IV. Addressing national constraints, energy pricing and subsidies in joining AEMI

Maxensius Tri Sambodo (lead),[1] *Adoracion Navarro*[2] and *Tran Van Binh*[3]

Abstract

The analysis in this chapter focuses on national constraints, which have been divided into two main parts, i.e., institutional challenges, especially energy pricing policy, and infrastructure constraints in the case of the ASEAN Power Grid (APG) and Trans-ASEAN Gas Pipeline (TAGP). There are four main findings. *First*, the exit strategy for energy subsidies has not been discussed in depth at ASEAN Ministers of Energy Meetings (AMEM). As a result, most of ASEAN members are still providing varying levels of energy subsidies. This condition conflicts with the ASEAN Energy Market Integration (AEMI) objectives because subsidies for fossil fuels not only cause over-consumption of such fuels but also reduce the incentives for investment in energy efficiency and renewable energy. *Second*, there is still high national resistance to conducting institutional reform of the energy market. For example in the case of Indonesia, removing fuel subsidy needs approval from the parliament. *Third*, APG can be well developed if each country does its best to (a) develop grid connections close to its borders, (b) harmonize technical standards, (c) minimize the environmental impact, and (d) reduce transmission and distribution loss. However, concern remains over the sustainability of power trading if a country cannot increase its national capacity. *Fourth*, while investing in pipelines is an important part of supporting the TAGP, it is also important to prepare a trading hub, promote a competitive natural gas market and develop the national network of gas infrastructure. The new focus of TAGP has also changed in order to provide more space for LNG trading and providing strategic buffer management of gas. AEMI has six major roles to play in measuring national constraints. First, AEMI can encourage countries to eliminate fossil fuel subsidies, thus ensuring that countries share the responsibility for promoting a more competitive and efficient energy market. Second, AEMI can prepare specific procedures or criteria to be followed before countries decide to provide energy subsidies. Third, AEMI can promote innovative financing that can promote infrastructure connectivity in the context of ASEAN+3. Fourth, AEMI can provide alternative solutions to allow more flexible ways of promoting energy trading. This is an important aspect of creating shortcuts in dealing with infrastructure constraints such as LNG trading, as proposed by the ASEAN Council on Petroleum (ASCOPE). Five, AEMI needs to promote and develop energy education in assessing the linkages between economies, energy and the environment. This can help to develop awareness of the need to measure national constraints such as subsidy, energy infrastructure, energy efficiency and conservation. Finally, as a part of energy education, and due to the fact that benefits and challenges of energy market integration will be distributed unequally across the ASEAN members, it will be necessary to bridge the gap in understanding the benefits of AEMI. Overall, the authors suggest developing an energy security framework for analyzing the correlation between national interest and AEMI interests. It is noted in this chapter that there are two possibilities for investigating the relationship between national constraints and regional objectives. If common interest at the national level is similar to that at the regional level, national constraints should disappear. However, if common interest at the national level conflicts with that at the regional level, national constraints will remain.

[1] Researcher, Indonesian Institute of Sciences (LIPI), Economic Research Center, Indonesia.

[2] Senior Research Fellow, the Philippine Institute for Development Studies (PIDS), Philippines.

[3] Chairman, Bach Khoa Technology Investment and Development Co., Hanoi University of Science and Technology, and ex-Dean, Faculty of Economics and Management, Hanoi University of Science and Technology, Viet Nam.

A. Introduction

The ASEAN region is relatively rich in energy resources, although only a few countries are genuinely self-sufficient. Oil, gas, coal, hydro, geothermal and biomass resources are available in Indonesia. Malaysia and Thailand have oil, gas and coal reserves in. Brunei Darussalam has quite large reserves of oil and gas. There are potential reserves of oil, gas and hydropower in Myanmar, while oil and hydropower resources are available in Cambodia. The Lao People's Democratic Republic has large hydro potential. Viet Nam has oil, gas, coal, hydro and biomass resources while the Philippines has oil, gas, coal, hydro and geothermal reserves. Singapore has no indigenous energy resources, but the country is very important as a major processing center for oil and petrochemical products, and oil bunkers.

Due to the variety in energy supply and demand conditions, energy cooperation in ASEAN was initiated in the 1970s when Thailand and the Lao PDR were adversely affected by the oil crisis in the 1970s. The ASEAN Council on Petroleum (ASCOPE) was established in 1975. In 1981, The Heads of ASEAN Power Utilities/Authorities (HAPUA) was established. Energy cooperation within ASEAN is challenged by its individual members' energy priorities, bilateral trade partners and development dynamics beyond the ASEAN borders. Indonesia delivers natural gas through a pipeline to Singapore and Malaysia. The Lao PDR supplies electricity to Cambodia, Thailand and Viet Nam, while Cambodia also imports electricity from Thailand and Viet Nam. A joint development area for energy resources development was earlier established between Malaysia and Thailand. ASEAN crude oil is sent to Singapore for refining and portions of the products are sent back to the producing countries.

Energy market integration (EMI) is characterized by the flow of trade and investment. Institutional dimensions and infrastructure connections determine the degree of market integration. Pursuing EMI is not only about economic decisions but also political decisions. Even energy sovereignty tends to be overlooked than the economic objectives. For example, according to the Energy Law of the Republic of Indonesia No. 30, 2007, Part 7 deals with "International Cooperation". Article 10 states that "International cooperation in the energy sector can only be conducted to: (a) guarantee the nation's energy resilience; (b) guarantee the availability of domestic energy; and (c) improve the nation's economy. Further, the law also indicates that any international agreement in the field of energy that has wide-raging and fundamental impacts on people's lives associated with the state financial burden, and/or requiring the amendment of, or making laws, is subject to approval by the House of People's Representatives.[4]

After more than four decades of promoting energy cooperation progress has been made, but there are still abundant tasks that need to be completed. For example, ASEAN is still struggling with the regulatory framework for LNG exports, harmonization of the regulatory framework and technical standards for the operation of the ASEAN Power Grid (APG).[5] Institutional reform such as

[4] According to Government Regulation of Indonesia No. 42, 2012, there are six criteria to be met before importing electricity: (a) local demand cannot be met (if the reserve capacity is less than 30 per cent of the peak load); (b) complementing local needs; (c) no negative impact on national interests such as sovereignty, security and economic development; (d) improvement of the quality of local supply; (e) development of national capacity should be given priority; and (f) the country will not be drawn into energy dependency. With regard to exporting, three criteria must be met: (a) local needs must have been fulfilled; (d) no provision of a subsidy in price; and (c) no impact on the quality of local supply. Thus, the criteria for importing are more complex than for exporting.

[5] Joint Ministerial Statement of the thirtieth ASEAN Minister of Energy Meeting on 12 September 2012 in Phnom Penh, Cambodia.

liberalizing, privatization, deregulation and restructuring is still in progress. This indicates that there is still a challenge to harmonization of national interests and regional objectives. It is argued in this chapter that the key to success for the ASEAN Energy Market Integration (AEMI) depends on individual efforts by each member country in following up and implementing their commitments. Thus, it is necessary to understand national constraints in terms of institutional and infrastructure challenges, in order to more easily establish AEMI.

B. Institutional challenge – pricing policy

The institutional dimension was discussed at the first meeting of the ASEAN Economic Ministers on Energy Cooperation in Bali in 1980. At that meeting, the framework for energy cooperation, comprising exchanges of information on policy planning, programming and financing, and the strengthening of institutional arrangements was considered by the delegations. The ASEAN members also agreed unanimously that they would need to create a more competitive and efficient energy sector in the region. ASEAN also needs its members to implement their commitments.

However, acceleration of institutional reform is moving slowly. For example, energy pricing reform policy is one of the determinant factors of how energy efficiency and the promotion of new and renewable energy resources can be achieved. Energy subsidies by ASEAN members are likely to be indirect as the Institute for Energy Research (IEA) has shown that developing countries provide indirect subsidies by artificially lowering energy prices and paying the difference from government resources. In contrast, the United States and other developed countries offer direct support to energy production in the form of tax credits, loan guarantees or use mandates (Institute for Energy Research, 2013). Beaton and others (2013) also noted that Governments in South-East Asia subsidize fuels to varying extents. For example, Indonesia subsidizes mostly petroleum products and electricity while Thailand subsidizes all energy types, Malaysia provides subsidies for all fuel types except coal and Viet Nam provides subsidies mostly to the electricity sector. The Philippines, however, has removed almost all energy subsidies but uses preferential taxation for some petroleum products.

Most of the ASEAN members still provide energy subsidies varying degrees; some even provide subsidies above world levels.[6] Tables 1 and 2 list pre-tax and post-tax subsidies for petroleum products, electricity, natural gas and coal as of 2011. Post-tax subsidies are higher than pre-tax subsidies.[7] Subsidies for petroleum products are higher than those for other energy commodities. In

[6] IMF (2013) conducted a study that covered 19 countries with 22 case studies and 28 major subsidy reform episodes in sub-Sahara Africa, Asia, the Middle East, North Africa, Latin America, the Caribbean, Central and Eastern Europe and the CIS. Of the 28 reform episodes, 12 were classified as a success, 11 as a partial success, and five as unsuccessful.[6] This indicates that not all subsidy reforms are successful. The IMF study found that subsidy reform (fuel) in Indonesia in 2008 was partially successful, while fuel and electricity subsidy reforms in the Philippines were successful.

[7] The definition and terminology refer to IMF (2013). Pre-tax subsidy = PW – PC; PW = international price appropriately adjusted for transport and distribution costs; PC = the price paid by consumers. In the case of electricity, the benchmark price is taken as the cost recovery price (e.g., the cost of generation, transmission and distribution of electricity). Pre-tax subsidies only exist in countries where the price paid by consumers is below the international or cost recovery price. Post-tax subsidy = (PW + t*) – PC, t* = adjustment for efficient taxation (t*>0) to reflect revenue needs and a correction for negative consumption externalities. In the case of electricity, the benchmark price is taken as the cost recovery price (e.g., the cost of generation, transmission and distribution of electricity). When a refined petroleum product is imported, the benchmark price is taken as the international FOB price plus the cost of transporting the product to the country's border plus the cost of internal distribution. When the product is exported, the benchmark price is the international FOB price minus

the case of pre-tax subsidy, Brunei Darussalam allocated 3.32 per cent of GDP for total energy price, while in Indonesia was about 3.24 per cent of GDP. However, in terms of government GDP, the Indonesian Government allocated the highest subsidy rate of about 18.2% of government revenue, while Thailand and Malaysia allocated about 9.59 per cent and 8.57 per cent, respectively. In the case of post-tax subsidies, Malaysia was the highest in terms of its share of government expenditure.

the cost of transporting the product abroad (since this cost is saved when the product is consumed domestically rather than exported) plus the cost of internal distribution.

Table 1. Pre-tax subsidies for petroleum products, electricity, natural gas, and coal in 2011

Country	Petroleum products		Electricity		Natural gas		Coal	
	Percentage of GDP	Percentage of Gov revenue	Percentage of GDP	Percentage of Gov revenue	Percentage of GDP	Percentage of Gov revenue	Percentage of GDP	Percentage of Gov revenue
Brunei Darussalam	2.34	3.77	0.98	1.57	0.00	0.00	0.00	0.00
Cambodia	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Indonesia	2.58	14.51	0.66	3.69	0.00	0.00	0.00	0.00
Lao PDR	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malaysia	1.24	5.67	0.33	1.49	0.31	1.41	0.00	0.00
Myanmar	0.54	9.35	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Philippines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Thailand	0.15	0.66	1.64	7.24	0.14	0.61	0.25	1.08
World	0.30	0.91	0.22	0.64	0.16	0.48	0.01	0.03

Source: IMF, 2013.

Table 2. Post-tax Subsidies for Petroleum products, electricity, natural gas, and coal in 2011

Country	Petroleum products		Electricity		Natural gas		Coal	
	Percentage of GDP	Percentage of Gov. revenue	Percentage of GDP	Percentage of Gov. revenue	Percentage of GDP	Percentage of Gov. revenue	Percentage of GDP	Percentage of Gov. revenue
Brunei Darussalam	5.92	9.51	1.37	2.19	1.12	1.81	0.00	0.00
Cambodia	0.00	0.00	n.a.	n.a.	n.a.	n.a.	0.00	0.01
Indonesia	3.87	21.74	0.72	4.04	0.30	1.67	0.47	2.62
Lao PDR	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malaysia	5.12	23.39	0.56	2.54	0.79	3.36	0.74	3.38
Myanmar	0.97	16.93	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Philippines	0.20	1.18	0.00	0.00	0.08	0.43	0.46	2.65
Thailand	1.40	6.16	1.76	7.77	0.72	3.19	0.84	3.73
World	1.26	3.77	0.26	0.77	0.43	1.28	0.77	2.31

Source: IMF, 2013.

Subsidies on fossil fuels not only cause over-consumption of such fuels, they also reduce the incentives for investment in energy efficiency and renewable energy. On the other hand, ASEAN members also agreed to reduce energy intensity at least by 8 per cent by 2015 based on the 2005 level and to achieve a collective target of 15 per cent of renewable energy in the total regional power installed capacity by 2015.[8] This reflects a contradiction between the regional objectives and the national behavior.

When there are no pricing mechanisms for the negative externalities of energy consumption on the environment, public health and traffic congestion, the presence of subsidies exacerbate these externalities by promoting over-consumption due to the artificially low prices. Energy subsidies also put pressure on the fiscal space of Governments as these subsidies represent government revenues that are foregone and could have been made available for social services. Moreover, the volatility of international fossil fuel prices also translates into volatility in subsidies, thereby complicating budget management.

The intention of developing country Governments to offer subsidies is often good for improving overall social welfare by making energy more affordable by the poor.[9] However, the Asian Development Bank (ADB, 2013) argued that this was not happening, given that many of the poor in Asia lack electricity and gas connections, few own vehicles, and most of them use transport sparingly. Therefore, the main beneficiaries of the subsidies are not really the poor. Citing IEA data, a report by ADB (2013) stated that of the nine Asian countries and two African countries surveyed by IEA in 2011, only 15 per cent of the benefit from kerosene subsidies and only 5 per cent of the benefit from liquefied petroleum gas subsidies went to the poorest 20th percentile.

Similarly, IMF (2013) found that energy subsidies depressed growth in four ways. First, subsidies can discourage investment in the energy sector. Second, subsidies can crowd out growth because they can reduce fiscal space that can be used for public health and education, and other productive public spending. Third, subsidies diminish the competitiveness of the private sector over the longer term. Fourth, subsidies create incentives for smuggling. The same IMF report also indicated the implications of energy subsidies in other dimensions. First, the balance of payments of energy-importing countries is vulnerable to international energy price. Second, subsidies can cause over-consumption of energy, which can negatively affect the environment such as through global warming and local pollution. Third, energy subsidies mostly benefit the rich and will also divert public spending from the poor.

IMF (2013) identified six barriers faced by energy reforms: (a) a lack of information regarding the magnitude and shortcomings of subsidies; (b) a lack of government credibility and administrative capacity; (c) concern regarding the adverse impact on the poor; (d) concern regarding the adverse impact on inflation, international competitiveness and volatility of domestic energy prices; (e) opposition from specific interest groups that benefit from the status quo; and (f) weak macroeconomic conditions. However there are five elements that can increase the

[8] Joint ministerial statement of the twenty-seventh ASEAN Ministers of Energy Meeting on 29 July 2009 in Mandalay, Myanmar.

[9] In the case of Indonesia, the Energy Law stated that "energy prices shall be determined on the basis of a fair economic value". The Energy Law also stated that "government and regional government shall provide subsidy funding for less wealthy community groups". However, the Government of Indonesia is still providing an energy subsidy. However, because it is an open subsidy, both the poor and the people enjoy the benefit. This indicates that reducing energy subsidies is always a hard decision.

likelihood of successful subsidy reform (IMF, 2013): (a) a comprehensive reform plan; (b) a far-reaching communications strategy, aided by improvements in transparency; (c) appropriately phased energy price increases, which can be sequenced differently across energy products; (d) targeted mitigation measures for protecting the poor; and (e) depoliticizing energy pricing to avoid the recurrence of subsidies.

The IMF (2013) study illustrated the impact of subsidies on global warming and local pollution by estimating the effects of raising energy prices to levels that would eliminate tax-inclusive subsidies for petroleum products, natural gas and coal. The study noted that by eliminating the subsidies, CO_2 emissions could be reduced by 4.5 billion tons, representing a 13 per cent decrease in global CO_2 emissions. Moreover, the results suggest a reduction in local pollution in the form of 10 million tons of SO_2 emissions and a 13 per cent reduction in other local pollutants, which implies that significant health benefits could be generated at the local level.

Energy subsidy reforms can be pursued at different rates, depending on country-specific factors. As suggested by Beaton and others (2013), the framework for the rate can be referenced using two extremes – the "gradual" rate or the "big bang" approach. The latter approach is defined as a reform that literally produces a significant shock to the economy and the citizens of the country concerned; an extreme example would be the elimination overnight of all energy subsidies. A comparison of these two approaches is given in table 3.

In reality, reforms seldom adhere to either of these extremes, but instead are likely to tend towards one approach more than the other. For example, the subsidy reforms in Eastern Europe following the collapse of the Soviet Union tended towards the “big bang” approach. Beaton and others (2013) reported that a quick withdrawal of subsidies and a fast move to market-based pricing were instituted in Eastern European countries through several rounds of significant price hikes. This type of reform was politically feasible because it was part of much bigger political and economic transformations.

The fossil-fuel subsidy reform in the Philippines, on the other hand, tended towards a gradual approach, although there was one significant drastic step. Previously, the Philippines had an Oil Price Stabilization Fund (OPSF), which was created in 1984 as a measure to protect domestic consumers from debilitating global oil price shocks, such as that which occurred happened in the 1970s. In 1996, the Philippines launched a partial deregulation of the downstream oil industry and introduced a regulator-approved, automatic pricing mechanism that operated concurrently with the continued OPSF operation. In 1998, with the passage of the Downstream Oil Industry Deregulation Act, both OPSF and the automatic pricing mechanism were abolished; this was a significant and drastic step but one that was guided by transition pricing for a few months before prices were fully floated.

Table 3. Comparison of gradual and "big bang" approaches

Performance criteria	Gradual	"Big bang"
Macroeconomic		
Reduction of costs	Gradual	Instantaneous
Impact on inflation and GDP	Low with each price increase, but risk of creating long-term expectations of inflation—"anticipatory inflation."	High, but over a short period.
Microeconomic and social		
Negative social impacts on households and businesses	Low to moderate. Easy to manage by adapting reform plan. Households and businesses have longer to adjust.	High. May lack capacity to promptly change reform strategy. No time for households and businesses to adjust.
Political		
Added risk of political instability	Low, but gives opposition time to organize against reforms.	High.
Use of political capital	High. Each price increase requires political capital. Increases risk of deferrals.	Medium. Only one price increase, but at the cost of a large economic shock.
Administrative		
Added risk of poorly designed reform strategy	Low to moderate. Actual impacts can feed into subsequent plans.	High. It is difficult to predict the impact of large economic shocks.
Added risk of poor implementation	Low. Allows for ongoing adjustment of reform strategy.	High. Requires very good projections of impacts and preparations.
Energy markets		
Reduced energy demand	Gradual	Instantaneous
Added risk of hoarding	High. Varies if schedule of price increases is known in advance.	Low. Varies if date of price increase is known in advance.

Source: Beaton and others, 2013.

C. Infrastructure constraints

During the twenty-seventh ASEAN Energy Ministers Meeting held in Myanmar, the ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015 was approved with the main content: APG; TAGP; Coal and Clean Coal Technology (CCCT); Energy Efficiency and Conservation (EE&C); renewable energy (RE); regional energy policy and planning (REPP); and civilian nuclear energy (NEC). There are seven working groups within the framework of APAEC, including: ASCOPE; ASEAN Power Utilities/Authorities (HAPUA); ASEAN Forum on Coal (AFOC); Energy Efficiency and Conservation Sub-Sector Network (EE&CSSN); Renewable Energy Sub-Sector Network (RE-SSN); Regional Energy Policy and Planning Sub-sector Network (REPP-SSN); and the Nuclear Energy Cooperation Sub-Sector Network (NEC SSN).

However, from concept to reality is long journey that is beset by difficulties, constraints and challenges. The development of TAGP, APG and other energy cooperation projects, however, has been quite slow, due to financial constraints, technical difficulties and differences in industry regulatory frameworks among ASEAN members as well as other factors.

1. ASEAN Power Grid

Although the idea of power network interconnection has been developing since 1978, it was approved by ASEAN Governments in 1997 in the "ASEAN vision 2020". The aim is to set up an energy security system for the ASEAN region through a common power network, based on that the members can share the ability of supply, transmission. Therefore, the lack of electricity supply in one member can be fulfilled by the other members through electricity trading. The interconnection among the 10 countries in ASEAN will bring huge economic efficiency both for

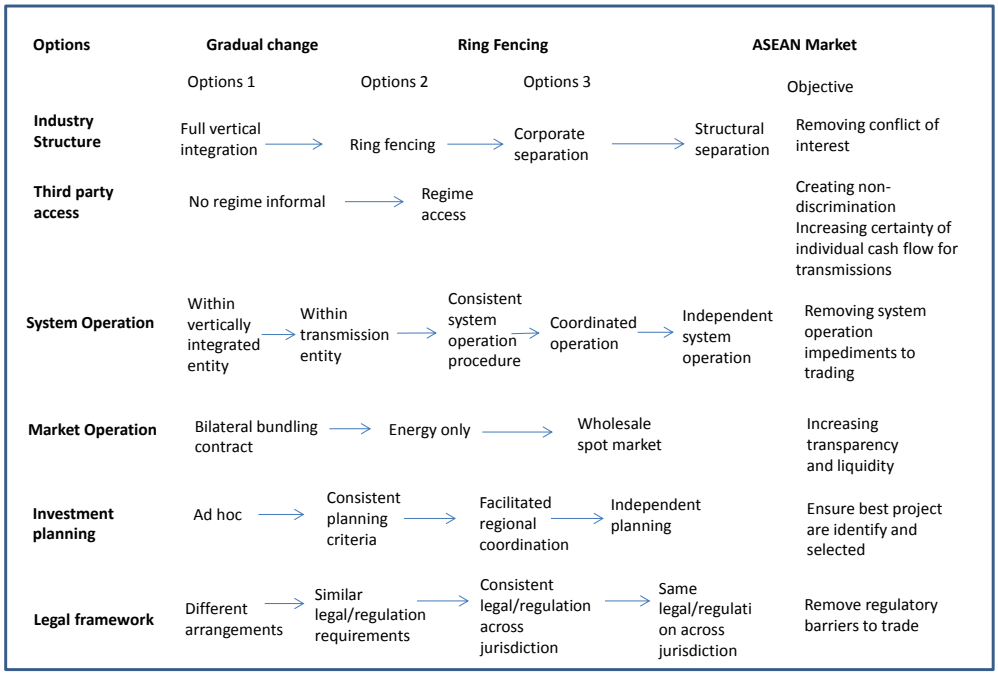
investors and for users. It will also promote the development of the power market and investments, and ensure energy security for each country. It will play an important role in the process of meeting high energy demand during ASEAN modernization, as the primary energy demand of the region is expected to increase approximately threefold from 2005 to 2030.

However, Bannister and others (2008) pointed out the existence of five barriers to the energy market integration in electricity sector: (a) management of risks and security; (b) the need to recognize the fact that financial impacts may differ from economic benefit cost analysis; (c) the need to clarify and agree on the scope of APG trade; (d) competitiveness, and open access and pricing; (e) rules and procedures for trade. Similarly, Porter and Situmeang (2005) pointed out that at the national level there was no transparent information regarding the price of energy (generating), transmission and distribution. They noted that as a result, the risk facing transmission and generating decisions were relatively high.

Further investigation of the policy options from gradual change to the ASEAN market (figure 1) reveals several constraints that need to be measured at the national level. Option 1 requires a gradual change for unbundling the sector such as generating, transmissions, and distribution. Further, the development of independent regulatory and legal frameworks is necessary for each country. In option two (ring fencing changes), a transmission working group can be established for each country and collaboration among them enhanced. Coordinated planning and investment need to be promoted at this stage.

Finally, the long-term objective (APG) can be established. In this situation, transmission and generating cost is separated, groups of transmission operators are created, and a uniform regulatory and legal framework is implemented. There are three types of cross-border interconnections: (a) point-to-point interconnections; (b) limited network-to-network; and (c) full system interconnection. Point-to-point interconnection can be implemented with option 1 (figure 1). Option 2 reflects a limited network-to-network interconnection. Finally, full system interconnection represents AEMI.

Figure 1. Electricity – the dynamics of an evolutionary change process



Source: Porter and Situmeang, 2005.

Equipment for transporting and delivering gas, electricity and other energy supplies from one country to another is similar to commodity trading, and will be subject to national, regional and/or international regulations. These could be pipeline permits, territorial boundaries, other licenses, taxation, quality standards, environmental regulations etc. Each country has its own power market tariff system that is different from that of other countries. In addition, the differences in technical standards of power systems are also a barrier. In fact, the power grid of each ASEAN country is much different, while the power transmission of ASEAN 6 is better than ASEAN 4, which is less developed and unstable.

For a cross-border power project, technical standards are essential during both construction and operation if operational integrity is to be maintained. Differences in standards and procedures may contribute to unreliability of interconnected power grids. For example, unstable voltage levels, frequent power outages and a non-guaranteed power level at 220kV could seriously affect the overall power grid. Further, although electric power transmissions and distribution losses in some ASEAN members tended to decrease between 2000 and 2010, in most of the countries the losses were still above the Organisation for Economic Co-operation and Development (OECD) standard (table 4). Therefore, at the national level, each country needs to improve efficiency and promote investment in transmission and distribution to minimize the losses.

Table 4. Electric power transmission and distribution losses (percentage of output)

Country	2000	2010
Brunei Darussalam	1.14	9.53
Cambodia	11.16	28.77
Indonesia	11.51	9.40
Lao PDR	n.a.	n.a.
Malaysia	8.00	6.54
Myanmar	31.30	16.61
Philippines	14.01	11.52
Singapore	3.64	7.05
Thailand	7.91	6.34
Viet Nam	13.77	10.11
High income: OECD	6.81	5.86

Source: World Development Indicators, World Bank.

There is a need for investment in infrastructure development and technical capacity enhancement. However, in order to promote energy market integration (EMI), it will be necessary to introduce competition in the domestic energy markets; however, such an approach often requires the restructuring of vertically integrated energy utilities into separate functional companies. However, the monopoly status of the national energy companies in most of the ASEAN members is a major obstacle to attracting private investment and foreign direct investment in energy infrastructure development in the region (see box 1).

Box 1. Changes in the Electricity Law of Indonesia

In 2002, the Government of Indonesia issued a new law for the electricity sector. The aim of Electricity Law No. 20/2002 was to create a more competitive environment for the power-generating business in the short term and, in the future, in the selling area. Thus consumers would have many options from which to select electricity suppliers who can provide electricity with good quality and services. Based on Electricity Law No. 20/2002, competition and transparency will improve efficiency in the electricity industry. Thus, there is a need to provide equal opportunity for all parties to participate in providing electricity utilities. Supporting electricity utilities means any activities that are related to consultation, development and installation, testing, operation, research and development, education and training, and any activity that is directly related to electricity.

However, on 15 December 2004, Electricity Law No. 20/2002 was canceled by the Constitutional Court because it was in violation of the Constitution. Electricity is a very important and strategic sector with regard to achieving national goals; thus, the Court argued, it should be controlled by the State and cannot be liberalized. As a result, electricity was regulated again by Electricity Law No. 15/1985. On 16 January 2005, Government Regulation No. 3/2005 was issued to replace Government Regulation No. 10/1989. Generally speaking, there are two reasons why the Government issued Government Regulation No. 3/2005. First, Government Regulation No. 10/1989 was based on Electricity Law No. 15/1985, which was highly centralized. On the other hand, in 2004 the Government issued Law No. 32/2004 on local government. Thus, there is a demand for decentralizing electricity authority to local governments. Second, the Government needs to enhance the participation of cooperatives, state-owned enterprises, local government-owned enterprises and the private sector to supply electricity.

Source: Sambodo, 2012.

A typical example of bilateral and regional cooperation in ASEAN in the field energy is grid connection among GMS countries. In 2000, with the support of ADB (2000),[10] the Master Plan on Power Interconnection was developed for 2000 to 2020 and then adjusted in 2010 within the framework of the Technical Assistance Project TA 6440-REG (ADB, 2007).[11] The proposal to develop power trade in the GMS is anchored on the principle that integration should proceed in four well-defined stages: (a) bilateral cross-border connections through power purchase agreements (PPAs); (b) grid-to-grid power trading between any pair of GMS countries, eventually using transmission facilities of a third GMS country; (c) development of transmission links dedicated to cross-border trading; and (d) when most of the GMS countries have moved to

[10] Technical Assistance for the Regional Indicative Master Plan on Power Interconnection in the Greater Mekong Subregion. Manila (TA 5920-REG, US$ 900,000, approved on 10 July 2000, and financed by the TA Special Fund and the Government of Norway).

[11] Technical Assistance for Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion. Manila (TA 6440-REG, US$ 5 million, approved on 19 December 2007, and financed by the Government of Sweden). A small component of the Technical Assistance for GMS Regional Power Trade Coordination and Development (TA 6304-REG) also undertook some simulations to update the regional indicative master plan.

multiple sellers-buyers regulatory frameworks, a wholly competitive regional market can be implemented. The grid connection process among the GMS countries is promoted by high-demand countries such as Thailand and Viet Nam through investment projects of building power plants (mainly hydropower exploitation) together with the power purchase agreement among the countries. The investment project is being implemented in phases up to 2020.

Table 5. Investment projects in GMS

Project	Location	Market	Type	Capacity (MW)	Completion Date
Xekaman 3 (IPP)	Lao PDR	Lao PDR/ Viet Nam	Hydro	250	2012
Theun–Hinboun Expansion (IPP)	Lao PDR	Lao PDR/ Thailand	Hydro	220 + 60	2012
Xekaman 1 (IPP)	Lao PDR	Lao PDR/ Viet Nam	Hydro	322	2014
Sekong 3	Lao PDR	Lao PDR/ Viet Nam	Hydro	205	2015
Xekaman 4	Lao PDR	Viet Nam	Hydro	80	2016
Hongsa Lignite (IPP)	Lao PDR	Lao PDR/ Thailand	Coal	1,878	2015
Nam Ngum 3 (IPP)	Lao PDR	Lao PDR/ Thailand	Hydro	460	2017

Source: ADB, 2012.
Note: IPP = independent power producer, MW = megawatt.

However, some obstacles exist in the negotiation process for establishing cooperation among a few countries in the ASEAN region (e.g., the border conflict between Thailand and Cambodia, and the debate between Cambodia, the Lao PDR, Thailand and Viet Nam over the construction of Xayaburi hydropower dam in the context of the impact of hydroelectric dams on the lower Mekong River environment (Lee, 2010). Similarly, Hebertson (2012) pointed out that developing the lower Mekong River dams would involve significant social, economic and environmental costs. Development of the Xayaburi Dam has created two opposing opinions, i.e., the Lao PDR and Thailand are pro-dam while Cambodia and Viet Nam are against the project. Further, Hebertson (2012) pointed out three lessons to be learnt from the Xayaburi project. First, energy planning should not take place behind closed doors. Second, strategic environmental assessments should become a regular part of energy planning. Third, when somone says that hydropower is "renewable" be sure to ask more questions. These conflicts will delay the whole process of forming the APG.

This study found that sustainability of power trading will become a challenge in the future. It appears that power trading has occurred due to lack in power supply; however, if a country can increase its electricity production, power trading may decrease in the future (see box 2). This may waste investment fund that has been allocated by one country. This condition needs to be discussed seriously among the member, especially when industrial, commercial zones tend to develop in the future. Fair competition among the power companies in the countries also need to be promoted.

Box 2. Indonesian-Malaysian interconnection [12]

According to PT.PLN's business plan for 2009-2018, in the area of Kalimantan it plans to buy (import) electricity from SESCo. An interconnection between Sarawak and West Kalimantan will be constructed with transmission at 275 kV. The transmission is designed to supply electricity at a capacity of 200 MW. SESCo is connected with Benkayan's system in Indonesia and Mambong in Sarawak-Malaysia. Indonesia will be responsible for constructing a 180-km transmission line between Benkayan and Malaysia's cross-border and inter-bus transformer at 250 MVA. Power trading or energy exchange will start in 2015. From the Indonesian perspective, there are two benefits to be gained from power trading. First, it can support the steam coal (peat steam) Pontianak 1 project, if the project is delayed due to environmental constraints. Second, power trading can increase power reserves, which is important to improving the energy security system. Furthermore, Indonesia can sell electricity to SESCo. Electricity trading will be promoted under the independent power producer (IPP) scheme. The document indicates that power trading will start with a 50 MW capacity from 2015 until 2018. As the following table shows, West Kalimantan will buy about 34 per cent of the total electricity balance from SESCo. However, the share will decrease to below 10 per cent between 2019 and 2021.

Energy balance in West Kalimantan (GWh)

Year	PT.PLN	SESCo	Total	Share of SESCO in total (%)
2012	1,374	0	1,374	0
2013	1,725	0	1,725	0
2014	1,993	0	1,993	0
2015	1,443	733	2,176	34
2016	1,798	727	2,525	29
2017	1,970	737	2,707	27
2018	2,141	738	2,879	26
2019	2,833	227	3,060	7
2020	3,162	142	3,304	4
2021	3,250	317	3,567	9

Source: PT.PLN, 2012.

2. Trans-ASEAN Gas Pipeline

The implementation of TAGP also remains constrained by regional and national conditions. IEA (2013) raised two main issues that need to be addressed at the regional level. First, there is a lack of a trading hub to facilitate the exchange of natural gas; Singapore appears to be the candidate best suited to develop not only a trading hub in the medium term but also a competitive natural gas market. Second, there is a need to develop a transparent price signal to steer investment in natural gas infrastructures. According to IDA (2013), the offshore East-Natuna natural gas field is

[12] Sambodo, M. T. (2013), 'Facilitating the Penetration of Renewable Energy into the Power System' in Kimura, S., H. Phoumin and B. Jacobs (eds.), Energy Market Integration in East Asia: Renewable Energy and its Deployment into the Power System, ERIA Research Project Report 2012-26, Jakarta: ERIA. pp.195-225.

a critical factor of TAGP, but it has a very high CO_2 content. This has driven up the cost of developing the resource and consequently pushed back the start-up date (IEA, 2013).

The bilateral connection has been established such as among Malaysia, Thailand and Singapore (table 6). Singapore is also connected with Indonesia. Malaysia has been connected with Thailand and Thailand is also connected with Viet Nam. Thailand technically has become connected with Myanmar and, in 2013, Myanmar will be connected with China. There are two main challenges that need to be addressed: (i) an improvement of the transit capacity, and (b) promotion of LNG re-gasification terminals while waiting for pipeline distribution to materialize (IEA, 2013). In addition, IEA (2013) suggest two market models for promoting more competitive pipeline infrastructure: (a) the pipeline-to-pipeline competition model, and (b) mandatory third-party access to the network model.[13]

At the national level, constructing the national pipeline infrastructure for the domestic market is still a problem. Thus it is relevant to argue that negotiations on AEMI need to be started by solving the infrastructure bottleneck at the national level. Promoting a regional pipeline and forgetting the national pipeline will become a political economic challenge in the medium term. It is important to maintain a balance between the regional pipeline target and national pipeline targets. It is important that Governments allow markets to determine natural gas prices with minimal interference from short-term political considerations. It is also important to separate transportation activities from commercial activities, price deregulation at the wholesale level, sufficient network capacity and non-discriminatory access, and a competitive number of market participants with the involvement of financial institution.

Table 6. Intra- and interregional pipeline(s) in Asia Pacific

Intraregional	Pipeline	Operational (year)	Capacity (bcm/yr)
Myanmar-China	Myanmar-China Pipeline	2013	12.0
Myanmar-Thailand	Yadana-Export Pipeline	1998	5.4
	Yetagun-Export Pipeline	2000	2.0
Thailand-Vietnam	PM3-Ca Mau Pipeline	2007	2.0
Thailand-Malaysia	Trans-Thailand-Malaysia Gas Pipeline (TTM)	2005	7.7
Malaysia-Singapore	Peninsular Gas Utilisation Pipeline System (PGU)	1991	1.5
	Peninsular Gas Utilisation Pipeline System (PGU)	2007	1.1
Indonesia-Singapore	West-Natuna Transportation System	2001	3.4
	Grissik-Singapore Pipeline	2003	3.6

Source: IEA, 2013.

Following ASCOPE (2011), the strategic focus of TGAP has been expanded. Although the aspiration is still the same on energy security, in terms of strategic focus and enablers it has changed. For example, in the case of strategic focus, instead of constructing pipelines to move gas supply to meet demand, developing LNG terminals is promoted for developing LNG trading. ASCOPE (2011) also suggested collaboration in two key initiatives to assure regional gas supply security, i.e., the strategic gas buffer management and LNG cooperation. A strategic gas buffer

[13] In the case of the pipeline model, competition is organized between suppliers who build the infrastructure to deliver to customers (IEA, 2013). In the second model, a distinction can be made between a market with wholesale competition and a market with full retail competition; in the latter case, competition is introduced into the final part of the value chain, while wholesale competition stops short of the retail segment (IEA, 2013).

management aims to assist the countries during the crisis time. Thus it can secure top level commitment from ASEAN leaders. In the case of LNG cooperation, an MoU between member countries is required to outline requirements for implementation of LNG cooperation, especially in the commercial and technical areas (ASCOPE, 2011). Thus, if the current focus and proposed new focus of TGAP are compared, two important elements can be seen (ASCOPE, 2011). First, due to slow progress in pipeline construction, flexibility in the means of trading is created. LNG trading is promoted to ensure energy security. Second, there are three consequences that need to be prepared: (a) regulatory framework on piped gas and LNG terminals; (b) a commercial framework; and (c) technical collaboration.

D. The way forward

The third ASEAN Energy Outlook indicates three major findings: (a) the degree of dependency on fossil fuels, and especially oil, tends to increase; (b) the region has become a net importer of oil; and (c) use of coal is increasing. In response to energy supply security and global environmental stability, the outlook offers promoting clean coal technology, improving energy efficiency, developing renewable and alternative energy, improving energy investment climate, and sharing best practices. However, an exit strategy on fossil fuel subsidy is still missing, even if that fact has not been clearly mentioned in joint press statements by ministers at energy meetings. The majority of ASEAN members implement pre-tax and post-tax subsidies above the world average. ASEAN appears keep this issue at the national level, but it will have a huge impact on the regional level. Although energy cooperation was established in the 1970s, price distortion is one of the reasons why progress has been very slow. AEMI can encourage countries to eliminate fossil fuel subsidies. This will indicate that countries share responsibility in promoting a more competitive and efficient energy market.

The nature of EMI requires several conditions. Kimura and Shi (2010) pointed out two elements: (a) improvement of domestic energy access and usage efficiency in developing countries; and (b) encouragement of the free flow of foreign direct investment to the energy sector. Sheng and Shi (2013) argued that eliminating obstacles and monopolies in domestic energy markets appeared to be a more important factor in contributing to the ability of poor countries to catch up with rich countries. Thus, energy price reform needs to be done simultaneously with energy market integration. There are two options for dealing with market reform – the "gradual" rate or the "big bang" approach. The key point to choosing the right reform is to understand the nature, conditions and assumptions of the two approaches. Therefore, AEMI could prepare specified procedures or criteria before countries decide to provide energy subsidies.

The Asian economic crisis in 1997/1998 had substantial impacts on joint collaborative efforts in the energy sector, particularly with regard to TAGP and APG. Due to financial difficulties, there has been no substantial investment at the national level. ASEAN as a region and its individual members need to establish a reserve fund for infrastructure connections. Electricity companies such as PT.PLN in Indonesia have three major sources of funding for new power investments, i.e., state budgets, PT.PLN's self-financing, and other funding obtained from issuing obligations (bonds), multilateral loans such as those from IBRD and ADB, or bilateral loans from JICA, AFD and China. In addition, ASEAN also provides financing modalities such as the ASEAN infrastructure financing mechanism. PT.PLN has utilized green funding from the Clean Development Mechanism and Voluntary Carbon Mechanism.

Innovative financing needs to be promoted for infrastructure connectivity, and ASEAN+3 can provide more resources for investment. The rationality of ASEAN+3 needs to be expanded not only for managing high energy prices and for addressing several issues – energy security, the oil market, oil stockpiling, natural gas, renewable energy, energy efficiency and conservation – but also on how to assist the ASEAN countries in promoting cross-border investments.

ASEAN has established channels to harmonize regulatory practices and technical standards, such as the ASEAN Energy Regulators Network, to support APG (collaboration with ADB as well as UNEP) as well as a common regional framework to facilitate more oil and gas trading and marketing within the region.[14] ASCOPE also follows the LNG export regulatory framework of the United States.[15] The ASEAN-Russia Energy Cooperation Work Programme (2010-2015) focuses on three areas such as capacity-building programmes, the peaceful use of nuclear energy, and coal, oil and gas exploration.[16] These types of collaboration need to be promoted in the future.

It is important for AEMI to be able to measure the financial constraints, technical difficulties and differences in the industry regulatory frameworks among ASEAN members. It is also important that AEMI be able to improve the level of efficiency in providing electricity, such as the reduction of transmission and distribution losses. Thus, it will be possible to reduce the efficiency gap among ASEAN members. Enhancing energy market competition at the national level can provide positive feedback in accelerating energy market integration. Further, it is also important that in promoting EMI the environment will not be harmed. Thus nature and human life will receive positive feedback (Lee, 2010). Promoting green energy in the context of AEMI needs support from developed countries. AEMI, in the context of ASEAN+3, also needs to develop the technological capability of all ASEAN members. The institutional setting to smooth market reform also needs to be shared.

Finally, it is suggested that an energy security analysis can provide a framework for analyzing the relationship between national constraint and regional objectives. Three scenarios or policies can be prepared, such as: (a) considering only national efforts, and a combination of the national and regional levels; (b) an analysis of how AEMI can change the direction of the energy security indicator at the national level; and (c) developing the Sovacool (2012) framework. As shown in table 7, energy security covers the five elements of availability, affordability, technology development and efficiency, environmental sustainability, and regulation and governance. This framework can be developed as an outline for energy education, which will become the key element in providing an energy knowledge bridge between current and future generations. Promoting energy education can create a better understanding in mapping out the linkages among the economic, energy and environmental aspects.

[14] Joint ministerial statement of the twenty-ninth ASEAN Ministers of Energy Meeting on 20 September 2011 in Jerudong, Brunei Darussalam.

[15] ASEAN also promotes energy efficiency through education in collaboration with the United States.

[16] Joint media statement of the twenty-eighth ASEAN Ministers of Energy Meeting on 23 July 2010 in Da Lat, Viet Nam.

Table 7. Energy security dimension and component

No.	Dimension	Component	Metric	Unit
1	Availability	Security supply	Total primary energy supply per capita	BOE per capita
2		Production	Average reserve to production ratio for the three primary energy fuels (coal, natural gas and oil)	Remaining years of production
3		Dependency	Self-sufficiency	Percentage of energy demand by domestic production
4		Diversification	Share of renewable energy in total primary energy supply	Percentage of supply
5	Affordability	Stability	Stability of electricity price	Percentage of change
6		Access	Percentage of population with high quality connections to the electricity grid	Percentage of electrification
7		Equity	Households dependent on traditional fuels	Percentage of population using solid fuel
8		Affordability	Retail price of petrol	Average price in US$ PPP for 100 liter of regular gasoline/petrol
9	Technology development and efficiency	Innovation and research	Research intensity	Percentage of government expenditures on research and development compared to all expenditures
10		Energy efficiency	Energy intensity	Energy consumption per dollar of GDP
11		Safety and reliability	Grid efficiency	Percentage of electricity transmissions and distribution losses
12		Resilience	Energy resources and stockpiles	Years of energy reserves left
13	Environmental sustainability	Land use	Forest cover	Forest area as a percentage of land area
14		Water	Water availability	Percentage of population with access to improved water
15		Climate change	Per capita energy-related carbon dioxide emissions	Metric tons of CO_2 per person
16		Pollution	Per capita sulfur dioxide emissions	Metric tons of SO_2 per person
17	Regulation and governance	Governance	Worldwide governance rating	Worldwide governance score
18		Trade and connectivity	Energy export	Annual value of energy exports in 2009 US$ PPP – (billion)
19		Competition	Per capita energy subsidies	Cost of energy subsidies per person (2009 US$ PPP)
20		Information	Quality of energy information	Percentage of data complete

Source: Sovacool, 2012.

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