

**A TECHNO-ECONOMIC EVALUATION OF
BIOMASS GASIFICATION AND
BRIQUETTING IN INDIA**

by

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in fulfillment of the requirements of the degree of
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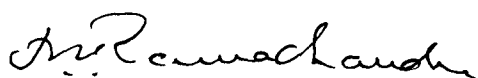
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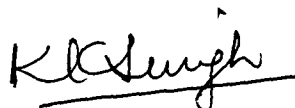
Dedicated
to
My Parents

C E R T I F I C A T E

This is to certify that the thesis entitled **A TECHNO-ECONOMIC EVALUATION OF BIOMASS GASIFICATION AND BRIQUETTING IN INDIA**, being submitted by Mr. Arun Kumar Tripathi to the Chemical Engineering Department, Indian Institute of Technology, Delhi, for the award of the degree of **Doctor of Philosophy** is a record of the original, bonafide research work, carried out by him, under our guidance and supervision and has fulfilled the requirements for the submission of the thesis, which to our knowledge has attained the requisite standard for a Ph.D. degree of this Institute. The material presented in this thesis has not been submitted in part or in full to any other University or Institute for the award of any degree and/or diploma.



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ABSTRACT

The share of biomass energy use from various biomass resources (agricultural residues, animal dung, fuelwood etc.) is about 57% of the total energy requirement, and in rural areas the biomass meets about 80% of the energy demand in India. Although the use of biomass through direct burning has been a traditional practice, the conversion of biomass into secondary fuels (solid, liquid or gas) for a variety of thermal, shaft power and electrical applications, is a recent phenomenon. In this direction, significant developments of biomass gasification and briquetting technologies have taken place during the last two decades in India.

In this thesis an attempt has been made to analyse the techno-economic aspects of biomass gasification and briquetting systems. The financial viability of biomass gasifier based power generation, institutional cooking and water pumping has been studied besides that of biomass briquetting. The role of various factors affecting the unit cost of useful energy has also been studied. An attempt to estimate the availability and cost of agricultural residues and fuelwood from energy plantations has been made. The performance data were collected from the working biomass gasification and briquetting plants and the same have been used for the techno-economic evaluation. It is found that in many situations the biomass gasifier based systems can compete with the conventional options and that the cost of briquettes is lower than that of coal.

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