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**EXTENDED COST BENEFIT ANALYSIS OF  
BIOGAS GENERATION USING MUNICIPAL  
SOLID WASTE**

By

**K. G. S. P. KARUNARATHNA (B.Sc.)**

Dissertation submitted in partial fulfillment of the requirement for the postgraduate degree of Master of Science (M.Sc.) in Forestry and Environmental Management of the Faculty of Graduate Studies in University of Sri Jayewardenepura.

**Department of Forestry and Environmental Sciences**

**University of Sri Jayewardenepura.**

**Nugegoda, Sri Lanka**

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## DECLARATION

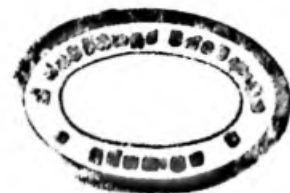
I carried out the research study described in this dissertation on economics of a biogas generation project, under the supervision of Dr. Mrs. U A D P Gunawardena as the partial fulfillment of the M.Sc. degree course, in the Department of Forestry and Environmental Sciences at the University of Sri Jayewardenepura, Sri Lanka.

*Kspgana*.....

(K.G.S.P.Karunarathna)

*20 - 11 - 2004*.....

Date




## SUPERVISOR'S CERTIFICATION

This is to certify that this dissertation is based on the study carried out by the candidate herself and is now approved for submission.

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Date

  
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Signature

Dr. Mrs. U A D P Gunawardena,  
Supervisor, Senior Lecturer,  
Department of Forestry & Environmental  
Sciences, Faculty of Applied Sciences,  
University of Sri Jayewardenapura,  
Nugegoda.

DEDICATION

TO

MY LOVING PARENTS AND TEACHERS

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## ABBREVIATIONS

BCR	- Benefit Cost Ratio
CAFOs	- Concentrated Animal Feeding Operations
CBA	- Cost Benefit Analysis
CEA	- Central Environmental Authority
CVM	- Contingent Valuation Method
DUV	- Direct Use Values
GHG	- Green House Gas
GWP	- Global Warming Potential
IPCC	- Inter government Panel of Climate Change
IRR	- Internal Rate of Return
IUV	- Indirect Use Value
MSW	- Municipal Solid Waste
NERD	- National Engineering and Research Development center
NPV	- Net Present Value
NUV	- Non-Use Values
OV	- Option Value
P.S.	- Pradesheya Saba
PV	- Present Value
SWM	- Solid Waste Management
TEV	- Total Economic Value
U.C.	- Urban Council
UV	- Use Value
WTA	- Willingness To Accept
WTP	- Willingness To Pay

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**Karunarathna K.G.S. P. Extended Cost Benefit Analysis of Biogas  
Generation using Municipal Solid Waste**

Department of Forestry and Environmental Science,  
University of Sri Jayewardenepura

**ABSTRACT**

Solid waste is a growing problem in Sri Lanka in the absence of proper management measures. Development and implementation of a National strategy for municipal management is essential in order to reduce environmental, social and the economic problem associated with the present disposal practices. Such strategies however, need to be subjected to proper economic analysis in order to arrive at informed decisions. The present study presents an extended cost benefit analysis of a biogas generation plant that uses municipal solid waste as the raw material.

To dispose vegetable market garbage available in Wattala, Kandana and Ja-ela areas productively, the 640 Mt capacity biogas/ bio fertilizer project has been housed at Muthurajawela (along Hamilton canal, Elakanda), by the National Engineering Research & Development Center of Sri Lanka (NERDC), which uses Dry Batch Anaerobic Digester Technology. Among the other biological treatment options, anaerobic digestion is the most cost effective, due to the high-energy recovery linked to the process and its limited environmental impacts.

Economic analysis has been carried out to identify costs and benefits associated with the above project. Several environmental valuation methods have been applied to value the identified costs and benefits. The main benefit of reduction of municipal solid waste has been estimated as Rs 1,093,444 per year. Contingent valuation method (CVM) was used to estimate this benefit using samples from Wattal-Mabola, Ja-ela, and Peliyagoda local authorities. Green house gas (methane) emission from solid waste was estimated through Scholl Canyon model and valued using avoided global damage cost approach. Benefits of biogas as an energy source, organic fertilizers and employment benefits were estimated by market based approach.

The project is viable from economy and environment point of view with net present value of Rs. 249.43 million for 20-year period with 10% discount rate. This analysis provides a justification for undertaking solid waste management strategies in a technologically environmentally and economically viable manner.

