Chapter 02

PROBLEM STATEMENT

The possibility of large scale solar thermal power plants in Sri Lanka has never been studied. There are two reasons behind this; the high cost of unit of energy produced and novelty of large scale solar thermal power technology compared to conventional technologies. However now, large scale solar thermal power plants are being commercially operated in 2009. Two central receiver type solar thermal power plants, 11MW and 20MW are being operated in Spain. Therefore solar thermal power plants will be widely available in the world in a few years. It is forecast that large scale solar thermal power not only will become economical but will also be competitive with conventional power. Therefore even if it is not technically or economically viable to construct large scale solar thermal power plants in Sri Lanka today, the possibility of solar thermal power in the future requires to be studied.

Further solar thermal power is a 100% green technology. Such technology can claim 0.015 to 0.03 USD for a kWh through the Carbon credit program which will reduce the cost of a kWh produced.

In this study the basics of a central receiver type solar thermal power plant including thermal storage will be studied. Further, the technical feasibility of a central receiver type solar thermal power plant near Hambantota will be studied. The requirement of a power plant and the size of the plant will be determined. The availability of solar resources in the area and the best area to locate a solar thermal power plant will be studied. The required other resources like water resources, lands, proximity to transmission lines shall also be studied.

Further the impact on the environment and the possible measures to mitigate such impacts will be examined.

The technical features of a central receiver type power plant will be further studied and a conceptual design of such power plant will be developed. In the conceptual

design the total required number heliostats or reflectors, the heliostat filed layout, the receiver size, the thermal storage size and the tower height will be calculated.

Finally the economic feasibility of the plant will be determined considering the available soft loan facilities which can be obtained from an international development banks such as GEF and World Bank. The economic benefits of Carbon credit program will also be taken into account.