A METHOD TO ASSESS FEASIBILITY OF ELECTRICITY GENERATION USING MUNICIPAL SOLID WASTE

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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ABSTRACT

Management of municipal solid waste is a severe issue locally and globally too, since its generation is increasing day by day. Many social, health and environmental problems occur around the Municipal solid waste dump yards. To overcome this problem there are many methods practicing around the world. But this issue is site specific, area specific & country specific.

Electricity requirement in Sri Lanka is increasing exceedingly in past few years. In 2012, 71% of electricity generation is based on thermal generating plants mainly by using diesel, heavy fuel or coal. The balance 28% is based on Hydro power generation which is mainly depend on rain. Only 1% of total generation was done by Non-Conventional Renewable Energy sources.

Electricity generation by municipal solid waste is one method to address the above issues. This method is practicing some countries with great success but fails in some countries.

Generation of solid waste in the country is very much higher than that count. The total collection of MSW was estimated as 7000 Ton/day. In Colombo district, the amount of solid waste collection was 1250Ton/day and the collection under CMC areas was nearly 700 Ton/day. This amount is almost 10% of the MSW collection throughout the country and it is reasonable to focus the study to the waste collection under CMC areas.

For this study, generation of electricity by using MSW combustion, 10MW Steam turbine was selected since this size & technology was proven and using in many countries, all over the world.

The amount of energy grabbed in the collected MSW was calculated and verified that it was quite enough for the plant that selected for electricity generation by MSW.

To get the financial feasibility of this project, the financial tool that using for the similar studies around the world, Net Present Value, was selected. The NPV scenario is that if the NPV is negative, that shows the project is financially not feasible, if the NPV is zero then the project reached its break-even point and if the NPV is positive the project is financially feasible. The break-even point shows the simple payback period of the project.

Finally, the variation of simple pay-back period of the project was observed with the changes of major factors that influence greatly to the project.

DEDICATION

I lovingly dedicate this thesis to my wife and children who supported me in each & every way to make this effort a success.

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Abbreviation	Description
MSW	Municipal Solid Waste
CHP	Combined Heat & Power
PRV	Pressure reducing valve
CMC	Colombo Municipal Council
CEB	Ceylon Electricity Board
BOP	Balance of plant
HP	High pressure
IP	Intermediate pressure
LP	Low pressure
EOT	Electric Overhead Travelling
HVAC	Heat, Ventilation & Air Condition
PF	Power Factor
CT	Current Transformer
VT	Voltage Transformer
GSS	Grid Sub Station
O&M	Operation and Maintenance
BTU	British thermal unit
NPV	Net Present Value
IRR	Internal Rate of Return
PUCSL	Public Utility Commission of Sri Lanka.
NCRE	Non-conventional Renewable Energy
SPPAs	Standardized Power Purchase Agreements
EPC	Engineering, procurement & construction
FAC	Fuel Adjustment Charges

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