Economic Regulation of the Single Buyer:

Enhancing Efficiencies Through an Incentive Based Framework

Noor Zafina Mohd Zamin and Joon B. Ibrahim, *Member, IEEE*
Single Buyer Department, Planning Division,
Tenaga Nasional Berhad
Kuala Lumpur, Malaysia
zafinamz@tnb.com.my, jooni@tnb.com.my

***Abstract*—Centralized power-purchasing units that exist within a vertically-integrated entity have been criticized for failure to provide a truly level playing field for the players in the generation sector competing to sell power to the single buyer. Efficiencies in dispatching and power planning are also questioned as monopolistic markets often lack the competitive motivation to deliver quality services. The recent wave of reform in the Malaysian Electricity Supply Industry (MESI) sees the implementation of Incentive Based Regulation (IBR) as an economic regulation mechanism to replace the traditional rate-of-return based regulation (RORB). This paper demonstrates how IBR can provide an elegant tool to extract efficiencies from a single buyer in a vertically-integrated electricity industry. This paper further highlights the key components of MESI's IBR framework. The tariff setting mechanism is included as well as performance indicators that will track the operational efficiencies of SB. A review on economic regulation in neighboring countries is also included. Finally, the paper discusses how IBR can provide an elegant solution to the major concerns plaguing the single buyer market model.**

Keywords—Incentive Based Regulation; Malaysian Electricity Supply Industry; Single Buyer; Vertically Integrated Utility

I. INTRODUCTION

The Malaysian Electricity Supply Industry (MESI) has gone through various stages of reform and has evolved from a predominantly single entity to a multiplayer industry particularly in the generation sector. While the generation sector is very much competitive, many parts of the industry are still under the responsibility of the national electricity company, Tenaga Nasional Berhad (TNB).

As part of the ó9+1 MESI reform packageô [1], the Single Buyer department (SB) of TNB was formally established on September 2012 as the single entity to procure energy from generation plants [2]. Also included in the reform package is the establishment of a superior tariff-setting framework and regulation to replace the previous rate-of-return based (RORB) regulation, which was perceived as non-transparent and unsustainable.

There are many benefits that can be gained from a well-structured regulatory framework namely; lower cost of service, improvements in quality of services and investment for industry development [3]. As an economic regulation tool, Incentive Based Regulation (IBR) (or sometimes Performance Based Regulation (PBR)) seeks to balance the needs of both utility and customers by driving down costs, promoting efficiencies while ensuring that the utility receives a fair rate of return. Generally speaking, IBR is a tariff setting mechanism which provides a systematic incentive for a utility to lower cost through improved efficiency [4].

II. OBJECTIVES

Notwithstanding deregulated electricity markets in other countries, the Economic Council of Malaysia has made an executive decision for MESI to remain in the single buyer model as of now. Some argued that this model has major disadvantages, and it is better to skip this stage altogether and move directly to market [5].

The objective of this paper is to demonstrate how Incentive Based Regulation can be used as a tool to regulate the Single Buyer effectively. Thus, major shortcomings as described by single buyer skeptics may be effectively mitigated.

III. MESI IBR REGULATORY FRAMEWORK

The recent license granted to TNB by the Regulator incorporates provisions for the establishment of IBR as an economic regulation framework to be obligated on TNB. The IBR framework encompasses tariff setting principles, incentive mechanism to promote efficiency and service standards and the tariff review process. The guidelines for IBR implementation are specified in detail in the Regulatory Implementation Guidelines (RIGs). The RIGs was issued by Suruhanjaya Tenaga (ST), the industry regulator, on 1st January 2012.

The incentive mechanism covers three areas:

- Operational efficiencies; incentives to pursue efficiencies in operational expenditure (OPEX) and capital expenditure (CAPEX),
- Financial efficiencies; incentives to pursue an efficient capital structure, and
- Performance efficiencies; incentives to pursue improvements in network performance and customer services.

The IBR implementation in Malaysia will commence in Financial Year (FY) 2014 (September 2013 ï August 2014) as an Interim/Trial Period and the First Regulatory Period will be from FY 2015 through to FY 2017 (September 2014 ï August

2017). A regulatory period of three years is recommended for the first term.

IV. ECONOMIC REGULATION IN OTHER COUNTRIES

A. The Philippines

Performance Based Regulation (PBR) in the Philippines is the outcome of the Electric Power Industry Reform Act (EPIRA) back in 2001. Under this law, the generation and retail sector were open up to competition while the Transmission and Distribution sector remained as regulated natural monopolies. The Energy Regulatory Commission (ERC) was created as an independent regulatory body and is authorized to establish alternative forms of internationally accepted rate-setting methodology for regulated entities within the industry [6].

Under the Rules for Setting Transmission Wheeling Rates (RTWR) framework, a revenue cap will be imposed on the National Grid Corporation of the Philippines (NGCP); the entity which is responsible for the operation and management of the grid. The regulatory period is set at five years and the Annual Revenue Requirement (ARR) set for this period will be converted to a smoothed revenue cap to reduce the likelihood of price shocks to consumers. This revenue cap will be recalculated annually and adjusted to cater for economic uncertainties via the Consumer Price Index (CPI) [7].

As of 2012, there are a number of 139 distribution utilities (DUs) in the Philippines, of which 19 are privately-owned and 120 are electric cooperatives [8]. For private DUs, the performance based rate setting framework is similar to the one employed in transmission sector and is captured in the Rules for Setting Distribution Wheeling Rates (RDWR). For electric cooperatives, on the other hand, rates are set based on benchmarking methodology. DUs under the PBR scheme will be subjected to price cap regime with a regulatory period of four years [9]. Performance incentive scheme incorporates an S-curve, similar to the one employed in MESI IBR.

B. Australia

The economic regulation for electricity network businesses in Australia is embedded within the National Electricity Law in Chapters 6 and 6A. The Australian Energy Regulator (AER) approves pricing proposals and revenue requirements for all electricity networks in the National Electricity Market (NEM). Networks in Western Australia will be regulated by the Economic Regulation Authority, while the Utilities Commission regulates networks in the Northern Territory [10].

Regulatory period lasts for typically five years, whereby the AER will undertake public consultation at least every three years to develop its approach to setting the rate of return. For Transmission network service providers (TNSPs), a revenue cap is imposed. Control mechanisms provided for distribution network service providers (DNSPs) varies across networks and includes weighted average price caps and average or maximum revenue caps.

Under the efficiency benefit sharing scheme, network businesses are incentivized to achieve efficient operating and maintenance expenditure. Efficiency gains or losses are shared with customers through tariff adjustments of up to 70 per cent.

The service target performance incentive scheme (STPIS) is administered to ensure that service quality is maintained. The STPIS for TNSPs include a service component, market impact and network capability component. AER sets separate standards that reflect the circumstances of each network based on past performance [11]. On the other hand, performance targets for DNSPs covers four components namely reliability of supply, quality of supply, customer service and guaranteed service level (GSL). The GSL does not apply if the DNSP is subjected to jurisdictional GSL obligations.

For large individual projects requiring huge capital expenditure, a separate assessment process or regulatory test will be applied. The regulatory investment test for transmission (RIT-T) and distribution (RIT-D) are similar, whereby RIT-D will apply to investment projects over $5 million. Investments that are deemed neither prudent nor efficient may be removed from the regulatory asset base (RAB).

Recently, AER has embarked on the Better Regulation program aimed to deliver an improved regulatory framework for the long term interest of electricity customers. The new guidelines will include an improved framework for assessing expenditure proposals and calculate the allowed return on assets, and will be published by end of 2013.

V. SEPARATION OF BUSINESS ENTITIES AND UNBUNDLING

Under the IBR framework, MESI has evolved from the traditional vertically-integrated monopoly structure into the Managed Market Model (M3) [12]. Five business entities that are subjected to incentive-based regulation are defined namely; TNB Generation (TNBG), Single Buyer (SB), Transmission (TNBT), System Operator (SO) and Customer Services (CS). The Independent Power Producers (IPPs) are collectively the sixth business entity and contracts sale of electricity with the Single Buyer. Each of these business entities will need to establish its own set of Regulatory Accounts, also known as accounting unbundling. This exercise creates distinct entities with separate identification of costs and revenues, allowing for disaggregation of tariff components. Fig. 1 illustrates the flow of funds in the current M3 model.

SB is the business entity entrusted to procure electricity from IPPs and TNBG based on the terms of the power purchase agreement PPAs) and service level agreement (SLAs). SB then dispatches generation units based on a dispatch merit order and also produces the day-ahead dispatch. In order to address the issue of transparency and fairness in the generation sector, SB and SO are ring-fenced within TNB and enforced with certain rules and guidelines namely the SB &SO Rules and Code of Conduct.

VI. SETTING THE SINGLE BUYER TARIFF

The final electricity tariff for customers is a bundled tariff; consisting of the sum of CS tariff, Transmission tariff, SO tariff and SB tariff. The forecasted average tariff for each business entity will be applied and fixed over the Regulatory Term. This

average tariff will consist of forecast annual revenue requirements taking into account the approved weighted average cost of capital (WACC).

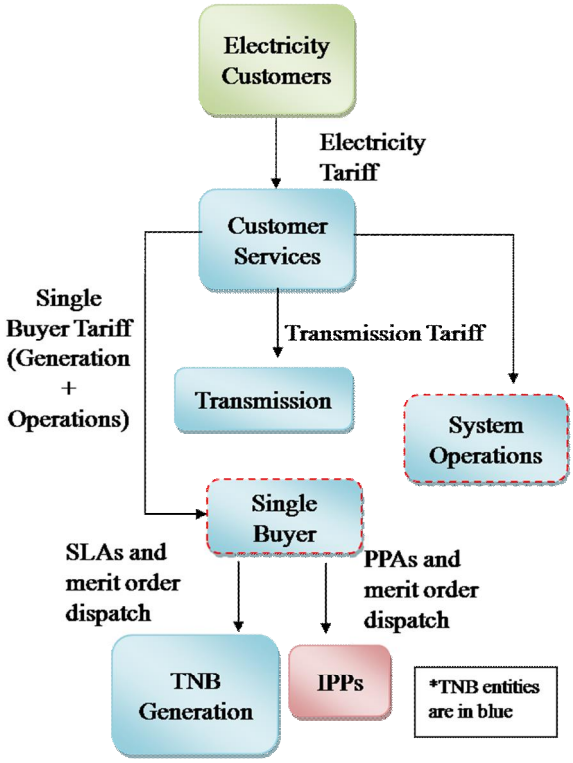

Fig. 1. Flow of funds within the Managed Market Model (M3)

The Single Buyer Tariff comprises of two elements:

1) Single Buyer Generation component: which is based on all costs of generation including fuel, capacity payments and other costs associated with the terms and conditions of the PPAs, SLAs and other fuel procurement contracts; and

2) Single Buyer Operations component: which is based on the other operational and capital related costs of running the SB operations and includes an allocation of joint costs (if any).

SB will operate under a Revenue Cap regime for its own operating costs, while for generation specific costs, Actual cost regime will apply. Under a pure Revenue Cap, annual revenue is set for each year of the Regulatory Term. On the other hand, Actual Cost regime will allow TNB to recover all of its actual cost.

Under the Actual Cost regime, SB will pass on all actual costs of procuring electricity from the IPPs and TNB Generation, capacity payments and other costs associated with the terms and conditions of the PPAs, SLAs and other fuel procurement contracts to Customer Services. Actual cost of procuring electricity from renewable generation and other generation entities are also included. These costs will then be passed on to electricity customers via the bundled tariff. Actual Costs will be adjusted every six month. The tariff setting framework is explained in detailed in RIG 2[13].

VII. IMBALANCE COST PASS-THROUGH (ICPT)

As explained in the previous section, the SB tariff is composed of two components. For the generation specific component, the SB will forecast its generation cost based on the current price of gas and coal. However, fuel prices tend to get very volatile and may impact the profitability of the generation utility. Hence, to protect TNB from this inconsistency, a fuel price adjustment is allowed. The ICPT consists of two components [14]:

1) Fuel cost past through: which captures the variation in gas and coal cost as a results of changes in the fuel price, quantity, foreign exchange etc., and

2) Other Generation Specific Cost Pass-Through (GSCPT): which captures the variation in other fuels (e.g. distillate and MFO), all costs incurred by the Single Buyer under the PPAs and SLAs (incentive or bonus payments, Liquidated Damages, Savings etc.) as well as the displaced costs for the Renewable Energy.

Every 6 months, SB will compare its actual cost of procuring electricity to its actual revenue based on the generation specific component. SB will have to present detailed analysis and documentation to verify the changes in fuel prices. Any over or under recovery from the actual figure will be passed on to customers in the following 6 month period.

VIII. PERFORMANCE INDICATORS FOR THE SINGLE BUYER

The incentive framework for operational performance aims to link electricity tariffs with TNBôs operational performances. If TNB business entities exceed a certain target, TNB should be allowed to charge slightly higher prices. On the other hand, TNB should charge a slightly lower price if the utility performs below a certain standard. However, there are caps on the maximum incentives and penalties.

The incentive scheme links the performances of the business entities with the incentives or penalties based on the S-curve. The proposed incentive scheme is illustrated in Fig. 2.

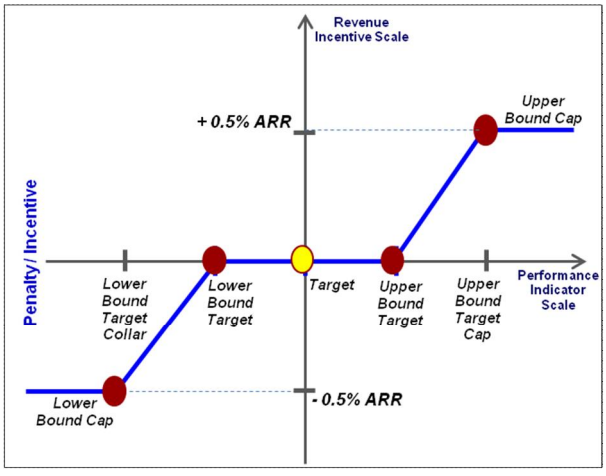

Fig. 2. S-curve for the Performance Incentive Scheme

The dead-band lies between the Upper and Lower bound targets and therefore there is neither incentive nor penalty for performances in this region. If actual performance falls below the Lower Bound Target, the penalty starts and caps out at for example, 0.5% of annual revenue requirements (ARR) at the Lower Bound Cap. Conversely, if actual performance is better than the Upper Bound Target value, the incentive commences and caps at for example, 0.5% ARR, when actual performance reaches or exceeds the Upper Bound Cap. The revenue incentive or penalty amounts for actual performance between the upper and lower bound target values and their respective cap values will be based on a straight line linear equation.

For the first Regulatory Term, the four sets of performance indicators approved by ST for SB are as follows:

TABLE I. PERFORMANCE INDICATORS FOR SINGLE BUYER

	Performance Indicator	Description
1.	Dispatch deviation	Measures the difference between actual generation and least cost generation plan within system limitations. The system limitation is the limit in forecast deviation, forced outages and gas volume
2.	Compliance to Timely Settlement of Generators' Invoices	Measures the percentage of verification and settlement of generation capacity and energy payment invoices made within the time stipulated in the PPAs
3.	Number of non-compliance to the Malaysian Grid Code (MGC)	MGC is a set of technical specification which defines the parameters an electricity generating plant and grid system network have to meet.
4.	Number of non-compliance to the Single Buyer Rules (SBR)	SBR governs the operation of SB market and conduct.

IX. DISCUSSION

A study carried out by the World Bank provided a list of shortcomings associated with the single buyer model among others; lack of transparency, stranded investment costs, over-optimistic forecast, non-competitive procurement and inefficient generation dispatch [15]. In this section, it can be seen that implementation of IBR and competitive procurement in tandem may be the most advantageous solution.

Previous RORB based regulation in MESI focuses on recovery of historical cost without any incentive for pursuing efficiencies. On the other hand, the tariff setting framework under IBR focuses on recovery based on forecast efficient expenditure. Accounting unbundling exercise creates separate and transparent accounts for each business entity, preventing cross subsidies between them. Thus, financial and operational efficiencies of each business entity can be easily analyzed; forcing each entity to operate in the most efficient manner.

Several studies concluded that the acute electricity shortages in South Africa are attributed to the single buyer model [16]. The study claims that the generation sector lacks investor confidence due to ESKOMôs stranglehold on the entire electricity industry. Another study goes to propose that ESKOMôs designation as the sole purchaser of electricity should be revoked to encourage private sector involvement [17]. For countries employing the single-buyer model, transparency is vital. MESIôs IBR enhances transparency in the single buyer model through the Single Buyer Rules, Ring-fencing guidelines and SB Code of Conduct. These rules are provided to ensure that SB behaves in a fair and transparent manner, promotes investorsô confidence while preserving SBôs credibility.

Generation capacities in MESI are procured through a transparent and competitive exercise; via competitive bidding. This exercise is carried out by the Regulator and allows TNB to compete on the same platform as the IPPs. Another study by the World Bank acknowledges that competitive bidding has reduced PPA prices by 25 percent [18] and pointed out that it is the best methodology to assure transparency and fairness in the energy procurement process [19].

Another study proposed that the single buyer entity should not be separated from the entity that will have to pay for the long-term PPAs being tendered. Otherwise, the single buyer entity might not have strong incentives to reliably produce least cost plans or even to administer competitive tenders [20]. However, since SB is ring-fenced within TNB and rigorously monitored under the IBR performance incentive scheme; this concern may be mitigated.

X. SUMMARY AND CONCLUSIONS

As TNB embarks on its IBR Interim Period by the end of 2013, the outcome of its implementation is yet to be seen. Yet, IBR experiences in some countries are very encouraging and display improved performance and cost savings [21]. Crucially, the IBR tariff setting framework allows TNB to recover its true cost of services, while ICPT mechanism allows the full recovery of fuel and generation specific costs as carried out in other jurisdictions.

SB plays a major role in supporting IBRôs goals and objectives. In the absence of a pool market, SB acts as the off taker and optimizes generation costs based on efficient dispatch of generation. Furthermore, responsibilities of fuel management, generation plant-up and load forecasting also lies within SB. Therefore, sound and robust planning by SB will lead to optimal operations by the system operator, efficient fuel and energy procurement and successful implementation of ICPT; translating to huge financial savings for TNB. Provisions of incentive scheme within IBR are crucial to extract efficiency and transparency from SB, while further complemented by the competitive bidding exercise in the generation sector.

Indeed, a myriad of opportunities are embedded within IBR. IBR monitoring mechanism and reporting requirements can be used to display TNBôs efficiencies that would otherwise be overshadowed by political constraints. Moving forward, the challenge for TNB is to demonstrate its ability to balance all three types of efficiencies obligated upon them namely; cost,

financial and operational efficiencies. Additionally, the ex ante tariff setting approach requires excellent forecasting methodology as any variation from the forecast will affect TNBôs future revenues. Those are no easy feat requiring full support from all stakeholders.

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