

Single Buyer – A Step Forward in Malaysian Electricity Supply Industry Reform

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Abstract—This paper describes the historical evolution of the Malaysian Electricity Supply Industry (MESI) leading to the formalization of the Single Buyer. Key MESI reform initiatives are highlighted and a survey on reform in neighboring countries is included. The new functional structure and framework of the Single Buyer is also presented. The MESI's reformed Single Buyer framework includes a new reporting structure and is ring-fenced to enhance transparency and accountability. The Single Buyer Rules and Codes of Conduct ensure the impartial and unbiased operationalization of the power purchase agreements (PPAs) and further strengthen the roles of the regulator. Finally, the significance and relevance of the Single Buyer and its advantages in the Malaysian context are enumerated and discussed.

Keywords—*electricity industry reform; managed market model; Incentive Based Regulation; ring fencing; single buyer; single buyer's rules*

I. INTRODUCTION

Malaysia, a country in the Southeast Asia, is made up of Peninsular Malaysia and Borneo Island. The electricity in Peninsular Malaysia is supplied by Tenaga Nasional Berhad (TNB), while for Sabah and Sarawak in the Borneo Island, the grid systems are operated by Sabah Electricity Private Limited (SESB) and Sarawak Electricity Supply Corporation (SESCO), respectively.

The current total installed generation capacity in Peninsular is 21,611MW of which 51% is owned by TNB, 38.5% is produced by the Independent Power Producers (IPPs) and the remaining 13.7% is co-owned by TNB and the IPP. The maximum demand is 15,826 MW.

The Malaysian Electricity Supply Industry (MESI) has for many years remained a regulated monopoly. The national electricity utility, TNB is vertically integrated and controls generation, transmission and distribution of electricity including retail to its 7.88 million customers. While the introduction of IPPs and competitive bidding allows a level playing field in the generation sector, there is no competition in other areas as TNB fully controls the other aspect of the electricity business from transmission down to distribution and retail.

Although plans for industry transformation have been continuously discussed, the implementations of the reform

initiatives are limited. Recently, a comprehensive reform package plan was developed by the government via MyPower, to address crucial issues in the industry such as governance, tariff, fuel and industry structure.



Fig. 1. Malaysia is a country in Southeast Asia

II. OBJECTIVE

The intention of this paper is to present the historical evolution of the MESI and discuss how this development paves the way towards the formation of a ring-fenced Single Buyer.

This paper further highlights the key MESI reform initiatives and the reaction of the incumbent utility that leads to the adoption of current market model. The survey on Electricity Supply Industry (ESI) reform in the neighboring countries is also included.

The paper finally discusses the significance & relevance of the Single Buyer model in current MESI particularly and its advantages in Malaysia's context generally.

III. BACKGROUND AND HISTORICAL EVOLUTION OF MESI

A. The Early Days

Electricity first made its appearance in Malaya, the pre-independent Malaysia, at the turn of the ninetieth century. The earliest record of power generation can be traced back to a small mining town in Rawang, in the state of Selangor. To operate their mines, two enterprising individuals, Mr. Loke Yew and Mr. Thamboosamy Pillai, installed an electric

generator in 1894. They were the first to use electric pumps for mining in Malaya. Soon after, private supply for the street lighting was extended to Rawang Town. In 1895 the railway stations in Kuala Lumpur received its first electricity supply. In 1900, the Raub Australian Gold Mining Company built the first power station in Malaya, the Sempam Hydroelectric Power Station, in Raub town[1].

On 1 September 1949, the Central Electricity Board of the Federation of Malaya (CEB) was established for the electrification of Peninsular Malaysia. At that time, CEB owned 34 power stations with a generation capacity of 40 MW. With the establishment of CEB, the age of private generators had to come to an end.

After the independence of Malaya from the British government, on 22 June 1965, CEB was renamed as National Electricity Board of the States of Malaya (NEB or LLN). Between 1964 and 1982, NEB had consolidated the generation, transmission and distribution network, with the take over several facilities that were owned by private company and local government such as Huttenbachs Ltd in 1964, and Jabatan Bekalan Elektrik Majlis Perbandaran Pulau Pinang (Penang Municipality) in 1976. In 1982, the NEB took over the Perak River Hydro Electric Power company (PRHEP) and its subsidiary Kinta Electrical Distribution Co Ltd (KED). PRHEP which built the hydro-electric station and dam at Chenderoh, was at one time the largest power supplier in Malaya.

By then, the consolidation of the ESI in Malaysia is complete. NEB was the sole state-owned body supplying electricity to the whole of Peninsular. Its transmission lines now stretched over 6,300 kilometers, which is a major achievement from its previous 1,560 kilometers just a decade ago.

B. In the Nineties

As demand for electricity continued to rise, more funds were needed to fund the expansion plans. Taking the lead from developed countries for privatization, in 1990 under the Electricity Supply Act, NEB was corporatized to become TNB. The privatization of TNB is the largest privatization exercise carried out by the Malaysian government. TNB became a public listed company in February 1992, with the Malaysian government owning about 73% of its shares[2]. It also marked the day of which the ESI in Malaysia, has gone a complete circle from being privately owned, to state-owned, and to publicly owned.

After the worst blackout in MESI history back in 1992, the government decided to introduce some competition in the power generation sector. In 1993, a number of five companies were granted licenses to build, operate and own power plants in Peninsular Malaysia. These so-called 'First generation IPPs' were contracted to supply 30% of the nation's electricity demand. Currently, there are 15 numbers of IPP plants, providing 70% of the nation's electricity demand.

SESB is the power utility for the state of Sabah and the Federal Territory of Labuan. In 1998, SESB was privatized and taken over by TNB as an 80% owned subsidiary[3].

C. In the Twenties

In 2001, the government of Malaysia enacted the Five Fuel Policy in their 8th Malaysia Plan. The Five Fuel Policy targets to include renewable energy as its main fuel alongside oil, gas, coal and hydro. Companies were given fiscal incentives as a way to encourage the use of renewable energy in the private sector, as the government targeted to achieve 5% of energy supplied by renewable by 2005[4].

In the same year, the Energy Commission Act was enacted. This led to the formation of the Energy Commission, an independent body which is responsible for regulation and law enforcement as well as development of the MESI. To further increase competition in the generation business, the Single Buyer model was implemented where TNB became the sole purchaser of power from TNB's own generators and IPPs.

The National Green Energy Policy was introduced in 2009. This policy serves to accelerate the national economy and promote sustainable development by seeking to promote efficient energy use[5].

With the objective of achieving a high performing electricity industry, MyPower Corporation was established in 2010 to plan and manage the delivery of reform recommendations. Since then, some of the key reform initiatives that has been carried out include; competitive bidding for new plant-ups, Incentive Based Regulation (IBR), and the establishment of the ring-fenced Single Buyer.

IV. SURVEY ON NEIGHBORING COUNTRIES

A. Thailand

The electricity industry in Thailand is very much still monopolistic in structure. In 1960, three government-owned enterprises were formed in order to deliver electricity throughout the country. The Electricity Generation Authority of Thailand (EGAT) is responsible for power generation and transmission. The Metropolitan Electricity Authority (MEA) is responsible for distribution in Bangkok and in the vicinity, whilst the responsibility for electricity distribution to the rest of Thailand rests with the Provincial Electricity Authority (PEA). The privatization of EGAT, however, and further liberalization of the ESI has been hampered many times due to political and governance issues[6],[7].

In 1992, Prime Minister Anand Panyarachun's government legalized private participation by allowing IPPs. In 1999, suffering from the aftermath of the Asian financial crisis, EGAT had to divest one of its most profitable plants in the Stock Market of Thailand (SET). In 2000, Thailand was beginning to explore the idea of restructuring the electricity supply industry along the lines of the United Kingdom's (UK) power pool model. The plan, however, was drop in 2001 when Prime Minister Thaksin Shinawatra was elected into power[8].

In a move so-called "privatization without liberalization" of state-own enterprises including EGAT, MEA and PEA, the Thaksin's government aimed to create "national champions" in all sectors. The employees' labor union, however, was not in favor and was strongly opposing the privatization move. The labor union argued that privatization would lead to higher

tariff, allocation of shares to cronies in a nontransparent manner, and asset take over by foreigners. Consequent to series of protests and strikes, the government called a halt to the privatization plan[9].

The introduction of the Energy Industry Act in 2007 established a new regulatory regime for Thailand's energy sector and opened the way for promoting new competition. Through this act, policy making, regulation and operating functions are separated. It also led to the establishment of the Energy Regulatory Commissions (ERC) an independent energy regulator responsible for Thailand's energy reform program[10]. However, the ERC still lacks the authoritative power needed to govern the industry and thus, the possibility of reform in the near future remains in doubt[11].

The liberalization of the gas sector along with the Automatic Tariff Adjustment Mechanism (Ft) provide some amount of transparency and safeguard against political influence to the electricity tariffs[12]. However, without the appropriate regulatory framework and effective competition law, the state-owned enterprises: EGAT, MEA and PEA will remain dominant and monopolize the electricity industry.

B. Indonesia

Indonesia has for many years suffered from significant power shortages and thus, a comprehensive electricity reform is crucial. Despairingly, despite the government's many efforts for reform, they often end up in failure. Indonesia's electricity reform faces huge challenges mainly in terms of finance, governance and implementation[13].

Indonesia's Energy Law (2007) mandates energy resources to be utilized for its peoples' welfare, resulting in very low tariffs that are heavily subsidized. This, together with high subsidy in the generation sector to the state-owned PLN (Persero - Perusahaan Listrik Negara) makes for an inefficient market structure that does not encourage investments both foreign and domestic. The reform effort was practically stalled when the 2002 Electricity Law which intended to fully liberalize the industry was revoked[14].

The 2009 Electricity Act brings new hope for Indonesia's electricity reform program. The act proposes to liberalize and create a more competitive industry including the unbundling of PLN and tariff restructuring.

C. Singapore

Singapore is the model country of how electricity reform can be implemented smoothly and systematically. It's ESI has evolved from a traditional vertically-integrated-government-owned monopoly to one that is structured to facilitate wholesale and retail market. To date, the liberalization has created market competition in energy sales of up to 75%.

The success of Singapore's reform lies in good legislation and regulatory framework as well as well-enforced market rules. The clear separation of natural monopolies (i.e. grid) from competition (i.e. generation and retail) and the introduction of vesting contracts to curb market power have managed to promote efficiency and competition.

Singapore ESI is now at its third and final phase of deregulation, where the implementation of full market contestability is underway[15].

V. THE PATH FOR REFORM

A. Initial Reforms

Industry reforms for MESI started back in 1992 with the privatization of the national electricity utility. On February 29 1992, TNB was listed on the local bourse. Though a publicly listed company, the government (through state-owned strategic investment funds) is the major shareholder and makes key decisions for the industry including capacity plant-ups and tariffs.

A major blackout across Peninsular Malaysia shortly after the privatization exercise pushed the government to invite new players in the generation sector. The introduction of IPPs ended TNB's monopoly in the generation sector.

B. The Independent Grid System Operator

After the introduction of IPPs, the Malaysian Government had the intention to further liberalize the MESI by introducing competition in generation dispatch. The Economic Planning Unit, an agency in the Prime Minister's Department formed the Independent Grid System Operator (IGSO) Task Force in November 1998. The IGSO Task Force was tasked to set up a market operator, the Independent Grid System Operator. The market operator would handle the dispatch of power plants in a deregulated electricity market. The task force's main task was to review, design and draft all related rules, codes, procedures and agreements necessary to operationalize the new MESI structure.

TNB, in response to the market structure proposed by the IGSO Task Force, appointed the Boston Consulting Group (BCG) in 2001 to study a suitable market structure for MESI[16]. The soon to be proposed market structure by BCG would reflect the standpoint of TNB to remain a monopoly. The Task Force was disbanded in February 2001.

C. Managed Market Model

The Boston Consulting Group, in its study, recommended a Managed Market Model (M3) for MESI. M3 is an alternative to the proposal of unbundling the vertically integrated utility (VIU) structure of TNB.

Under this model, management unbundling of TNB will be implemented at minimum without separation of ownership. That being said, System Operator (SO) can remain in TNB, but is ring-fenced to enhance transparency and market conduct independence. This model also results in the formation of Single Buyer entity to execute and manage power contracts. However, the system adequacy planning, in terms of capacity planning (generation) and system security (transmission) is to be tasked to an Independent Planning Unit (IPU), which sits outside TNB.

The implementation of the proposed M3 was however put on hold, due to some major events that happened in the global electricity industry. The infamous California Energy Crisis

circa 2000 and 2001 originated from market manipulations among others[17], and the momentous spike in Australian spot price to more than \$10,000 per megawatt hour in July 2010[18], caused the government to take a step back in implementing the structural reform for MESI. Nevertheless, in late 2012, the idea was revived by MyPower Corporation under a new reform initiative.

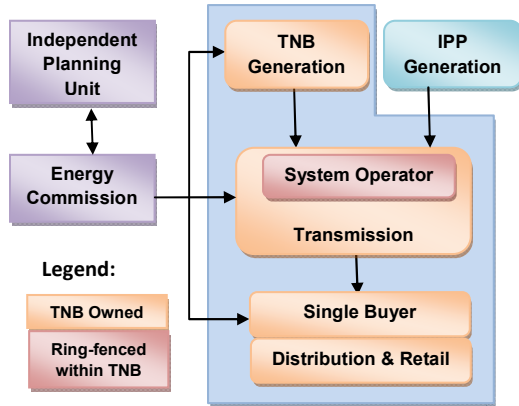


Fig. 2. Proposed Managed Market Model in 2001

D. MESI Structure Prior to Single Buyer

Prior to the establishment of the Single Buyer, the role and responsibilities of the Single Buyer is embedded within TNB. TNB acts as the off-taker for power plant capacity and energy contracts. This structure is also known as the ‘integrated single buyer’ model[19]. The responsibility of dispatching generating capacity also lies within TNB, hence raising concerns over the transparency and efficiency of this structure.

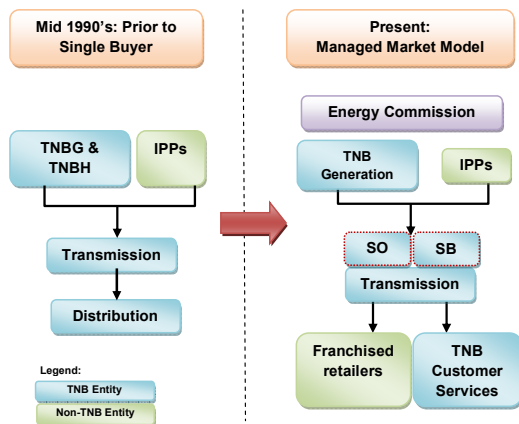


Fig. 3. Evolution of MESI

E. MyPower Reform Initiatives

MyPower Corporation is a special-purpose company set up in 2010 under the Ministry of Energy, Green Technology and Water (KETTHA). The purpose of MyPower is to track and manage delivery reforms for MESI, based on the outcome of the KETTHA-Khazanah study completed in 2009.

Under the IBR guidelines, the previously recommended M3 structure is revived and enhanced to suit the current industry demands. In the new M3 structure, TNB’s business is categorized into five business entities: TNB Generation, Single Buyer, Transmission, System Operator and Customer Services. TNB’s divisional accounting framework will also be separately identified while SB and SO will be ring-fenced within TNB.

VI. SINGLE BUYER

In economic theory, “single buyer” or “monopsony”, is a form of imperfect competition in which there is only one buyer and many sellers of a product[20].

In MESI’s context, Single Buyer as defined by the Single Buyer Rules, is the person authorized by EC to be responsible for the management of procurement of electricity and related services[21]. The SB Department of TNB was formally established on 1st September 2012. The main function of SB is to procure electricity from IPPs and TNB Generation and also to develop “Dispatch Schedules based on a Least Cost Dispatch Scheduling Methodology”[21]. The Single Buyer will be reinforced with clear, transparent, non-discriminatory and auditable functions and operating procedures.

A. Functional Structure

The functional structure of the Single Buyer Department, as illustrated in Fig.4, consists of four units, namely Power and Resource Planning, Power Contract Management, Enterprise Management and Technical Advisory and Industry Development.

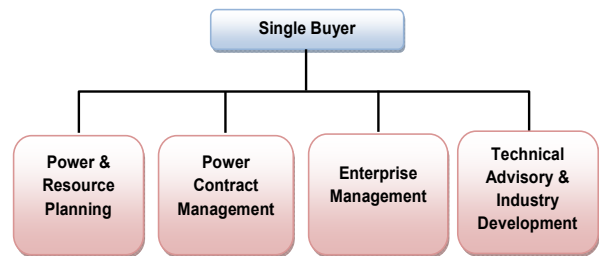


Fig. 4. Functional Structure of Single Buyer

The Power and Resource Planning is mainly responsible for load forecasting, long-term capacity planning and day ahead generation scheduling. The unit is also accountable for fuel management in terms of fuel mix study and fuel security planning, development and management of gas supply agreement and medium term capacity scheduling for fuel and outage planning.

Matters related to power contracts, i.e. Power Purchase Agreement (PPA), Service Level Agreement (SLA) and Cross-border trading, is under the purview of Power Contract Management unit. The tasks include development and negotiation as well as management of all power contracts.

The creation of Technical Advisory and Industry Development unit is to assist EC in providing technical advisory related to transmission and generation related matters.

B. Ring-Fencing

The Independent Competition and Regulatory Commission of Australia defined ring-fencing as “the identification and separation of business activities, costs, and decision making within an integrated entity where part of the entity is providing monopoly services and another is providing services in a competitive market”[22]. In MESI’s perspective, the ring fencing of Single Buyer, in principal, involves maintaining a separate set of Single Buyer’s account as well as separation of its operations. Since Single Buyer is still part of TNB, this move essentially eliminates potential conflicts of interest and perceived favoritism that can lead to lessening of competition in the generation sectors.

It is envisioned that ring-fenced Single Buyer would result in a greater transparency and stronger supervision of the Energy Commission as the regulator. To achieve these objectives, MyPower has outlined the following requirement of the Single Buyer that needs to be complied with[23]:

1) *Non-discriminatory*: Single Buyer shall ensure that its decision or action does not unreasonably discriminates against any other participants.

2) *Ring-fencing of Accounts*: The Single Buyer is required to keep a separate account of its operational expenses and all expenses related to the generation specific costs.

3) *Cost Allocation*: Any costs that are shared between the Single Buyer and any other Division or units within TNB must be allocated according to a cost allocation methodology that has been approved by the EC.

4) *Limits on Sharing of Information*: The Single Buyer shall not disclose any information to any party that may result in conflict of interests, lessening of competition or competitive advantage of another party except to extent required in the performance of its functions under the Single Buyer Rules.

5) *Ring-fencing of Operation*: As long as Single Buyer is still an entity under TNB, then Single Buyer shall identify circumstances where interactions with other divisions or units may lead to conflict of interest, lessening of competition or competitive advantage. This includes, but not limited to:

- Participations in TNB’s internal meetings or discussions concerning tendering for new generation capacity by TNB Generation,
- Establishment of a separate work area from other divisions and units in TNB, and
- Enforcement of access controls for the Single Buyer’s IT system.

C. Single Buyer Rules

The Single Buyer Rules (SB Rules), drafted by MyPower, was established with the purpose to govern the operation of the Single Buyer Market and the conduct of the participants in complying with the rules[21]. The SB Rules applies in conjunction with the prevalent Acts, Licenses and Codes and Generator Contracts.

The Single Buyer Rules contains twenty articles that comprehensively cover all aspect of its existence from the roles

and functions of Single Buyer, the ring-fencing arrangements to the work processes particularly in developing the dispatch schedule of generators. The task to administer and oversee compliance of Single Buyer to the SB Rules is mandated to the Energy Commission as the Chairman of the Oversight Panel.

D. Single Buyer Code of Conduct

The Single Buyer Code of Conduct provides guidelines to the employees of Single Buyer as to how they should conduct themselves in performing their functions. The establishment of the Code of Conduct is necessary and consistent with the Ring-fencing requirement.

The SB Code of Conduct outlines six fundamental principles in ensuring successful implementation of Ring-fencing requirement[24]:

1) *Transparency*: Single Buyer will perform its function in a consistent and transparent manner.

2) *Competition*: Single Buyer will support in promoting fair competition in generation sector.

3) *Independent*: Single Buyer will perform its function independently to ensure security of supply without fear or favor.

4) *Conflict of Interest*: Single Buyer employees will have to disclose any conflict of interest to SB Management.

5) *Confidentiality of Information*: Single Buyer will reasonably ensure that confidential information remains confidential.

6) *Compliance with Laws and Regulations*: Single Buyer will ensure that there is compliance with laws, regulation, codes, rules specifically with the Single Buyer Rules.

VII. DISCUSSION

Reference [25] argued that electricity industry reform is ideally structured along a middle path between the conventional vertically integrated utility and liberalization of wholesale and retail market. Reference [26], furthermore, reviewed critically both the argument for vertical integration in the electricity industry, as well as the argument for restructuring based on unbundling of its products and organizations in favor of market mechanisms. It was concluded that both arguments are “deficient”. A combination of both vertical integration and liberalization is believed to be the ideal structure.

Reference [27] debated that for both vertical integration and competitive markets to have desirable economic outcome, industry restructuring should be formulated based on the most efficient combination between the two schemes. Vertical integration streamlines coordination of highly specific and interdependent investments between generation and transmission. Transmission and distribution, however, remain most efficiently organized as monopolies, and should continue to be regulated as in the case of IBR.

The latest series of reform initiatives for MESI sees the transformation of the industry into M3. M3 can be construed as the “middle path” which allows the incumbent utility, TNB, to remain a VIU whilst introducing a degree of liberalization

in the generation sector. M3 allows Malaysia to continue on the path of liberalization while ensuring system security remains a key objective. The model is based on nation's desire to promote competition for new generation capacity. To ensure supply security and stability, M3 continued the use of long term contracts for supply. M3 also offers predictability of investment returns for generators.

In the M3, the roles and responsibilities of a Single Buyer are manifested through some major structural changes which led to the establishment of the Single Buyer department within TNB. Provision of ring-fencing rules further improves the credibility of the Single Buyer. This ensures the impartial and unbiased operations of the power purchase agreements and further strengthens the roles of the regulator. Within this framework, transparency is greatly enhanced and the Single Buyer is able to play its role and responsibilities effectively.

Worldwide experience with the Single Buyer model has raised concern on how this model may backfire. Lack of transparency and fairness, poor system planning and non-competitive procurement are some of the drawbacks of a poorly constructed Single Buyer. These concerns are however addressed within the IBR regime, where the Single Buyer is incentivized to be more efficient and transparent. Furthermore, competitive procurement provides an elegant solution to the complexities of cost pass-through and self dealing transactions. Concurrent implementation of both mechanisms will further solidify the validity of the Single Buyer in the industry.

It is important to note that, several observers voiced concerns over a profit-seeking Single Buyer, citing conflict of interest, duplication of costs and tariff hikes[28]. Others commented that it is better to skip the single buyer model and go straight to market[29]. However, these concerns can be mitigated as long as the Single Buyer remains regulated[30].

VIII. SUMMARY AND CONCLUSION

In a move to ensure greater transparency and efficiency in MESI, the Single Buyer function which was formerly embedded within TNB is now formalized through a series of structural changes and rule settings under the new M3 structure.

The reformed Single Buyer is reinforced with clear, transparent, and auditable functions and operating procedures which allows for a non-discriminatory level playing field for participants. It is also well complemented by the implementation of competitive bidding while the performance incentive scheme under IBR will ensure efficient operation of SB. In a vertically-integrated environment, these mechanisms encourage efficiency and competition in the generation sector as well as promote confidence in MESI via improved transparency.

The evolution of MESI towards the M3 model can be seen as another positive step towards reform. However, MESI continues to face multi-dimensional challenges in terms of tightness in fuel supply, industry governance and unsustainable tariff structure. The MESI reform transformation is clearly

underway, and more reform initiatives is expected to be implemented in the near future.

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