

# VI. The pathway to ASEAN Energy Market Integration

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## Abstract

Global experience in regional energy market integration presents broad elements of integration, i.e., binding agreements, physical infrastructure, standardized or harmonized rules of operation, and governing or coordinating institutions. The pathway to ASEAN Energy Market Integration (AEMI) will also involve creating these elements; however, this activity must be preceded by trust-building activities among ASEAN members. Trust should be built by candidly disclosing mutual gains from, and shared costs and externalities in energy resource development, trading energy products, market adjustments and regulatory reforms. Shared databases and assessments could allow ASEAN members to formulate the building blocks of an AEMI regional accord. ASEAN leaders could then forge a regional accord for AEMI through 2030 with actionable targets and timetables. The targets could include establishing or strengthening institutions for facilitating integration efforts, removing border and behind-the-border barriers to energy trade and investments, harmonizing rules and standards, and building the physical infrastructure for regional energy trading. Since energy market integration takes place not only at the government level but also at the private sector level, ASEAN members must base their preparedness to join AEMI on the business case for integration rather than merely on the availability of energy resources. Moreover, at the minimum, ASEAN members should have independent energy regulators and pursue harmonization of rules and standards.

*Keywords:* ASEAN; cross-border infrastructure; energy market integration; energy regulatory reforms; energy trading.

## A. Introduction

Energy market integration in the East Asia region has been pursued at different levels in the history of East Asia energy cooperation. Thailand and the Lao People's Democratic Republic concluded the first energy agreement in 1966 (Shi and Kimura, 2010). Governments in the Greater Mekong Subregion (GMS) – which consists of Cambodia, the Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam plus Guangxi Autonomous Region and Yunnan province of China – have signed memoranda of understanding for bilateral power trade agreements from 1990 onwards (Zhai, 2010). The first to third ASEAN Plan of Action for Energy Cooperation (APAEC) also specified regional programme areas for cooperation that could support energy market integration, such as the ASEAN Power Grid (APG) and the Trans-ASEAN Gas Pipeline (TAGP) envisioned in APAEC 2010-2015. In other regions, energy market integration is also at various stages of implementation.

Valuable lessons that may be applicable to ASEAN Energy Market Integration (AEMI) through 2030 can be learned from these experiences. Thus, this chapter extracts lessons from the experiences of other regional energy markets such as those in the European Union, the North American Free Trade Agreement (NAFTA) region, the MERCOSUR region (*Mercado Comun del Sur* or Common Market

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of the South) and the Central Asian region. It also draws on lessons from within East Asia by examining the GMS power market. The chapter also investigates specifically what types of energy markets have been integrated and how the integration has been carried out thus far in those regional markets. Taking off from the assessment of regional markets, it then analyzes the options for pursuing integrative activities as well as the possible alternative approaches by the ASEAN members in joining AEMI, given their domestic constraints. The chapter then presents the summary and conclusion.

## **B. Analytical framework**

A regional public goods approach is helpful in examining the pathway to energy market integration, since such integration involves delivering services that create positive spill-over effects in member countries – effects that are greater than what could be achieved if countries provide the services on their own. Two standard properties are used in characterizing public goods in any market – non-rivalry of benefits and non-excludability of free riders. These properties are also helpful in describing regional public goods. Non-rivalry is present when the consumption of a good or enjoyment of a good's benefits by one country in no way diminishes the consumption or enjoyment of such a good's benefits by other countries. Rivalry occurs when crowding or congestion reduces consumption of a good or enjoyment of its benefit. On the other hand, non-excludability of benefits is present when paying countries and non-paying countries alike gain from the positive spillovers of the regional public good. This happens when it is either impossible or prohibitively expensive to exclude non-paying countries from enjoying that regional public good.

Based on the degree of non-rivalry and non-exclusivity, the standard public goods typology consists of four types of goods: pure public good; impure public good; club good; and joint product. These distinctions are also applicable to regional public goods. Sandler (2004 and 2007) described and gave examples of these four types. According to Sandler, in the provision of regional pure public goods, the dispersion of benefits is both completely non-rival and non-excludable. Adopting sound standards of regulations and practices, for example, provides completely non-rival and non-exclusive benefits. On the other hand, in the provision of regional impure public goods, the enjoyment of benefits is partially rival or partially exclusive, i.e., a country's use of the good reduces the benefits available for other countries, or the good's benefits can be limited to those countries that pay for it. Examples include vigilance in surveillance (because vigilance directed at one area reduces vigilance elsewhere) and research findings that are disseminated exclusively to a specific set of countries.

Regional club goods, in turn, provide benefits that are partially rival but fully exclusive, such as regional power grids, air traffic control networks and waterways. Lastly, in joint products, a single activity gives rise to two or more outputs with "publicness" characteristics. An example is the late 1980s treatment programme for river blindness, a disease that affected Latin America, Africa and the Arabian Peninsula. The programme resulted in joint products: (a) it limited potential disruption in the whole region (a pure public good); and (b) it curtailed the country-specific damage to those countries that experienced the disease outbreak.

The regional public goods framework is applicable to energy market integration because there are specific services in an integrated regional energy market that have public good characteristics. Andrews-Speed (2011) provided a preliminary list and classification of such services (Table 1).

**Table 1. Selected services that have features of regional public goods for a regional integrated energy market**

Category	Service	Type of good
Knowledge	Dissemination of research results	Pure public good
	Joint public pronouncements	Pure public good
	Best practice laws, procedures and rules	Pure public good
	Early warning systems	Pure public good
	Market and reserves data	Impure public good
	Analysis of data	Impure public good
	Technological research and development	Impure public good
	Benchmarking data	Impure public good
	Capacity-building and training	Club good
	Events and meetings	Club good
Infrastructure	Network construction	Club good
	Construction of shared infrastructure	Club good
	Maintaining network integrity, security and access	Pure public good
Environment, natural resources, and health	Providing clean energy to cities and households	Pure public good
	Effective husbanding of natural resources	Pure public good
	Reducing acid rain	Impure public good
	Cleaning up after polluting event	Impure public good
Peace and security	Construction of emergency stocks	Pure public good
	Emergency stock sharing system	Club good
	Sea-lane security	Pure public good
	Network security	Pure public good
	Emergency response team	Club good

Source: Andrews-Speed, 2011.

As mentioned by Andrews-Speed (2011), this preliminary identification is illustrative rather than exhaustive. Nevertheless, it is very useful in the sense that it provides important clues on which services need to be delivered and part of the steps towards building an integrated energy market.

## C. Regional energy markets around the world

This section reviews the different pathways that integration took in the energy markets of the European Union, NAFTA, the MERCOSUR (*Mercado Comun del Sur* or Common Market of the South) region and the Central Asian region. It also examines the embryonic pathway to energy market integration within ASEAN itself by describing the current efforts to deepen electricity trading in the GMS.

### 1. European Union energy market

The accomplishments in the integration of energy markets of the European Union member States were facilitated by the presence of an advanced legal system for enforcing regional energy laws. The concept of mandatory and comprehensive European energy policies was implemented through this legal system. The system involves: (a) European Union regulations, which are legislative Acts that must be enforced by all member States simultaneously; and (b) European Union directives, which lay down goals and are transposed by member States into national laws and procedures within specified deadlines. Since the European Commission has the power to take legal action against any European

Union member State, it can enforce European Union energy regulations and directives, and can refer cases of non-compliance to the European Court of Justice (European Commission, 2013a).

In the case of the European Union, the energy markets that were integrated were the electricity and gas markets. It is generally agreed that the sequencing of steps in energy market integration has so far involved three successive waves of major reforms, called the first to third energy packages. The pathway that is visible in these energy packages is liberalization of the energy market, as described by Rokas (2009).

The first energy package comprised European Union directives of 1996 and 1998 concerning common rules for the internal market in electricity and natural gas, respectively. It pushed for generation and transmission unbundling and established the minimum requirements for it, including the requisite accounting and management activities. Rokas explained that this gave rise to a long and controversial discussion on the theory of monopolies, and spawned clarifications of core principles on free competition, transparency, free access to energy networks and security of supply.

The second energy package, which was adopted in 2004, comprised new rules for the internal market in electricity and natural gas. The rules strengthened the separation of transmission and distribution, mandated the establishment of national energy regulators and allowed consumers to choose their energy supplier. By 2004, industrial consumers had the freedom to choose their energy supplier, and by 2007, domestic consumers were able to exercise this freedom.

The third energy package, which was adopted in 2009 and had a transposition deadline of 2011 for the European Union directives, aimed for “ownership unbundling” or the effective separation of supply and production activities from the operation of transmission and distribution systems. It established the Agency for Cooperation of Energy Regulators and the European Network of Transmission System Operators for electricity and gas. It also set binding rules for cross-border network management and additional rules to ensure the transparency of retail markets.

With regard to interconnectivity of infrastructure, the history of physical integration was highly influenced by the development of power exchanges such as the Nordic Power Exchange (Nordpool), which was formed by Norway, Sweden, Finland and Denmark, and the European Energy Exchange in Central Europe. Moreover, continental Europe has what is called a synchronous grid that includes part or all of Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark (western part), France, Germany, Greece, Hungary, Italy, Luxembourg, Macedonia, Montenegro, the Netherlands, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain and Switzerland (UCTE, 2008).

The Asian Development Bank (ADB, 2013a) described the European Union as already well-interconnected. Moreover, ADB explained that the European Commission recognized early on the importance of infrastructure interconnection in preventing the risk of short supply as interconnection diversified sources and facilitated the conveyance of additional generation capacity from renewable energy. At present, more reforms in the European electricity grid are in the offing. The “European Electricity Grid Initiative Roadmap, 2013-2022”, in particular, proposes increases in research, innovation and investment activities in order to increase network capacity for grid users, and to pave the way for a fully decarbonized pan-European electricity system by 2050 through more renewable energy production (European Commission, 2013b).

However, there are still significant barriers to competition that are hindering the progress of European Union energy market integration, as reported by the European Wind and Energy Association (2012). One stumbling block is the fact that European Union member States are currently at different stages of implementing common electricity rules, despite the adoption of the timetable for transposition of

European Union directives. Moreover, nationally-regulated consumer prices currently do not allow a transparent comparison between generation technologies; this presents obstacles to efficient and fair competition. The continuing high concentration in energy markets in European Union member States also persists, resulting in significant market power and difficulties for small and medium-sized companies to compete.

## **2. Energy trading in the NAFTA region**

In the trilateral trade bloc created by Canada, Mexico and the United States of America in NAFTA, energy trade is an important component. In fact, the pathway to energy market integration in the NAFTA region is basically the pathway traversed by free trade efforts.

The sequence of steps in energy market integration in the region was preceded by the gradual growth of bilateral natural gas trading between the United States and Mexico, and electricity trading between the United States and Canada. The United States-Mexico natural gas trading began in 1929 when the United States started exporting gas to Mexico. Natural gas was transmitted through a pipeline constructed by a United States company and distributed through the United States pipeline company's subsidiary in Mexico. Over time, gas flowed in both directions across the border, depending on the need and demand in each country (CBA Energy Institute, 1998). United States-Canada electricity trading, on the other hand, began in 1959 when the Government of Canada came up with a national power policy that enabled the interconnection of provincial transmission systems and the export of its surplus power to the United States (Centre for Energy, 2013). In 1988, liberal energy trading provisions were formalized in the Canada-United States Free Trade Agreement (CUSFTA). Most parts of the energy trade provisions in CUSFTA were then extended to Mexico through the 1994 trilateral NAFTA (Hufbauer and others, 2005).

The free trade agreements (FTAs) have been less influential in harmonizing energy policies and prices, but the necessity of cooperating in electricity regulation led to the creation of the North American Electric Reliability Council (NERC) in 1968 and the gradual convergence of energy policies. NERC created electric reliability standards across North America and relied on peer pressure and mutual self-interests in enforcing regulations. In 2006, NERC ceased to be a council and, instead, became a non-profit corporation, the North American Electric Reliability Corporation (the new NERC). Because Mexico's constitutional ban on foreign exploitation of its subsoil resources constrains its energy policy towards its neighbors, NERC is primarily an exercise between the United States and Canada. Nevertheless, NERC members also include energy suppliers to a portion of Baja California Norte, Mexico (Hufbauer and others, 2005).

## **3. Infrastructure investments, energy trade in MERCOSUR**

In the MERCOSUR region, the pathway to energy market integration was cleared by greater economic openness and liberalization in Latin America in the 1990s. After the politically tumultuous 1980s, the Latin America region slowly stabilized and new instruments for regional cooperation emerged, such as the MERCOSUR in 1991. MERCOSUR, which is an economic and political agreement among six member States – Argentina, Brazil, Paraguay, Uruguay, Venezuela and Bolivia (which became the newest member in July 2013) – is a customs union or a type of trade bloc that is composed of a free trade area with a common external tariff.

The liberalization in the MERCOSUR region facilitated not only trade but a wave of investments, including investments in natural gas pipelines and electricity transmission lines. According to Bailey (2013), seven natural gas pipelines were built between 1997 and 1999 to connect Argentina's natural gas reserves with resource-poor Chile. In 1999, a massive natural gas pipeline from Bolivia's then newly proven reserves to southern Brazil was also completed. Expansion of electricity transmission

grids also occurred during 1997-1999. The grid interconnection between southern Brazil and Argentina, which was built in 1999 and then reinforced with double capacity in 2002, allowed Brazil to access Argentina's thermal power capacity during periods of drought and, in turn, allowed Argentina to access Brazil's cheap hydropower during peak demand periods. Small-scale transmission links between Argentina and Uruguay, and then between Brazil and Uruguay, were also built to insure Uruguay's hydropower-dominated power system against drought.

Power industry restructuring activities in the region also helped, and the transfer of control to private groups as well as capitalization of power companies led to greater investments. Hammons and others (1997) explained that Chile pioneered industry restructuring in Latin America in 1982, as it unbundled the formerly integrated utilities into different business units for generation, transmission and distribution. Argentina also embarked on restructuring in 1991 as it provided for a vertical division of activities and the establishment of a wholesale electricity market. In 1994, Bolivia adopted a structure similar to that of Argentina.

The formulation of guidelines and common energy policies under the market framework of MERCOSUR also facilitated the greater openness to energy trade and infrastructure investments in the region. The Work Subgroup on Energy Policy does most of the work of coordinating information and the points for decision-making by the Common Market Group, the executive body of MERCOSUR, and by the Common Market Council, where the highest level of decision-making in MERCOSUR takes place. Burgos (2007) described the market framework for integration and cooperation in the energy sector as including financial stipulations, energy efficiency, environmental protection and legal harmonization. These are particularly contained in rules such as MERCOSUR Decision No. 1/93, which calls for the definition of basic guidelines for energy policy in the common market, and Resolution GCM No. 57/93, which stipulates the fundamentals for energy cooperation.

Moreover, the Initiative for the Integration of Regional Infrastructure in South America (IIRSA), a forum for the coordination of intergovernmental actions, is helping to strengthen the physical integration of infrastructure through a portfolio of projects financed in part by the Inter-American Development Bank (IADB, 2013). However, IIRSA – which covers a region larger than that of MERCOSUR – not only focuses on energy but also on transportation and communications.

Bilateral agreements are the norm in energy trade and integration in MERCOSUR. However, after the energy rationing crisis in Brazil in 2001-2002, energy supply security became a major concern. It became evident that bilateral agreements limit the scope for energy integration and for preventing opportunistic behavior. At present, a multilateral energy security reserve, which will be provided with multilateral mechanisms and legal agreements, is being proposed to prevent the opportunistic behavior of Governments and energy market agents (de Oliveira, 2010).

#### **4. Integrated power system in Central Asia**

In the case of the Central Asian region, generation and transmission were integrated through the joint operation of the Central Asian Power System (CAPS, which comprises the power networks of Uzbekistan, southern Kazakhstan, the Kyrgyz Republic, Tajikistan and Turkmenistan. Mercados Energy Markets International (2010) traced the origins of CAPS to the 1970s when the present national borders of the former Soviet Union republics were not yet defined. The integrated power system has historically relied on hydropower plants for electricity generation and some contribution from fossil fuel-based generation, especially when hydropower generation is low during winter. After the disintegration of the Soviet Union, coordination failures emerged in the operation of the components of the power system, such as water reservoirs and fossil fuel-based generation.

The case of integration in Central Asia is not one where energy market integration has been built from previously non-integrated national markets, but one wherein an integrated energy market has been prevented from collapsing. As in the cases of a gradual build-up of energy market integration in the European Union and the NAFTA and MERCOSUR regions, cementing and strengthening integration in Central Asia required the following steps: (a) forging legal agreements among countries; (b) establishing an entity to take charge of coordinating energy-related transactions; and (c) assessing and taking advantage of trading opportunities.

Mercados Energy Markets International (2010) reported that the legal basis for joint regional power operation was forged in 1998 when senior management officials from the separate national power systems signed the “Agreement on Parallel (Joint) Operations of the Power Systems of the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan and the Republic of Uzbekistan.” Other agreements were signed in the succeeding years, such as the agreement on energy transit and the agreement on mutual assistance in case of power system failures. The five countries also founded the regional Coordination Dispatch Center located in Tashkent, Uzbekistan. The center, which functions as the first coordination level for Central Asia dispatch, is financed by the five countries on a cost-sharing basis. Each national power system has its own dispatching authority, which functions as a second level for dispatch operations.

Data from the Coordinating Dispatch Centre cited by Omorov and Lynch (2010) show that electricity imports and exports between the countries declined in 2000-2008. During that period, national internal power systems began to fail functionally due to, among other reasons, ageing regional power infrastructure and coordination difficulties. Subsequently, self-sufficiency became the strategy of each country, seemingly unaware that there were lost economic opportunities and foregone mutual benefits from weakening trade. As argued by Omorov and Lynch (2010), regional energy trade in the Central Asia region will result in benefits to the participating countries by ensuring that energy demand is met and surpluses are traded optimally. To carry out trade, infrastructure projects, such as maintaining reservoirs, building substations, rehabilitating transmission lines and improving transmission metering, are crucial; this fact is currently gaining recognition, as is apparent in the project list of the member countries of the integrated CAPS.

Industry restructuring, however, is not yet a major component of the pathway to stronger integration in the Central Asian region. Mercados Energy Markets International (2010) also reported that among the member countries in CAPS, Kazakhstan was the only one that had introduced electricity market restructuring, which is done by separating the transmission system operator from the generation and distribution company. The other countries still maintain vertically integrated generation, transmission and distribution.

## **5. GMS electricity trading**

Electricity trading in the GMS reached its current state through a sequence of steps that involved, for the most part, forging bilateral agreements. The first energy agreement between Thailand and the Lao PDR was signed in 1966, one year before the first ASEAN Declaration in 1967. From 1990 onwards, more bilateral agreements were signed between various Governments in the subregion (Zhai, 2010).

Building the physical infrastructure to allow more trading was also a significant step. Beginning in 1992, projects for forging greater energy cooperation and constructing transmission interconnection were implemented with private sector participation and ADB assistance. Prior to this, the only significant transmission links in the subregion were those between the Lao PDR and Thailand. As a result of the infrastructure investments, major high voltage power interconnections now exist through the following links: Lao PDR-Thailand, Myanmar-Yunnan Province of China, Viet Nam-Cambodia,

and Yunnan Province of China-Viet Nam. Medium- to low-voltage interconnections also exist through the following links: Lao PDR-Cambodia, Lao PDR-Thailand, Lao PDR-Yunnan Province of China, Lao PDR-Viet Nam, Yunnan Province of China-Viet Nam, Thailand-Cambodia and Viet Nam-Cambodia. These interconnections allow the following electricity trade flows: Cambodia has been importing from southern Lao PDR since 2010, Thailand since 2009 and southern Viet Nam since 2008; northern Lao PDR has been importing from Thailand since the late 1990s and Yunnan Province of China since 2009; Thailand has been importing from the Lao PDR since 1971; northern Viet Nam has been importing from Yunnan Province of China since 2004; Yunnan Province of China has been importing from Myanmar since 2008 (ADB, 2012).

The path that GMS interconnection pursued also involved a series of calculated steps to institute a governance mechanism for energy cooperation and trading. First, as a result of an energy sector study assisted by ADB, a subregional Electric Power Forum (EPF) was formed in 1995 and henceforth has been meeting at least once a year. Next, EPF facilitated the adoption of a policy statement on regional power trade in the GMS in 1999, which then led to the formulation of an intergovernmental agreement to implement the policy statement. This agreement served as the legal authority to implement electric power trading and was signed by all GMS countries during the first GMS summit in 2002. In the agreement, the GMS countries also agreed to create a Regional Power Trade Coordination Committee (RPTCC) to provide strategic direction and overall management of GMS power trade. The RPTCC's major accomplishment thus far is the completion of the initial Regional Power Trade Operating Agreement, which is a set of technical and commercial guidelines to support the establishment of a regional power market in the GMS (ADB, 2012).

Zhai (2010) explained that the GMS countries committed, through successive memoranda of understanding (MoU), to embark on a road map towards a regional power market. In one MoU, the road map is described as comprising the following four stages:

- Stage 1 – The first cross-border transactions are developed; transactions between pairs of neighboring countries exist and are linked to power purchase agreements (PPAs);
- Stage 2 – Trading becomes possible through bilateral PPAs between any pair of GMS countries using the transmission facilities of a third regional country;
- Stage 3 – Multiple buyers-sellers are allowed to enter into cross-border transactions;
- Stage 4 – Most of the GMS countries change to the multiple sellers-buyers regulatory framework; a regional wholly competitive market exists.

ADB (2012) reported that the subregion is currently in Stage 1, wherein GMS regional power trade is characterized mainly by bilateral trade via PPAs involving independent power producers.

## **D. Different options for a pathway to AEMI**

An examination of the experience in energy market integration in different regions of the world shows that common elements have emerged. Broadly, these are: (a) binding agreements; (b) physical infrastructure; (c) standardized or harmonized rules of operation; and (d) governing or coordinating institutions.

With regard to binding agreements, all the energy markets studied in the previous section feature regional agreements with different levels of strength in binding the member States. It can also be seen that investing in physical infrastructure, either to connect existing infrastructure networks in neighboring countries or to create new networks that cut across countries, is a significant activity in these markets. This is to be expected because such infrastructure is the main vehicle in physically

carrying out energy trade. Moreover, the formulation of new rules, such as cross-border dispatch rules to which each generator, supplier, or distributor in participating countries must adhere, is closely tied to the operation of the infrastructure. In addition, all the scrutinized energy markets have regional institutions with varying degrees of governing powers – some can directly govern the energy market and some can only coordinate and provide guidance to bilateral agreements.

It is also apparent that the common elements mentioned above are major building blocks of an integrated energy market; the sequencing of steps towards energy market integration can be guided by the desire to prioritize the building blocks. There are certainly other building blocks, but the discussion here is not meant to exhaust the listing of all of them; the aim is only to identify the major ones that emerged in the specific review of literature that has been conducted in the preceding section. For example, restructuring and unbundling of the energy industry has been a building block in some cases, but has not been a crucial factor in cases wherein a country's vertically integrated energy industries are still able to participate in regional energy market integration.

The features of these regional markets that hold promise for the ASEAN members' appreciation of the need for energy market integration are those features that resonate well with them and which are gradually emerging as sources of their vulnerabilities as a region and as individual countries. The two most prominent features are energy security and adaptability of regulations to dynamic global conditions. ASEAN's growing demand for energy juxtaposed with internal and external (i.e., outside ASEAN) competition for energy use brings to the fore the need to secure energy supply, not only unilaterally but also as a region and in a coordinated way. The energy security objective, however, need not be pursued in a protectionist manner nor equated with advancing regional energy self-sufficiency.

The flexibility of regulations to allow countries to efficiently trade in energy products not only within ASEAN but also with countries outside the region, especially during energy crises, is very important. Within ASEAN, the responsiveness of energy regulations to dynamic global conditions is a serious challenge that must be acknowledged by leaders of the member States. It is crucial to note that some ASEAN members do not even have independent regulators for energy (as discussed in the next section). The realization that there is a need to address these two interrelated sources of vulnerabilities – energy security and regulatory flexibility – could rouse awareness among ASEAN leaders of the positive spill-over effects of, and mutual benefits from providing regional public goods in an integrated energy market. The decision to take advantage of mutual gains could then lead to them pursuing steps to supply the regional public goods and examining the appropriate way of sequencing those steps.

### **1. Varying emphasis on steps towards integration in other regional markets**

The sequencing of steps towards energy market integration in other regions, however, has not been a clear-cut sequencing. Rather, it is an interrelation of big steps and small steps with varying emphasis, i.e., with some steps gaining more prominence than the others simply because that is what is required by the region's environment and historical context. The options for pursuing AEMI based on other regions' experiences can therefore be presented as options for placing emphasis on, or for prioritizing the building blocks of an integrated regional energy market. The emphases, as interpreted in this paper, are:

- (a) Integration of the legal structures (European Union experience);
- (b) Free trade in energy (NAFTA experience);
- (c) Liberalization of infrastructure investments (MERCOSUR experience);

- (d) Operation of physical infrastructure (Central Asian experience); and
- (e) Bilateral agreements (GMS experience).

The European Union pathway took advantage of the rule-making process set by the European Commission to liberalize energy markets and facilitate integration. In the regional legal system of the European Union, member States agreed to be bound by European Union regulations and transpose their national laws or regulations to conform to European Union directives. In addition to the mutual pursuit of energy market integration objectives, the existence of a regional court to enforce legal agreements also prompts member States to adhere to action plans and targets. Given the legal structure, there is a relatively commodious support for creating institutions with powers rather than institutions that merely facilitate information flow and cooperation agreements. The Agency for Cooperation of Energy Regulators (ACER) is one such institution. ACER is created not only to promote cooperation among national energy regulatory authorities in the European Union but also, and more importantly, to provide the European Union-level authorities with a means of monitoring the activities of national energy regulatory authorities. The ACER also has decision-making powers on cross-border issues (ACER, 2013).

ASEAN, however, is far from having a regional legal system similar to that of the European Union. Tracing the successive treaties that led to the current regional legal system in the European Union will reveal an evolution that was initially motivated by a desire to temper extreme nationalism and intolerance witnessed during World War II. Such strong impetus for having supra-national legal entities is missing in the ASEAN historical context and it may take a while before a similar legal structure evolves in ASEAN.

The NAFTA pathway, which puts emphasis on free trade in energy products and services, may be feasible for ASEAN. The ease of implementation, however, may not be comparable, given that the NAFTA case started with only two countries and then three later. Coordination in quickly implementing free trade in energy may be more difficult to handle in ASEAN wherein 10 member States are involved in a free trade area. Moreover, the removal of tariff and non-tariff barriers in ASEAN, one of the primary objectives of the ASEAN Free Trade Agreement when it was signed in 1992, is still a work in progress. This is quite apparent in the efforts to have an ASEAN Economic Community (AEC) in place by 2015. The AEC is envisioned as an integrated economic region characterized by four pillars: (a) a single market and production base; (b) a highly competitive economic region; (c) a region of equitable economic development; and (d) a region that is fully integrated with the global economy (ASEAN Secretariat, 2012a). At present, it appears that the full achievement of AEC in 2015 is unlikely, given that a significant number of the various AEC measures agreed upon in 2007 have not yet been achieved. For example, the ASEAN Secretariat (2012a) reports that in the AEC Scorecard for Pillar 1, that is, a single market and production base (which involves the free flow of goods, services, investment and capital), the implementation rate was only 65.9 per cent as of 2012, just three years before the AEC target.

The same can be said about the option wherein the liberalization of infrastructure investments is emphasized in the steps towards energy market integration, as was done in the MERCOSUR region. This option may be feasible in ASEAN, but significant barriers to the free flow of capital and investments still exist and removing them is turning out to be a long process. For example, measures to implement the free flow of capital and investments within ASEAN are difficult to ratify because some of them are not aligned with national domestic laws, such as restrictions on foreign equity ownership in domestic firms or limits to the land tenure of foreigners.

The emphasis on the operation of physical infrastructure, as was done in the Central Asian region, is not a practical pathway at present. This is obvious because the prerequisites to such an operation are not yet in place. In the GMS grid interconnection, for example, transmission regulation is the more practical objective (at least, at present) than joint operation. Even in the GMS case, the prerequisites for undertaking transmission regulation have yet to be attained, i.e., performance standards, transmission regulation rules, metering guidelines and a GMS Grid Code (ADB, 2013b).

Moreover, even in the pursuit of the envisioned ASEAN power grid, challenges remain. The planned interconnection projects will require significant investments in marine or undersea cable interconnections as well as inland interconnections involving the participating countries' transmission grids. Although interconnection was deemed technically feasible in the 2011 Master Plan on ASEAN Connectivity (ASEAN Secretariat, 2011), the economic viability of the planned projects have yet to be established and accepted by the participating ASEAN members. It should be noted, however, that the Central Asian experience provides a critical lesson that is relevant to ASEAN, i.e., a breakdown in infrastructure operation could lead to energy insecurity and a desire to pursue self-sufficiency, which could then lead members to be blind to the mutual gains from trade.

## **2. Possible emphasis on, and sequencing of steps in AEMI**

The emphasis on bilateral agreements on trade and cross-border infrastructure, as currently being followed in the GMS experience, may be viewed as a natural recourse in the absence of governance mechanisms at the regional level. However, the option for AEMI should strive for something higher than this. ASEAN members should strive to forge multilateral agreements on energy trade and investments. Multilateral trade relationships could provide a stronger compulsion for the removal of energy tariff and non-tariff barriers across the ASEAN region than what could be provided by bilateral trade relationships.

Energy market integration should also go beyond trading of electricity that can be transported over the wires. There are still other energy products that can be traded aside from electricity including, for example, petroleum products, natural gas, biomass resources and renewable energy technological equipment. The GMS experience, nonetheless, opened up opportunities for testing the building blocks of an integrated energy market in one corner of ASEAN. Given this experience, expanding the energy market integration effort in scale and scope from one subregion to the whole ASEAN region is a promising option.

In the literature, there is no estimation yet of the benefits that will accrue to ASEAN from pursuing this option of expanding the GMS regional energy market integration to cover the whole ASEAN. However, the benefits in the GMS region itself provide helpful leads to the potential benefits for ASEAN. In a study by Economic Consulting Associates (2010) of the potential of regional power sector integration in the GMS, the benefits include lower tariffs for countries that have high tariffs and are dependent on high-cost generation. Countries that could benefit include Cambodia, which has extremely high tariffs due to its dependence on oil-fired generation, and Thailand, which has relatively high tariffs partly due to its dependence on gas-fired generation. Moreover, trade in an integrated energy market is driven not only by the benefits in the form of lower tariffs for end-users in importing countries but also by revenue-generating opportunities for exporting countries. In this regard, Economic Consulting Associates explained that the demand for power exports from hydro-power produced by the Lao PDR and Myanmar has provided these countries with opportunities to earn revenue through independent power producers. There are also potential benefits in terms of carbon emissions reduction. ADB (2009) estimated that around 3 per cent savings in carbon emissions

could be realized in a fully integrated GMS regional energy market scenario, relative to the business-as-usual base scenario.

The practicable approach for expanding the energy market integration effort in scale and scope within ASEAN is “the ASEAN Way”, which is the succinct description being used by ASEAN members in their approach to unifying the region on various matters. As encapsulated in the Treaty of Amity and Cooperation in Southeast Asia (ASEAN Secretariat, 2013), the ASEAN Way can be characterized as being guided by non-interference, discreteness, informality, consensus building, non-use of force and non-confrontational bargaining. It contrasts with the majority votes, legalistic decision-making, litigation and confrontational methods such as sanctions and economic embargoes.

Given that the ASEAN Way emphasizes building trust, the desirable first step towards AEMI is to conduct:

- (a) A candid evaluation of the opportunities for investments in energy resource development, with full disclosure of benefits and costs (including costs related to the environment or health);
- (b) A reliable assessment of energy trading potential in the region, with emphasis on mutual gains from trade; and
- (c) Comparative surveys of domestic energy market structures as well as regulatory institutions, frameworks, rules and plans, with emphasis on areas for technical cooperation rather than weakness points.

Of course, an important prerequisite is an agreement among senior leaders of ASEAN that conducting these assessments and surveys is worth undertaking. The buildup of databases and assessments of resources, investment, trade, market structures and regulations is meant to bring out the elements of an AEMI regional accord, or a set of AEMI regional accords if necessary, that balances the interests of ASEAN members. The next step is to forge an ASEAN regional accord for AEMI with actionable targets and timetables.

A general timetable of up to 2030 may emerge, given that in the vision for ASEAN 2030, the remaining barriers to the free flow of goods, services and factors of production will be eliminated in the years up to 2030. Creating a regional institution or strengthening an existing regional institution to be the repository of information and monitor accomplishments is an important next step. The existing institution that may be strengthened in order to coordinate and monitor integration efforts is the ASEAN Centre for Energy, an entity established in 1999 and provided with core funding from an energy endowment fund consisting of equal contributions from the 10 ASEAN members. The existing group that may be strengthened in order to facilitate regulatory reforms is the ASEAN Energy Regulators’ Network (AERN). AERN is a network of regulators that has been meeting since March 2012 and was recognized in the 30th ASEAN Ministers of Energy Meeting in September 2012, wherein the network was asked to strengthen communication channels in order to promote mutual understanding of energy regulations among member States (ASEAN Secretariat, 2012b).

After making the case for more liberal trade and investments in the energy sector, ASEAN members could agree to remove border and behind-the-border barriers to trading of energy products and investing in energy infrastructure. As a consequence, energy provisions could be written in future FTAs in a more tangible and explicit manner. Harmonization of rules, standards and procedures (for example, rules for resource exploration, standards for power purchase contracts, procedures for dispatch in interconnected grids, and customs clearance along borders), could also augment the removal of barriers to trade and investment. The shape of the physical interconnectivity through such infrastructures as power grid interconnection, gas pipeline network, liquefied gas shipping ports,

petroleum transportation points, and regasification terminals, will be guided by resource availability, feasibility of investments, and trading opportunities.

Later, the question of joint operation of physical connections or infrastructures with on and off switches will emerge and ASEAN could be confronted with two choices: (a) to create a separate institution that has decision-making powers on cross-border operational issues; or (b) agree on protocols for operations and conflict management with which each national authority for infrastructure operations has to comply. The ASEAN Way that emphasizes building trust and disfavors sanctions will not necessarily be in conflict with global standards on punitive actions for operational non-compliance as long as protocols are approved by a high-level ASEAN governing body.

### 3. Electricity market interconnection

With respect to electricity market interconnection, which is a subset of energy market integration, Porter and Situmeang (2005) discussed the stages of reform towards an ASEAN Electricity Market. Table 2 clearly indicates that to obtain a sound investment climate in the sector, separating transmission and generation, and distinguishing between transmissions and generating price must be prioritized. A road map to clearly address the reform targets needs to be formulated for each country. Further, as Table 3 shows, there can be three road maps for cross border interconnections: (a) point-to-point interconnection; (b) limited network-to-network interconnection; and (c) full system interconnection.

Based on electrical distances or regions, Porter and Situmeang (2005) divided the region into three electrical systems: (a) system 1 – part of the GMS that comprises Cambodia, the Lao PDR, Myanmar, Thailand and Viet Nam; (b) system 2 – peninsular Malaysia, Singapore, Sumatera (Indonesia) and Thailand; and (c) system 3 – Brunei Darussalam, Sabah, Sarawak and West Kalimantan (Indonesia). Moving towards interconnected systems will increase not only the complexity of the institutional arrangements but also the level of investment. In order to make the transition smooth, studies need to be conducted in order to prepare for all possible difficulties that need to be hurdled at the regional and national levels.

**Table 2. Stages of reform – transition to the ASEAN electricity market**

<b>Reform Target</b>	<b>Timing rationale</b>	<b>Priority</b>	<b>Country issues</b>
Separation of transmission from generation	Early step - to facilitate separate and better informed investment decisions on transmission and then generation	Very high	Completed in the Philippines and Singapore - plans elsewhere in differing stages
Separate pricing of transmission and generation (energy) charges	Until prices are separate, there will be a tendency to get unsound investment decisions	Very high	
Passage of electricity and competition laws, including laws re. transmission and access regimes	Existing laws may not be adequate to cover what is needed	High	Need to get details right - can progress some issues contractually before law is passed
Development of code for electricity trading and contracting	Need to do structural separations and pricing reforms first	Medium	Singapore well developed - some good role models

Remove supply subsidies - e.g., on oil and gas	Politically difficult, but in varying degrees; need clear communications as to why subsidies are not effective in helping those in poverty; need to use other strategies	Medium - delay will cause poor decisions and fiscal problems	Problems in Indonesia, Malaysia and Brunei Darussalam
Restructuring stranded generation assets, new PPA	Sunk costs need to be written off and charged to general revenues. Allow optimal use of all assets at current valuations	High	Problems in a few ASEAN countries

Source: Porter and Situmeang, 2005.

**Table 3. Choice of road map**

<b>Gradual change - continued point-to-point interconnection (Option 1 or Road Map 1)</b>	<b>Ring-fenced changes - unbundling of transmission prices and limited point and network to network interconnection (Option 2 or Road Map 3)</b>	<b>Full system interconnection - ASEAN Electricity Market (Option 3 or Road Map 3)</b>
<u>Steps Required</u> <ul style="list-style-type: none"> <li>• No change from current situation, but with selective evolution of pricing and ring-fencing of transmission and generation, with a view to long-term goals</li> <li>• Institutions <ol style="list-style-type: none"> <li>1. No need for regional institutional body</li> <li>2. Negotiations on bilateral basis</li> <li>3. Joint system operation; coordination with other countries system control if it couples operationally with the national grid, to assure the agreed cross-border electricity transfers</li> </ol> </li> <li>• Commercial arrangements <ol style="list-style-type: none"> <li>1. Mostly long-term contracts and emergency exchange agreements</li> <li>2. Information asymmetry – no disclosure of cost basis</li> </ol> </li> </ul>	<u>Steps Required</u> <ul style="list-style-type: none"> <li>• Step-by-step advances from current situation, notably in the separation of pricing on transmission and generation, and ring-fencing of the respective businesses</li> <li>• Formation of transmission system operator (TSO) for each system – can initially be more than one in some countries with separated systems</li> <li>• Set up of region-wide institution – ASEAN Committee on Transmission and Interconnection <ol style="list-style-type: none"> <li>1. Management committee of TSOs, with three regional subcommittees</li> <li>2. Financial, regulatory and planning expertise, usable by Member Countries</li> <li>3. Coordination centre for system operation (2 levels for system</li> </ol> </li> </ul>	<u>Steps Required</u> <ul style="list-style-type: none"> <li>• Regional institutions as for Option 2 – ASEAN Committee on Transmission and Interconnection PLUS</li> <li>• Regulation <ol style="list-style-type: none"> <li>1. Increasing harmonization across countries, common rules</li> <li>2. Unbundled pricing and competition on price (not cost) – desirable but not required</li> </ol> </li> <li>• Commercial arrangements <ol style="list-style-type: none"> <li>1. Loose trading pool with longer-term contracts still available</li> </ol> </li> <li>• Conventions <ol style="list-style-type: none"> <li>1. On accounting, dispute resolution, disclosure requirements so information is symmetric</li> </ol> </li> </ul>

	operation management), or at <u>minimum requirement</u> joint system operation coordination with other countries system controls	
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Source: Porter and Situmeang, 2005.

## E. Influence of national constraints

The ASEAN member states have different national constraints that could influence the pace at which they would be able to join AEMI. These include, but are not limited to, preparedness in exploring their own resources, subsidy policies, national laws limiting their participation, and regulatory inflexibility.

With regard to energy resources, Nicolas (2009) states that eight of the ASEAN members have proven oil and gas reserves (Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Thailand and Viet Nam,) and five have substantial coal resources (Indonesia, Malaysia, the Philippines, Thailand and Viet Nam); moreover, the countries in the northern region (the Lao PDR, Myanmar and Viet Nam) are rich in hydropower resources. Singapore, in contrast, does not have any natural energy resources and is heavily dependent on energy imports. Given the mapping of resource availability, the temptation is strong to formulate a blueprint for integration based on such mapping. This is apparent in the vision for a trans-ASEAN natural gas network. The activities towards achieving this vision have been pushed back due to delays in developing the Indonesian East Natuna field that has total proven reserves of 46 trillion ft<sup>3</sup> of gas (Global Association of Risk Professionals, 2013). It has turned out that the delays are due to commercial viability issues arising from the huge cost of developing the gas field, which contains high carbon dioxide levels, without government incentives.

From this experience, it is apparent that energy market integration does not only take place at the government level but also at the private sector level. Thus, an alternative approach to basing integration plans on resource mapping is planning integration based on an indicative business case test as well as the preparedness of countries to develop their energy resources (through their own investments or jointly with foreign partners).

The high subsidies in other ASEAN members could also influence their pace in joining AEMI. According to an IMF (2013) report on energy subsidies, most ASEAN members provide energy subsidies. The IMF report also shows that in the case of pre-tax subsidies, Indonesia provides the highest subsidy for petroleum products (2.58 per cent of GDP) while Thailand provides the highest subsidies for electricity and coal (1.64 per cent and 0.25 per cent of GDP, respectively) and Malaysia provides the highest subsidy for natural gas (0.31 per cent of GDP).

Energy market integration aims to enforce market-based pricing and energy-use efficiency, but the subsidy policies of some ASEAN members may run counter to these goals since subsidies understate the true price of energy and encourage over-consumption. Thus, the AEMI efforts must also include agreements to implement a gradual and coordinated phasing-out of subsidies or the replacement of subsidies with energy programmes that directly target the poorest of the poor.

National laws may also present limitations to the pace and level of integration. For example, in the Philippines, the liberalization of investments in energy will be limited by the 40 per cent ceiling on foreign equity ownership of companies operating domestically. Another example is Indonesia, which has stricter criteria for electricity imports relative to exports. Government Regulation of Indonesia No. 42, 2012 provides that the following six criteria be fulfilled before contracting electricity imports: (a) local demand cannot be fulfilled (i.e., reserve capacity is less than 30 per cent of peak load); (b) imports complement local need; (c) no negative impact on national interest such as sovereignty, security and economic development; (d) imports will improve the quality of local supply; (e) development of national capacity should come first; and (f) the country will not be trapped in energy dependency. On the other hand, there are three criteria for contracting exports: (a) local need has been fulfilled; (b) there is no subsidy on price; and (c) exports do not have a negative impact on the quality of local supply. These criteria imposed by Indonesia imply that trade flows will be guided less by cost advantages and price differentials, and more by the need to prioritize the national generation capacity in dispatch even if the priority dispatch is costlier than imports.

The amendment of national laws will likely be a delicate issue among ASEAN members; at the start, as the harmonization of laws is being worked out, the potential gains from energy trade and investments must still be explored while recognizing the limits set by national laws.

With regard to regulatory reforms in order to aid trade and investment liberalization, the alternatives could be to proceed with a common goal of market restructuring and private-led competition or to proceed despite the presence of vertically integrated industries and state-owned monopolies. Regulatory reform is a serious challenge, given that some ASEAN members do not even have independent regulators (Table 4).

**Table 4. State of energy regulation in ASEAN members**

Country	Regulator	Independence	Structure
Brunei Darussalam	Department of Electrical Services	Not independent; under the Ministry of Energy	Single Buyer
Cambodia	Electricity Authority of Cambodia	Independent; set up in 2001	Single Buyer
Indonesia	Department of Energy and Mineral Resources	Not independent; under the Ministry of Energy and Mineral Resources	Single Buyer <sup>a</sup>
Lao PDR	Department of Electricity	Not independent; under the Ministry of Energy and Mines	Single Buyer
Malaysia	Energy Commission	Independent; set up in 2001	Single Buyer
Myanmar	Ministries of Electric Power 1 and 2	Not independent; under the Ministries of Electric Power 1 and 2	Single Buyer
Philippines	Energy Regulatory Commission	Independent; set up in 2001 <sup>b</sup>	Price Pool
Singapore	Energy Market Authority	Not independent; under the Ministry of Trade and Industry	Price Pool
Thailand	Energy Regulatory Commission	Independent; set up in 2007	Single Buyer
Viet Nam	Electricity Regulatory Authority	Not independent; under the Ministry of Industry	Cost-based Pool

Source: Ruangrong, 2013.

<sup>a</sup> Partial liberalization is achieved by allowing power plants to sell capacity directly to end-users rather than to Perusahaan Listrik Negara alone.

<sup>b</sup> However, even before 2001, a regulator existed – the Energy Regulatory Board under the Department of Energy.

Admittedly, although more work is needed in liberalizing energy markets domestically, ASEAN members should not wait until energy industries are restructured and domestic power exchanges are established before joining AEMI. The establishment of competitive domestic energy markets should still be set as a long-term goal. However, participation in AEMI efforts could proceed in gradual steps, even though the domestic markets in some ASEAN members are still dominated by state-owned enterprises or by vertically integrated industries.

What is crucial in the immediate future is building trust between importers and exporters, regardless of whether the importing or exporting entities are state-owned or private, or whether these are domestic monopolies or not. Nevertheless, the establishment of independent regulators in each ASEAN member as well as the harmonization of rules and standards should be minimum prerequisites. This is important in formulating regional regulatory agreements that ensure the sanctity of contracts is respected, supply interruption is avoided when political problems occur and ownership of cross-border infrastructure or control over a resource is not used for opportunistic trade.

## **6. Summary and conclusion**

This chapter shows that countries choosing to join a regional integrated energy market can enjoy regional public goods produced in the integration process. These regional public goods create positive spill-over effects for the member countries that are greater than what could be achieved if the countries produce the goods on their own. Examples of regional public goods in regional integrated energy markets include (a) knowledge-related services such as best practices in regulating the energy market, (b) infrastructure such as electricity transmission network, and (c) security services such as emergency energy reserve sharing system.

In the review of the experiences of selected regional energy markets around the world, broad elements or building blocks of integration that have “publicness” characteristics emerged. These are binding agreements, physical infrastructure, standardized or harmonized rules of operation, and governing or coordinating institutions. The decision to take advantage of the positive spill-over effects and mutual benefits from regional energy market integration can lead the ASEAN members to take steps to supply these regional public goods through AEMI.

The sequencing of steps towards energy market integration is not clear-cut, as shown in the experience of other regional energy markets; rather, the steps are interrelated and could be given varying emphasis, depending on the regional market’s environment and history. As interpreted in this chapter, the highlight of the European Union experience is the integration of legal structures. The NAFTA experience highlighted free trade in energy. The emphasis in the MERCOSUR experience is on liberalization of investments that made infrastructure build-up possible. The highlight of the Central Asian experience is the operation of infrastructure interconnection. Finally, the highlight of the GMS experience is the forging of bilateral agreements.

In the case of AEMI, it is recommended that the practicable option is to expand the initiated GMS integration effort in scale and scope within ASEAN, through “the ASEAN Way”, which emphasizes building trust among the member States. Trust should be built by candidly disclosing mutual gains from, and shared costs and externalities in energy resource development as well as trading energy products, market adjustments and regulatory reforms. There is also a need to accumulate shared databases on, and assessments of resource, trading, investment, market structures and regulations in order to uncover the elements that should be part of an AEMI regional accord. ASEAN leaders could

then forge a regional accord for AEMI through 2030 with actionable targets and timetables, such as establishing or strengthening institutions for facilitating integration efforts, removing border and behind-the-border barriers to energy trading and investments, harmonizing rules and standards, and building the physical infrastructure for regional energy trading.

The ASEAN members are currently confronted with national constraints of varying intensities and these could have an impact on their motivation to join AEMI. One sticking point is the lack of independent regulators for the energy sector in some ASEAN members. Thus, this chapter recommends that, at the minimum, the ASEAN members should have independent energy regulators and should pursue harmonization of rules and standards.

Finally, the ASEAN members should note that energy supply and demand imbalances that drive integration and create mutual gains from trade are never permanent. It is also possible that the ever-changing supply and demand outlook could lead to one or several ASEAN members being either overconfident or insecure, both of which could result in less reliance on energy market integration, the pursuit of energy self-sufficiency domestically, or more inclination to look outside the region for trading and investments. However, ASEAN members must recognize that the future will always be uncertain. Moreover, it is this same dynamic nature of supply and demand within and outside ASEAN that should motivate the pursuit of energy security through an integrated energy market that has the flexibility to adjust to changing global conditions.

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