

Chapter 8

CHOICE OF ELECTRICITY MARKET MODEL FOR MALAYSIA

8.1 Fundamental Requirements for an Effective Competitive Electricity Market

The choice of the market model will determine the mechanisms through which generators and suppliers of electricity will interact to meet the demands of consumers while ensuring the integrity and reliability of electricity in Malaysia. Accordingly, it will be of critical importance for the creation of a competitive and efficient electricity market in Malaysia that will ensure residents of low-cost and reliable electricity supply, meeting the specific needs and tastes of each particular consumer.

For a market reform to be truly worthwhile, it must ensure that effective competition is introduced. In this regard, the structure of the market or the choice of the market model, to be established to replace the current vertically integrated monopoly must recognize the requirements for effective competition. The California's energy crisis has demonstrated the importance of getting the market structure right at the outset in order to reap the benefits of a competitive market.

In designing a competitive electricity market, there are three fundamental requirements that must be accommodated.

8.1.1 Market Design should Promote Effective Competition and Economic Efficiency.

Generally, there are four essential conditions that make truly competitive markets possible.⁵³

- The goods being produced by any one supplier is indistinct from and easily replaced by output from other suppliers i.e. substitutes are readily available;
- Entry of new competitors into the market is reasonably free
- A sufficient number of competitors exist so that all must sell their output at the market price, i.e. they are “price-takers” and no firm is able to affect price by altering its output; and
- Relevant product and market information is freely available to buyers and sellers.

Nevertheless, in markets today, these conditions are rarely, if ever, obtained. Therefore, most economists will often consider a market to be effectively competitive if at least three conditions are satisfied:

- There are at least five reasonably comparable competitors;
- There is an absence of single-firm dominance (that is, when one firm has a market share of at least 40 percent to 50 percent) and
- There is reasonably free entry

The above conditions will require most utility companies to spin off or divest their generation assets. TNB is of no exception.

Competition, of course, should not be viewed as an end in itself. It will be essential that efforts to enhance competition do not also jeopardize the reliability and integrity of the electric system. Competition should also not be promoted

where it is likely to have economic costs outweighing its potential economic benefits. This may be the case, for example, where the relevant activities have natural monopoly characteristics such that efforts to create competition would result in production inefficiencies or duplicative costs that would outweigh the potential benefits from competition. A nuclear plant or the transmission backbone of an existing electric system is an example of such a natural monopoly.

8.1.2 Market Design should support both Provider and Consumer Choice in regard to the Supply and Purchase of Electricity

The ability to choose among competing service offerings will be a fundamental requirement for consumers to be able to reveal their preferences regarding such supply characteristics as reliability, time of use and the desired degree of unbundling. Maximizing consumer welfare and economic efficiency, however, will also require that suppliers have choice and flexibility to meet these demands in the least cost and most efficient manner.

8.1.3 Basic Market Design Establish a Level Playing Field for Competition.

In all markets, there will be some businesses that are more effective competitors than others. Providing a level playing field should not be about establishing equality among them. Rather, it should only be concerned about providing a framework within which all firms will thrive or fail on the basis of their ability to meet consumers' demands and needs at the best combination of price and product terms. Only where such conditions exist will the efficient allocation of output among competing suppliers be assured.

⁵³ Shepherd, W.G., "Market Power in the Electric Utility Industry: An Overview"

8.2 Basic Issues related to the Market Design: Setting up of an Independent Regulator or commonly known as The Independent System Operator (ISO) or The Independent Market Operator (IMO)

The choice of the market model should complement the objectives of restructuring of the electricity industry in Malaysia, as stated in Chapter 3 of this research paper. Based on the model of reform in other developed countries, some of the key features that need to be considered are:

Maintaining continuous system balance and frequency, assuring adequate voltage support and stability and keeping operations within defined security limits are essential to maintain a safe and reliable system. Performing these functions requires some degree of centralized coordination. All modern electrical grid system, whether they support competitive markets or not, therefore require a central grid operator to perform these and other related functions.

However, in a purportedly competitive or “free” market, the desirability of market coordination by a centralized regulated entity such as an ISO is one of the more hotly debated market design issues, particularly in the United States. The debate hinges on whether the “market making” or “market functions” should be “left to the market” instead of relying on a centralized regulated entity. Nevertheless, the virtual necessity of a centralized market coordination function for the electricity market is internationally well accepted. The argument for market coordination arises from the fact that the electrical network grid needs to be continuously coordinated, taken into account the constraints in the transmission network and the need to maintain balance between supply and demand. Market traders operating on a strictly decentralized trading arrangement, without critical information on the real time status of grid constraints and security requirements, cannot possibly clear the market and yet maintain system balance within the reliability constraints.

It is not surprising that the ISO has numerous tasks and responsibilities. In addition of being independent and transparent in carrying out its operation, the ISO will “run an electricity exchange, dispatch power based on least cost bids, and arrange financial settlements between buyer and sellers.”⁵⁴ The following is a generic description of steps found in virtually every electricity market. (The list is not exhaustive. It is merely a set of representative general tasks)

1. Market participants must submit offers or bids to the ISO at some designated time period prior to the dispatch day/hour. These offers would include both generation bids and load bids (or at least forecasts) for the amounts of amount of energy that will be served through the ISO's dispatch. The bidding may occur one or more days ahead or as short as an hour ahead of any dispatch hour.
2. In many systems, the grid operator also accepts proposed schedules of bilateral trades. Such bilateral schedules might also incremental or decremental bids, indicating the prices at which the bilateral parties were willing to increase or decrease generation or loads.
3. Once it has all the bids and schedules, the ISO must examine whether the schedules are feasible within the security constraints and transmission limits of the grids. If not, the ISO must eventually use the market participants' bids to arrange a security-constrained dispatch; that is, it determines a merit order for dispatching generators (and dispatchable loads, if any) to meet all loads not served through bilateral schedules, while maintaining system balance and meeting all grid security and transmission limits.

⁵⁴ Issue Paper No.3, Choice of Market Model, Ontario Market Design Committee

4. The ISO must dispatch the flexible generators (and loads) in real time, taking account of scheduled resources and continuing to meet balancing and security requirements.
5. Following the dispatch, the ISO must determine the market clearing prices that will apply to settlements, based on the market participants bids and the dispatch.
6. Finally, the ISO must settle with market participants, paying generators for any output delivered pursuant to the dispatch and charging loads for energy withdrawn from the grid pursuant to the dispatch. Bilateral traders must settle for any deviations between their schedules and their actual deliveries and usage. Depending on the congestion management pricing methods, there may also be charge for transmission use, embedded in either in the settlement market-clearing price that is applied to spot traders or in a transmission usage charge applied to bilateral traders.

8.2.1 Governance Structure of Independent Regulator

To protect the independence of an ISO, it is necessary to consider the governance structure of this independent regulator. In addition, the compensation for ISO needs to be taken into account as well. To answer these questions about the organization of ISO's and how ISO's should be compensated for their services, four basic options have been suggested.⁵⁵

⁵⁵ The Organization of Competitive Wholesale Power Markets and Spot Price Pools, The National Council on Competition and the Electric Utility Industry, The Electric Industry Restructuring Series, <http://www.ncouncil.org/pubs/pool.html>

8.2.1.1 Expanded “club” Approach

The expanded “club” approach would result in a diversified board of directors or a management council that includes representatives of a broad range of participants from the “players” in the electric power industry. For example, the management council could consist of representatives from the generating companies, the transmission-owning utilities, the power marketers, independent power producers and even the consumers as well. With such a broad range of participants, this structure ensures that the ISO is dictated by one type of market participant. The downside is that mutually agreed decisions are usually harder to achieve as each party jostles for an advantage. In this model, the ISO could be a for-profit or not-for-profit corporation.

8.2.1.2 Independent Contractor subject to Performance-Based Regulation Approach

In this approach, the ISO would be engaged through a competition for the ISO franchise and compensated on a performance basis. As such, the ISO is a for-profit organization with compensation based on the efficient operation of the transmission system. This approach maximizes the independence of the ISO. However, this model requires careful attention to the definition of ISO performance incentives. Rewarding the ISO for maximizing throughput might encourage uneconomic expansion of transmission capacity. On the other hand, if the ISO’s performance incentives were based minimizing transmission cost, the ISO could discourage transmission investment where such investments would reduce electricity prices and costs to consumers. To optimize the efficiency of the overall electric power system, incentives for the ISO would have to encourage reductions in the combined cost of transmission and excess generation costs resulting from transmission constraints.

8.2.1.3 The Hybrid Approach

In this approach, a multiparty board would be established to administer a franchise competition and establish a performance-based contract with an ISO management company. If the contractor performed successfully, the board could renew its contract. The board would have responsibility for overall guidance, while the day to day administration would be left to the contractor, subject to a performance-based contract.

8.2.1.4 The Public Authority Approach

In this approach, the ownership of the transmission system could be turned over to an independent public authority. As such, an independent public agency would take responsibility for the operation of the transmission system.

There is little doubt that the breakthrough that made real competition possible on an electricity grid was the concept of an independent system operator. The ability of an ISO to operate a centralized spot market, integrated with real time physical operations and open to competitive buyers, is an important element in replacing monopoly control of the industry. Nevertheless, the detailed setting up, governing and operational rules of an ISO are beyond the scope of this chapter.

8.3 Market Power Mitigation

The existence of market power in the hands of a few market participants can result in significant economic costs. Consequently, in designing a competitive electricity market, it is important to have a clear understanding of the guidelines used to identify the existence of market power and the regulatory framework necessary to deal with it.

There are two fundamental steps in determining the extent of market power.⁵⁶ The first is to define the relevant market and the second is to assess the degree of market power in that market.

Economic theory suggests that a market is determined by the extent of substitution among competing products. This is measured by cross-price elasticity of demand. However, cross price elasticity is often inaccurate. Even if it could be measured accurately, it is not clear which threshold would be used to define a competitive market. As such, a more judgmental approach is usually required.

In the case of Malaysia, the only real substitute for electricity could be natural gas. However, unlike countries such as Australia and UK, which has a fully developed gas distribution infrastructure, gas market in Malaysia is still in its infancy stage. Therefore in the short to medium term, the market of interests is the market for electricity for which there is little possibility of substitution from other energy sources.

Currently TNB, through its generation subsidiary arms, owns more than 80% of the generation market. Therefore, there is little doubt that TNB has the potential for significant market power. In addition to regulating the market to curb the problem of market power, it is therefore necessary to get the generation market structure right in the first place. Obviously, this would require TNB to divest some of its interest in power plants,

Certain countries have adopted price caps to mitigate the problems of market power. However, price caps distort markets and they treat symptoms rather than the causes. Price caps are therefore only a temporary, last resort measure.

⁵⁶ Competition In a Restructured Ontario Electricity Market, Henley International Inc., April 1997

8.4 The Wholesale Market Design

Based on the assessment of the various design features that have been implemented in the more advanced markets, one possible set of wholesale market is as illustrated as below:

The Malaysian Electricity market can be designed to accommodate the following trading arrangement:

1. The electricity market can include both a spot market based on market participants bids and coordinated by the Independent System Operator (ISO) and a bilateral contract market based on allowing end-use consumers to choose their own suppliers.
2. Consumers will have the following choices in meeting their electricity needs:
 - They can engage in bilateral contract with suppliers of their choice.
 - They can purchase any part of their needs from the spot market.
 - They can back up or supplement their bilateral contracts with spot market purchases.
 - They can sell energy from scheduled bilaterals back to the spot market.
3. Suppliers will have choices in how they serve the market
 - They can engage in bilateral contracts and schedule them with ISO
 - They can submit bid to sell energy in the ISO coordinated spot market.
 - They can back up their bilateral contracts with spot market purchases.
 - They can sell energy from their scheduled bilateral contracts in the event their loads are curtailed.

4. The ISO will coordinate both a real time market and one or more forward markets.

- The ISO will accept day ahead bids and bilateral schedules for the day ahead market
- Consistent with transmission constraints, the ISO will define a day ahead schedule that includes bilaterals and a least cost dispatch based on participants' bids.
- The final day ahead schedule will consist of forward contracts in which participants are financially committed to the amounts scheduled
- Day ahead market clearing price will apply to spot energy bought and sold day ahead.
- Deviations from amounts committed to day ahead will settle at real time prices.

5. Transmission access and pricing will be comparable for all market participants.

- A uniform, region-wide access fee will be charged to all loads, whether they meet their needs through contracts or through the spot market. The access fee will cover the fixed costs of the transmission system.
- Any congestion charges will be comparable between bilateral contracts and spot traders, so that there will be no discrimination and cost shifting regardless of the type of trading used.

This study recommends a hybrid structure for the Malaysian electricity market. This hybrid structure would consist of a voluntary power pool (i.e. spot market, supplemented by financial contracts for differences) and a physical bilateral contracting arrangement among market participants. With a hybrid structure market, traders have maximum flexibility to structure commercial transactions in

whatever manner they regard as best. How much of their business they transact through the spot market and how much through physical bilaterals is up to them.

The above hybrid structure is currently adopted by our neighboring countries, Singapore and Thailand. With the ASEAN Interconnection Grid being proposed, it would also ease trading among ASEAN participants if all the participating countries decide to adopt the hybrid structure.

In addition to the trading arrangement that is proposed above, a more difficult task would be to develop and implement rules for the proposed structure. Some of the rules will address the following:

- Who is allowed to participate in the market and under what conditions?
- What participants are allowed to do and what they are prohibited from doing?
- How they make bids and offers?
- How settlement prices are calculated?

It is however, beyond the scope of this study to explicitly recommend all the rules governing the proposed structure.

8.5 Regulating Electricity Transmission

The electricity transmission network is generally presumed to be a natural monopoly service, one in which a single supplier can serve the entire market at a lower cost than two or more firms can. Therefore, duplication or creating competition in the transmission network is not deemed to be feasible. The reform undertaken by other countries and the prevailing belief among industry observers seems to be that regulators will determine the prices and conditions for some time to come.

To avoid discrimination, regulators would require transmission facility owners to provide open access to those companies that wish to send electricity over their transmission for sale at the wholesale level to local distribution and other wholesale purchasers. However, it is expected that transmission owners will be compensated for their investments and regular maintenance. Nevertheless, transmission prices that are too high “could lead to the wasteful use of forms of energy other than electricity, to excessive co-generation, and to placement of power plants closer to end users than is necessary”⁵⁷. On the other hand, if the regulators decide to set the prices too low, utilities will have too little incentive to install, maintain and expand the capacity necessary to ensure that the rest of the electricity industry can perform competitively and efficiently.

In summary, in designing the market structure for a competitive electricity market, the following questions related to transmission access needs to be reviewed: whether to regulate transmission, how to regulate transmission and which transmission facilities to regulate.

8.6 Retail Competition

Introducing wholesale competition without due focus on retail competition will defeat the purpose of any restructuring exercise. Retail competition is necessary to ensure that the long-term price reductions expected from introducing competition at the wholesale level flow through to customers, including those who choose to remain with their existing supplier.

As such, consumer education remains an important issue in retail competition. In addition to protecting the rights of consumers, they need to be informed on how the new system will work, of available options and their responsibilities.

⁵⁷ Brennan, T.J, Palmer K.L. et. al , “ A Shock to the System – Restructuring America’s Electricity Industry”.