

**STUDIES ON BIOGAS PRODUCTION FROM STABLE WASTE
AND ITS APPLICATIONS FOR BRAZING & WELDING**

By

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Centre for Rural Development and Technology

Submitted

in fulfilment of the requirements of the degree of Doctor of Philosophy

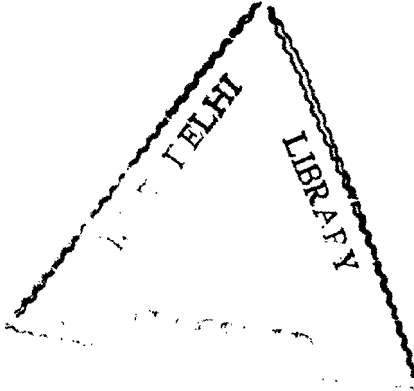
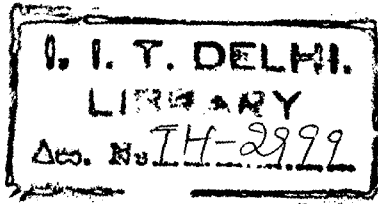
to the



Indian Institute of Technology, Delhi

August, 2003

Biogas energy
- welding

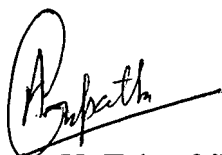


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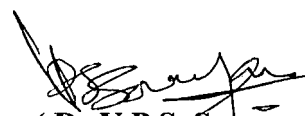
CERTIFICATE

This is to certify that the thesis entitled “**STUDIES ON BIOGAS PRODUCTION FROM STABLE WASTE AND ITS APPLICATIONS FOR BRAZING & WELDING**” submitted by Mr. Mahendra Kumar Mohanty to the Indian Institute of Technology ; Delhi for the award of degree of Doctor of Philosophy, is a record of bonafide research work carried out by him .Mr. Mahendra Kumar Mohanty has worked under our guidance and supervision and has fulfilled the requirements for the submission of this thesis, which to our knowledge, has reached the requisite standard.

The research material and results in the present form contained in this thesis have not been submitted in part or full, to any other University or Institute for award of any degree or diploma.



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ACKNOWLEDGEMENTS

It is my great pleasure and privilege to express my deep sense of gratitude and warmest regard to my supervisor Dr.V.P.S. Sorayan for his constant and consistent inspiring guidance and utmost cooperation at every stage which culminated in successful completion of my research work.

I am very much thankful to my co-supervisor Dr. A.K.Tripathi of MNES for his help for providing literatures and constant suggestions for my research work.

I offer my sense of gratitude to Dr. S.N.Naik for his genuine suggestions and kind co-operation through out the research work.

I feel that without the support of my parent institution, Orissa University of Agriculture and Technology, Bhubaneswar, it was not possible to reach at this height of qualification and experience. I express my heart felt gratitude to Vice Chancellor and Registrar of the O.U.A.T, Bhubaneswar for deputing me for higher study, leading to PhD degree at I.I.T. Delhi.

I am very much thankful to Prof. Rajendra Prasad, Head, Centre for Rural Development and Technology (CRDT) for his encouragement and for providing necessary facilities for conducting the present research work. My sincere thanks to Prof. R.C. Maheshwari, Prof.(Mrs) Santosh Satya and other faculty members of CRDT for their kind advice and timely help. I am also thankful to Mr.Sivkumar of Mechanical


Engineering Department and Mr. Bhardwaj of CRDT for their help and cooperation during the experimental work.

I owe special thanks to my friend Mr. P.C. Pradhan of O.U.A.T for his valuable assistance and encouragement during the study. I am also thankful to my friends Mr. Meher, Dr. Vivek Kumar, Dr.V.Swami and Mr.M. Kulkarni for their cooperation and encouragement during the research work.

I am thankful to Department of Science and Technology, Govt. of India for providing financial help for conducting some parts of the research work. My special thanks to Race Course club, Delhi, Management committee for their cooperation for survey work.

I have no befitting words to express my deep sentiments to words my father , mother , mother in law, wife **Milanika**, daughters **Adyashaa** and **Ananyaa** for their whole hearted moral support and patience, unending love and encouragement through out this study.

Last but not the least, my wife and me, both extent our obligation to Mrs. Sorayan for her encouragement through out our stay in Delhi.


Mahendra Kumar Mohanty

ABSTRACT

An alarming shortage of conventional fuels such as petrol & diesel, their increasing demand and adverse effect on environment has led to the exploitation of renewable energy. By now significant role of biogas technology, on the energy front is well established. Considerable research and dissemination efforts in the field of biogas technology have been undertaken all over the world in general and India in particular. The implicit objective of these programmes in India is to reduce the use of non renewable fuels, deforestation and environment pollution.

The thesis aims at exploring the production of biogas from stable waste (horse dung); scrubbing of biogas and scope of applications of biogas in welding and brazing for rural industries. A financial analysis of the proposed pilots scale biogas plant from stable waste of Racecourse, Delhi was also done.

The proximate and ultimate analysis of stable waste was done. The production of biogas from stable waste was carried out in different types of digesters like batch digester, fixed dome and floating dome digester and associated problems were detected. By studying the problems two horizontal plants were fabricated and performance were tested for biogas production. The result shows that gas production of $0.03 \text{ m}^3/\text{kg}$ of stable waste added per day for a retention period of 30 days was obtained.

A case study for construction of biogas plant at Racecourse Delhi is reported in the thesis. As techno-economics plays a key role in the acceptability of the system, the economic analysis of proposed plant was carried out using different economic indicators

namely net present value (NPV), internal rate of return (IRR) and benefit cost ratio(B/C ratio) and pay back period by considering the different life periods of the system. The results of economic analysis indicate that the biogas is profitable for all proposed life periods for end applications like direct burning and generation of electricity. The internal rate of return is between 22 to 24 percent.

In biogas, carbon dioxide occupies considerable amount of volume, and reduce the heating value as well as the storage space. The problems of scrubbing and compression were studied in detail and reported in the thesis and experiments were conducted on chemical absorption process and found to be suitable for scrubbing of gas from small size plants.

In the present report, theoretical studies on oxy-gas flame were done. The experiments were conducted to study the oxy-biogas flame temperatures and its use for brazing and welding. Different metals and thin sheets made of stainless steel, galvanized iron, copper and mild steel were brazed and their tensile strength was measured.

It is hoped that the present study would encourage the scientists and extension workers for biogas production from stable waste and applications of biogas for brazing purpose in rural industries.

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