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Realising the ASEAN power grid through unbundling: takeaways from the Philippines' and Singapore's experience

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Abstract. The ASEAN Power Grid (APG) is a flagship initiative mooted in 1997 to strengthen and promote power interconnection and trade in the ASEAN region. The ultimate aim of the APG is to ensure energy security and sustainability in the region, particularly the electricity. One way to achieve this, as demonstrated by the Nordic countries, is by having a regional electricity market, on top of the physical interconnection of the grids. Thus, taking the cue from the Nordic region, a pre-requisite to the regional electricity market is the liberalisation of the electricity supply industry (ESI) of each of the ASEAN member countries. Although there is no one-size-fits-all solution to the establishment of the regional electricity market, liberalisation of the ESIs can potentially be the path for the ASEAN countries too, with the necessary modifications and localisations in place. Furthermore, ESI liberalisation or unbundling is not entirely new to the ASEAN countries. Nine out of the ten of its member countries have implemented unbundling, although the degree of implementation varies. To date, two ASEAN countries have unbundled their ESIs fully, namely Singapore and the Philippines. However, the two countries underwent different experience in liberalising their ESIs. While it was a 'bumpy ride' for the Philippines, Singapore had a smoother and more orderly transition. As such, deliberation of their experience in liberalising their ESIs would provide good insights for the other ASEAN countries to consider in liberalising their ESIs, should it become the direction. This paper therefore presents a brief overview of the Philippines' and Singapore's experience in their transformation towards liberalised ESIs with the aim to identify the good practices, the challenges as well as the lessons learnt from these transformations. Findings from the study show the importance of the governance and legislative framework to instate reform, as well as the gradual introduction of the reform moves. This is especially necessary as the lack of homogeneity and harmonisation of the regulatory framework and ESI structure of the ASEAN countries was found to be amongst the barriers towards the full realisation of the APG.

1. Introduction

The ASEAN Power Grid (APG) is a flagship initiative under the ASEAN Vision 2020, mandated in 1997 by the ASEAN Heads of States/Governments. Realising the significant benefits that a regionally interconnected power systems can bring, the APG initiative was kicked off during the Second ASEAN Informal Summit held in Kuala Lumpur on 15 December 1997. The aim is to enhance regional energy sustainability, security and reliability such that more efficient, economic and secure operation of power



system can be achieved for the region. While most of the ASEAN countries are rich in natural energy resources, the energy demand of each country differs and may not be proportional to the potential it has. Thus, collective and coordinated effort at the regional level can lead to the efficient use of these resources. According to the plan, the construction of the APG would begin with a regional power interconnection on cross-border bilateral terms, which then expands to sub-regional basis towards a totally integrated South East Asia power grid system. Twenty years after its inception, a number of progress is seen especially in terms of the physical interconnection of the grids. However, a lot more still need to be done with regards to the trading, especially when compared to what have been attained by the Nordic countries that started similar initiative at about the same time. The current approach is mostly through bilateral power purchase agreements between the bordering countries. To fully exploit the potential of the APG, a regional electricity market is needed where the sellers and buyers can trade. However, for this to happen, the electricity supply industry (ESI) structures in the ASEAN countries need to be in common, or at least compatible with one another, i.e. harmonised and homogenised. “Against which structure?” one may ask. A plausible option would be through liberalisation and unbundling, taking the cue, again, from the successful regional electricity market in the Nordic countries. Should that become the chosen path, the ASEAN countries need to learn from their members who have been in the shoes earlier. Thus far, there are only two ASEAN countries that have implemented unbundling; the Philippines and Singapore. In this paper, a chronological review of their transformation towards liberalised ESIs is presented. Reasons for the review is obvious. As ASEAN countries, they bear similar local characteristics such as geographical and political that may render their electricity market liberalisation approaches more amenable to the other ASEAN countries. Good practices, challenges and lessons learnt are then identified. Results showed that both countries have different stories to tell. While the Philippines’ journey is described as ‘bumpy ride’ in some literature, Singapore has a less controversial experience. Findings from the study also showed the significance of governance, legislation, and regulatory bodies and institutions to instate reform.

2. The Philippines’ journey

Prior to the liberalisation of its power industry in 2001, the state-owned monopoly National Power Corporation (NPC) was the vertically integrated power utility engaged in the production, transmission and distribution of electricity and used to be the largest provider and generator of electricity in the Philippines. The efforts towards energy restructuring in the Philippines started to materialise with the change in government in 1986. The Energy Regulatory Board (ERB) constituted in 1987 assumed the responsibility to regulate the energy sector, overseeing the power rates and services of private electric utilities in the country. The year 1988 saw the beginning of independent power producers (IPPs) in response to an executive order from the then President, driven by the need to address looming power shortages in the island [1]. By 1994, more than 40 IPP contracts were accumulated, a number that is more than any other developing countries [2]. The Asian financial crisis in 1997 led to the Philippines having the second highest electricity prices in the world that was putting more pressure for reform. Thus, a more serious move towards deregulation of the industry began in 2001, when the Republic Act 9136, known as the Electric Power Industry Reform Act (EPIRA) was enacted after almost eight years on the table. It was regarded as the most comprehensive piece of legislation of its kind in Asia by the Asian Development Bank (ADB). Being comprehensive, it is also the most complicated with the involvement of many parties [3]. The EPIRA called for the following [4].

- Creation of the National Transmission Company (TransCo) to assume the transmission function of the NPC
- Privatisation of NPC assets, including the newly created TransCo
- Creation of an independent, quasi-judicial entity called the Energy Regulatory Commission (ERC) to ensure a transparent, competitive, and reliable electricity market

TransCo was created immediately in the same year and started operating and managing the power transmission system that links power plants to the electricity distribution utilities nationwide in 2003. The ERC, an independent, quasi-judicial regulatory body that promotes competition, encourages market

development, ensures customer choice, and penalises abuse of market power, replaced the ERB. The EPIRA also resulted in the creation of the Power Sector Assets and Liabilities Management (PSALM) Corporation in 2001, a wholly-owned and -controlled government entity to take over the ownership of all existing generation assets of the NPC, IPP contracts, real estate, and all other disposable assets including the transmission assets of the TransCo. By the same token, PSALM assumed all outstanding obligations of NPC arising from loans, issuances of bonds, securities, and other instruments of indebtedness. The principal purpose of PSALM is to manage the orderly sale and privatisation of these assets with the objective of optimally liquidating all of the NPC's financial obligations. The Small Power Utilities Group (SPUG), which provides electricity to the off-grid customers and has been in existence since 1996, was put under the NPC and will absorb the remaining unsold assets of the NPC.

The EPIRA also mandated the Wholesale Electricity Spot Market (WESM) to be established within one year of the Act. As a result, rules and regulation with regards to the conduct of the WESM were announced in 2002. In November 2003, the Philippine Electricity Market Corporation (PEMC) was incorporated as a non-stock, non-profit corporation to establish and govern an efficient, competitive, transparent, and reliable market for the wholesale purchase of electricity and ancillary services. It was designated in August the following year to undertake the preparations for and the initial operations of the WESM. After several months of trial operations, the WESM commenced commercial operations in the Luzon grid on 26 June 2006. Four years into the commercial operations in Luzon, the Visayas grid was integrated into the WESM and commenced commercial operations on 26 December 2010. In June 2017, WESM in Mindanao was officially launched but it is not yet operating commercially. It is expected to be commercially operational in January 2020, after a number of revisions. As at April 2018, there were 113 generation companies in the Luzon-Visayas grid alone and all of them are WESM participants [5]. The restructured electricity industry now has the following key players [6]; Department of Energy (DOE), ERC, PSALM, PEMC, NPC, TransCo, National Grid Corporation (NGC) and National Electrification Administration (NEA).

At the retail market level, the retail competition and open access (RCOA) was launched in June 2013 for contestable customers. The threshold for customer contestability began with 1 MW, which means that consumers whose power usage reach a monthly average of at least 1 MW are required to buy their electricity from the retail electricity suppliers (RES). The threshold for contestability is gradually increased. In May 2016, customers with an average monthly peak demand of at least 750kW are mandated to enter into a retail electricity contract with a retail electricity supplier by June 2017. If it is not due to the temporary restraining order (TRO) by the Supreme Court resulting from the petition submitted by a few contestable customers [7], [8], the contestability level would have been lowered further to include customers with an average peak demand between 500 kW and 749 kW. At the time of writing, the high court has yet to lift its order [9]. The number of customers enrolled in the open access scheme of the electricity retail market, as reported by the PEMC, reached 940 in November 2017 [7], nearly four times the level of contestable customers when it was launched in 2013. This represents 23% of the energy share in the market, while distribution utilities (DSO) and bulk users have the remaining 77%. From the 940, 862 are contestable customers with an average monthly peak demand of 1 MW and 78 with an average monthly peak demand of between 750 kW and 999 kW. As at September 2018, there is a total of 1,873 contestable customers from Luzon (1,662) and Visayas (211) regions. There are also 30 licensed RES, 25 local RES and 44 Supplier of Last Resort (SOLR) in the RCOA system. SOLR is an entity that provides last resort supply to contestable customers who suddenly find themselves without a RES. Out of the 1,873 contestable consumers who consume 750 kW or more, 62% (1,153) now have retail supply contracts with RES, representing 71% of the total 4,008 MW of contestable customers' demand. In spite of the TRO, more and more contestable customers who were earlier issued certificates of contestability by the ERC are opting to voluntarily migrate.

3. The Singapore's journey

Over the years, the energy sector in Singapore has been progressively liberalised and restructured. During this time, the generation and retail markets are opened up to the commercial players, a regulatory

framework is established and a wholesale electricity market run by the Energy Market Company (EMC) with spot bidding every 30 minutes is introduced. The ESI reform in Singapore is divided into four phases; corporatisation from 1995 to 1998, regulatory infrastructure from 1998 to 2001, privatisation and divestment from 2001 to 2009 and full market contestability from 2009 until now [10]. The reform began in 1995 when Singapore Power Limited (SP) took over the electricity and piped gas functions from the Public Utilities Board (PUB). SP at the time was wholly owned by the government and was a vertically integrated monopoly. After the takeover, electricity generation, transmission, distribution, wholesale and retail became the responsibility of the SP. Five new entities (companies) under the SP were in charge of the different segments. Generation was put under the Tuas Power, Power Senoko and Power Seraya. Power Grid (now SP PowerGrid) was in charge of the transmission and distribution, and Power Supply Limited (now SP Services) became the sole retailer. PUB were left to perform the regulatory function with regards to the energy sector as a result. When the Singapore Electricity Pool (SEP) was launched in 1998, Singapore became the first ASEAN country to have the wholesale electricity trading market, a day-ahead market operated by Power Grid. Until July 2001, Power Supply Limited was the only buyer in the SEP where the three power generation companies above and a government-owned waste incineration plant were the sellers of electricity in the market. Electricity tariffs were unbundled at the same time, making Singapore's ESI to become the most liberalised in ASEAN by the late 1990s.

The Electricity Act (Chap. 89A) was enacted in 2001, with the aim to create a competitive market framework for the electricity industry and provide safety, technical and economic regulation of the generation, transmission, supply and use of electricity. With it, the Energy Market Authority (EMA) of Singapore Act (Chap. 92B) was also enacted to establish and incorporate the EMA of Singapore, to provide for its functions and powers. Consequently, the Energy Market Authority (EMA) was set up in 2001 to regulate the energy industries. As a result, PUB's role was further reduced to become the sole water authority and SP Power Grid only operates and maintains the transmission and distribution grid. As a regulator/power system operator, EMA was also tasked to ensure that Singapore has a reliable and secure energy supply (generation and transmission) and to promote effective competition. To run and operate the (new) wholesale electricity market, a new company, the Energy Market Company Pte Ltd (EMC) was established. It was a joint venture between EMA and M-co, a company from New Zealand. The SEP day-ahead market lasted until December 2002. Beginning 1 January 2003, the New Electricity Market of Singapore (NEMS) took over its role. There is a total of eight players in NEMS [11]; EMA, EMC, power system operator (SP PowerGrid), transmission licensee (SP Power Assets), market support services licensee (MSSL) (SP Services), generators, retailers and consumers (contestable and non-contestable).

Since July 2001, EMA has progressively opened the retail electricity market to competition to allow 'contestable consumers' to manage their energy cost. The threshold for contestability began with those with usage of 10MWh down to 8MWh in 2004, to 4MWh in 2014 and 2MWh in 2015 [12]. At this stage of partial liberalisation, contestable consumers were able to purchase power from either retailers at a price plan that best meet their needs, or from the wholesale electricity market at the half-hourly wholesale electricity prices, or from SP Services. The non-contestable consumers, mainly households and small businesses, buy electricity at the regulated tariff from SP Group (through SP Services), the designated Public Electricity Supplier (PES) that sells electricity to the non-contestable customers. Since 1 April 2018, EMA commenced the soft launch of open electricity market, where households and businesses in Jurong can choose to buy electricity from a retailer at a price plan that best meets their needs. From 1 November 2018, the open electricity market is extended to all consumers across Singapore by zones. This initiative provides about 1.4 million households and business accounts with more choice and flexibility when buying electricity, while being provided with the same electricity supply through the national power grid. Consumers who wish to remain with the SP Group and buy electricity at the regulated tariff can choose to do so. The switching is not compulsory and there is no deadline for switching. Transmission and distribution of the electricity is still owned and operated by the SP PowerGrid (SP Group), and the prices remain regulated.

4. Discussion

The Philippines and Singapore are the only two countries in ASEAN that have attained full liberalisation of their ESIs. The striking contrast between the two countries in terms of the geographical and demographical situations, as shown in Table 1, provide positive indication on the suitability and potential of ESI liberalisation to other ASEAN countries as they may well stand between these two countries, geographically as well as demographically. While Singapore has been enjoying 100% electrification since at least 1990¹, the Philippines has been continuously working to improve access to electricity, which currently stands at 93%. Thus, it provides a good starting point for the discussion on the prospect of ESI liberalisation of the other ASEAN countries as the Philippines and Singapore already represent the two extremes conditions. They are perhaps only similar in their commitment to have their ESIs liberalised no matter what, albeit for different reasons and of different motivations.

Table 1. Selected demographic information of the Philippines and Singapore.

Attribute	The Philippines	Singapore
Land size (km ²)	300,000	716
Population	100,981,437	5,612,000
Access to electricity (%) ²	93	100

Apparent from the experience of both countries is the defining role of legislative framework, followed by the setting up of the regulatory bodies and institutions prompted by the enactment of the laws and acts. The Philippines with its comprehensive EPIRA and Singapore with its Electricity Act. The establishment of each body should be followed by the act to define their scope of work, such as the EMA Act. The other lesson learnt is on the gradual implementation of the reform. It usually begins with the large power consumers from the commercial and industrial sectors as the result will be more impactful. Residential consumers would usually be the last to be addressed. Mechanism has to be in place for supplier of last resort or default supplier for residents in the remote areas where retailers may not be interested to compete. However, barriers are also identified. The other ASEAN countries were said to be sceptical towards market liberalisation due to reasons such as, but not limited to, the following [13].

- Very low electrification rate. In countries like Cambodia and Myanmar where the electrification rates are 60% and 34% respectively, the focus of the government would be on improving the infrastructure and access to electricity such that liberalisation would not get the priority.
- Size of the country. In countries like Brunei Darussalam for example, which is very small and self-sufficient, the motivation to liberalise their ESIs may not be there. Brunei currently has the most vertically integrated and monopolistic ESI in the ASEAN region.

As for Malaysia, moves towards ESI liberalisation have started as early as early 1990's with the presence of the first generation IPPs. The first reform that started in 2011 had envisaged the managed market model with the presence of the franchisers at the retail market with contestable and non-contestable consumers like in Singapore. However, the progress has been slow, until only recently with the new government taking over and the launching of the next wave of reform, MESI 2.0 [14], things start to change. However, political environment is also foreseen as a challenge for Malaysia as ESI liberalisation may bring together with it increase in the tariff that has been subsidised for so long. A bold move is needed, packaged with the necessary knowledge transfer and information sharing

¹ Data earlier than 1990 could not be found

² The World Bank Data 2017

programmes to equip the people with the understanding on its importance and urgency e.g. for sustainability.

Extending the ESI liberalisation to the whole of ASEAN and subsequently realising the APG, a more authoritative form of coalition is needed, similar to the European Union where each member state is, by law, obliged to comply. Having said that, integrated ASEAN power grid does not have to wait until all ASEAN countries have liberalised their ESIs in order to materialise. It would be sufficient to have the necessary regulations imposed for the setting up of compatible ESIs that can connect and communicate regionally. With the depleting fossil fuel and the energy demand that is predicted to exceed the production of indigenous resources of the region based on the recent Southeast Asia energy outlook [15], increased penetration of renewables into the grid, and more efficient use of energy would be the silver bullets in alleviating the impact of depleting natural indigenous energy resources. Experience from regions, such as the Nordic, shows that liberalised ESI aligns very well in accommodating renewables and attaining efficiency. Thus, it is a potential that future direction of the ASEAN countries with regards to the energy and electricity is towards the liberalisation of the ESIs.

5. Conclusion

In this paper, the chronological review of the Philippines' and Singapore's journey towards the liberalisation of their ESIs is presented. While the Philippines went through an eventful transformation, Singapore had a more structured and well-planned transformation. Nevertheless, both have respective lessons and best practices to share with the other ASEAN countries should they plan to follow the footsteps. It is not within the ambit of this research to provide a detailed review on the electricity reform of each ASEAN country. This can be a separate study on its own. The purpose of focusing on the Philippines and Singapore in the review, as mentioned earlier, is because of their current state of ESI liberalisation, which is considered to be in a more advanced stage compared to the other ASEAN countries. More detailed data are not able to be included for discussion due to the space constraint. They will be deliberated in one of our future work.

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