

A BILATERAL BASED ELECTRICITY MARKET DESIGN FOR MALAYSIA
ELECTRICITY SUPPLY INDUSTRY

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To my beloved family

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ABSTRACT

The purpose of this project is to study and design a bilateral market model for Malaysia Electricity Supply Industry (MESI). Current MESI is adopting Single Buyer Model, which produces no competition either on generation and demand side. Tenaga Nasional Berhad (TNB) is the only one company that buying and selling energy to all relevant parties. On the other hand, the tariff is determined by the government, in other words, customer cannot do anything to the energy tariff. A bilateral market model bring the energy trading to more open and competitive environment, TNB will no longer monopolising the market, where as the parties involving selling and buying energy freely negotiate among themselves based on their demand and needed. It will be forming an electricity wholesale market. Due to the market forces, expected resulting in reduction of cost of wholesale electricity, further to reduce retail energy prices, and benefit to the end user of the reduction of the tariff. A few assumption cases study will be made to simulate the bilateral trading process. The case study for Single Buyer Model (SBM) to be included capacity payment, and assumed that there is no competition among generators. The generators will be only involving Independent Power Producers (IPPs) in Malaysia. On the other hand, a few cases will be studied under bilateral model, stimulate competition among generators will be the essential, and how to make a fair competition environment will also be taken into account. Both results of SBM and bilateral model were compared and discussed. This project has demonstrated the potential of replacing Malaysia's Single Buyer Model to bilateral market model, towards an open and competitive electricity trading market.

ABSTRAK

Tujuan kajian projek ini dijalankan adalah untuk mempelajari dan mengkaji model pasaran bilateral dalam pasaran industri elektrik di Malaysia. Pada masa kini, pasaran elektrik di Malaysia menggunakan Model Pembeli Tunggal (SBM), di mana tiada persaingan dalam operasi bekalan tenaga elektrik. Tenaga Nasional Berhad (TNB) merupakan satu-satunya syarikat di Malaysia yang membeli dan menjual tenaga kuasa elektrik kepada semua pihak. Sementara itu, tariff elektrik ditentukan oleh pihak kerajaan dan pembeli tiada kuasa dalam menentukan kadar tariff elektrik. Pasaran bilateral mewujudkan pasaran terbuka dalam persekitaran yang kompetitif dan TNB tidak lagi dapat memonopoli pasaran elektrik di Malaysia. Di dalam pasaran ini pihak yang terlibat dalam jualan dan belian tenaga elektrik bebas untuk berbincang dan menentukan keperluan mereka. Berhubung dengan kuasa pasaran, dijangkakan kos operasi tenaga elektrik dapat dikurangkan dan seterusnya mengurangkan harga pasaran kuasa elektrik dan ini membawa kebaikan kepada pengguna akhir akibat kesan pengurangan tariff. Beberapa kajian kes dibuat dalam proses merangsangkan pasaran bilateral. Kajian kes untuk SBM di mana melibatkan kapasiti bayaran dan andaian tiada persaingan dalam syarikat penjana elektrik. Syarikat penjana elektrik ini merupakan syarikat yang terlibat dalam firma penjana kuasa bebas (IPP) di Malaysia. Sementara itu, beberapa kes akan dikaji di bawah model bilateral dan rangsangan dalam persaingan di kalangan syarikat penjana elektrik sangat penting dalam mewujudkan persekitaran persaingan yang adil. Seterusnya keputusan kajian akan dibandingkan di antara SBM dan model bilateral. Projek ini juga menghasilkan potensi dalam penggantian SBM kepada model bilateral dan ini membawa kepada pasaran elektrik yang lebih terbuka dan penuh persaingan.

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LIST OF ABBREVIATIONS

EC	-	Energy Commission
DisCo	-	Distribution Company
ESI	-	Electricity Supply Industry
GenCo	-	Generation Company
ISO	-	Independent System Operator
PPA	-	Power Purchase Agreement
PX	-	Power Exchange
SBM	-	Single Buyer Model
TNB	-	Tenaga Nasional Berhad
TransCo	-	Transmission Company

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Malaysia has been undergoing restructuring Electricity Supply Industry (ESI) that for many decades under vertically integrated monopoly. The change in the ESI involves two different aspects that are related to each other. One is restructuring, the other is privatization.

Restructuring refers to change in ESI structure. It is about separating or unbundling vertically integrated ESI and introducing competition and choice. Privatisation is a change from government to private ownership, and is the end-point of a continuum of changes in ownership and management.

Restructuring ESI is driven by factors such as:

- Technology advances
- Changes in political and ideological attitudes
- Regulatory failures
- High tariffs
- Managerial inadequacy

- Global financial drives

The purposes of restructuring are various and are very depends on country policy. Basically, a few common objectives can be summarized as follows:

1. To reduce the costs of energy production and distribution
2. To eliminate certain inefficiencies
3. To shed labour
4. Increase customer choices
5. To reduce government debt burden

1.2 Objective

In the past 20 years, the topic of restructuring Electricity Supply Industry (ESI) was broadly discussed, and practically implement with various model around the world. The process is being proved to benefit to the industry and consumers. Therefore to introduce new model for restructuring Malaysian ESI will be the main objective of this project:

1. To study the current Malaysia electricity supply industry (ESI) model as well as restructured ESI around the world.
2. To compare Malaysia ESI model with bilateral model.
3. To design and propose a bilateral electricity market for Malaysia ESI

1.3 Scope of Project

In order not to deviate from the topic, the project scope of work is set out below:

- Study the current Malaysia Electricity Supply Industry
- Study the various market models; focus on bilateral and single buyer model.
- To design a model for Malaysia Electricity Supply Industry based on bilateral model.
- Price bidding process.

1.4 Research Methodology

The methodology used for this research was to identify the problems facing by TNB with respects to IPP, and utilise the IPP's information for analysis work, which comprises of IPP's installed capacity, energy bid price, and capacity payment. In addition, the information of TNB generators and load profile in peninsular also an essential. Most of the data is available in the Internet, books, and other people research works. The only data that IPP's energy bid price, capacity payment paid by TNB, due to confidential, were obtained from unsaid source.

1.5 Importance of Study

Due to the fuel price is increasing rapidly, and the nature gas as well as crude oil are going to be used up, the Malaysia energy tariff subsidy mechanism may not last for long time. Government is urged to revise or even have to consider of removing the subsidy mechanism, which is treated as producing no efficient and wastes.

On the other hand, TNB was posts net loss of 283 millions in forth quarter 2008, due to one of the reasons that high IPP cost. In fact, the IPP cost is a major burden to TNB, since the terms and condition restricted, the giant is now hard to move forward.

The importance of this study is to think about the solution to the problems stated. It must be some policies or any suggestion to come out before the market collapsed. This thesis hopefully can be some forms of help of assisting in new policy set out and further research works to overcome the crisis.

1.6 Thesis Outline

The thesis is organised as follows. Chapter 2 discusses the models for electricity supply industry, describes the typical models of reform and provides a general viewpoint of parties involved. Chapter 3 discusses current status of Malaysia ESI, and the problems with the existing model. Chapter 4 generates a number of cases studies for both single buyer and bilateral model, on the effects of competition, and provides a discussion of the results. A propose new Malaysia ESI model is

presented in chapter 5. The last part of the thesis, chapter 6, summarises the main conclusions and propose a future work for any extended project.

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