CHAPTER I

INTRODUCTION

1.1 Background

Electricity is the main source of human needs in carrying out most activities. Humans need electricity to help in solving problems. In the electrical system, electrical energy is generated by power plants, distributed through transmission lines, and then distributed so that the electricity produced can reach customers. Whether or not the transmission system and distribution system can be seen from the power received by the customer. There are many factors that determine, including the distance between the power plant and the load center is too far, resulting in too large of power losses and can cause a decrease in voltage [3]. Examples of power plants in Indonesia are PLTA (Hydroelectric Power Plant), PLTU (Steam Power Plant), PLTS (Solar Power Plant), PLTB (Wind Power Plant), and others[4].

The problems that occur are mostly faced by the electricity system in Indonesia, such as the distance between the power generation system and the load center is too far, resulting in a reduction in power. This power reduction is due to the process of sending power from the generator to the customer through the transmission line and distribution line where there are power losses and voltage drops. The farther the distance from the generator to the load center, the greater the potential for voltage drop that occurs.

In the electric power system, generation and loading information are needed to evaluate the performance of the power system and analyze the flow of electricity that flows in the power grid system. This research is usually referred to as a power flow study. This power flow study provides information on the power flow or voltage under steady/stable operating conditions. This power flow will calculate the system flow and voltage at a certain terminal/bus. This power flow analysis will provide information related to the electrical conditions on the line and the necessary improvements to make the line better, such as improvements to power losses and improvements to the voltage quality of each bus while taking into account the applicable standards.

Distributed Generator (DG) is a small capacity generator located in the electric power distribution system [5]. DG is placed on buses that are directly connected to the load. DG installation has the benefit of increasing system efficiency and reliability, and can improve power quality and voltage levels. However, DG also has a disadvantage, such as increasing the number of short-circuit current sources if there is a disturbance in the system.

To support the benefits of DG in the power generation system, it is necessary to have good planning and determine the location of placement and the amount of output power in the DG. The power plant system, which has a large number of buses, becomes a challenge in determining the location of the DG unit, the output power of the DG, and the number of DG units to be placed. Errors in determining this can affect the reliability of the DG unit, fuel efficiency of the DG unit, and power losses in the electricity line [5]. Therefore, a genetic algorithm is used to determine the location and power capacity of the DG. The advantage of using this genetic algorithm method is that it is a simple method but can solve complex problems.

1.2 Problem Formulation

Based on the background exposure, the formulation of the problem in this study is as follows:

1. How to determine the optimization of DG placement and capacity on a single line distribution diagram?
2. How is the configuration and mechanism using the genetic algorithm method?
3. How do you compare the quality of voltage and active power losses before installation and after installation of DG?

1.3 Purpose and Benefits

The aim of this research such as:

1. DG modeling and applied to the distribution of radial line generators
2. Evaluate the impact of installing DG to reduce active power losses and

improve voltage quality in generator distribution

3. Improvements made from before installation of DG

1.4 Problem Limitation

In this study, there are limitations to the problem in order to anticipate the weakening of the preparation of this final project, which are as follows:

1. Focused on radial distribution line data
2. The optimization determined is the capacity of the Distributed Generation
3. If the voltage of each bus is unknown, assume the voltage is 1 + j0 pu (flat start). This is because the voltage on each bus will not be far from 1 pu
4. Modeling the load and power on the transformer in the radial bus distribution line is neglected

1.5 Research Method

The writing of this research uses the following research methods:

1. Literature study is carried out by studying materials related to this final project research. The sources used are from journals, textbooks, and several trusted websites.
2. Simulation on a single line diagram of a radial distribution line.

1.6 Systematics of Writing

1. CHAPTER I INTRODUCTION

This chapter provides an overview of the problem to be discussed, which contains the background of the problem, problem formulation, objectives and benefits, problem limitations, research methods, and writing systematics..

2. CHAPTER II LITERATURE REVIEW

This chapter contains the concepts and theories that support the final project research.

In addition, it discusses what is needed in conducting research

3. CHAPTER III SYSTEM PLANNING

This chapter contains the design, simulation, and implementation of the object under study.

4. CHAPTER IV RESEARCH RESULTS AND ANALYSIS

This chapter contains data and analysis of the simulations made

5. CHAPTER V CONCLUSIONS AND SUGGESTIONS

This chapter is the closing section which contains the conclusions obtained from the results of testing and analysis, as well as suggestions from the authors relating to the results obtained from testing and analysis in the previous section.