CHAPTER 7. CONCLUSION AND RECOMMENDATIONS

MSW, it is a real nuisance, but a useful energy source. It is a highly heterogenic blend with many constituents, but ultimately a mixture of combustible matters, volatile matters, moisture and ashes. In general, combustible/volatile matters consist of carbon, oxygen, hydrogen, nitrogen, sulfur, and other minor elements such as chlorine, fluorine, and heavy metals. The heating value of MSW varies with seasons, lifestyle of the people that which the area of collecting MSW, and the economic activities. Typically, MSW has a heating value of 8-12 MJ/kg

The country, like Sri Lanka, that has no fossil fuel, has to pay a significant portion from its national budget for their energy needs. Also, the era of fossil fuel will come to its end in near future and the high impact to the environment, the discussion of using renewable energy was taken place. Apart of Wind energy and hydro power, solar PV, solar thermal, WtE, Gasification technologies were introduced. Since the amount of energy grabbed in MSW, it is also considered as a Non-Conventional renewable energy source. The gazette notification (extraordinary) of No 1553/10 dated 10.06.2010 shows that the minimum level of 10% of electrical energy supplied to the grid to be from NRC by the year 2015.

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Considering all above, implementation of MSW power plant in Sri Lanka could be treated as a current requirement to the country.

The amount of Waste generation in the country is many times that are collected. Most of the rural areas the waste was not collected, but residencies buried the waste generated by them in their own premises. Even though in urban areas the waste generation within their premises, was separated (at the time of generation) and buried the bio degradable, mostly of kitchen waste, and other compounds such as paper, polythene, metal etc would hand over to the collectors of recycling/disposing facilities. However, the industrial or commercial institutes were managed their waste or hand over to the local authority collection system.

58~60% of total waste generation is from western province of the country. This is because of the high population density in the western province. Nearly 700 Ton of MSW was collected by Colombo Municipal area and this amount is nearly 10% of the total waste collection of the country. Since, it is reasonable to consider the MSW collection in the CMC areas, for this study.

Only domestic, commercial and institutional wastes were collected by CMC and with Industrial waste were not dealt by the CMC in the area. It was managed by the industries by their own way. Therefore, it was not possible to consider, how to extract the grabbed energy in the industrial waste within the area for generating electricity in this study.

For this study, a 10MW, MSW combustion, electricity generating plant was considered. There are many types of technologies available for power generating by MSW combustion.

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A mass burn technology, which having least preparation of fuel-MSW was selected due to separation of solid waste for any purpose is quite new to the country. However, by promoting the separation of MSW to its elements at the generation point, at homes for domestic waste etc. this problem could be managed and hence more energy could obtained that were to be wasted. The steam turbine technology which was proven for many years was choosing to electricity generation in this study. A super heater, re-heater and economizes could be introduces to increase efficiency of the cycle. Calorific values of each constituent of collected MSW were considered as the same in throughout the world since there were no such differences when it was dried.

To estimate the total project cost it was considered a rough price for the plant & equipment which has to be procure from abroad. The price that is US$ 4,000,000/MW was very reasonable for 10MW MSW combustion plant and was selected after carrying a thorough market survey for similar plants. The division of capital cost among its major components was done as the way in the international

projects. Based on the correct design of the plant, the EPC contractor could be handled the project and continuous monitoring was necessary with qualified consultancy service. The equipment other than the major components would be procure and construct by the EPC contractor and EPC contractors responsibility would be up to reliability run of the plant after successful construction.

Implementation of MSW combustion projects will have many social benefits since the waste management process is still nonsystematic in many areas in the country. Few of Local authorities are conducting projects of preparing compost manure from the MSW collected in their areas. Few of proper land filling were done by recent past but not enough to cater the incoming rate of MSW. The huge balance of MSW collection was dumped openly and will cause many social and environment problems. Bad odor, pollution of water resources by leachate and damages to the aesthetic appearance are the main problems. Somehow, burning of MSW is also causes the environmental pollution by emissions such as NO_x, SO_x, CO_x, CO_2 and Particulate matters. To eliminate or minimize the above exhaust gas pollution, the combustion process could be controlled by keeping the control of combustion temperature. However, comparing of the social & environmental issues creating by MSW open dumping, the same that creates by MSW combustion plant is very less. A 80~90% volume reduction can be obtained by MSW combustion. By careful handling of bottom ash and fly ash which ware highly demand for the cement manufacturing can obtain an additional income to the plant. Considering all above, apart of the power generation these would be the major benefits to the society and environment by having MSW combustion plant. Therefore, it is highly worth to offer a monthly grant to the project for effective management of MSW by social and environmental point of view. Such grant will reduce the operation cost of the plant and encourages the inventors too.

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As a government policy which promotes NCRE projects, government or local authority could be subsidizes the capital cost by a significant amount at least 40% of the capital cost. This kind of subsidies will encourage the investors and the payback period of the project could be minimized.

The amount of water need to run the plant would not be considered in this study. However the energy need to pump water from water well within the premises was considered under auxiliary power requirement.

In this study a capacity of 10MW pant was considered. But there will be different combinations to get 10MW such as 5MW × 2 units, 3.33MW × 3 units or 2.5MW × 4 units etc. Considering the above options, the plant cost, installation cost, and operational cost could be varied. For maximized the benefit to the investor by maximizing the profit and the project to be reliable, a further study could be carried out. The quantity of water is also varied with different plant configurations it could also to be considered. As discussed in chapter 2 there would be some cheaper technologies available and gasification technology also could be considered. By carrying further study it can be focused for best suitable technology for Sri Lanka for Electricity generation by using MSW.Is is further recommended to study for gathering energy from Industrial waste which is not collected by CMC at present.

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The political stability will play a great roll for any project to success in the country. There were many examples of projects that were not completed, abundant or delayed. Therefore, the great care to be taken the project to be completed within its designated period.