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Cost Structure and Implications for Power Sector Reforms

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Joel Q. Tanchuco
De La Salle University-Manila, Philippines

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Abstract

This paper sought to answer the question *"What can the Philippines learn from the reform experiences of other countries?"* by identifying the similarities and differences in the reforms undertaken by other countries in relation to the Philippines; enumerating possible requirements in the short term; and suggesting broad policies that can further improve Philippine reform efforts.

Cost Structure and Implications for Power Sector Reforms

The inception of the power industry can be traced to the perfection of the incandescent bulb by Thomas Alba Edison in 1879 (Eden, Posner, Bending, Crouch, & Stanlislaw, 1981). Three years later, a firm was created by Edison, the Edison Electric Illuminating Company which coincided with electricity service provided to a small area (Petersen, 1993). The limitation was attributed to the use of direct current which limited transmission efficiencies to small areas. The invention of the transformer will change this situation, allowing service to larger areas with voltage levels to be "stepped up or stepped down."

Increasing the voltage levels allows creation of transmission lines to serve bigger areas with electricity traveling longer distances at relatively small losses in efficiencies (Stoft, 2002). In turn, this allowed the creation of huge centralized generating facilities possible and the consideration for electricity supply to exhibit natural monopoly characteristics. The view has been considered especially prevalent up to the first two decades after World War II. Meanwhile, "incremental" technical innovations into electricity generation, political expediencies and introduction of numerous appliances reinforced these developments on the supply side.

With the dramatic expansion of generating capacities came the spread of transmission networks which created opportunities for introducing trade and competition. As more consumers and providers are integrated into an interconnected grid, price begins to indicate signals and opportunities for efficiency gains to be realized. Continued reliance on a multitude of fuels into power generation has only served to strengthen this trend.

Rising per capita electricity consumption tend to be positively correlated with an economy's growth and other development indicators. But in order for an economy to demonstrate this, its power sector must be capable of providing electricity as efficiently and accessibly as possible, which necessitates the undertaking of power sector reforms.

In the Philippines, the undertaking of power sector reforms is embodied in the Electric Power Industry Reform Act (EPIRA) of 2001. This law mainly aims to restructure ownership, improve efficiency in the provision of electricity, reduce tariffs and introduce more competition. Since the law's introduction, a big information gap has been created between what is known to business and household consumers and members of the power sector. This information asymmetry can be partly solved by examining the experiences of other countries which have undertaken reforms.

Statement of the Problem and Objectives

Many economies which have instituted reforms into their electricity industries can provide valuable lessons and insights into the Philippines' undertaking of reforms. This paper seeks to answer the question ***"What can the Philippines learn from the reform experiences of other countries?"*** A premise that accompanies this question is to avoid the costly mistakes made by countries which have undertaken their reform efforts earlier.

This paper aims to: (a) identify the similarities and differences in the reforms undertaken by other countries in relation to the Philippines; (b) enumerate possible requirements in the short term; and (c) suggest broad policies that can further improve Philippine reform efforts.

Framework

Ownership of electricity companies can be classified into either government-owned, consumer co-operative or private investor-owned. Most studies about the power industry use the concept of a natural monopoly as a framework. A natural monopoly situation is said to exist "if the consumer can be served at the least cost or greatest net benefit by a single firm".[1] Alternatively stated, this definition refers to a market situation where the firm's average costs decline or there is economies of scale over the range of existing market demand. The economies of scale or declining average total costs can be mainly attributed to the presence of large fixed costs being allocated to rising output levels.

Take for instance a power generating plant that costs millions of pesos to construct and be rendered operable. As this power plant generates more and more kilowatts of electricity, the fixed cost gets divided into more and more kilowatts, causing the average cost per kilowatt generated to decline. The declining average fixed cost, however, must be compared with the increasing average variable cost as the output of the firm increases. This implies that the average total cost curve must be declining at some levels of output but not at all levels. When the declining average total cost is realized while the existing market demand can be serviced entirely by a single firm, the firm can be considered a natural monopoly.

Declining costs per unit can also be attributed to the existence of economies of scope. Economies of scope means that the total cost of producing two or more output by a single firm is lower than the total cost of producing the outputs separately (Train, 1995). In the production of electricity, economies of scope can be considered present when, in the course of generating electricity, the incidental steam is sold to another firm. The different generating technologies to service peak and off-peak electricity consumption can also be given as a possible instance of economies of scope.

Whether due to economies of scale or economies of scope, the average total cost of the firm must decline as the firm services the market demand. This can be shown by Figure 1, showing average total cost (ATC) and marginal cost (MC) curves together with the market demand $\mathbf{D_m}$.

[1] Braeutigam (1989). There are studies which do not agree with considering electricity as a natural monopoly. See for instance Tomain's "Whither Natural Monopoly?"- The case of electricity, in Grossman and Cole (2003).

Figure 1. Natural monopoly.

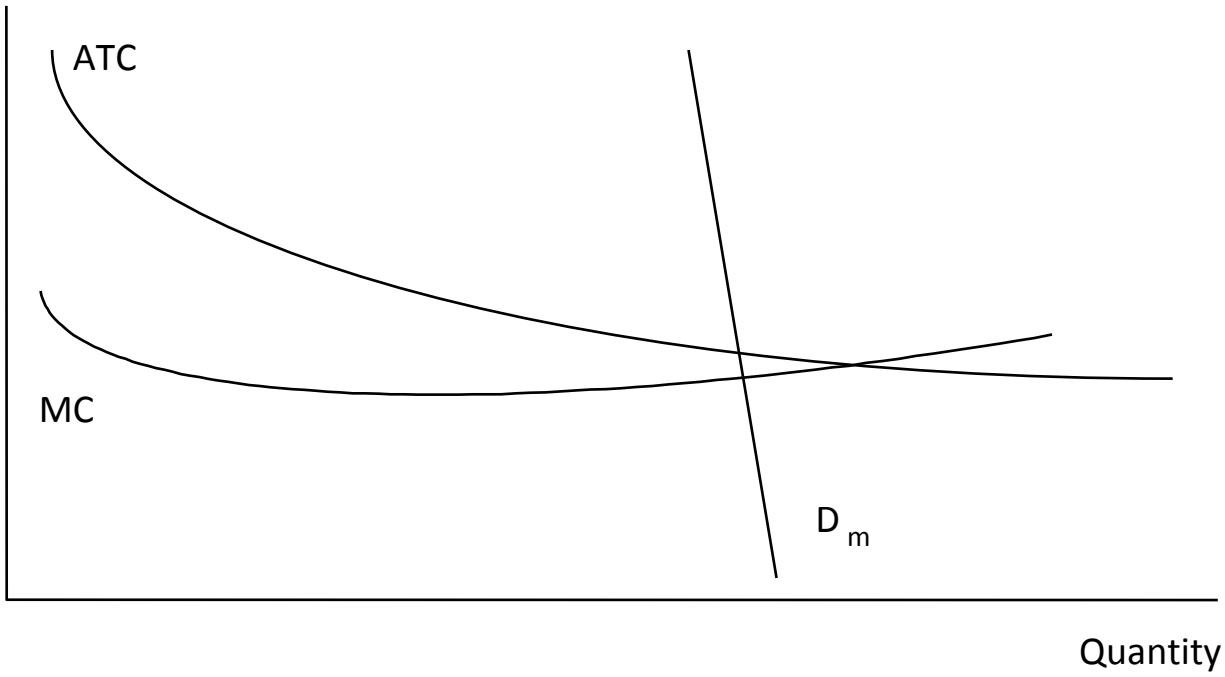

Figure 1 shows that at demand levels higher than current market demand, the cost curves (ATC and MC) begin to go upwards. This behavior of the cost curves demonstrate that for both economies of scale and economies of scope, while present for some levels of output, can be reversed for other output ranges. In the figure above, there is a tendency for the costs to show diseconomies of scale at market demand greater than $\mathbf{D_m}$.

The same graph can used to demonstrate another important aspect in the case of a natural monopoly: ***subadditivity of costs***. Stated simply, subadditivity refers to the total cost of a single firm being lower than the total cost of two or more firms. If costs are indeed subadditive, it implies that the production of output is cheaper if undertaken by one firm than by two or more firms. This suggests that society benefits more (in the sense production cost are lower or the firm is more efficient) if output is provided by one firm rather than several firms. The graph above illustrates that allowing more firms into the market will force the existing firm to exhibit higher average total costs since this firm's market demand will decrease (or $\mathbf{D_m}$ will shift to the left). In the case of a single output and subadditivity of costs, allowing a plurality of firms to operate forces each one to produce at a higher cost per unit of output so that all firms can be accommodated by market demand (Train, 1995). When taken in the context of a multiple output case, there will emerge a difference between costs subadditivity and economies of scale (Braeutigam, 1989; Viscusi, Vernon, & Harrington, 1995). The reason is that if costs are subadditive, even if a single firm operates within its range of diseconomies of scale but is still lower when compared with the costs of two or more firms, production is still more efficient under a single firm.

Given that costs are subadditive and society wants to maximize efficiency, another aspect of a natural monopoly needs to be demonstrated—the temptation the monopolistic firm faces in wielding its absolute influence on market prices with disastrous implications on consumer welfare.[2] If the monopolist succumbs to the temptation of earning positive economic profits, the situation acts as a beacon to potential entrants into the market.

The scenario given previously demonstrates the aspect of sustainability in the literature of natural monopolies—that a natural monopolist will sell at a price equal to its average total cost; that is, economic profit equals zero. Doing so provides no incentive for potential entrants to materialize, and given cost subadditivity, could result to higher production cost or inefficiency.

The behavior of costs, sustainability and subadditivity illustrate the difficulties encountered by regulation when faced with the situation of a natural monopoly. Explicitly stated, the problem is how to exploit the benefits of least cost from monopoly production without exorbitant pricing—a question of allowing productive efficiency against maximizing consumer welfare. Given this quandary, the task of regulation utilizes two economic criteria: First Best and Second Best. First Best, (a.k.a. the most efficient condition) is the condition where *price equals marginal cost*. Second Best, on the other hand, relates price to average costs.

Using the First Best condition in the case of a natural monopoly also poses a difficult problem for a regulator. If prices are equated to marginal cost, the firm will earn a pure economic loss. This can be seen in Figure 1 where the intersection between demand and marginal cost curves is lower than the intersection between demand and average total cost curves. For an output as vital as electricity, allowing or forcing the firm to provide at a loss will not provide any benefit to both sides of the market.[3] This creates a situation where there is a need to reconcile the objective of making the providers involved as efficient as possible with the need to make electricity as affordable as possible to the most number of consumers.

An alternative condition that can be used is related to sustainability, i.e. equating the price to average costs. This condition is sometimes termed as Second Best. Even then, if most of the natural monopoly situation envisaged in the literature is considered, neither the Second Best condition is readily adaptable to the objectives of the regulator nor the long term viability of the regulated. Electricity generation is an example. If the Second Best condition is applied to this industry, generators will be granted prices not higher than average costs per kilowatt-hour electricity generated. This implies that returns to investors are not higher than the opportunity cost of investment; in the long run, this could lead to deterioration of generating assets due to the difficulty of sourcing of funds.

The unique regulatory difficulties of achieving revenue adequacy, promoting efficiency without neglecting consumer welfare has created different suggestions about possible policy

[2] The need to reconcile efficiency with equity or consumer welfare is used to justify the imposition of regulation in the provision of electricity. See for instance Khan (1971).

[3] Even then, attempts at improving efficiency have developed methods to approximate prices with marginal costs of electricity provision. These methods are summarized in Munasinghe and Rungta (1984).

options. One group of options includes optimal subsidy schemes such as those founded on the principles developed by Loeb, Magat, Sappington, and Sibley. Another group of options involve pricing schemes designed to cross-subsidize or capture consumer surplus while another group includes non-regulatory options.[4]

[4] Some examples of pricing schemes include price discrimination and multipart tariffs while some non-regulatory options include contestability and Demsetz competition.

Analysis

Currently, there has been a notable reliance on ***rate of return regulation*** or what industry insiders call ***cost of service regulation***. Compiling the previous experience of countries which have used rate of return regulation has illustrated that this regulatory form has imposed huge regulatory costs and resulted in the Aversch-Johnson effect – a phenomenon which results in relatively higher use of capital by utilities (Aversch & Johnson, 1962; Baumol & Klevorick, 1970). This effect has been the response of regulated firms in an attempt to increase its allowable profits based on the specified rate under regulation. Due to these experiences, alternative forms of regulations have been considered. Some European countries have tried imposing a price cap regulation on parts of their power sector. The Philippines is planning to switch to a performance-based regulation.

Provision of electricity has several peculiar characteristics compared with the provision of other output. Electricity cannot be stored. Non-storability reduces market size from the perspective of time. The size of the market is determined by instantaneous demand rather than demand over a longer period. This has been used as an indication in the past that a single firm can provide electricity at a minimum efficient scale. Demand is subjected to random variation but supply needs to be provided continuously, at assured quality and at specified voltage level. As a consequence, suppliers must provide spinning reserve and black start capacities.[5] The pairing of variable demand with continuous supply requires maintenance of excess capacity to meet peaks in demand. As the number of consumers supplied by a given utility increases, reserve margin requirements decrease due to groupings of consumers, effectively pooling risks faced by suppliers, decreasing operating and capital costs per customer.[6] In principle, both will create network externalities and costs savings from monopoly provisions. The externalities occur because the operation, function and malfunction of each provider affect systems conditions within the entire network.

At present, the approach towards the power industry is to consider electricity provision as composed of functionally disaggregated or vertical fragmented businesses. This approach has been commonly referred to as ***unbundling***. Taking this approach will mean separation of electricity service provision into generation, transmission, distribution and supply. Generation refers to the production of electricity using possible sources such as oil, natural gas, coal, nuclear power, hydro, geothermal and non-conventional sources. Generating technologies are differentiated according to cost structure.[7] The main cost components of electricity generation are fuel prices, capital costs, and maintenance costs. In turn, these costs are influenced by the performance of the generating technology through consideration for capacity factor, thermal efficiency and operating life. Nuclear power plants exhibit the highest fixed costs among

[5] Spinning reserve is capacity to provide electricity instantly-incurring costs while not providing electricity to network. Black start capacity is the ability for generating assets to start up when system power is lost.

[6] Reserve margins refer to the percentage of existing dependable capacity above electricity peak demand.

[7] Differences in cost structure across energy sources are attributed to physical and engineering factors by Cassedy and Grossman (1998). Shepherd and Wilcox (1979) attributes differences in cost structure to topographical, factor endowments and size indivisibilities of different types of generators.

alternative generating technologies due to longer construction periods, decommissioning of outdated plants, installation of expensive environmental and security safeguards and waste disposal. The advantages of these power plants revolve around having lower fuel and operating costs over a power plant's lifetime. Hydro generating power plants likewise exhibit relatively lower variable costs, depending on gravity and the presence of water for operations. The costs of coal, oil and natural gas power plants consist of fuels with variable costs consequently higher nuclear plants. Relative advantages of these power plants however revolve around their low fixed costs and shorter construction time.[8]

The diversity of possible generating technologies and cost structures results in a "least cost merit order" in which different kinds of generators are feasibly operated according to the power plants fixed and variable costs. A least cost merit order in scheduling generating supply would mean that nuclear, hydro and coal power plants are used as base load, whereas power plants using fossil fuels become intermediate demand and peaking plants. The diversification of generation technology set improves efficiency by reducing reserve requirements and facilitating balance of supply and demand in real time. The least cost merit order and its efficiency gains should lead to lower electricity prices (Stoft, 2002).

Transmission is the high voltage transport of electricity. Transmission also involves management of dispersed generators in a grid to maintain suitable voltage and frequency and to prevent system breakdown. It is this function of electricity provision that is currently considered to exhibit natural monopoly characteristics. The reason is that competition in transmission would simply result in unnecessary duplication of the existing network. The regulation of transmission typically involves rate of return regulation with the concomitant display of the typical Averch-Johnson effect. The result is a noticeable over-investment in capital assets and consequent failure to minimize electricity costs.

Coordination of generators in a merit-order lies between generation and transmission. From this perspective, integration of generation and transmission would lead to economies if it internalizes externalities that result from dispersed generators which make investment and operating decisions that affect the entire network. On the contrary, if generation (itself not a natural monopoly) is integrated with transmission, it will be subject to the same regulatory challenges and inefficiencies as transmission under rate of return regulation.

Distribution is the low-voltage transport of electricity. Like transmission, it is generally considered a natural monopoly as competition will simply result in duplication of existing set of wires. Unlike transmission, there are no benefits to vertical integration or bundling of distribution with either transmission or generation.

Supply is the sale of electricity to end-users. This includes metering, billing and marketing and may be wholesale or retail. Supply is generally not considered a natural monopoly nor is there a significant benefit from its integration with the other functions. When electricity businesses were still vertically integrated, single firms assume responsibilities to supply

[8] Consideration for factors in costing differences was taken in view of least cost merit order and scheduling of supply into grids according to relative efficiencies.

electricity to all consumers within its designated territory. Designation of territories has usually required the grant of a license either from the national, regional or local governments. Ownership structure of these electricity providers ranges from national or local government, co-operative of consumers or private, frequently by a group of investors.

Because a single vertically integrated provider operates as a single firm, a regulator periodically sets tariffs to allow a fair rate of return on investments and recover operational expenses. Under this regulatory framework, the firm maximizes profits subject to many regulatory constraints. But because utilities have been allowed to pass costs to customers through regulated tariffs, there has been little incentive to reduce costs or make investments with due consideration of risks. In comparison, perfect competition and the interaction of supply and demand should result in prices being equated to marginal costs. That is, a tariff paid by electricity consumers is just equal to the last kilowatt per hour of electricity sold. This is the accepted economically efficient result.

Due to the continued consideration for both distribution and transmission as natural monopolies, the challenge to the regulator in introducing more competition focuses on the generating functions of the industry. This challenge becomes the need to introduce enough number of generators to reduce monopoly power using diversified technologies in the most efficient way possible.

Patterns, Developments and Motivations for Reforms

Combining competition into generation and supply together with recognition of transmission and distribution continuing to exhibit natural monopoly characteristics is not easy. Experience in this regard is not considered generally favorable to previous regulatory practices. Recent efforts at reforming the power sector have proceeded using the past experience as a premise. In addition these efforts have to proceed with consideration for the following developments: (a) new generating technologies; (b) a global economy requires maximum efficiency from input costs, which electricity is one; (c) state owned utilities have become lethargic in response, saddled with inadequate resources, displaced private business; and (d) information technologies and communication systems to make possible the exchange of huge volumes of information needed to manage electricity markets (Rothewell & Gomez, 2003).

The feasibility of combined cycle gas turbines (CCGTs) represents the new technology that seriously challenges existing technologies and exhibited costs of power plants. These plants have been increasingly utilized by small private investors to supply big state utilities. What differentiates these plants from the point of view of competition are higher generating efficiencies, shorter construction periods, smaller rated capacities (between 150 to 300 megawatts) and lower investment costs, making them dominant choice for new investments into competitive markets.

Global competition among economies has inclined domestic firms to economize on costs of inputs to enhance competitiveness in an international setting. Even with consideration for

differences in costs of production, decreasing electricity tariffs will significantly lower production costs.

In general, experiences with state-owned power plants have been found to exhibit sub-standard levels of efficiencies. This situation has raised alarms in some countries due to repeated need to finance losses using state resources. In some countries, the situation has become chronic resulting in persistent fiscal deficits.

New information and communication technologies had made possible day-ahead and on-line electricity, involving multiple agents and types of transactions. Metering, billing, quality control and load management options based on these new information technologies and communication systems are increasingly offered under restructuring and deregulation. These developments paved the way for introducing more competition mainly into generation and supply. The resulting retail competition using these systems allows entry of new electricity providers with new commercial relationships, offering attractive tariffs at high quality.

The introduction of competition requires the creation of whole sale electricity spot markets and retailing of electricity to bulk end consumers. Wholesale electricity markets have been organized with several generating companies that compete to sell their electricity into a centralized pool and/or enter into bilateral trading contracts with buyers. Retail competition serves as a venue in which consumers can choose among different sellers or buy directly from the wholesale markets have been implemented. This was done instantaneously for all customers in some countries or progressively under a multiyear program according to different consumption levels or thresholds.

Generating technology preferences combined with country specific features (history, governance and geography) has also impacted on reforms aimed at ownership structures. Previous experiences with financial losses involving government owned utilities have inclined some countries to rely heavily on privatization coupled with enhanced regulation to pursue its reforms. In other countries, the continuing covenant between society and government prompted a fine-tuning of regulation on publicly owned utilities. This fine-tuning resulted in some countries to shift in favor of price-capping and performance-based regulations. The latter form of regulation rewards the regulated firm with any resulting cost savings from realized efficiency improvements.

To avoid the double marginalization problem and erection of unfair entry barriers, reform efforts in different countries have also focused on ensuring access within the network system. The potential benefits from the entry of an efficient generating plant into the wholesale or retailing electricity markets cannot be realized without the capacity to sell the electricity to consumers. Thus, recent efforts at power sector reforms have specified the grant of third party access (TPAs) together with the entry of new generating and supplier power firms. These granting of TPAs have likewise advantaged the consuming side of the power market. Bulk end consumers can not choose among alternative providers or the best possible tariff without any access to existing network interconnections.

Reform Efforts in Other Countries

Efforts at reform in the other countries can be pinpointed to have started during the 1990s. Broadly, these efforts took the form of implementing new regulations to stimulate competition by liberalizing the electricity industry and focusing on functions that demonstrably has no natural monopoly features.[9] In particular, these policies were as follows: (a) unbundling of generation from the wires side of power provision; (b) granting access to network infrastructure to third parties; and (c) establishing markets whose prices are closely aligned to supply and demand conditions.

For the European countries considered here, there is a central framework to be followed: the European Commission Electricity Directive which mandates the creation of a single European electricity market.[10] Most states were given two years to comply with the directive. The states of Belgium and Ireland were given an additional year while Greece was granted four additional years.

The power sector reforms of other countries cited here were taken from Faye Steiner's "*Regulation, Industry Structure and Performance in the Electricity Supply Industry"* (2000). The study conducted a cluster analysis of panel data from 19 OECD countries covering the period 1986-1996. It aimed to assess the impact of liberalization and privatization on the performance focusing on the generation function of the electricity industry. In general, the study found difficulties in making broad general conclusions based on its empirical findings which can be attributed to separating the effects of regulatory reform from country specific features. A reason for the focus on generation taken by the study is argued in terms of the unanimous desire for regulatory reform: improving efficiency into supply and providing reasonable prices to consumers.

Relevant information on reform efforts undertaken in the different countries are summarized in Tables 1 and 2. The primary empirical findings in Steiner (2000) can be summarized as follows:

- Most countries began to consider and implement regulatory reform in the electricity supply industry. Early efforts at liberalization and/or privatization, while creating legal access for competition into generation, are slow to meet with actual entry and competition in generation;

- The most common pattern of liberalization begins with attempts to introduce competition in generation by unbundling generation from transmission and expanding legal access to transmission network. The most far-reaching reforms also create spot markets for trade in electricity and allow consumer choice of supplier for some customers;

[9] Liberalization here primarily implies allowing entry into generation and supply accompanied by privatization of transmission and distribution.
[10] Adopted on December 19, 1996 and implemented by February 19, 1997.

- Using cluster analysis, six groups of countries were identified: United Kingdom (as most liberal), Finland, New Zealand, Norway and Sweden. The least liberal group includes Belgium, Canada, France, Greece, Ireland, Italy, Netherlands, Portugal and Spain;

- Unbundling of generation from transmission, expansion of third part access and introduction of electricity markets reduce both industrial prices and ratio of industrial to residential prices. A high degree of private ownership and imminence of both privatization and liberalization tend to increase industrial electricity prices;

- Unbundling of generation and transmission and private ownership each serve to improve the utilization of capacities in electricity generation; and

- Unbundling of generation and transmission and private ownership each bring reserve margins closer to their optimum level.

Reform Efforts in the Philippines

Efforts aimed at reforming the Philippine power sector is embodied within the Electric Power Industry Reform Act (EPIRA) of 2001. This law contains various provisions broadly designed to "improve electrification and ensure quality, reliability, efficiency and affordability of electricity." The broad methods by which the law intends to achieve its objectives include the introduction of greater competition, restructuring of ownership and liberalization of entry coupled with regulation. It seems that this law intends to follow the general outlines of reform efforts pursued in other countries. In this regard, the law explicitly states the required unbundling of the power sector services into generation, transmission, distribution and supply functions. The generation functions will not be considered as public utilities—a provision that is obviously designed to encourage entry into this side of the business and the mandated privatization of the National Power Corporation. This is one of the favorable (towards promoting competition) provisions in terms of recognizing the "least cost merit order" among alternative generating technologies and exploitation of potential benefits from realization of efficiencies.

Transmission and distribution functions were to remain as regulated common electricity carrier businesses in recognition of the remaining natural monopoly characteristics of these functions. Currently, transmission remains a public monopoly under TRANSCO vested with the tasks of planning, construction, authority and responsibility, centralized operation and maintenance of high voltage transmission facilities. Distribution functions concerns the low voltage carriage of electricity to end consumers. The law mandates eventual privatization of the transmission public monopoly and specifically includes provisions for granting third party access (in the case of transmission) and open access (in the case of distribution) to the existing networks. Such provisions are again considered favorable towards the promotion of more competition within the system by preventing untoward erection of barriers against new power firms. Also, these provisions can be considered conducive to the eventual bilateral trading of electricity using wholesale and retail electricity pools.

Creation of supply functions under the law is the newest addition to the Philippine power landscape explicitly mandated under EPIRA. The addition was made in recognition of the technical innovations on the generating side of the business, allowing (but not limited to) smaller power plants to supply bulk electricity consumers. Doing so, will allow these power plants to exploit their cost efficiencies, generate or attract investments and fulfill their intended roles in the least cost merit order. More importantly, the supply side will be considered a contestable, meaning private entry will be allowed. Tariffs charge in contestable markets by suppliers will not be regulated by ERC and suppliers will not require a national franchise for operations. Other provisions designed to ensure network access will only serve to mutually reinforce favorable developments in terms of electricity supply.

There will now be three different markets for electricity that will exist in the Philippines: the existing markets using the old arrangements, sales involving wholesale electricity and retail pooling. Section 30 of the EPIRA law concerns the establishment of a wholesale electricity spot market (WESM) three years after 2001. Rules and procedures in this market are explicitly given but bilateral trade will not be covered in these stipulations. The Department of Energy (DOE) and the Energy Regulatory Commission (ERC) is tasked with governing tasks and duties associated with the establishment of these wholesale markets. Entry into these markets is allowed with possible participants to include generators, distributors, suppliers, bulk-end consumers or any party authorized by ERC.

Retail competition and the necessary open access are likewise provided by the law. Just like wholesale electricity trading, retail pooling should have been introduced by 2004. This type of electricity trading is allowed in designated contestable markets, which by definition covers all end users with a monthly average peak demand of at least one megawatt for the previous 12 months. In these markets, the specified consumption threshold will be reduced to 750 kilowatts (from the average of 1 megawatt) two years later or 5 years from the implementation of the law. Subsequently consumption thresholds in the retail competition will be reduce to the household level subject to evaluation and affirmation of ERC that certain conditions are met.

In sum, the provisions pointed out here should allow Philippine reform efforts to be at par with the outlines of the reform experiences in OECD countries. However, actual experience in electricity reforms proves otherwise. What was actually experienced in the case of the Philippine power sector are highlighted by the following:

- Functional unbundling has taken place. The results could be seen through the periodic billing of end consumers. There are remaining franchise areas whose tariffs have not been functionally unbundled.

- Mandated privatization of government owned generating and transmission assets have not been realized. Auctions conducted have failed so far. The failure primarily concerns disposal of stranded assets of the former government utility and negotiation of existing contractual arrangements.

- Preparations into the establishment of whole sale and retail markets have taken place. Outcome of the registrations of possible participants by December 2004 was unclear. Trial of wholesale market in Luzon by June 2005 is likely impossible. Actual unveiling/operations have been delayed.

- Removal of cross subsidies inter-grid and intra-grid cross subsidies have begun but is not expected to be completely eliminated until October 2005.

- Considerations for alternative regulation regimes are being made. Performance base regulation is the prime choice in these considerations.

Conclusion

So far, the Philippine experience in reforming its power sector may not be considered favorable. The delayed privatization of government assets into generation and transmission functions will probably remain the major issue in this regard. As mentioned, the re-negotiation of existing supply contracts and disposal of stranded assets must be considered serious constrains. Failure in this aspect of reforms will seriously affect the expected benefits of future reform efforts. To illustrate, consider the data given in Table 3.

Currently, the power situation seems assured during the periods given in Table 3. The Mindanao situation should however, deserve serious attention. Existing reserve margins in the region of 9% is already lower than the allowable 13.2% level accepted by industry insiders.

But what the failure cited has seriously affected in the required capacity additions foreseen from 2005 to 2014. The Philippines as a whole requires an addition of 5,450 megawatts by the end of 2014. These additions will not be forthcoming unless the mandated restructuring of ownership proceeds again.

Any efforts at reform should be accompanied by support or acquiescence of electricity consumers. If the capacity additions will not be realized, blackouts and brownouts will ensue, damaging the prospects of reforms being accepted among businesses and households. In the absence of capacity additions, potential efficiency improvements through a more optimal least cost merit order and the resulting lower electricity tariffs will not be realized. An examination of comparative electricity tariffs in Table 4 indicates local prices are not the lowest in the region.

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Table 1

Regulatory Reform in the Electric Supply Industry as of 1998

Country	Liberalization	Third Party Access	Electricity Market	Transmission Price Regulation	Consumer Choice Thresholds
Australia	yes (for the state of Victoria)	regulated TPA	yes	cost based	none by 2001 (for state of Victoria)
Belgium	none	none	none	cost based	distribution only
Canada	none	none	yes (for the province of Alberta	cost based	no choice
Denmark	yes	regulated TPA	none	cost based	no choice
Finland	yes	regulated TPA	yes	cost based	none
France	none	none	none	cost based	no choice
Germany	yes	negotiated TPA	none	cost based	none by 1998
Greece	none	none	none	-	no choice
Ireland	none	none	none	-	no choice
Italy	none	none	none	price cap	no choice
Japan	yes	negotiated TPA	none	cost based	2 MW by 1998
Netherlands	yes	none	none	none	no choice
New Zealand	yes	regulated TPA	yes	-	none by 1994
Norway	yes	regulated TPA	yes	price cap	none by 1991
Portugal	none	none	none	cost based	5 GW by 2001
Spain	yes	negotiated TPA	none	cost based	1 GWh by 2004
Sweden	yes	regulated TPA	yes	none	none by 1996
United Kingdom	yes	regulated TPA	yes (England and Wales)	price cap	none by 1998
United States	yes	regulated TPA	none	cost based	New Hampshire, California none by 1998

Source: Steiner (2000)

Table 2

Ownership and Vertical Integration, 1998

Country	Ownership of Supply	Vertical Integration; generation to supply	Separation of Generation from Transmission
Australia	mixed	mixed	separate companies
Belgium	mostly private	integrated	integrated
Canada	mixed	integrated	integrated
Denmark	mostly public	integrated	accounting separation
Finland	mostly public	unbundled	separate companies
France	public	integrated	integrated
Germany	mixed	unbundled	accounting separation
Greece	public	integrated	integrated
Ireland	public	mixed	accounting separation
Italy	public	integrated	integrated
Japan	private	mixed	integrated
Netherlands	public	mixed	integrated
New Zealand	public	mixed	separate companies
Norway	mostly public	unbundled	separate companies
Portugal	mostly public	mixed	accounting separation
Spain	mostly private	mixed	separate companies
Sweden	mixed	mixed	separate companies
United Kingdom	private	unbundled	separate companies
United States	mostly private	integrated	accounting separation

Source: Steiner (2000)

Table 3

Some Power Sector Indicators (in megawatts)

Philippines	**2001**	**2004**
demand	7497	9069
existing dependable capacity	11209	14035
reserve margin	33%	35%
Luzon	**2001**	**2004**
demand	5646	6728
existing dependable capacity	8523	11086
reserve margin	34%	39%
Visayas	**2001**	**2004**
demand	898	1063
existing dependable capacity	1377	1520
reserve margin	35%	30%
Mindanao	**2001**	**2004**
demand	953	1278
existing dependable capacity	1309	1429
reserve margin	27%	9%

Table 4

ASEAN Basic Electricity Tariffs (in US cents per kilowatt-hour, across consumer classes)

Country	Residential	Rank	Commercial	Rank	Industrial	Rank
Brunei	2.91-14.61	8	2.98-11.69	7	2.98-11.69	7
Cambodia	8.77-16.29	10	15.03-16.29	10	12.03-15.04	10
Indonesia	1.5-4.1	2	2.46-5.04	2	1.52-3.9	3
Lao PDR	0.39-2.71	1	2.98-3.72	1	2.5	1
Malaysia	5.53-8.94	6	2.63-10.52	5	2.63-10.52	5
Myanmar	8.42	7	8.42	8	8.42	9
Philippines	3.1-10.55	5	3.62-9.71	6	3.3-10.68	6
Singapore	9.35	9	4.48-7.27	4	4.23-6.78	4
Thailand	3.36-7.35	3	2.89-7.35	3	2.89-7.01	2
Vietnam	2.89-8.09	4	4.2-13.83	9	2.8-13.83	8

Source: ASEAN Center for Energy

Note: Ranking was made based on midranges