FEASIBILITY ANALYSIS FOR COMMUNITY-SCALE ELECTRICITY GENERATION FROM BIOMASS UNDER CONSTRAINTS OF LOGISTICS, TECHNOLOGY AND ENVIRONMENT IMPACT

JENJIRA PIAMDEE

DOCTOR OF ENGINEERING IN ENERGY ENGINEERING

FEASIBILITY ANALYSIS FOR COMMUNITY-SCALE ELECTRICITY GENERATION FROM BIOMASS UNDER CONSTRAINTS OF LOGISTICS, TECHNOLOGY AND ENVIRONMENT IMPACT

## JENJIRA PIAMDEE

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF ENGINEERING IN ENERGY ENGINEERING

## Copyright<sup>O</sup> by Chiang Mai University Alling a graduate school CHIANG MAI UNIVERSITY SEPTEMBER 2012

FEASIBILITY ANALYSIS FOR COMMUNITY-SCALE ELECTRICITY GENERATION FROM BIOMASS UNDER CONSTRAINTS OF LOGISTICS, TECHNOLOGY AND ENVIRONMENT IMPACT

JENJIRA PIAMDEE

THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF ENGINEERING IN ENERGY ENGINEERING

**EXAMINING COMMITTEE** 

CHAIRPERSON Asst. Prof. Dr. Poon, Thiengburanathum

Asst. Frof. Dr. Sat Vorayos

Prof. Dr. Tanongkiat Kiatsiriroat

Matanu Vnays Dr. Natanee Vorayos

Asst. Prof. Dr. Verachai Arjharn

THESIS ADVISORY COMMITTEE

. ADVISOR Asst. Frof. Dr. Nat Vorayos

Prof. Dr. Tanongkiat Kiatsiriroat

Matanu Vorayos CO-ADVISOR

BEIOKI

21 September 2012

© Copyright by Chiang Mai University

## ACKNOWLEDGEMENTS

The work presented in this thesis would not be possible without the support I have received. Especially, the author wishes to express her utmost gratitude to her adviser, Asst. Prof. Dr. Nat Vorayos for his constructive guidance, suggestion, comments and discussions throughout every phase of the study.

Grateful acknowledgement is made to the members of the Doctoral Program Committee, Prof. Dr. Poon Thiengburanathum, Prof. Dr. Tanongkiat Kiatsiriroat, Dr. Natanee Vorayos and Asst. Prof. Dr. Verachai Arjharn and for their valuable comments.

Acknowledgement is due to Mahasarakham University for awarding the scholarship for study at Chiang Mai University, the Policy and Planning Office (EPPO) for awarding the scholarship for research, the Energy Research and Development (ERDI) for supported GIS's data and the Graduate School and Department of Mechanical Engineering, Chiang Mai University for supporting this thesis.

Finally, the author wishes to thank her family for all the guidance and encouragement, which made this work possible.

Jenjira Piamdee

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright<sup>©</sup> by Chiang Mai University All rights reserved