CHAPTER I
INTRODUCTION

1.1 Background

Metal waste is one of the biggest contributors to the accumulation of waste in various regions, whether it comes from electronic goods or canned beverage waste. Metal waste or waste is solid waste that cannot be decomposed naturally or by biological processes originating from the metal industry. For example, the metal smelting industry or from industries that use metal products such as the canned beverage industry.

The characteristics of metals that have good heat absorption can be the reason for recycling metal waste. Recycling metal waste for the industry is an important thing because it reduces production costs [1]. But not all types of metal waste, the industry will be recycling. One type of that metal waste is canned drinks. Because this type of metal waste comes from society so it should be recycled from society itself. Metal waste in the form of canned drinks can be used as a heat-absorbing material which can then be used as a drying medium.

The intensity of solar radiation reaching the earth's surface varies up to 1367 W/m^2 depending on the time of day, geographic location, and local weather conditions. The geographical location of Indonesia, which is on the equator, has resulted in very large potential for the use of solar energy with ideal irradiation of 4 to 5 hours per day. The World Bank report shows that the potential for solar energy in Indonesia is 3.41 – 4.47 kWh/m^2 or equivalent to 447 W/m^2 [2].

One of the devices that can absorb and collect solar thermal energy is a solar collector. Solar collectors can be applied to heat water, dry clothes, dry crops, and meet other heat energy needs. However, solar radiation energy cannot be completely converted into usable heat energy, so studies on solar collectors must always be improved to obtain maximum results [3].

Many studies have been carried out on improving the performance of solar collectors, especially in the absorber section. The absorber is the main component of

the solar collector which functions to absorb and store heat. In previous studies, performance testing has been carried out on flat plate solar collectors with a V-Corrugated wave-shaped absorber and a sinusoidal wave-shaped absorber. From this study, the sinusoidal wave plate absorber has a higher performance than the V-Corrugate plate absorber [4].

The shape of the absorber also affects the heat produced, both from the type of material to the size of the material used as the absorber. Materials made of metal can be one of the suitable materials to be used as absorbers. In addition to the material, the size of the absorber is also very influential. From previous studies, there has been no in-depth examination of the effect of using an absorber made from metal waste in the form of used drink cans and also the effect of the size of the metal waste itself on the performance of the solar collector.

1.2 Problem Formulation

There are many canned beverage products available in 320 ml and 330 ml sizes. Therefore, the formulation of the problem in this research is how the size of the used beverage cans measuring 320 ml and 330 ml as absorbers affect the performance of a flat plate solar collector.

1.3 Objective

This study aimed to obtain the performance value produced by a solar collector using used beverage cans with sizes of 320 ml and 330 ml as absorbers and to compare the two absorbers.

1.4 Benefits

The expected benefit in this final project is to become a reference in the utilization of metal waste, especially used canned drinks as an absorber in flat plate solar collectors which can later be useful in the following fields:

a. Fishery

Fishermen can use this tool as a drying medium for the caught fish and can dry the fish faster.

b. Agriculture

Farmers can use this tool as a medium for drying or heating agricultural products effectively and without requiring large costs because the materials used come from used goods. In addition, the time required for the drying process is also faster than from direct sunlight.

c. Domestic industry

This device can be used for the process of heating cakes or processed foods that require high temperatures in their processes, so it is suitable for home industries engaged in culinary or food processing.

1.5 Problem Limitations

1. To avoid misunderstandings and so that the scope of the analysis does not widen, it is necessary to limit the problem, namely:
2. The type of solar collector used is a flat plate solar collector
3. In this study, there is no economic analysis
4. The solar collector used uses one cover
5. Analysis of the efficiency of the solar collector absorber under steady flow conditions
6. In this study, did not calculate the heat losses generated

1.6 Report Outline

The systematics of writing this report is organized into 5 chapters with the following systematics:

1. **CHAPTER I** Introduction

   In this chapter, there is an introduction that describes the background of writing, problem formulation, objectives, benefits, and systematics of writing.

2. **CHAPTER II** Literature review

   This chapter consists of a literature study on solar collectors, types of solar collectors, heat transfer, and other literature that supports this research.

3. **CHAPTER III** Research methodology

   This chapter consists of the implementation procedure, time and place, as well as the tools and materials used.

4. **CHAPTER IV** Results and Discussion

   This chapter is a part of describing, analyzing and explaining the data generated during the test in graphical form.

5. **CHAPTER V** Closing

   This chapter describes the conclusions from the research that has been carried out and suggestions or recommendations for further research.