

CHAPTER I INTRODUCTION

1.1 Research Background

In every activity carried out by humans, there is always waste produced. Based on Law No.18/2008 entitle Waste Management, waste is the remains of human daily activity and/or natural processes in solid form. This output is unwanted because of several reasons, ranging from its uselessness, its insignificant value when compared to the main output of the activity, and other reasons those are unfavorable.

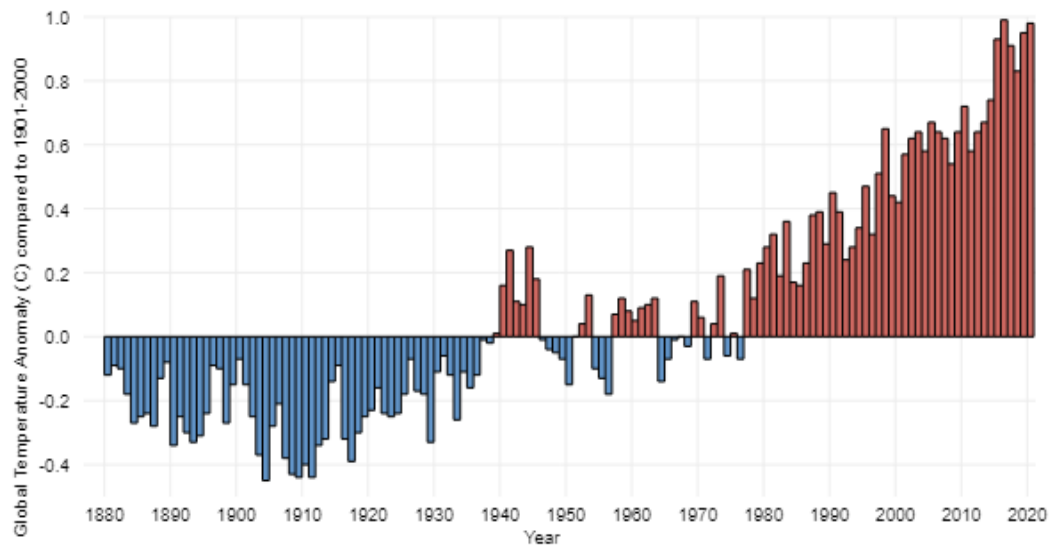
The importance of waste processing is based on the negative impact of unmanaged waste piles. The accumulation of untreated trash releases methane gas, which contributes significantly to greenhouse gas emissions. The increase in greenhouse gas emissions is very dangerous for the environment because it will trigger global warming (Laksono, 2010).

Fifty kilograms methane gas is produced for every ton of solid trash. With Indonesia's growing population, it's anticipated that by 2020, the Indonesia's waste production will be over 500 million kilograms a day, or 190 thousand tons per year. This indicates Indonesia will release 9500 tons of methane gas into the environment in that year (Laksono, 2010).

Global warming itself is certainly a big problem for the survival of the earth we live in. Uncontrolled global warming can cause climate change, a change in the statistical characteristics of the climate system, which lasts for decades or more. The

following figure presents information about the global surface temperature from 1880 to 2020.

Figure I. 1 History of the global surface temperature since 1880



Source: National Oceanic and Atmospheric Administration (2021)

Even a minor increase in Earth's average monthly surface temperature necessitates a vast quantity of heat energy. Although the 2-degree increase in world average surface temperature since the pre-industrial era may appear insignificant, it represents a considerable increase in collected heat. The extra heat is causing regional and seasonal temperature extremes, as well as lowering snow cover and sea ice, intensifying heavy rainfall, and shifting plant and animal habitat ranges (Dahlman and Lindsey, 2021).

Awareness of the need to address climate change has made 195 countries in the world unite to overcome it. The Paris agreement is present as a form of commitment

from these countries. The thing that has to be achieved is to limit global warming to 2 degrees Celsius (preferably 1.5 degrees Celsius) well below pre-industrial levels.

As one of the countries that signed the Paris Agreement, Indonesia also bears the responsibility of protecting the world's climate. Indonesia, which is currently producing massive amounts of waste, needs to find a breakthrough solution for this waste. Good waste processing will certainly make a positive contribution to the world climate.

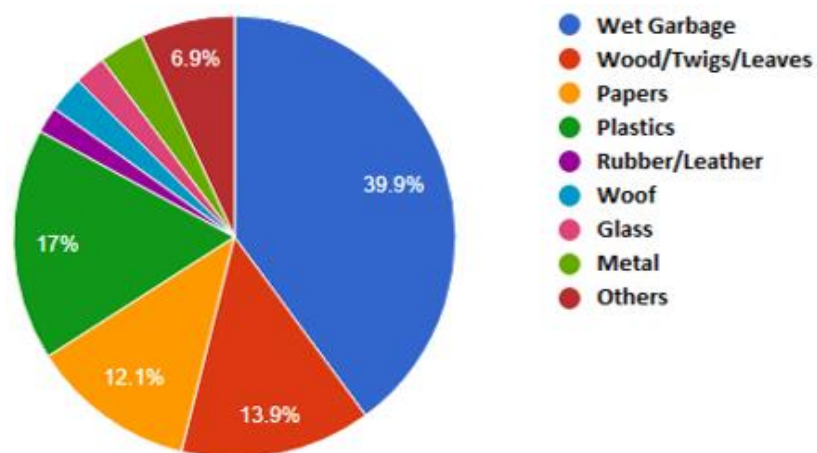
However, the fact is that waste management in cities in Indonesia is a potential problem that has yet to find an effective solution. Based on data published by the ministry of environment and forestry, Indonesia's waste generation in 2020 reached 36.7 million tons, higher than the previous year's waste generation of 31.3 million tons. And for the year 2020, 17.1 million tons (46.8% of the total 2020 waste generation) will not be managed.

The waste problem has grown into a national issue. Basuki Hadimuljono, Minister of PUPR, stated that the waste management program will be implemented through regular and special programs. Construction of regional landfills (TPA), TPS-3R (Waste Management Sites-Reduce, Reuse, and Recycle), Community-Based Sanitation (Sanimas), Wastewater Treatment Plants (IPAL), and Sewage Treatment Plants are among the regular programs to be implemented (IPLT). Then there are special programs like the Harum Citarum Program, the use of plastics in asphalt mixing, the establishment of a Waste Power Plant (PLTSa), and the waste management system Refuse Derived Fuel (RDF).

This significant issue indicates that better form of waste management is needed. One form of waste management that can be done as an alternative is processing waste into an energy source (Sudarman, 2010). In short, the existing waste is processed using technology to produce energy sources such as electrical energy, heat energy, and others.

When it comes to converting waste into electricity, there are numerous challenges. One of the challenges is that waste processing technology must be tailored to the characteristics of waste in Indonesia, which, according to statistics released by the Ministry of Environment and Forestry in 2020, is dominated by wet garbage, accounting for 39.7% of total waste. Waste processing will be more efficient, effective, and cost-effective if the right technology is chosen.

Figure I. 2 Composition of waste in Indonesia in 2020



Source: Ministry of Environment and Forestry (2020)

Another difficulty that arises from an energy-producing project is the great need for costs. This is due to the high cost of waste processing technology, both from the initial investment side (capital expenditure) and from the operational side (operating expenditure). Therefore, sufficient and significant financing is needed for successful implementation of this waste-to-energy project.

The need for financing from this project is faced with the fact that the success in obtaining financing is greatly influenced by the commercial aspect of the project. A project will be easier to get financing if it is supported by good commercial potential. Conversely, if the commercial aspect of the project is very low or even negative, funding will be increasingly difficult to obtain and even though it can be obtained, the cost of funds that will be the returns from investors and / or debtors will be very expensive.

The waste-to-energy project has some problems in the aspect of project financial feasibility. Based on a study conducted by the Corruption Eradication Commission (KPK), the problem in the financial feasibility aspect of the project in question is that the high cost of project processing is not proportional to the selling value of the output produced by the project. This will make the project experience difficulty in obtaining financing.

Based on Law No.18/2008 Article 5, the government has the responsibility to ensure the implementation of good and environmentally friendly waste management. One form of responsibility for this is to provide facilities for waste processing. This

means that legally, the government needs to intervene in waste management in Indonesia.

Government intervention is needed in order to support the financing that can be obtained by waste-to-energy projects. However, the amount of budget held by the government is limited, making it impossible to finance projects using the government budget. This is where the important role of the government, both in providing guarantees and facilitating the provision of public and non-public funds, in order to assist waste-to-energy projects in obtaining the best financing scheme.

In addition to financing, waste-to-energy projects also need to think about aspects of how to pay back the financing obtained. It is called the funding aspect of the project. Rospriandana (2019) states that there are at least 2 streams in the funding aspect of this project, namely tipping fee and revenue from the energy produced.

One form of government intervention in the problem of funding of the project is the issuance of President Regulation No.35/2018 concerning the Acceleration of the Construction of Waste Processing Plants into Electric Energy based on Environmentally Friendly Technology. In this regulation, the government tries to provide funding support to waste-to-energy project. It is by requiring PT Perusahaan Listrik Negara (PLN) to purchase electricity produced by PLTSa.

However, the policies issued by the government are in fact not yet fully effective. Based on a study conducted by the Corruption Eradication Commission (KPK), PLN

will bear a sizable burden on the difference in prices borne. PLN will bear a loss of at least 1.6 billion rupiah per year for the total electricity capacity of 244.5 MW.

In the event of such a large loss, PLN certainly cannot continue to bear it. In the aftermath, this loss will lead PLN to increase electricity rates which of course will burden the Indonesian people. If the Indonesian people are unable to pay the high electricity rates, in the end the government must step in to provide subsidized assistance which will be burdensome from the government budget side.

The insignificant fishery value of waste makes waste seen as something that is less important. In fact, we are faced with the fact of continuous production of waste, starting from small-scale activities such as activities in households to large-scale activities such as in factories. Waste production that continues to run results in a massive amount of waste which is very important to be followed up.

Based on the research background that has described above, the author is interested in making a study entitled "An Exploratory Study of Optimal Financing and Funding Schemes to Support Financial Feasibility of Waste-to-Energy Project in Indonesia".

1.2 Delimitation of Study

This study is an exploratory study of waste-to-energy project in Indonesia. A financial feasibility analysis will be carried out using a financial model. Since the solid

waste processing project is not something of a fully commercial nature, there will be problems in financial feasibility.

Problems in the aspect of financial feasibility will make this waste processing project experience difficulties in obtaining financing. This paper will try to explore the financing schemes that can be used for this solid waste project. The financing scheme chosen will be adjusted to the characteristics that the scheme requires a cheap cost of funds as well as a choice of technology applicable to the characteristics of waste in Indonesia.

Problems in the aspect of financial feasibility will also make waste processing projects experience difficulties in repaying previously received financing. This paper will try to explore a funding scheme that can be used for this solid waste project. The funding scheme chosen will adjust to the amount of funds that can be realized as well as with a significant possibility of being realized.

The results of this study can be interpreted in general for all types of waste-to-energy processing projects. However, in the research there will be assumptions that are specific in nature in addition to general ones. The meaning of research results also needs to be adjusted with special assumptions related to the condition of waste-to-energy project.

1.3 Research Questions

Based on the background and scope previously described, the research questions are as follows

1. What is the optimal waste management and technology option that can be applied to a waste-to-energy project?
2. What is the optimal financing and funding scheme that can be applied to a waste-to-energy project?
3. How does the optimal funding and financing scheme affect the financial feasibility of a waste-to-energy project?

1.4 Research Objectives

Research questions will be answered through the following objectives

1. Describing how a waste management should be implemented in Indonesia.
2. Presenting the most optimal technology options to be applied in accordance with the characteristics of solid waste in Indonesia.
3. Presenting an optimal financing scheme tailored to the choice of technology.
4. Presenting an optimal funding for repayment of financing obtained for this waste-to-energy project.
5. Analyzing the financial feasibility of the waste-to-energy project using a financial model with information obtained from the previous objectives.

1.5 Research Benefits

The benefits that can be obtained from this research are as follows

1. For the government, this research is expected to be a reference for developing appropriate financing and funding schemes for waste-to-energy processing projects in Indonesia.
2. For PLTSa, this research is expected to be one of the reference materials in making decisions on waste-to-energy projects.
3. And for academics, this research is expected to increase knowledge and application of the feasibility assessment of a project from a financial aspect and become a relevant source in developing research in this sector.

1.6 Systematics of Writing

The writing systematics of this thesis are as follows

CHAPTER I	INTRODUCTION	This chapter will discuss the research background, delimitation of the research, research questions, the objectives of the research, the benefits of the research, and the systematic writing of this research.
CHAPTER II	THEORETICAL FRAMEWORK	This chapter will discuss the theories and previous studies those are relevant to this research.
CHAPTER III	RESEARCH METHODOLOGY	This chapter will discuss the methods and research designs used in answering the research questions.
CHAPTER IV	RESULTS AND ANALYSIS	This chapter will discuss the output of research and analysis of the problems raised in this study.
CHAPTER V	CONCLUSIONS AND IMPLICATIONS	This chapter will discuss the research conclusions, research limitations, and suggestions for further research.