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**DEPARTMENT OF AGRICULTURAL MECHANISATION AND  
IRRIGATION ENGINEERING**

**DESIGN AND CONSTRUCTION OF A MANUALLY OPERATED BRIQUETTING  
MACHINE**

**BY**

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**BU UG 2011 19**



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## Abstract

According to the Uganda Poverty Status Report in 2005, Uganda's forest cover had diminished from over 11 million hectares in 1890 to less than 4 million hectares in 2005. This is because only 5% of the rural population having access to electricity, more than 90% of the country's total energy needs in Uganda come from biomass sources. (Ferguson, 2012) The over dependency and unsustainable use of the biomass sources have led to the over exploitation of forest resources and hence a rapid reduction in the country's forest cover overtime. Heavy dependence on imported oil leads to economic and social uncertainties. Currently there is a strong worldwide interest in the development of technologies that allow the exploitation of renewable energy sources, for both environmental and economical reasons. Biomass, a domestic energy source is naturally abundant and represents promising renewable energy opportunity that could provide an alternative to the use of fossil resources (Sugumaran and Senshadri, 2010).

To ensure economical and sustainable use of biomass resources, biomass briquetting was devised. This led to the invention and innovations of some briquetting machines.

However, some of these machines are inappropriate for use at the local level. They are manufactured for mass production. They rely on mechanisms that require resources, such as extrusion screws, thrust bearings, or refined fuels, which are locally not readily available.

This creates the need of an appropriate machine design that suites the local economy.

The objectives of this project was to design, construct, and test the capacity and efficiency of the manually operated briquetting machine prototype. In achieving the above objective, the researcher has carried out necessary calculations needed in the design, construction and testing the performance, economic analysis. Therefore, the project covered the design, construction and testing.

Using basic engineering principles and some physical properties of biomass and briquette mixture as size and density, the various components of the manually operated briquetting machine prototype were designed and fabricated.

## Declaration

I TUWANGUDDE Moris declare that that the information in this project proposal is a result of my original work unless where stated and it has never been submitted to any institution or university for any academic reward.

Name: Tuwangudde Moris

Signature: 

Date: 09/05/2015

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## Approval

This project proposal report was written by Tuwangudde Moris under my supervision.

Name: Mrs. Abbo Jacqueline

Signature: .....

Date: .....

Name: Mr. Mugisha Moses

Signature: .....

Date: .....

## **Dedication**

I take this opportunity to dedicate this project report to my lovely parents Mr. Mutebi Paul and Mrs. Nalwanga Proscovia.

## **Acknowledgement**

First of all, I take this opportunity to thank the Almighty God for the gift of life, His gracefulness and provision upon my life that has enabled me make it all this far.

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## List of acronyms

FAO- Food and Agricultural Organization

GHG-Green House Gas

BM-Bending Moment

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

According to the Uganda Poverty Status Report in 2005, Uganda's forest cover had diminished from over 11 million hectares in 1890 to less than 4 million hectares in 2005. This is due to the unsustainable exploitation and utilization of biomass fuel resources.

Despite of the fact that the world economy is dominated by technologies that rely on fossil energy (petroleum, coal, natural gas) that are imported to produce fuels, power, chemicals and materials. This heavy dependence on imported oil leads to economic and social uncertainties.

Currently there is a strong worldwide interest in the development of technologies that allow the exploitation of renewable energy sources, for both environmental (release of pollutants and fossil reserves depletion) and economical reasons. Biomass, a domestic energy source is naturally abundant and represents promising renewable energy opportunity that could provide an alternative to the use of fossil resources. (Sugumaran and Senshadri, 2010)

The trend of growth in global energy consumption is expected to continue in the future primarily because of the expected growth in world population and the expected economic growth of the developing countries. It is likely that the current pattern of energy consumption, which is characterized by continued growth and heavy dependence on fossil fuels, cannot be sustained in the future because of two major constraints. One of these is the environmental impact of using fossil fuels, particularly climate change and the other is the depletion of the reserves of fossil fuels. Since the biggest source of GHG emission is the combustion of fossil fuels, one of the most effective approaches to the mitigation of GHG emission would be reducing consumption of these fuels through their substitution by renewable energy (Bhattacharya, 2006).

Briquetting has been adapted to promote sustainable use of biomass wastes for fuel so as to reduce on green vegetation resources depletion GHG emissions. In the briquetting industries of the third world, devices of several kinds have been developed for forming briquettes. However, these machines are inappropriate for use at the village level. They are manufactured for mass production and large volume sales to well-populated areas and

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