

**EMISSION CONCERNED ECONOMIC DISPATCH CONSIDERING
CARBON DIOXIDE QUOTA POLICY**

This thesis is presented in partial fulfillment for the award of
Bachelors of Engineering (Hons.) Electrical
UNIVERSITI TEKNOLOGI MARA



HANISAH BT ABD JALAL
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY TECHNOLOGY MARA
40450 SHAH ALAM
SELANGOR

ACKNOWLEDGEMENT

Gratitude to Allah, the Almighty for the blessings on me in completing this project. Not forgetting the great beloved Prophet Muhammad SAW that gives light to all mankind. And also, this dissertation would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable assistance in the preparation and completion of this project.

First and foremost, my utmost gratitude to Associated Professor Pn. Bibi Norasiqin Bt Sheikh Rahimullah, my Final Year Project's supervisor who sincerity gives supports and advices throughout this project. Also her effort and willingness to sacrifice her golden time to guide me in all aspect of final year project allows me to complete this task.

And not forgetting my parents, Abd Jalal B. Othman and Siti Hawati Bt Nasoha and my siblings for their encouragement, support and love during the completing of this project.

Last but not least, I would like to thank my friends for their continuous support in providing advice, guidance and encouragement directly or indirectly throughout my course and staff in the Electrical Engineering Departments for the use of facilities. Due to all the given cooperation and support, I was able complete my final year project smoothly.

Thank You.

ABSTRACT

This thesis presents the mathematical formulation of economic dispatch problem in electricity market under emission concerned policy, which is carbon dioxide quota policy. The formulation using Lagrangian relaxation methods is presented in this thesis. An algorithm, which is developed using MATLAB, is proposed to solve economic dispatch problem considering the carbon dioxide quota policy. Data from four generators in IEEE 14-bus system are used in this formulation. By using the proposed algorithm, the results for the economic dispatch problem can be obtained and fulfil the quota policy. In this manner, the problem of emission of carbon dioxide can be reduced and controlled.

Keywords – Economic dispatch, Lagrangian relaxation, greenhouse gasses, carbon dioxide quota policy, low carbon economy, MATLAB.

TABLE OF CONTENT

CONTENT	PAGES
DECLARATION	
ACKNOWLEDGEMENT	i
ABSTRACT	ii
TABLE OF CONTENT	iii
LIST OF FIGURES	vi
LIST OF TABLES	vii
CHAPTER 1: INTRODUCTION	1
1.1 Overview	1
1.2 Problem Statement	3
1.3 Objectives	4
1.4 Scope of Work	4
1.5 Thesis Organization	5
CHAPTER 2: LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Economic Dispatch	7
2.2.1 Operating Cost of a Thermal Plant	7
2.3 Economic Dispatch Constraints	10

2.3.1 Economic Dispatch with No Generators Limits and Neglecting Losses	10
2.3.2 Inequality or Generation Limit Constraints	15
2.3.3 Equality Constraints	15
2.3.4 Economic Dispatch with Generating Limit but Neglecting Losses	16
2.4 Carbon Dioxide	17
2.5 Carbon Dioxide Quota Policy	18
2.6 MATLAB	19
2.6.1 Introduction of MATLAB Programming	19
2.6.2 Control Flow Study	20
CHAPTER 3: METHODOLOGY	24
3.1 Introduction	24
3.2 Implementation of an algorithm based on Lagrangian Relaxation Method	24
3.2.1 Basic of Lagrangian Relaxation Methods	26
3.2.2 Lagrange Relaxation Methods to Economic Dispatch	27