount.⁽³⁾ This results is published by Z Adilien, Dipl Eng in March 1988, through *Teknologi* Journal of Indonesia.

The calorific value of trash in Jakarta is varied between 1100 – 1600 kcal/kg. Humidity is varied between 30 – 60 % The higher the humidity of the trash, the lower the calorific value and vice versa. These means that the calorific value of trash in Jakarta is about to equal to one-fifth of calorific value of medium rank coal. The value that probably has no financial benefit on the side of economic view but has tremendous social and environment advantages.

The Importance of Energy Research and Waste Management Quality Improvement

According to Bappenas data in 2006, the waste volume in the big cities is experience an increment of 5 – 6%. The national volume of waste is estimated to increased fivefold in 20 years. Its proportionate to the average increment of people in cities, but not proportionate to local government capabilities in manages and services the waste.⁽⁸⁾

The lack of government capacity to manages the waste can be seen from the water pollution, air pollution and land pollution around the waste landfill (Tempat Pembuangan sampah Akhir / TPA) which heavily influence the health of citizens by the spread of unwanted smell, substances and toxins. So far, transporting and collecting the waste into landfill is the basic management aim of the government at present.

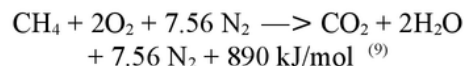
A research project financed by government or by energy corporation is necessary to create such as in a big city like Palembang, in order to use, to process and to recycle the waste become energy or other form of matters.

Remembering the waste management in Liverpool when being student in that city, in 1987 there are a small plant in the cityside that compacting the used cars become a small size of solid metal cube. These metals cube then send to furnace to be melted and reproduced become other forms of steel products. The glass parts of these cars is collected and joined in other glass garbage from other sources such as bottle, jars, windows and electronic appliances to be recycled become other forms of glass products.⁽³⁾

1 In north Los Angeles an engine of small truck flattens tons of food scraps, paper towels and other household trash. A set of pipes is tunneled into the mound of extract gas from rotting waste and send it to a plant that turns gas into electric energy. In Southern California the waste is compacted by a huge-wheeled engine, so it doesn't smell, and yet it burnt in the garbage incinerators to turn it into energy. (6)

On the assumption that every person in developing countries like Indonesia throw away 600 kilograms of waste to landfill in a year compare to one ton per year per person in developed countries, it means that on average about 1.7 tons rubbish is produced by 1000 people in residents each day. If technologically we able to change these waste into energy, it is being touted as a potential and continues source of clean energy in cities as the previous cities has done. By this way of thinking, the waste is categorized as a renewable energy. The main gas produced by landfill is anaerobic decomposition forms methane gas, and anaerobic decomposition producing carbon dioxide. Methane is coming out from biodegradable garbage such as food scraps, fruits, vegetables, sewages. Methane is a colorless and odorless gas, non-toxic and flammable only over a narrow range of concentrations (5 – 15%) in air. (9)

1 Methane (CH₄) gas has a worse greenhouse effect of 21 times worse than carbon dioxide. (6) If instead methane gas is collected and burnt to generate electricity, the resulting emissions of carbon dioxide and H₂O are less harmful to the environment than the original methane. Say, one mole methane will produce one mole CO₂ if burnt stoichiometric:



2 As an example, gas engine require about 0,5 m³ of methane per-horsepower perhour. (12) Methane gas have energy content of 39 megajoules per cubic meter, or 1,000 BTU per standard cubic foot. (12) One cubic foot of gas may be generated maybe generated of cow manure at around 28°C. This gas volume is enough to cook a day meals for 4 – 6 people in India. (12)

Burnt the methane gas exactly reducing the global warming threat and got a significant amount of heat energy. The future trends in waste management is sorting and recycling the waste. Not all waste may dumped in landfills regarding the long time to decomposed. Glass, plastics and metals should sorted and separately experienced the recycle processed outside the landfills. Paper and cardboard should also separately recycled, apart from dumped in landfills. In England, the paper read today could be from papers recycled two days ago. The waste which have special impact on environment like batteries, aerosols, oils, acids and fluorescent tubes, should collect in a strong concrete box buried in the ground to prevent it from contaminate the land and the soil water. Kitchen waste which is easily decomposed and degradable will mainly dumped in landfills. The methane gas generated from landfills will collected and flown to homes to be friendly fuel. (10)

The sorting and recycling will significantly reduce the amount of garbage dumped in landfills on one side and increased the benefit of rubbish as a useful matters through the recycle process on the other side. The decreased

of rubbish volume will help the government to minimize the number of landfill sites in town and decrease the area occupied. The minimum number of landfills will mean minimize the conflict between the government officials and the urban people which generally reject the landfill existed around them. Finally, improve the waste management by applying the sorting and recycling the waste before dumped in landfills is urgently prepared as early as possible. The use of methane generated in landfills will minimize the negative effect on the environment. Sorting and recycling the waste apart from dumped in landfills will increase the benefit of waste and change it become a valuable matter.⁽¹⁰⁾

Proposed Waste Sorting Scheme

Regarding the effort have been made by cities all over the world, Palembang as a big city in South Sumatera should prepared a new concept which accommodate a modern waste management that has implemented in cities explained previously. The following scheme is a simply Waste Management Concept proposed to government officials of Palembang city (especially to Dinas Kebersihan Kota Palembang) , in order to support “Palembang Sebagai Kota Bersih, Modern dan Mandiri” in the future.

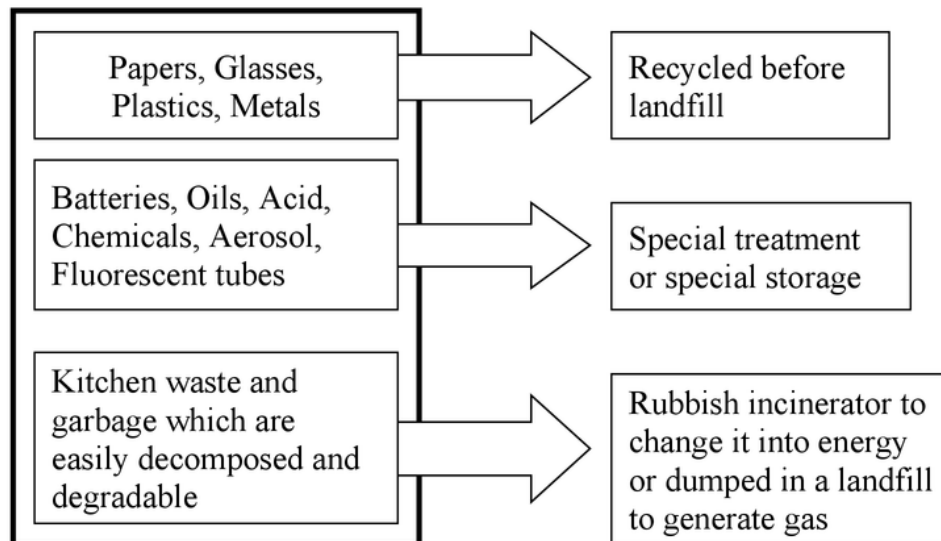


Fig 2: Proposed Waste Management Sorting Scheme to Palembang and cities in South Sumatra Province to support “Palembang kota Bersih, Modern dan Mandiri”

A small scale rubbish incinerator should be tried to be built up at the mouth of landfill, and a small electric generator should be coupled to a steam turbine, as an experiment project, how rubbish could change into electric energy and supply power hundreds homes and vehicles. At the other side the society in the city happy by gaining cleaner air and water, more jobs and a research field for the university students.

Conclusions

From the previous explanation, we can withdraw some conclusions as follows:

1. Change the urban waste into clean energy in the future should be assumed as a challenge for the university researchers and the government officials in the cities in Indonesia in order to manage the waste in modern way and to create a clean and renewable energy from the waste.
2. Sorting and recycling the waste as a modern management as have implemented in the cities worldwide is proposed to adopt by Palembang city officials in order to manage the Palembang city waste to be clean energy and economic matter.

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