**CHAPTER I**

**INTRODUCTION**

Electricity is the only form of energy which is easy to produce, easy to transport, easy to use, and easy to control. So, it is mostly the terminal form of energy for transmission and distribution. Electricity consumption per capita is the index of the living standard of people of a place or country. Also, it is an extremely versatile form of energy. It can be generated in many ways and from many different sources. It can be sent almost instantaneously over long distances. Electricity can also be converted efficiently into other forms of energy, and it can be stored. Because of this versatility, electricity plays a part in nearly every aspect of modern technology. Electricity provides light, heat, and mechanical power. It makes cell phones, computers, televisions, and countless other necessities and luxuries possible.

The Department of Energy (DOE) forecasts a total System Peak Demand of 12,285 MegaWatts (MW) for Luzon to occur in May 2020, an increase of 8.3% from the actual 2019 peak demand of 11,344MW which occurred on 21 June 2019.

According to NGCP, “There appears to be a shift in the way consumers use power. Luzon’s annual peak demand was long driven by increased use during the hot summer months. Mindanao and Visayas peak usage usually occur at the end of the year. The Regulator and authorities must take a closer look at the shifts in peak demand and strategize short term and long-term solutions to address the ever-increasing need for power vis-à-vis power consumption trends,”.

Thin electricity supply is forecasted between April to June 2020, even with an expected incoming 700MW capacity from new power plants. The Luzon grid needs around 4% of the peak demand, or around 491MW in regulating power to stabilize the grid; it also needs to maintain power equivalent to the largest plant online (usually equivalent to 647MW) as contingency power to support the grid in case of an emergency power plant shutdown.

“With the increase in power demand, lack of new baseload plants, power plants de-commissioning and longer unplanned maintenance shutdowns of aging plants, as well as the unpredictable weather, NGCP is urging the authorities to focus efforts on stemming what seems to be an impending power shortage in Luzon, especially during the summer season. As the Transmission Network Provider and System Operator, NGCP performs its functions within the bounds of its mandate. We cannot provide or implement solutions to a generation deficiency-induced shortage,” NGCP appealed.

A steam power plant continuously converts the energy stored in the fossil fuels (coal, oil, natural gas) or fissile fuels (uranium, thorium) into shaft work and ultimately into electricity. The working fluid is water which is sometimes in the vapor phase during its cycle of operations. Energy released by the burning of fuel is transferred to water in the boiler to generate steam at a high pressure and temperature, which then expands in the turbine to a low pressure to produce shaft work. The steam leaving the turbine is condensed into water in the condenser where cooling water from a river or sea circulates carrying away the heat released during condensation. The water (condensate) is then fed back to the boiler by the pump, and the cycle goes on repeating itself.

Moreover, electricity is very much needed not only for household purposes but for industries, offices, and for recreational purposes as well. Therefore, the power supplier needs not only to deliver the power, but most important of all, is the availability of such power supply at any given time interval. This is a sure profit business.

In line with the article reported, it was determined that building a new power plant on the Luzon grid will be beneficial and profitable. The purpose of this study is to design a steam power plant that will produce a power of 500 MW in order to cater the needed demand of electricity in the region.