CHAPTER ONE

INTRODUCTION

1.1 Overview

A hybrid solar- diesel system that uses solar panels as the main source power while the diesel is being kept as a backup source of power to solve an issue of instability in the power grid and the cost of including far away locations in the grid.

1.2 Research Problem

Due to the shortage in the electrical supplement in Sudan specifically in the rural areas alongside the problem in the fuel supply, as well as the expensive cost of including the rural areas in the national grid, a good way to solve this problem would be using renewable resources of energy. Figure 1.1 shows types of renewable energy resources.
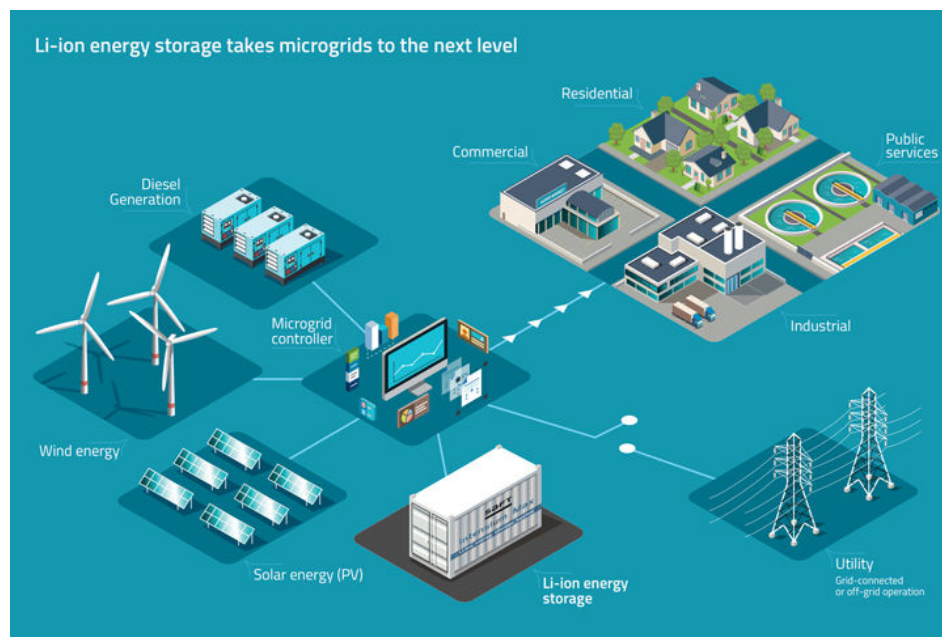

Figure 1.1: renewable sources of power

1.3 Research Objectives

Provide a stable electricity supply to an off grid area with the most economic cost and to achieve sustainable development in the energy department for the next generation so they wouldn't have to face the challenges we do today.

1.4 Research Methodology

Using a hybrid system of solar, battery banks and diesel generator, and they were connected to each other using auto transfer switches.

The system was then simulated using E-tap simulator and E-tap load flow analysis tool. Figure 1.2 shows the use of ATS in controlling the system.
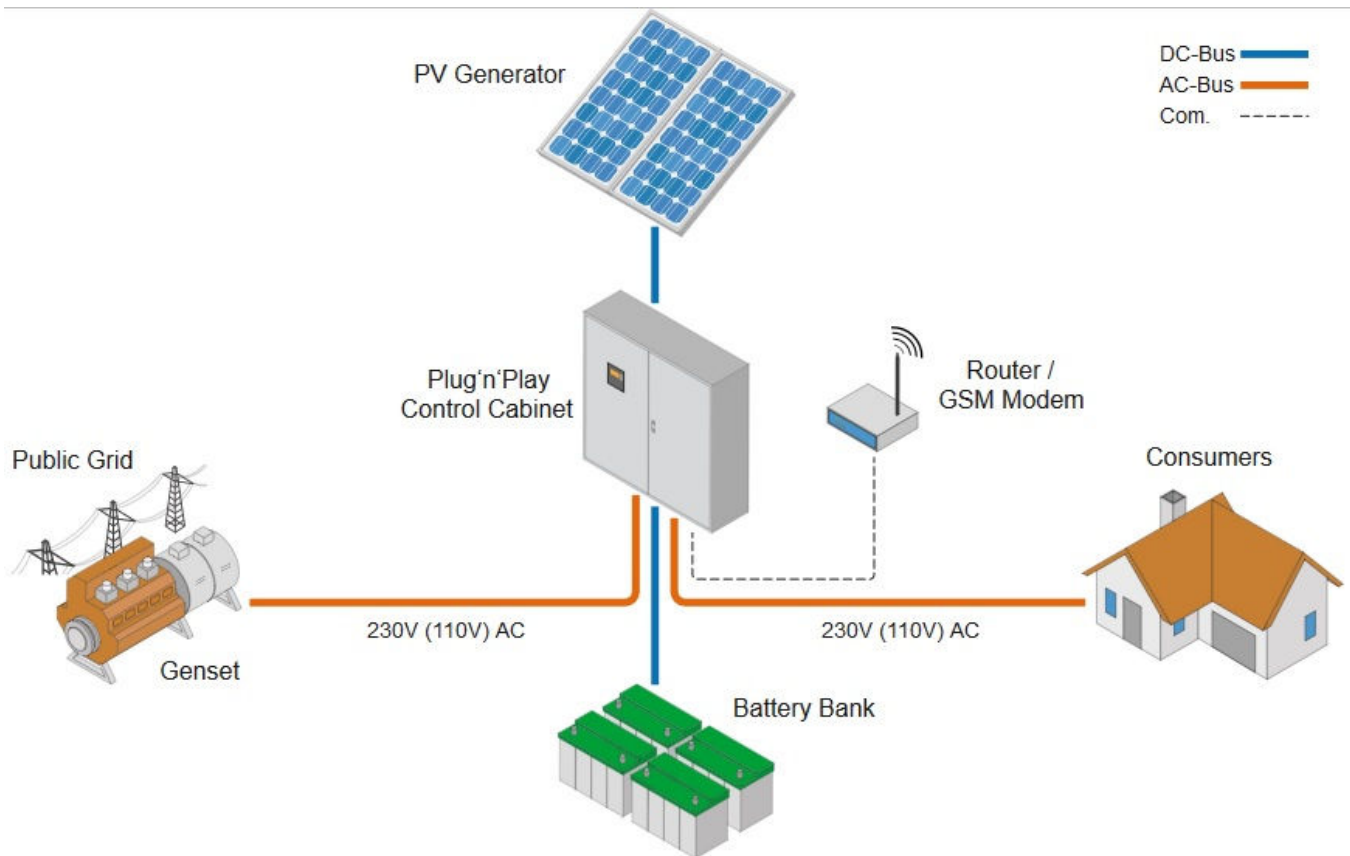

Figure 1.2: System components connected by ATS

1.5 Research Layout

- Chapter one: contains an overview of the research, the research problem, objective and methodology.

- Chapter two: contains an introduction to solar energy systems, their equipments and the operation of producing electricity using solar power pants.

- Chapter three: contains an introduction to diesel generators, diesel generator set and its components, paralleling and load sharing and the advantages of diesel generators.

- Chapter four: contains the application of the system and its simulation, results of load flow analysis, calculations of power consumption and the sustainable development achieved.

- Chapter five: contains conclusion, recommendations and references.