

## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS . . . . .	<b>i</b>
TABLE OF CONTENTS . . . . .	<b>ii</b>
LIST OF FIGURES . . . . .	<b>v</b>
LIST OF TABLES . . . . .	<b>viii</b>
CHAPTER ONE : PROJECT DEFINITION AND IMPLEMENTATION APPROACH	<b>1</b>
1.1. Project Background . . . . .	1
1.2. Rice Hull Stoves, Burners and Pyrolysis	3
1.3. Project Goals . . . . .	5
1.4. Rice Hull Availability in Asean Countries . . . . .	7
CHAPTER TWO : STATE OF THE ART: STOVES, BURNERS AND PYROLYSIS . . . . .	9
2.1. Domestic Stoves . . . . .	9
2.2. Small Scale Burners . . . . .	10
2.3. Research and Development of Pyrolysis of Rice Hulls . . . . .	13
CHAPTER THREE DOMESTIC STOVES	18
3.1. Description of Traditional Stoves . . . . .	18
3.2. Comparative Analysis . . . . .	26
3.3. Proposed Optimal Hull Stove . . . . .	29
CHAPTER FOUR : SMALL SCALE RICE HULL BURNERS . . . . .	35
4.1. Preparation of Technical Drawings . . . . .	35
4.2. Fabrication and Construction . . . . .	36
4.3. Performance Testing of the Indonesian Model . . . . .	37
4.3.1. Description of the Indonesian Rice Hull Burner . . . . .	37

	Page
4.3.2. Experimental Set-up, Instrumentation and Procedure . . . . .	41
4.3.3. Data Reduction and Presentation of Results . . . . .	46
4.4. Performance Testing of the Philippine Model . . . . .	53
4.4.1. Description of the Philippine rice Hull Burner . . . . .	53
4.4.2. Experimental Set-up, Instrumentation and Procedure . . . . .	57
4.4.3. Data Reduction and Presentation of Results . . . . .	57
4.5. Performance Testing of the Thai Model . . . . .	59
<b>CHAPTER FIVE : PYROLYSIS . . . . .</b>	<b>61</b>
5.1. Experimental Equipment, Instrumentation and Testing Procedure . . . . .	61
5.1.1. General Considerations . . . . .	61
5.1.2. The Experimental Pyrolytic Converter . . . . .	63
5.1.3. Instrumentation . . . . .	72
5.1.4. Testing Procedure . . . . .	76
5.2. Data Reduction and Presentation of Results	77
5.2.1. General . . . . .	77
5.2.2. Data Reduction . . . . .	78
5.2.3. Presentation of Results . . . . .	83
5.3. Preliminary Investigation of the Utility of Pyrolytic Products . . . . .	94
5.3.1. General Considerations . . . . .	94
5.3.2. Char . . . . .	94

	Page
5.3.3. Pyrolytic Oil . . . . .	102
5.3.4. Pyrolytic Gas . . . . .	103
CHAPTER SIX : INTERIM CONCLUSIONS AND FUTURE WORK . . . . .	110
REFERENCES . . . . .	112
APPENDIX A : DATA ON RICE HULL GENERATION IN ASEAN MEMBER COUNTRIES . . . . .	116
B : MEASURED AND REDUCED DATA FROM TESTING THE INDONESIAN RICE HULL BURNER . . . . .	122
C : NEASURED AND REDUCED DATA FROM TESTING THE PHILIPPINE RICE HULL BURNER . . . . .	150
D : MEASURED AND REDUCED DATA FROM TESTING THE EXPERIMENTAL PYROLYTIC CONVERTER . . . . .	163