ENERGY SECURITY – DEVELOPMENT OF ASEAN ENERGY SECURITY STRATEGY

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I. Introduction

Energy security has diverse dimensions and perspectives and there is no an umbrella definition. This paper aims to define energy security that fits well with ASEAN context and explore the following research and policy questions.

In the literature of energy security, energy security is defined as "an adequate and reliable supply of energy resources at a reasonable price". Adequacy refers to how much energy resources are available regardless of domestic and import for a country or a region and whether the available energy resources are sufficient enough for an economy to function properly. Reliability refers to whether and how the available resources are delivered to the end users and is associated with transportation of energy resources or transmission and distribution of electricity generated. A reasonable price refers to whether the price of energy resource is affordable so that the end user can have guaranteed access to the energy resource. There are a few studies that have developed quantitative indicators and applied them to measure the status of energy security for a country or a group of countries (for example, Sovacool and Mukherjee, 2011; Kruyt et al, 2009; von Hippel et al, 2009).

This paper is structured as follows. Section 2 reviews how energy security has been defined for the ASEAN context and what efforts in ASEAN context have been put to ensure and improve energy security in ASEAN. Section 3 scans the framework of energy security and policy implementation in a regional context such as OECD, EU, East Asia and North America. Following this review, section 4 defines energy security for ASEAN. With the definition of energy security for the ASEAN context, it assesses how the existing efforts of energy security policies and strategies for energy security in ASEAN have contributed to energy security in ASEAN. Following the assessment of existing efforts for ensuring and improving energy security, section 5 suggests new strategies for ensuring and improving energy security for ASEAN and proposes how to implement such strategies in ASEAN. Section 6 concludes this paper.

II. Energy Security and Strategy in ASEAN – Concepts, Policies and Implementation

a. Concepts and Indicators

As for energy security, ASEAN has mainly dealt with the availability of energy resources in ASEAN and how to improve the amount available in the region. The Asia Pacific Energy Research Centre (APERC) constructed the energy security framework using energy resource availability, accessibility barriers, environmental acceptability and investment cost affordability for the Asia-Pacific countries (APERC, 2007). For the specific indicators, they adopted the diversification energy supply sources, net energy import dependence, non-carbon based fuel portfolios and net oil import dependence and Middle East oil import dependence. Its main focus was oil supply security and suggested the diversification of energy resources and resource development and transport and resource trading. Advancing energy technologies such as nuclear energy, clean coal technology and renewable energy was also suggested.

Table 1 presents oil supply risk indicator and oil supply offset indicator. The former measures the key factors that could help decrease an economy's oil supply security. It is the weighted average of oil consumption, economic risk of imports, political risk of imports, oil demand elasticity and refining capacity. The latter measures the key factors that could help offset an economy's risk in acquiring enough resources. It is the weighted average of domestic resource capacity, non-energy intensive industry structure, strategic petroleum reserve (SPR) and non-carbon fuel switching. The higher the score is the better energy security is.

Table 1: Oil Supply Risk Indicator and Oil Supply Offset Indicator

Oil Supply Risk Indicator

Rank		Oil Consumption (MEX=10)	Economic Risk of Imports	Political Risk of Imports (INA=10)	Oil Demand Elasticity (RUS=10)	Refining Capacity (Deficit)	Score
1	USA	34.9	17.6	8.6	6.2	1.5	**3.5**
2	ROK	22.8	5.6	12.1	21.7	0.0	**3.0**
3	JPN	21.6	9.6	11.3	9.1	6.9	**2.6**
4	PRC	2.6	27.4	3.9	11.2	18.4	**2.5**
5	INA	3.2	2.7	10.0	17.7	54.7	**2.5**
6	CDA	33.3	0.0	8.7	5.9	0.0	**2.5**
7	THA	7.8	4.8	13.8	22.6	0.0	**2.1**
8	AUS	19.8	0.2	11.6	6.5	3.8	**1.8**
9	MEX	10.0	0.0	1.3	10.9	10.3	**1.4**
10	RUS	9.8	0.0	0.6	10.0	0.0	**1.1**

Oil Supply Offset Indicator

Rank		Domestic Resource Capacity	Non-Energy Intensive Industry Structure	SPR	Non-carbon Fuel Switching	Score
1	RUS	97.5	60.0	0.0	8.3	**14.5**
2	MEX	86.2	70.0	0.0	6.2	**14.0**
3	AUS	77.7	71.0	15.3	1.3	**13.9**
4	USA	66.3	77.0	23.7	10.6	**13.9**
5	CDA	68.6	66.2	17.8	19.7	**13.2**
6	PRC	89.9	41.0	0.0	2.7	**12.1**
7	INA	76.5	41.0	4.5	3.8	**11.0**
8	JPN	17.0	68.0	30.4	16.0	**8.7**
9	THA	43.0	46.0	4.4	0.5	**8.0**
10	ROK	2.8	56.0	22.4	16.2	**6.0**

Source: APERC (2007)

Applying the diversification of energy resources to energy security, Chang (2009) established the indicators of energy security based on the availability of energy resources. Four specific indicators for energy security are the total number of energy resources utilized, the share of the most utilized energy resource, the share of fossil fuels used and the share of the top five most utilized. These indicators are simple but very powerful to interpret the status of energy security in terms of the diversification of energy resources vis-à-vis the availability of fossil fuels and renewable energy resources in a country.

Table 2 presents the status of energy security based on the four indicators. The lower the value is the higher diversified and status of energy security. This indicator strongly suggests that ASEAN countries need to diversify the sources of energy resources in other words to decrease the dependence on fossil fuels and to increase the share of renewable energy resources. This is to be elaborated more in section 5.

Table 2: The Status of Energy Security in ASEAN Countries

Country	Number of resources (inverse of the number of energy resources [1/n])	Most utilised resource (share of the most utilised resource [%])	Share of fossil fuels used (%)	Share of top five most utilised resources (%)
Brunei	0.5 (2)	Natural gas (73)	100.0	100.0
Cambodia	1.0 (1)	Oil (100)	100.0	100.0
Indonesia	0.11 (9)	Oil (47)	97.7	99.6
Laos	0.33 (3)	Oil (100)	100.0	100.0
Malaysia	0.13 (8)	Natural gas (51)	97.5	100.0
Myanmar	0.5 (2)	Natural gas (56)	100.0	100.0
Philippines	0.13 (8)	Oil (58)	92.5	100.0
Singapore	0.33 (3)	Oil (88)	100.0	100.0
Thailand	0.13 (8)	Oil (52)	96.6	98.1
Vietnam	0.17 (6)	Oil (37)	100.0	100.0

Abbreviations ASEAN = Association of Southeast Asian Nations; *n* = number of resources

Source: Chang (2009)

Energy security index (ESI) for East Asian countries has been developed by the Economic Research Institute for ASEAN and Easy Asia (ERIA) and Institute of Energy Economics, Japan (IEEJ). It is based on the availability and reliability of energy resources, namely the development of domestic resources, the acquisition of overseas resources, the reliability of domestic supply chain, demand management, preparedness for supply disruptions and environmental sustainability (ERIA, 2011). The constructed ESI has been analyzed with respect to which policies have influenced the changes in the ESI (ERIA, 2013).

Table 3 presents an example of major energy security indices in Indonesia from 1970s to 2000-09 that are compared with the OECD average. The higher the indices are the higher the energy security status is.

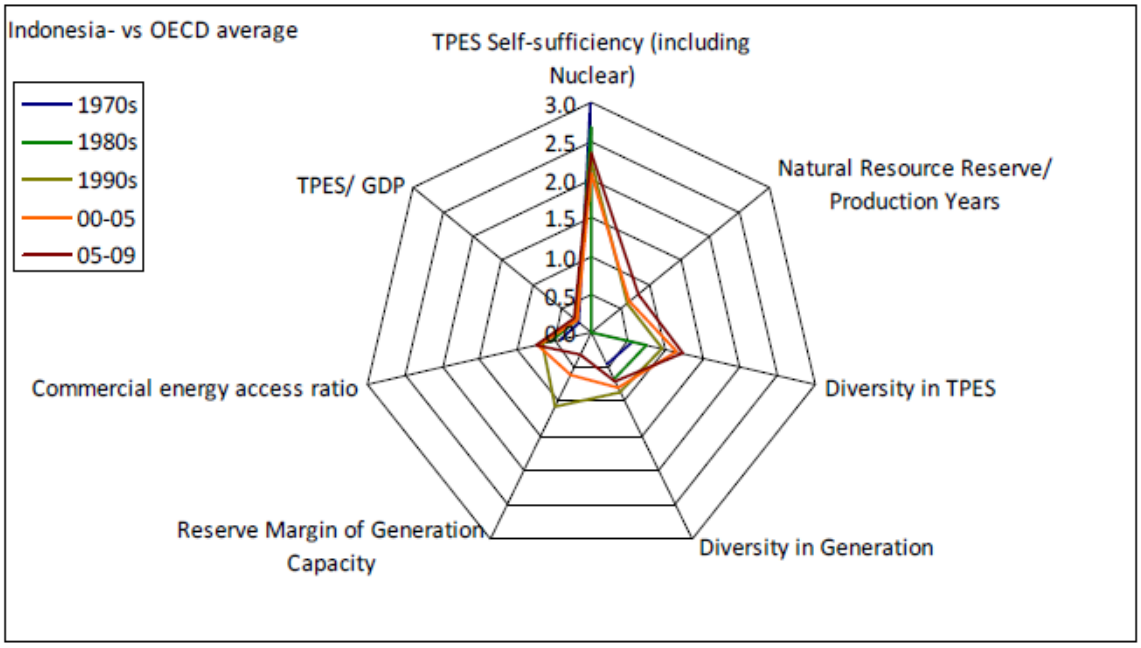
Table 3: Major Energy Security Indices in Indonesia in Comparison with the OECD Average

	1970s	1980s	1990s	00-05	00-09
TPES Self-sufficiency (including Nuclear)	3.2	2.7	2.2	2.1	2.3
Natural Resources Reserve/ Production Years		-	0.6	0.6	0.8
Diversity in TPES	0.6	0.7	0.9	1.1	1.2
Diversity in Generation	0.4	0.7	0.9	0.8	0.7
Reserve Margin of Generation Capacity			1.1	0.6	0.3
Commercial energy access ratio	0.4	0.6	0.7	0.7	0.7
TPES/GDP	0.2	0.3	0.3	0.2	0.3

Source: ERIA (2011)

Figure 1 shows the major energy security indices in a diagram. It clearly indicates a high level in self-sufficiency in Indonesia.

Figure 1: Major Energy Security Indices in Indonesia in Comparison with the OECD Average



Source: ERIA (2011)

b. Policies (e.g., APSA, APG, TAGP, etc.)

To increase the availability of energy resources in the region, a few policies have been suggested and implemented. One notable policy is the ASEAN Petroleum Security Agreement (APSA). The main goal of the APSA is to mitigate the possible negative impact of a sudden disruption of oil supply by increasing oil stockpiling in the region. It was signed in 1986 but it did not explicitly require oil stockpiling for oil supply disruptions or other emergencies in ASEAN. In 2009 it was signed for voluntary stockpiling among ASEAN countries. [1] This is clearly an improvement compared to the 1986 agreement. Unlike IEA countries, however, the APSA does not require compulsory stockpiling[2] and its effectiveness in improving energy security by mitigating the impact of oil supply disruption is expected to be minimal if not nil.

[1] APSA has been fully ratified by ten member countries and Coordinated Emergency Response Mechanism (CERM) has been added to annex.

[2] Stockpiling is not a "necessity" for oil producing countries but it can function as an inventory or a buffer of absorbing excess supply.

Noticing huge potentials in hydropower in the region, ASEAN adopted the vision of connecting the power grid in ASEAN. The Twenty-first ASEAN ministers on Energy Meeting held in Langkawi, Malaysia on 03 July 2003 approved the regional master plan on the ASEAN Power Grid (APG).[3] At the Twenties ASEAN Ministers on Energy Meeting held in Bali, Indonesia on July 2002 the ASEAN Energy Ministers signed a Memorandum of Understanding on the Trans-ASEAN Gas Pipeline (TAGP). APG and TAGP are mainly geared towards increasing the availability of energy resources within the region by promoting renewable energy development and utilizing natural gas that are relatively more abundant than oil.

c. Implementations (e.g., efforts by ASCOPE, HAPUA, etc.)

To implement the APSA, the APG and the TAGP, ASEAN established the ASEAN Council on Petroleum (ASCOPE) and the Head of ASEAN Power Utilities/Authorities (HAPUA).[4] The ASCOPE is tasked to lead greater cooperation to establish interconnection for electricity and natural gas to enhance energy security in the region. The HAPUA is assigned to task the APG.

III. Energy Security and Strategy in Other Regions – Indicators, Policies and Implementation

a. Organisation of Economic Cooperation and Development (OECD)

The OECD's principle energy security institution is the International Energy Agency (IEA). This was created in November 1974 is response to the oil supply crisis of 1973. As of September 2014, the IEA had 29 member countries plus the European Union. Most, but not all, of these countries are and have long been net importers of oil. Chile is a candidate member, whilst Iceland, Mexico, Israel and Slovenia are OECD members but not in the IEA. Formally, the IEA is an autonomous body within the framework of the OCED. The governing board comprises individuals from all member countries and has the power to make recommendations and decisions which are binding on its members.[5]

Membership of the IEA is restricted to members of the OECD. In addition IEA members must demonstrate that they have:

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[3] The current form of APG has been initiated by "bilateral needs" but it has been geared to integrate the power grid throughout the entire ASEAN. ASEAN Power Grid Consultative Committee (APGCC) has been formed to assist the implementation of APG Memorandum of Understanding (MOU).

[4] HAPUA and APGCC have prepared an APG Roadmap towards ASEAN Electricity Market Integration by 2025.

[5] OECD, *Decision of the Council Establishing an International Energy Agency of the Organisation* (adopted by the Council at its 373rd Meeting on 15th November, 1974), available at <http://www.iea.org/media/aboutus/history/decesionofthecouncil.pdf> (visited on 3 September 2014).

- "as a net oil importer, reserves of crude oil and/or product equivalent to 90 days of the prior year's average net oil imports to which the government (even if it does not own those stocks directly) has immediate access should the Co-ordinated Emergency Response Measures (CERM) – which provide a rapid and flexible system of response to actual or imminent oil supply disruptions – be activated;
- a demand restraint programme for reducing national oil consumption by up to 10%;
- legislation and organisation necessary to operate, on a national basis, the CERM; and
- legislation and measures in place to ensure that all oil companies operating under its jurisdiction report information as is necessary."[6]

These requirements reflect that fact that the original aim of the IEA was to address crisis in the international oil markets: crises of supply and/or crises of price. The most fundamental requirement is that all IEA members hold stocks of oil equivalent to 90 days of net imports. As at May 2014, the aggregate stocks of all IEA members amount to 222 days. In the case of those states which are net oil importers (i.e. excluding Canada, Norway and Denmark), total stocks amount to 171 days.[7]

The CERM is the central instrument of the IEA's strategy. These emergency response measures include:

- the coordinated drawdown of emergency stocks;
- the coordinated restraint of oil demand, principally in the transport sector;
- coordinated allocation of oil among IEA countries in the event of a severe supply disruption.[8]

The CERM has only been activated three times (Fattouh and van der Linde, 2012):

- at the outbreak of the "First Gulf War" in January 1991;
- after Hurricane Katrina had damage oil production infrastructure in the US Gulf of Mexico in 2005;
- in response to the drop in Libyan oil production in 2011.

Preparations for a coordinated stock drawdown were also made in late 1999 in anticipation of the Y2K information technology scare and in 2003 when a number of sources of supply interruption were emerging. In support of the CERM, the IEA runs emergency response simulation exercises and reaches out to non-member, net oil importing states such as India and China.

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[6] International Energy Agency, *Member Countries,* available at <http://www.iea.org/countries/membercountries/> (visited on 3 September 2014).

[7] IEA, *Closing oil stock levels in days of net imports,* May 2014, available at <http://www.iea.org/netimports/> (visited on 3 September 2014).

[8] IEA, *IEA Response System for Oil Supply Emergencies*, 2012, available at <http://www.iea.org/publications/freepublications/publication/EPPD_Brochure_English_2012_02.pdf > (visited on 3 September 2014).

In addition to creating and sustaining the CERM, the IEA also operates a permanent information system on the international oil market, as well as providing data on gas and coal markets. In the context of the framework for this paper, the IEA was established to address availability and affordability.

In addition to its core tasks relating to oil supply, the IEA carries out a number of other functions[9]:

- promoting rational energy policies in a global context through co-operative relations with non-member countries, industry and international organisations;
- trying to improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use;
- promoting international collaboration on energy technology;
- assisting in the integration of environmental and energy policies.

The IEA fulfils these tasks through a range of activities including carrying out and publishing research, developing bilateral policy dialogue and research programmes with selected non-member countries, providing training courses and holding events to disseminate information.

It has been argued that the IEA faces two key challenges today (Kolgan, 2009). The first is that its ability to respond effectively to an international oil supply crisis has diminished substantially over the last 20 years as its share of global oil trade has declined. The organisation has recognised this problem which is why it is seeking to build effective emergency response coordination mechanisms with China and India. Ideally, these two countries would join the IEA, but the bylaws of the IEA require new member to first join the OECD. Further, it is not evident that China and India would want to become members of the IEA in its present form. The second challenge for the IEA relates to the issue of scope. Recent years have seen the agency add an ever increasing number of analytical and coordinating tasks to its portfolio of activities. This risks undermining the core mission of the IEA which should be emergency response.

b. The European Union (EU)

In 2012 the EU relied on imports for about 54% of its primary energy needs and the only net energy exporter among the 28 member states was Denmark. Dependencies for individual fuels were 88% for oil, 66% for gas and 42% for solid fuels. In each case, the dependency had grown significantly over the previous decade.[10]

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9 International Energy Agency, *History,* available at < http://www.iea.org/aboutus/history/> (visited on 3 September 2014).

10 European Commission Eurostat, *Energy Production and Imports*, data from March and May 2014, available at <http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Energy_production_and_imports> , (visited on 3 September 2014).

Like the IEA, the EU is a rule-bound organization, but unlike the IEA its energy strategies and powers are very wide ranging. Formal collaboration between European countries in the field of energy began in the early 1950s with the establishment of the European Coal and Steel Community and the European Atomic Energy Community. The first of these was created with the express ambition of building a common market for coal, then the most important source of energy. The next significant step taken was progressive development from 1968 onwards of emergency response mechanisms to react to disruptions to oil supplies, including the construction of oil stocks (Matlary, 1997). This measure preceded the creation of the IEA by seven years.

A key feature of the EU is that the member states cede partial sovereignty to the institutions of the EU: to the Council of Europe which comprises the heads of government of each member state, to the European Commission which is a large and powerful civil service, and to the European Parliament which has members directly elected from the member states.

From the mid-1980s, a key component of the EU's energy strategy has been the creation of a single energy market with the twin objectives of enhancing security of supply and economic competitiveness. A decade of proposals, drafting and negotiating then took place. The most significant measure to emerge was the Directive on Hydrocarbons Licensing which was issued in 1994 (Cross et al., 2001). At the same time, the Commission issued legally-binding directives relating to price transparency and to electricity and gas transit, as well as Common Rules covering the removal of monopoly rights, the unbundling of vertically-integrated utilities and third-party access to transmission infrastructure were drafted (Lyons, 1996; Cameron, 2002). Despite all these formal measures, little was achieved towards building a single energy market until 1996 and 1998 when the Electricity and Gas Directives respectively were adopted. This breakthrough was assisted by the progressive emergence of competitive energy markets at national level, for example in the United Kingdom, Germany, the Nordic countries, the Netherlands and Spain (Egenhofer, 1997). Despite this positive influence, the level of opposition to the Commission's core ideas remained high. As a consequence these directives reflected compromise solutions to many key issues including third-party access to energy infrastructure and unbundling of utilities.

Further directives concerning the development of Europe-wide electricity and gas markets were adopted in 2003, but little progress was being made towards the creation of a single energy market. In 2007, the Council of Europe issued an 'Energy Policy for Europe' which showed renewed political commitment at the highest level to the single European energy market, with three objectives: security of energy supply, a competitive energy market, and the environment, particularly climate change (de Jong, 2008). A particular problem relating to security of supply arose from the shortage of cross-border transmission capacity and high prices for access to such capacity (Nowak, 2010).

A so-called 'Third Energy Package' of proposed measures was published in 2009 and took effect from March 2011. The main components are (Stanic, 2011): unbundling of transmission from production and supply activities; allocating stronger powers and independence of national regulators; issuing new rules to harmonize market and network operations across Europe; setting higher standards of public service obligations and

consumer protection; establishing new institutions to promote cooperation between regulators and between transmission system operators.

As of 2014, progress towards implementing this new package of measures and thus promoting energy security and the internal energy market have been much slower than hoped, In particular, investment in infrastructure and inter-connections has been too low (Yafimava, 2013; European Commission, 2013). In addition, the EU's energy policy is torn between three priorities: promoting the internal energy marker, mitigating climate change and addressing external energy security challenges, notably those relating to oil and gas supplies from Russia. With respect to the last factor, two issues are of particular concern. The first relates to Gazprom's insistence of indexing the price of its gas to oil, and the second arises from the worsening political relations between the EU and Russia

In conclusion, although (and possibly because) the EU attempts to address all aspects of energy security, progress continues to be slower than hoped by its leaders. National interests relating to the support of national champions and the management of domestic energy markets still act to constrain progress on key issues. These constraints have been exacerbated in recent years by the impacts of the financial crisis, the tension between energy supply security and climate change mitigation, and varying attitudes towards Russia among the member state governments.

c. East Asia

Savacool and Khuong (2011)[11] indicated that the International Energy Agency mentioned a double increase in global energy demand by 2040 and more than half of this increase in demand will come from Asian countries (and 45% alone from China). However, from the supply side, most of Southeast Asia countries face the decline in their large mature oil fields and having limited large new oil prospect. It estimated that regional oil production will decrease from about 2.6 million barrel oil per day in 2012 to about 2.4 million barrel per day in 2018 and 1.7 million barrel per day in 2035 (IEA, 2014)[12]. On the other hand, the energy demand will increase from about 5.7 million barrel per day in 2012 to about 6.7 million barrel per day in 2018. This indicates that energy security will become the important challenge for the region in the future.

Energy demand in Asia is predominately driven by two factors such as consumption-led and industrial-led (Savacool and Khuong, 2011). Consumption led is driven by increasing in the standard of living that demand more energy while industrial-led refers to industrial transformation to more energy-intensive. It is important to note that a growing trend on fossil fuel demand in Northeast Asia especially in China has become a major concern. China has become the second largest crude oil importer and a net importer of coal. This will have

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[11] Savacool and Khuong (2011). Energy Security and Competition in Asia: Challenges and Prospect for China and Southeast Asia, Darryl S.L. Jarvis and Anthony Welch (eds.) *ASEAN Industries and the Challenge from China*, New York, Palgrave Macmillan.

[12] IEA (2014). *Energy Supply Security 2014*, Paris, IEA

major consequences for financial and fuel markets and pollution both regionally and globally (Von Hippel et. al., 2008).

At the ASEAN level most of countries depend on industry stockholding obligations. APSA has become the framework of regional consultations and coordination for oil allocation in the case of emergency. Energy diversification has become an important agenda for region. Production of natural gas will continue to grow and countries such as Indonesia, Malaysia, Myanmar, and Brunei Darussalam will become the supplier of gas in the region. However, an emergency policy for natural gas disruptions has not been obtained as a top priority in the region (IEA, 2014).

Energy subsidies have put huge burdens on the national economies. Energy subsidy can hamper energy security because it can create overconsumption of energy, traffic congestion, and other external costs (Davis, 2014)[13]. Two of the ASEAN countries, Indonesia and Malaysia, are among the top ten countries in the world that provide substantial energy subsidies, and Indonesia is among the top five countries with the highest deadweight loss from fuel subsidy and deadweight loss relative to full social cost (Davis, 2014). In Indonesia, the allocation of energy subsidy reached 21% of total government expenditure in 2014. Failure to reduce the subsidies may leave these countries more vulnerable to potential supply disruptions especially when the price of oil is increasing. Howes and Davies (2014)[14] pointed out that the enemy of subsidy containment is inflation because the current regulated oil price in Indonesia is 22% lower than it was immediately after the large price hikes in 2005.

One of important event that alters development of clean energy is the nuclear disaster at the Fukushima Daiichi plant in March 2011. It has brought a big impact on the role of nuclear power as the key to reduce dependency on fossil fuels and climate change. IEA (2014) said that electricity production from nuclear declined by 10% between 2010 and 2012 due to safety evaluation.15 However, some counties such as Viet Nam are constructing the first unit while China announced that it will build only Generation III reactors.16 Indonesia plans to resort to nuclear energy as the last option.17

Along with the ERIA, APERC and IEEJ have constructed the energy security index (ESI). As stated in section 2, the ESI is mainly based on the availability and reliability of energy

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13 Davis, L.W. (2014). The Economic Cost of Global Fuel Subsidies, *American Economic Review: Papers and Proceedings*, 104(5):581-585.

14 Howes, S., and Davies, R., (2014). Survey of Recent Development, *Bulletin of Indonesian Economic Studies*, 50 (2): 157-83

15 Nuclear energy's rebirth is not robust enough to limit climate change, http://www.iea.org/ieaenergy/issue6/nuclear-energys-rebirth-is-not-robust-enough-to-limit-climate-change.html, accessed 8 September 2014

16 ibid

17 Rancangan Kebijakan Energi Nasional (R-KEN) disetujui [Draft on National Energy Policy is approved], http://www.esdm.go.id/index/37-umum/6668-rancangan-kebijakan-energi-nasional-r-ken-disetujui.html

resources regardless of domestic or overseas sources. Table 4 presents the correlation between policy and ESI.

Table 4: Correlation between Policy and ESI

ESI	Number of Yes *	% of Yes ***
TPES self-sufficiency	6/12	50
Coal self-sufficiency	7/11	64
Crude oil self-sufficiency	4/6	**67**
Natural gas self-sufficiency	4/7	57
Coal R/P	6/8	**75**
Crude oil R/P	2/4	50
Natural gas R/P	1/6	*17*
Coal R/C	7/8	**88**
Crude oil R/C	5/5	**100**
Natural gas R/C	5/6	**83**
Coal import source country diversity	2/2	**
Crude oil import source country diversity	1/3	*33*
Natural gas import source country diversity	1/2	**
TPES diversity	9/10	**90**
Power generation fuel diversity	8/10	**80**
Crude oil Middle East dependence	0/3	*0*
Natural gas Middle East dependence	1/1	**
Reserve margin of generation capacity	5/9	56
Power outage frequency	4/5	**80**
Power outage duration	3/5	**60**
Commercial energy access	9/12	**75**
Electrification	9/9	**100**
TPES / GDP	10/11	**91**
TFEC / GDP	10/11	**91**
Days of on-land oil stocks	4/5	**80**
CO_2 Emissions / TPES	3/12	*25*
CO_2 Emissions / Fossil fuel	2/12	*17*
CO_2 Emissions / GDP	3/12	*25*
CO_2 Emissions / Population	1/12	*8*

* See Table 2-4-1 for the detail. "Yes" means that the country is assessed as there was a correlation between policy and ESI. Denominator represents number of countries which has relevant policy.
** sample country 2 or less.
*** **Bold** type number shows percentage of two third or more.
Italic type number shows percentage of one third or less.

Source: ERIA (2011)

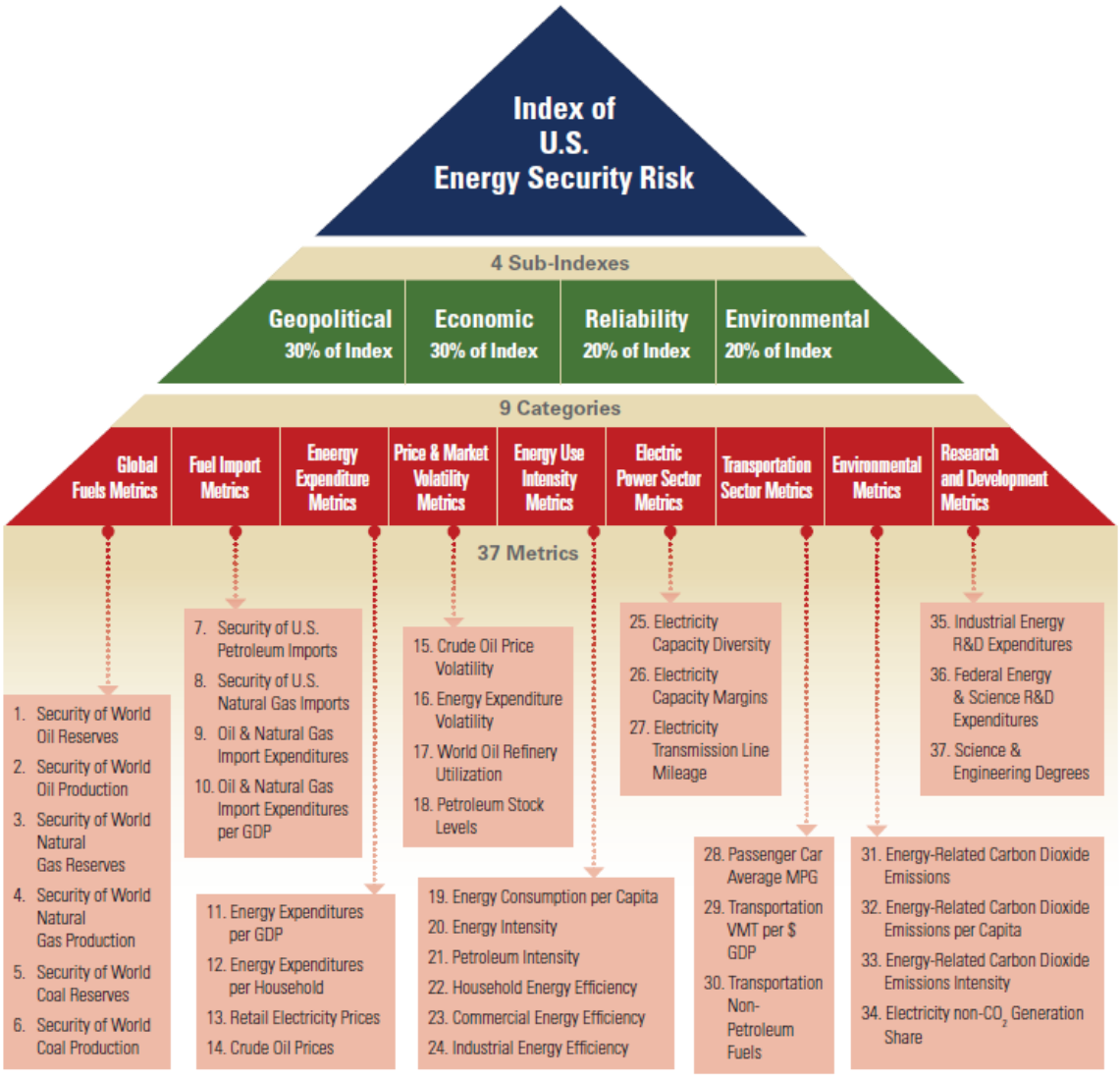
d. North America

Index of U.S. energy security risks were developed by the Institute for 21st Century Energy and the U.S. Chamber of Commerce (2010). The metrics of the index are classified into nine categories: global fuels, fuel imports, energy expenditures, price and market volatility, energy use intensity, electric power sector, transportation sector, environmental and research and development. It employs 37 specific metrics covering fossil fuel reserves and production, oil and gas import costs, energy expenditure, oil price and volatility, energy per capita, energy intensities and efficiencies, electricity, fuel mileage, various carbon emissions, energy and science R&D expenditures, and science and engineering degrees. These

indicators are merged into four sub-indexes and the overall index is calculated by the weighted average of the four sub-indexes. The four sub-indexes are Geopolitical, Economic, Reliability and Environmental and their weights are 30%, 30%, 20% and 20%, respectively.

Figure 2 present how the Index of U.S. Energy Security Risk is constructed. There are four sub-indexes followed by nine categories and 37 metrics in all. The nine categories have a different number of metrics.

Figure 2: Index of U.S. Energy Security Risk: A Schematic Diagram



Source: U.S. Chamber of Commerce (2010)

IV. Energy Security for ASEAN – Definition and Policies

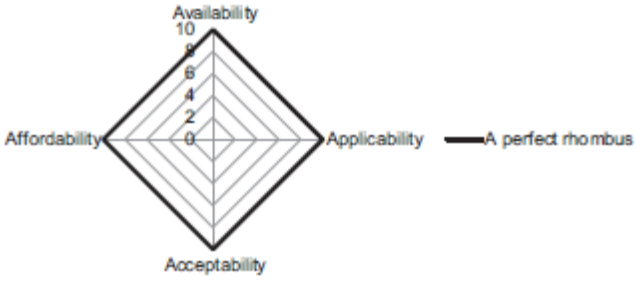
a. Definitions

Energy security has many dimensions and a few studies have tried to construct indicators for energy security by utilizing a single dimension or multiple dimensions. A notable study of a single dimension is one by International Energy Agency in which price volatility and volume volatility is suggested as the indicator of energy security. Studies of multiple dimensions are notably by Sovacool and Mukherjee (2011), Chang and Yong (2007), Chester (2008), Kruyt et al (2009) and von Hippel et al (2009).

The APERC, the ERIA and the IEEJ have worked on building metrics of energy security for ASEAN. This is mainly based on the availability and the reliability of energy resources. Energy security has various dimensions but it could be summarized in four dimensions such as the availability of energy resources including fossil fuels and renewable resources, the applicability of technologies for harnessing available energy resources, the societal acceptability towards a certain energy resource and the affordability of energy resource. Altogether they work towards securing the adequate and reliable supply of energy resources at a reasonable price.

Sorting out various dimensions adopted for the indicators of energy security in earlier studies, Yao and Chang (2014) constructed an analytical framework of energy security based on four dimensions, namely the availability of energy resources including fossil fuel reserves and renewable potential, the applicability of technology for harnessing fossil fuel reserves and renewable potential, the acceptability by society for energy resources and affordability of energy resources (it is called 4A's). The overall level of energy security for a country is the sum of the ordinal scores of the four dimensions (i.e., 4A's) that are converted from cardinal scores of all indicators. Each dimension has the equal number of indicators and each indicator contributes equally to each dimension. The ordinal scores of the four dimensions are plotted over a rhombus and the area of the rhombus is considered the status of energy security. The larger the area of the rhombus is, the higher the energy security is. Figure 3 present a perfect rhombus that is considered the highest level in energy security by given data.

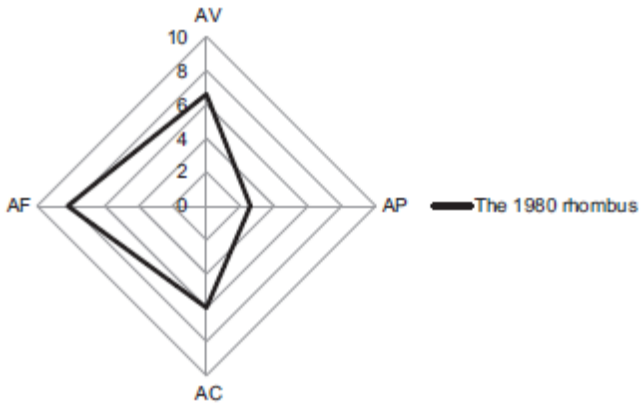
Figure 3: A Perfect Rhombus



Source: Yao and Chang (2014)

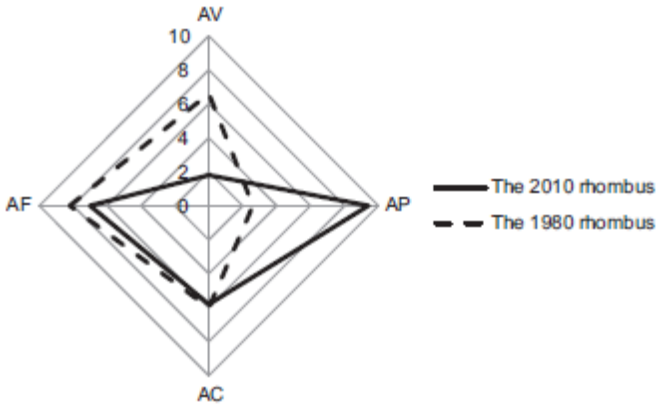
The framework was applied to evaluate the status of energy security in China. Figure 4 presents energy security status of China in 1980 and figure 5 presents energy security status of China in 2010. The area of the rhombus in 1980 is 68.04 and that in 2010 is 62.32. This implies the status of energy security in China has worsened a little bit in 2010 compared to 1980. The slight worsening in the status of energy security is due to a huge decrease in the availability of energy resources that offset a relatively high increase in the applicability of energy technologies in China. Figure 6 shows an example of how energy security index has changed over time.

Figure 4: Energy Security Status in 1980



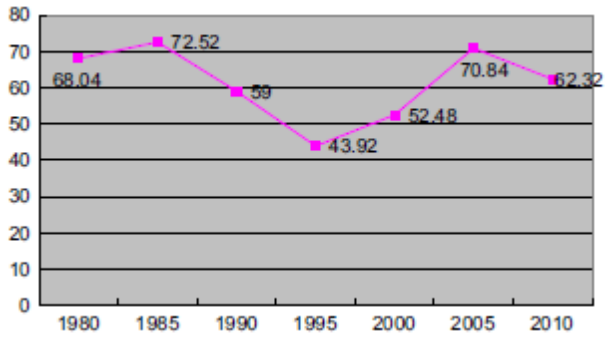
Source: Yao and Chang (2014)

Figure 5: Energy Security Status in 2010



Source: Yao and Chang (2014)

Figure 6: An Example of Energy Security over Time



Source: Yao and Chang (2014)

This four-dimension framework of energy security can be applied to examine the status of energy security in ASEAN countries. The Energy Research Institute (ERI) of the Chulalongkorn University, Thailand is constructing the four dimension framework of energy security in ASEAN countries and the result is expected to be available in October 2014.[18]

b. Policy recommendations

The four-dimension framework of energy security emphasizes equally on improving each dimension. The availability of energy resources could be done by new exploration, diversifying the sources of energy import, increasing stockpiling for oil and increasing capacity of harnessing renewable energy. The relevant policies recommendations are as follows. First, with help from the World Bank, the Asian Development Bank and other international aid agencies, ASEAN promote and subsidize those exploration and production efforts. Second, ASEAN needs to introduce Feed-in-Tariffs (FIT) and Renewable Portfolio Standards (RPS) or Renewable Energy Obligation. Third, ASEAN should make oil stockpiling compulsory with a different degree of stockpiling requirement to which a common but differentiated rule is applied.

The applicability of energy technologies to harness various energy resources can be developed by R&D activities. ASEAN could establish renewable energy R&D center to develop appropriate and applicable renewable energy technologies for ASEAN countries. Each member country contributes a differentiated amount commensurate to its economic capacity.

The acceptability of society towards energy resources can be improved by education and awareness campaign. ASEAN Centre for Energy could strengthen existing efforts to educate people in the region and propagate correct information about using energy resources.

[18] The preliminary results of this study will be presented at the Brainstorming Session of AEMI II from 14 to 16 October 2014 in Bangkok.

The affordability of energy resources can be improved by removing blanket energy or fuel subsidies and implementing ear-marked subsidies. In addition, stockpiling for oil can mitigate the short-term impact of oil supply disruption. ASEAN can build energy fund to help those who suffer from high energy prices by aiding them with an energy voucher.

V. Energy Security Strategy for ASEAN

a. Strengthening existing efforts

IEA (2014) pointed out four major elements that need to be considered such as increasing dependency on oil import, the importance of the Malacca Strait chokepoint for oil, LNG import and the potential for maritime border dispute in the South China Sea. Current development on the South China Sea may confirm Savacool and Khuong (2011:226) statement that said 'China and ASEAN countries talk about "regionalism" and "cooperation" on energy issue, but this talk seems to be designed only to mask opportunistic and protectionist thinking. The Chinese remains dedicated to procuring energy supply from as many sources as possible, and Southeast Asian leaders remain suspicious of each other and distrustful of Chinese plans for expansion, especially in areas of the region where sovereignty claims are actively contested.'

Further, a media review conducted in Indonesia (see Table 5) indicates that power trading will increase risks on national energy supply. People think that energy trading reflects a bad policy on power management in Indonesia. On the other hand, there are also many positive feedbacks in looking at the benefits of power trading. Reflecting the two cases China-ASEAN and Indonesia- Malaysia in quest for energy indicates that building trust and solidarity need to be developed. The spirit of solidarity and cordiality needs to be materialized by promoting people to people connection.

Table 5: People Attitude on Power Trading Between Indonesia and Malaysia

Positive attitude	Negative attitude
1. Reduce oil consumption (replacing diesel power plant) 2. It is much cheaper 3. Reduce carbon emissions 4. Benefited 8,000 household in Kalimantan 5. Supply reliability increase (quality) 6. Optimizing energy reserve 7. No impact on electricity supply in Sumatera (reserve 40%) 8. We still net exporter 9. Exchange power (day-head agreement) 10. Transition before preparing large power project 11. Promote industrial development (palm oil and smelting) 12. It is nice export electricity to Malaysia	1. Temporary solution before new plant coming 2. Risk on national energy security 3. Rich energy supply but need import (ironic) 4. Shameful Indonesia 5. Export coal, buy electricity

Source: brief review on media

While building trust among the decision makers and people become important, there is growing concern on the important promoting country resilience on supply disturbance especially for oil. There are several mechanisms that have been implemented such as APSA in 1986 that was revised in 1999. The ASEAN CERM (Co-ordinated Emergency Response Mechanism) has become a framework for regional consultations and co-ordinations to facilitate the oil allocation in emergency cases and the assistance will be delivered based on voluntary and commercial basis (IEA, 2014). There is ongoing activity on development the Oil Stockpiling Roadmap (OSRM). Countries such as Thailand and Viet Nam committed to obtain stock levels comparable with 90 days of net imports held by International Energy Agency (IEA), while others plan to reach lower levels of under 50 days of consumption or net imports.

Further, Southeast Asia is a key exporter of LNG to global market, but volume of export will decline due to increases in domestic consumption and maturing and declining output. Most of ASEAN countries have developed the LNG liquefaction capacity and now the capacity was about one-quarter of the total world capacity (IEA, 2014). In the future the capacity is expected to grow. This indicates that each country aims to promote regasification capacity and storage facilities. Although natural gas has become important for the region, there is no mandatory industry stock or government stock of natural gas in the region.

The existing efforts of improving energy security, mainly the availability dimension, need to be strengthened collectively and individually. There should be more efforts to improve the other dimensions of energy security such as applicability, acceptability and affordability. Developing technologies for harnessing renewable energy and sharing them among member

countries deserves a special attention. The acceptability towards coal or nuclear energy could be worse than as expected.

b. New strategies

To enhance the status of energy security, ASEAN need to work collectively and share the information available such as fossil fuel reserves, renewable energy potential, energy and fuel subsidies.

Chester (2010) said that because energy security has multiplicity of meanings, there can be no 'one-size –fits-all' solutions. For example pursuing energy affordability and reducing import dependency needs different policy formulation. Improving energy security can be promoted at a country level and a regional level.

At the country level we propose six agendas that need to be promoted.

- First, promoting energy infrastructure at the country level will significantly improve connectivity at the regional level. This can be done by reallocation of energy subsidy to energy investment.

- Second, energy subsidy may need to help the poor. Thus better targeting on energy subsidy beneficiaries need to be promoted.

- Third, promoting technology capacity by allocating more fund for research and development. Research and development needs to be promoted to support appropriate technologies such as for rural electrification program.

- Fourth, the environmental dimension needs to be promoted as a mainstream of energy development. Environmental degradation due to unsustainable practice such as coal mining has caused huge economic, social and ecological cost. Further, energy subsidy also has hampered the development of renewable energy. On the other hand, government needs to allocate more subsidies for the production of more renewable energy.

- Fifth, it is necessary to strengthen organizationally and institutionally the national energy council. The experiences from Indonesia indicate that if the committee is dominated by government officials or people who has affiliated with political party, it may lead to conflict of interest such as in providing advices to government or in reviewing energy pricing policy.

- Finally, it is important to administrative capacity in conducting monitoring, evaluation, and enforcement on energy saving programs.

At the regional level, it is important to promote connectivity because energy security also cannot be capitalized without any connectivity. Connectivity basically covers three elements: (i) infrastructure development including physical and financial; (ii) institution or regulatory frameworks, and (iii) people to people exchange. The three elements are connected. Under

the physical infrastructure there are several areas that have been developed such as ASEAN Strategic Plan for Transport, ASEAN ICT Master Plan, and ASEAN Plan of Action for Energy Cooperation. Physical connectivity has been developed in the area of oil, gas and electricity (see the Figure 7, 8 and 9). The financial infrastructure for energy connectivity needs to be studied further by benchmarking a successful case such as Nord Pool (this is the topic of Paper 5 and rigorously discussed in the paper).

West Kalimantan-Sarawak interconnection (BIMP-EAGA) has become one of the priority projects in the energy sector. Further, one of the key strategies for ASEAN Connectivity is 'prioritise the process to resolve institutional issues in ASEAN energy infrastructure projects'. Promoting connectivity in power sector both for adding new capacity and maintenance required huge investment costs. The ASEAN Infrastructure Fund (AIF) that is recently created is able to fund partly to all the identified list of priority projects and it is necessary to develop and optimize the financing infrastructure.

Strengthening competition policies and laws is necessary to increase the efficiency of the energy sector because most of the energy sector is still dominated by the state companies and it has been managed inefficiently. Corruption mentality and rent-seeking behavior have influenced poorly the quality of services and increased the burden of tax payers. Because the energy sector is capital-intensive and energy trading is under pressure of monopoly and collusion behavior, it is necessary to ensure that energy trading should be done in a transparent and efficient way. Along this line, ASEAN Competition Authority (ACA) has been suggested to be established before 2030.

This paper proposes to evaluate the state of energy security for each country, following the ASEAN Community progress monitoring system 2012. It also proposes to include additional information on the report such as stockpiling on oil and gas, and energy price (currently it covers only diesel fuel and gasoline), energy intensity, and energy diversification. This will generate more comprehensive understanding on energy security in the region.

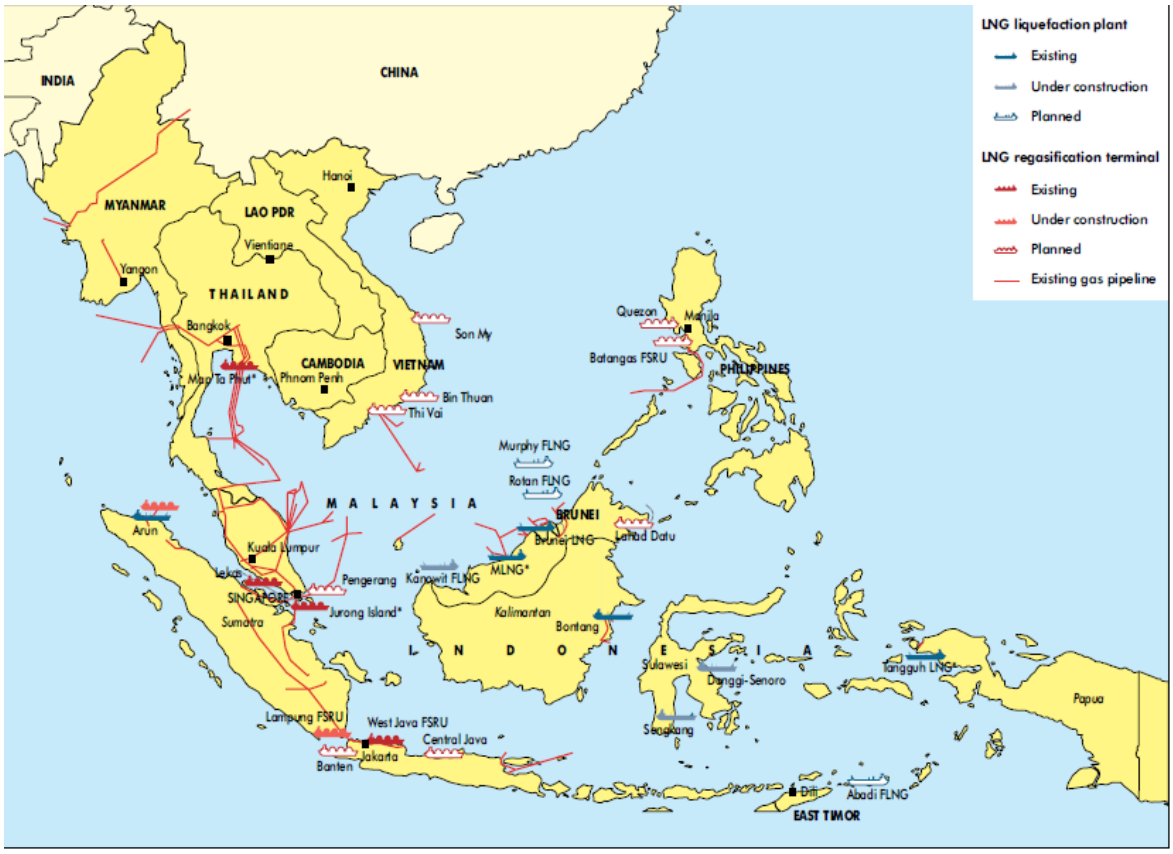
Affordability becomes important element in energy security. Affordability has become two swords of edges in promoting energy security. Due for an affordability reason, energy price has been depressed below the economic price. On the other hand, due to an open subsidy policy, most of energy subsidy goes to the rich. As a result, energy demand increased rapidly and so did income inequality. It should be common understanding among the ASEAN countries that energy subsidy should go to poor people. However, there has not established a common framework how to phase out energy subsidy in the regions.

Finally, there is interdependency among energy, water, road, rail, information and sea shipping connectivity. Integrating the infrastructure networks is necessary to avoid duplication and to ensure sustainability of the project.

Figure 7: Oil Infrastructure of ASEAN

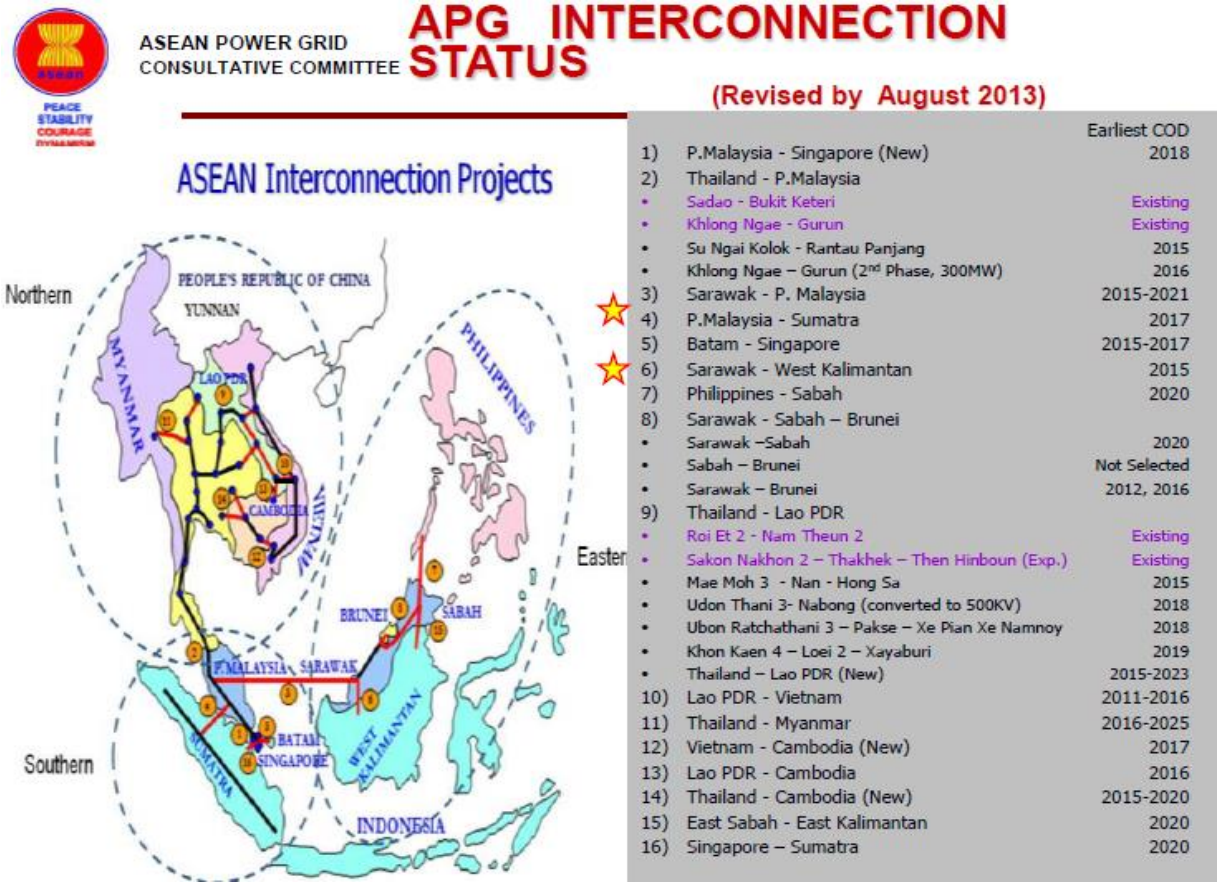
Source: IEA (2014)

Figure 8: Gas Infrastructure of ASEAN



Source: IEA (2014)

Figure 9: ASEAN Power Connectivity



Source: HAPUA Secretariat, Sustainable Energy Training, Bangkok, 25th November 2013

VI. **Conclusion**

Energy security has diverse dimensions to which many factors constitute. This requires the approach to enhance energy security needs to be multi-facet, collective and cooperative. There have been a few attempts to define energy security for ASEAN and the member countries have put efforts to improve energy security in the region. Connecting power grids and gas pipelines such as APG and TAGP respectively and promoting voluntary oil stockpiling are the examples of the efforts. Considering rapid increases in energy demand and fast declining in fossil fuel endowments, ASEAN countries need to establish new strategies for enhancing energy security. The experiences from OECD and EU could shed light on how ASEAN should build its energy security strategies. This paper suggests strengthening existing efforts of improving interconnectivity, introducing competition and market mechanism to the energy sector and establishing a transparent, anti-corrupt and efficient governance structure among others. Iit is necessary to highlight that institutional reform needs to be a basis for improving the state of energy security in ASEAN. The reform itself needs to balance between their national interest and regional interest. Energy subsidy is one of the critical

elements of institutional reform. As this issue is related to political dimension, it is better to quote one of the statement from a book “ASEAN 2030 Toward a Borderless Economic Community” that said “Eventually, ASEAN members need to appreciate that growing together for shared prosperity requires more decision-making powers to be shared in a flexible way. Political leadership is crucial in successfully addressing this important policy option” (ADBI, 2014).19

19 ADB (2014). ASEAN 2030 Toward a Borderless Economic Community. ADBInstitute, Tokyo.

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ENERGY POVERTY – ADDRESS ENERGY POVERTY THROUGH AEMI

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ABSTRACT

By 2030, it is expected that there is no energy poor people in ASEAN countries. The challenge is how AEMI can facilitate the member countries in providing a modern energy services with the different stages of energy development among the member countries. There are five main outcomes from this section. First, it needs more strong political action in tackling energy poverty in the regions. Second, there is an indication of narrowing gap in per capita energy use and electricity consumption. This situation is corresponded with increasing the ratio of GDP per capita between the CLV countries and ASEAN-6. This shows a positive signal on the important of narrowing energy gap for economic development in the region. Third, most of energy poor people live in rural areas. The rural electrification (RE) program need to be promoted because it provides income and non-income benefits. AEMI can promote RE both in directly and indirectly ways such as in providing financial assistance, technical and quality of service, basic services and economic opportunities. Fourth, in the area of financing, AEMI can promoted the existing scheme, and micro finance can be one areas that need to be focused. Finally, we argue that promoting the renewable energy target can be an intermediate target for universal energy access and AEMI simultaneously can determine incremental targets on electrification ratio and modern access cooking fuel.

SECTION 1

BACKGROUND

The World Summit on Sustainable Development, in Johannesburg, South Africa, 2002, was highlights the energy for sustainable development. The summit mention that:

> …access to energy facilitates the eradication of poverty…improve access to reliable, affordable, economically viable, socially acceptable, and environmentally sound energy services and resources…

In September 2011, the UN General Assembly launched the 'Sustainable Energy for All' initiative. UN Resolution 65/151, decided to declare year 2012 as the International Year of Sustainable Energy for All. There are three objectives that are going to be pursued up to 2030, namely[23]: (1) ensuring universal energy access; (2) doubling the share of renewable energy; and (3) doubling the rate of improvement in energy efficiency. Every country may have different pathways to attain the objectives given the differences in the characteristics of each country. The global action agenda has identified 11 action areas (seven sectoral areas and four enabling areas) to attain the three goals. The seven sectoral areas are: (1) modern cooking appliances and fuels; (2) distributed electricity solution; (3) grid infrastructure and supply efficiency; (4) large-scale renewable supply; (5) industrial and agricultural processes; (6) transportation; (7) building and appliances; the four enabling areas are: (1) energy planning and policies; (2) business model and technology innovation; (3) finance and risk management; and (4) capacity building and knowledge sharing.

Further, the UN Resolution 66/288, 'the future we want' (27th July 2012), section on Energy mentioned that:

> …"Sustainable Energy for All"…focuses on access on energy, energy efficiency, and renewable energies.

UN Resolution 67/215, in 61st plenary meeting, 21 December 2012, decides to declare year 2014 – 2024, as the "UN Decade of Sustainable Energy for All". In the spirit of UN resolutions, countries and regional cooperation need to follow up and prepare strategic to achieve the targets.

Similarly, ASEAN also needs to move forward to implement the resolutions because energy poverty has become the real problem in the region. Measuring energy poverty at ASEAN level need to be framed under the 'Sustainable Energy for All' initiative. In this regard, the energy development index (EDI), which measures the transition toward modern fuel and modern energy services, is a useful indicator that we can look at. The EDI among the ASEAN

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[23] http://www.se4all.org/wp-content/uploads/2014/01/SEFA-Action-Agenda-Final.pdf, accessed 18 June 2014

countries shows a quite wide development divide. In 2012, Malaysia has the highest rank while Myanmar has the lowest rank within ASEAN. (A total of 80 countries were ranked in the original list). Indonesia, Vietnam, and the Philippines have almost similar ranking; the same is true for Laos and Cambodia. However, although countries have almost the same EDI, it does not necessarily mean that they share the same problems at the household level and community level.

Table 1 Energy Development Index 2012

No	Country	Rank	Energy Development Index (EDI)
1	Myanmar	71	0.10
2	Laos	59	0.14
3	Cambodia	56	0.16
4	Indonesia	37	0.34
5	Vietnam	36	0.35
6	Philippines	34	0.38
7	Thailand	15	0.64
8	Malaysia	4	0.78

Source: World Energy Outlook 2012

We argue that ASEAN needs to address and emphasize the growing concern on modern energy access in the region. It is necessary to design a set of policies and frameworks to improve access to energy and eradicate energy poverty across ASEAN by 2030 under the AEMI framework. Promoting energy trade and investment is a precondition to improve energy access. In view of this, ASEAN energy market integration (AEMI) can facilitate a more vigorous energy trade and investment in the ASEAN region. An AEMI approach in investment can be optimize by promoting local energy resources, especially renewable energy sources such as biofuel, animal waste, wind power, solar panel, microhydro, etc.

Lack in modern energy access is reflected by lack in electricity access and cooking fuel. In ASEAN, about 134 million people without electricity access and Indonesia was contribute about 49%, while Philippines and Myanmar were contribute 21% and 18.6% respectively. Thus by ensuring the effectiveness of electricity access on those countries more than 88% of energy poverty problem in the region can be resolved. In terms, of energy for cooking, about 279 of ASEAN population was depended on traditional use of biomass for cooking. It seems that penetration on modern energy for cooking was lower than electricity. In many countries such as Cambodia, Lao PDR, Myanmar, and Vietnam, the share of population with traditional energy used for cooking was more than 50%. Most people who lack in electricity and a modern energy for cooking live in remote and isolated areas. The AEMI strategy by

promoting APG and TAGP may not reach those people. Thus, AEMI ways also need more flexible in promoting project both large and micro projects. The main objective is to facilitate more sustainable energy supply with acknowledging local resources, technology and community.

Table 2 Energy Poverty in ASEAN, 2011

	Population without access to electricity		Population relying on traditional use of biomass for cooking*	
	Million	Share (%)	Million	Share (%)
Brunei Darussalam	0	0%	0	0%
Cambodia	9	66%	13	88%
Indonesia	66	27%	103	42%
Lao PDR	1	22%	4	65%
Malaysia	0	1%	1	3%
Myanmar	25	51%	44	92%
Philippines	28	30%	47	50%
Singapore	0	0%	0	0%
Thailand	1	1%	18	26%
Vietnam	3	4%	49	56%
Total ASEAN	**134**	**22%**	**279**	**47%**

* Preliminary estimates based on IEA and World Health Organization (WHO) databases. Final estimates for 2011 will be published online at *www.worldenergyoutlook.org*.

To address problems on energy poverty in ASEAN, this paper is organized into six sections. Section one explore the background of this paper. Section two aims to evaluate to what extent energy poverty has been addressed at existing ASEAN energy framework. We analysed the regional initiatives in addressing energy poverty under the framework of the ASEAN Medium Term Programme of Action on Energy Cooperation APAEC. By providing example on the long process in realizing APG between Indonesia and Malaysia, this section aims to emphasize that real action is needed to realize energy for all. The three main bodies of ASEAN (politic and security; economic; and socio cultural) need to conduct more robust coordination in tackling multidimensional issues of energy poverty.

In section three, we investigate the convergence in energy access in ASEAN and we indicate a possible correlation with the GDP per capita. We found that in electricity sector, the convergence has been continued, but more energy use, the convergence has showed mix results. This indicates that more broad strategy is needed to narrow the energy gap such as for cooking and other energy used (transportation, industry, and commercial sector). However, there is an indication that energy convergence and narrowing GDP gap (between CLV and ASEAN-6) move in the same direction. The challenge that needs to be solved is how to ensure sustainability of energy supply if most of ASEAN countries depend on energy import outside the region in the near future.

In section four, we argue share national program in rural electrification program. We shared experiences from three countries such as Vietnam, Malaysia and Indonesia in promoting rural electrification program. We indicated that there are four areas where AEMI can support suitability of RE program such as in financing, technical and quality of service, integrating with other basic services, and providing economic opportunity. In this section, we also quantify the benefits of electricity access. We found that electricity access increased welfare through income and non-income benefits. Even, in the case of Indonesia, we found electricity access can reduce kerosene subsidy and CO2 emissions. Thus, by tackling energy poverty, government can obtain four benefits simultaneously such as economic, social, energy and environment.

In section five, we identify possible channels for financing the universal energy access. There are many possible scheme that can be utilized. However, the challenge is how to utilize the opportunity in more effective and efficient ways. At the national level, energy subsidy still become the major obstacle in acquiring larger fund for energy investment. The objective of AEMI to allow the free flow of energy, products, services, investment and skilled labour for all ASEAN member states. Thus, AEMI is not only can provide resources for better energy services in the region, but also AEMI can create greater opportunities in tacking energy poverty. In section six, we identified policy agenda that need to be done under the AEMI framework.

SECTION 2

APAEC AND ENERGY MARKET INTEGRATION

The ASEAN Medium Term Programme of Action on Energy Cooperation-APAEC (1995-1999) covered 7 areas: (1) electricity; (2) oil and gas; (3) coal; (4) new and renewable sources of energy; (5) energy conservation; (6) energy and environment; and (7) energy policy and planning. There are three plans of energy actions such as: APAEC 1999-2004; 2004-2009; 2010-2015; (for detail footprint refer to Table 3). The objectives of APAEC 2010-2015 are: to enhance energy security, accessibility and sustainability for the ASEAN region with due consideration to health, safety and environment through accelerated implementation of action plans, including, but not limited to: (i) ASEAN Power Grid; (ii) Trans-ASEAN Gas Pipeline; (iii) Coal and Clean Coal Technology; (iv) Renewable Energy; (v) Energy Efficiency and Conservation; (vi) Regional Energy Policy and Planning; and (vii) Civilian Nuclear Energy.

Table 3 APAEC's Footprint

1999-2004	2004-2009	2010-2015
1. Completion TAGP Master Plan by ASCOPE 2. Completion Interconnection Master Plan Study by HAPUA 3. Created Trans-Borneo Grid Interconnection Coordination Committee 4. Launch first energy competition (energy efficiency, conservation, renewable energy)	1. Signing of MOU for APG 2. Established AGP Consultative Council 3. Established ASCOPE Gas Center (AGC) 4. Promoting clean coal dialogue 5. Implementation of 19 EE&C projects 6. Implemented 48 projects on RE	1. Capacity building on EE&C (PROMEEC, AEMAS) 2. Completion of phase II, ASEAN interconnection master study 3. Extensive cooperation on Trans-ASEAN Gas Pipeline and LNG infrastructure 4. ASEAN Energy Award 5. Master Plan for ASEAN Connectivity 6. Finalization guideline on APG 7. Extend the Memorandum of Understanding (MoU) on the Trans- ASEAN Gas Pipeline (TAGP) Project for another term of 10 years until 20 May 2024 8. ASEAN fuel Policy for power generation 9. ASEAN's energy intensity reduced by 4.97% (2005-2009) target 8% in 2015 10. Collective target of 15% RE in total power installed capacity by 2015 11. New strategies focus on LNG developed

Source: brief summary from ASEAN Ministers of Energy Meeting

However, the discussion at the ASEAN Minister Meeting on Energy is lack to address issue on energy poverty. As seen from figure 1, the number of words count from the meeting only mention few words on access, even we have not found any words on poor, poverty, even energy poverty. We expect that more intensive discussion on the benefits of energy market integration especially for the poor need to be promoted. We argue that energy market integration needs to inclusive. This important to gain trust from ordinary people that though energy integration will not bring benefits to their life.

This picture shows electricity trading between Indonesia (PLN – State Owned Electricity Company) and Malaysia. The two people discussed that we (Indonesia) rich in natural resources, why we need to buy electricity? The other person said may be due to mismanagement. (Investor Daily, 12 April 2012)

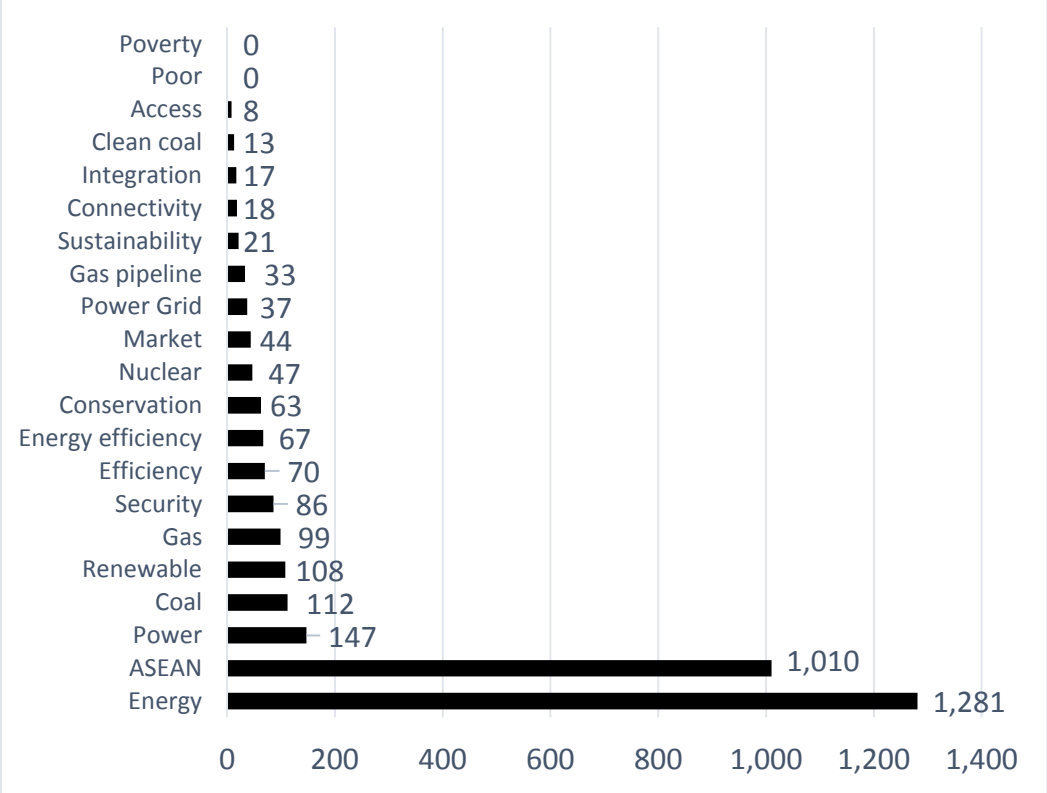


Figure 1 Word count on the Joint ministerial statement of the ASEAN Minister on Energy Meeting 1980 – 2013

We also argue that through energy market integration, poverty problem in the region can be partly solved. As seen from Table 3, the ten indicators on multidimensional poverty showed that electricity and cooking fuel has become important source of deprivation to poverty. If we combine both electricity and cooking fuel, the energy poverty indicator become the second largest contributor on poverty deprivation such as in Thailand, Indonesia, Vietnam, and Laos, even for Cambodia, it is has the highest shares. This implies that energy poverty needs to be solved seriously by all the leaders in the regions.

It is also necessary for AEMI to develop more active role in integrating both economic and social dimension. Most of poverty issues is handle by the ASEAN Socio-Cultural Community (ASCC). It has 13 ministerial meetings, one of them ASEAN Ministers and Senior Officials Meetings on Rural Development and Poverty Eradication (AMRDPE and SOMRDPE), the first informal meeting was held in December 1998. AMRDPE has produced two frameworks: (i) Framework Action Plan on Rural Development and Poverty Eradication (2004-2010); and (ii) Framework Action Plan on Rural Development and Poverty Eradication (2011–2015). The priority areas for the first framework aims to deal with globalization, basic access, and ICT. The second framework focus on sustainable development, social protection, food and climate change.

Table 4 Percentage contribution of deprivations of each dimension to overall poverty

Country	1 Years of Schooling	2 Child School Attendance	3 Mortality	4 Nutrition	5 Electricity	6 Improved Sanitation	7 Drinking Water	8 Flooring	9 Cooking Fuel	10 Asset Ownership
Thailand	29.2	11.5	19	12.2	1.2	4.8	4.4	2.5	10.6	4.6
Vietnam	18.5	14.3	12.9	12.2	1.5	12.1	5.5	5.5	13.1	4.4
Philippines	15.8	-	56.5	-	3.8	5.3	2.5	1.5	9.6	4.9
Indonesia	6.2	6.4	60.7	-	1.5	6.7	5.1	1.9	8	3.5
Lao PDR	16	15.4	18.9	11.5	6.3	9	5.3	2.3	10.9	4.4
Cambodia	14	8.1	13.5	19.3	10.9	10.6	6.8	1	11.9	4

Note: Years of schooling = number of household member has completed five years of schooling; Child school attendance = no child is attending school up to the age at which they should finish class 6; child mortality = any child has died in the family; nutrition = any adult or child for whom there is nutritional information is malnourished; electricity = the household has no electricity; improved sanitation = the household's sanitation facilities is not improved, or it is improved but shared with other households; safe drinking water = the household does not have access to safe drinking water of safe drinking water is more than a 30-minute walk from home, roundtrip; flooring = the household has a dirt, san or dung floor; cooking fuel = the household cooks with dung, wood or charcoal; and asset = the household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car of truck.

Source: Alkire, S., A. Conconi, and S. Seth (2014): "Multidimensional Poverty Index 2014: Brief

We highlights that political priority is necessary to acknowledge the energy poverty problem. The concern needs to be translated not only into more innovative policy actions, but also in ensuring sustainability of existing framework. There are two main pillars on infrastructure connectivity such as APG and TAGP that have been developed. Those infrastructure has improved a modern energy access for electricity and cooking. For example, currently, APG has capacity more 3.5 GW and electricity trade has involved six countries such as Thailand, Malaysia, Lao PDR, Singapore, Cambodia and Indonesia. Similarly, TAGP interconnection has length more than 3,019 km and it involved five countries such as Malaysia, Singapore, Thailand, Indonesia, and Viet Nam. Although, the energy facilities will increase in the future, there is a limitation on the program reach due to limitation on primary energy supply, geographic and region topology constraints. In the case of remote areas and rural areas, promoting infrastructure on LPG, biogas and advanced cook stoves will be more cost

effective than extending the TAGP facilities. Similarly, developing off grid and mini-grid facilities are more feasible than extending the APG. Further, sustainability of energy supply also need to be considered. For example, Mekong River has become the source of water for hydropower, but the source has showed declining in environmental quality. Kristensen (2001) said that "the pressure on the environment and the region's natural resources is increasing dramatically, as is the demand for additional food, water and energy, and is well known that such expediential growth puts untenable pressure on the environment and gives rise to conflict at all levels".

More political actions are needed: from planning to action - a story on the long road of APG

Energy access needs to be promoted both at national pathway and regional pathway. It is necessary to integrate both pathways. In the case of electricity, we observed that there have been slow progress. It needs more than 25 years preparation for ASEAN Power Grid (APG) between Kalimantan – Indonesia and Sarawak – Malaysia. We attempt so summarize the milestone as follow:

1. The Ministers noted the progress achieved in the Interconnection Project where the feasibility studies of four interconnection projects namely, Sarawak-West Kalimantan; Sarawak-Brunei Darussalam-Sabah; Sumatra-Peninsular Malaysia; and Batam-Singapore, have been completed and compiled in one document and is ready for submission to potential sources for technical assistance. (Joint Press Statement The Tenth Meeting Of The ASEAN Economic Ministers On Energy Cooperation, AEMEC Singapore, 22 August 1991**)**.

2. In particular, they expressed strong confidence in the growing opportunities for long term mutual cooperation in electricity and gas interconnections, joint exploration and production etc., in the region, as exemplified by the following cooperation projects among the ASEAN Member Countries... Sabah-West Kalimantan (Indonesia) Power Interconnection. (The 16th ASEAN Ministers on Energy Meeting Singapore, 1 August 1998)

3. The Ministers welcomed the new developments in the implementation of the ASEAN Power Grid (APG) project, particularly the signing of the MOU between Indonesia and Malaysia on the Interconnection Project No.4 Peninsular Malaysia-Sumatra (with its commercial operation date (COD) expected in 2017), and the agreement that the two Member States would start power exchanges of the Interconnection Project No. 6 West Kalimantan-Sarawak in 2015. (The 30th ASEAN Ministers on Energy Meeting (AMEM) was held on 12 September 2012 in Phnom Penh, Cambodia)

4. The Ministers also noted the progress of the six interconnection projects that are currently under construction, particularly the new interconnection projects … and between Sarawak in Malaysia and West Kalimantan in Indonesia. (The 31st ASEAN

Ministers on Energy Meeting (AMEM) was held on 25 September 2013 in Bali, Indonesia)

Figure 2 ASEAN Power Grid Indonesia – Malaysia

Power contract purchase between Indonesia and Malaysia is implemented by 2015 with capacity about 230 MW (50 base load and 230 for peak load). The period of contract between 2015 and 2019, but it can be extend. Now, Indonesia government is constructing a new capacity in West Kalimantan with capacity about 100 MW. Currently power is ongoing in Sajingan with 200 kVA and Badau with 400 kVA and forthcoming Entikong 1,500 kVA. Power trading will help West Kalimantan to increase electrification ratio that currently is about ratio 69.25% and improve electricity sold per capita that is about 375 kWh (national level 753.7 kWh/capita).

Another APG project that also important is the interconnection Peninsular Malaysia-Sumatra. As mention before this project will be ready for commercial operation date (COD) by 2017. There is a coal fired power plant (*mulut tambang* - mouth coal mining) in Indonesia, with capacity 1,200 MW. The site is located in Bukit Asam-Peranap, Indragiri Hilir, Riau. This project is a collaboration among PLN (Indonesia) – TNB (Malaysia) – PT.BA (Indonesia). Rupat Island as landing point for undersea cable (see Figure 3). The existing installed capacity in Riau 165 MW (Diesel Power Plant) with peak load 406 MW. Supporting system in Riau is driven by hydropower (21%). Thus it very risky especially risks during dry season. Currently, the electrification ratio in Riau is about 60.84% and electricity consumption is about 497 kWh. People expect that this project can improve power capacity in Riau province, but before PLN sell electricity to Malaysia, the project needs to be benefited people in Riau first.

Figure 3 Project No.4 Peninsular Malaysia- Sumatra

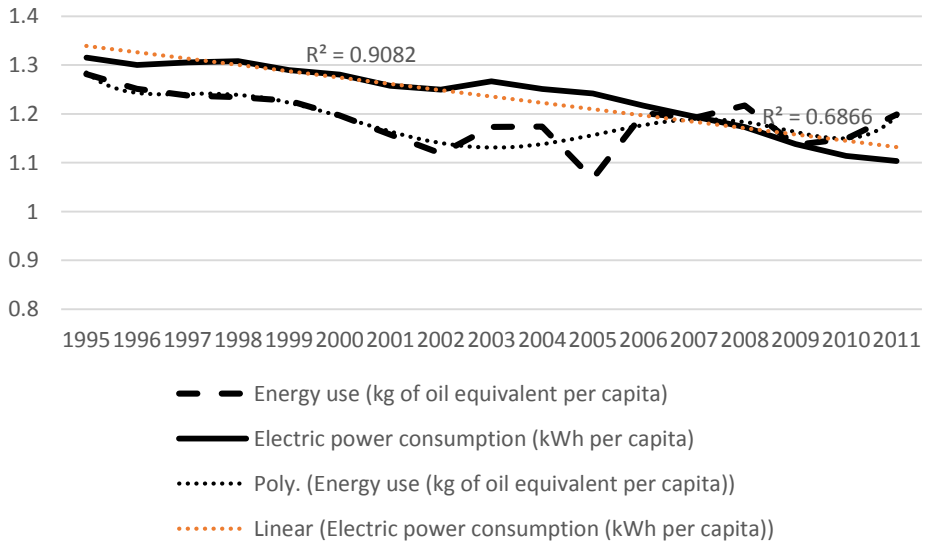
SECTION 3

ENERGY ACCESS CONVERGENCE OR DIVERGENCE

The previous sections clearly indicates that global objective on 'Sustainable Energy for All' needs to be transmitted in more real actions both at regional level and country level. There is also limitations in expanding the existing facilities under APG and TAGP. This section aims measure how the energy access has been promoted. This evidence can provide information on energy gap across the ASEAN countries. There are two indicators that we used to measure energy access such as energy use per capita and electricity consumption per capita. We applied the coefficient variation (CV) formula (σ) is given as:

$$\sigma_t = \left[\sqrt{1/N \sum (y_{it} - \bar{y}_{.t})^2} \right] / \bar{y}_{.t}$$

It is measured based on the standard deviation of energy consumption per capita normalized by the mean. A trend toward energy consumption per capita convergence is observed if the measured coefficient of variation decreased over time. It is simply based on the standard deviation (σ) of energy or electricity per capita (y_{it}) across countries divided by the mean $\bar{y}_{.t}$ in any given year; and *i* indicates country. The result can be seen from Figure 4 (we do not include Lao PDR for both indicators due to lack in data availability).



Note: Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants; Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.
Source: author's calculation

Figure 4 Convergence in Energy use and electricity consumption

As seen from Figure 4, the convergence index for electricity consumption per capita tends to decline. The CV parameter declined from 1.3 to about 1.1. This indicates that since the last seventeen years, the gap electricity consumption per capita across the ASEAN countries has decreased. This indicates that countries with relatively low level of consumption per capita can grow faster compare to countries with relatively high level of consumption per capita. This is happened because new investment on power generation on those countries grows much faster than other countries. In contrast, although energy use per capita showed declining trend for period 1995 – 2002, the trend increased after 2002, even the current level is similar with the level in year 2000. This indicates that there is a tendency for increasing the gap in energy used (other than electricity). By looking at the two trends we can conclude that inequality in energy indicators is not necessary moved in the same direction.

As seen by definition, energy use terminology reflects more complex elements than electricity consumption. Energy used covers both energy production and energy trade. Energy production depends on the availability of primary energy supply and for some countries such as Indonesia has become a net oil importer since 2004. Further, in terms of energy trade, as seen from Table 5, Singapore has become net importer for H4-270 and H4-277. Thailand also becomes net importer for H4-2711.

Table 5 Net Energy Export (in million USD)

Country	Commodity							
	H4-2701		H4-2709		H4-2710		H4-2711	
	2000	2012	2000	2012	2000	2012	2000	2012
Indonesia	1,290	24,269	3,565	1,490	-1,819	-26,263	6,621	17,439
Singapore	0	-8	-8,738	-39,879	2,164	-4,077	259	-5,727
Thailand	-117	-1,469	-5,720	-34,181	243	7,947	164	-5,586
Brunei Darussalam	NA	NA	NA	6,271	NA	-342	NA	6,176
Cambodia	NA	-20	NA	NA	-177	-910	-5	-40
Malaysia	-99	-2,137	2,589	1,477	-291	-177	3,465	19,187
Philippines	-130	-616	-3,171	-7,021	-47	-4,512	-210	-672
Viet Nam	94	991	3,503	7,750	-1,844	-7,680	-21	-610
Total	1,038	21,010	-7,972	-64,092	-1,771	-36,016	10,275	30,167

Note: H4-2701 (Coal; briquettes, ovoids and similar solid fuels manufactured from coal); H4-2709 (Petroleum oils and oils obtained from bituminous minerals, crude); H4-2710 (Petroleum oils and oils obtained from bituminous minerals, other than crude; preparations not elsewhere specified or included, containing by weight 70 % or more of petroleum oils or of oils obtained from bituminous minerals, these oils being the basic constituents of the preparations; waste oils); H4-2711 (Petroleum gases and other gaseous hydrocarbons such as propane, butane, and ethylene).

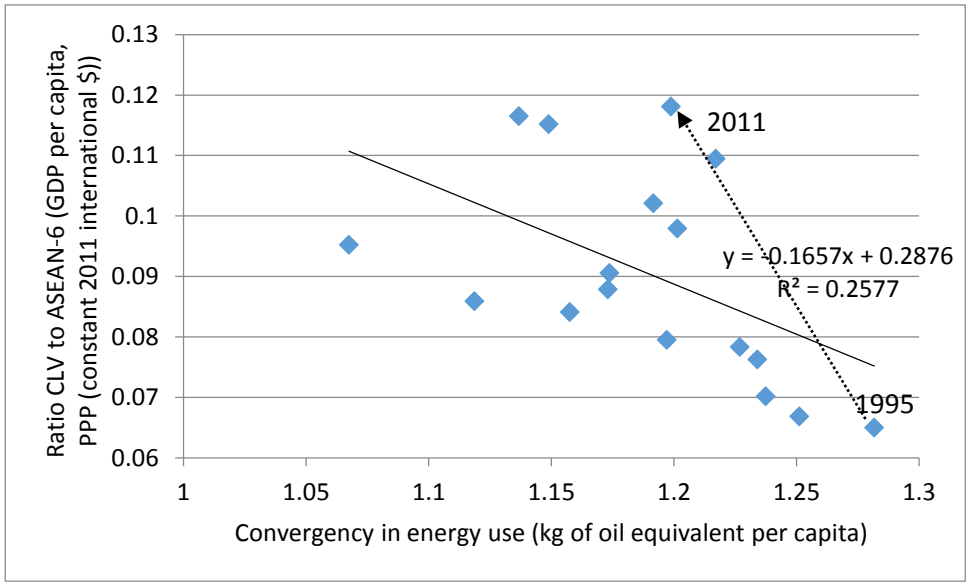
Source: author's calculation from UN Comtrade

Changing in indigenous energy production will affect the pattern of energy trade and it will influence the energy convergence. Countries with relatively rich in energy resource, will have more capacity to smooth the energy consumption with minor changing on energy pricing policy due to energy subsidy policy. On the other hand, countries with relatively poor energy resource will optimize energy trade and more often changing in domestic energy price. However, for resource rich energy supply, countries with poor energy management will face rapid depletion in energy supply. While production has showed declining trend and it may continue in the future, and it would be critical challenge at the ASEAN.

We conclude that there is convergence in electricity consumption per capita, but there is tendency for divergence for energy use per capita. The next section aims to investigate relationship or correlation between the convergence analysis and GDP per capita. We separated GDP per capita between the ASEAN-six (Brunei Darussalam, Indonesia, Malaysia, Singapore, Thailand, and Philippines) and CLV (Cambodia, Lao PDR, and Vietnam; we do not have information on Myanmar). When the ratio increases, this indicates that CLV countries can grow much faster than ASEAN-six, and vice versa. We expect that as the ratio increase, energy and electricity consumption per capita will decline (this is not causality relationship).

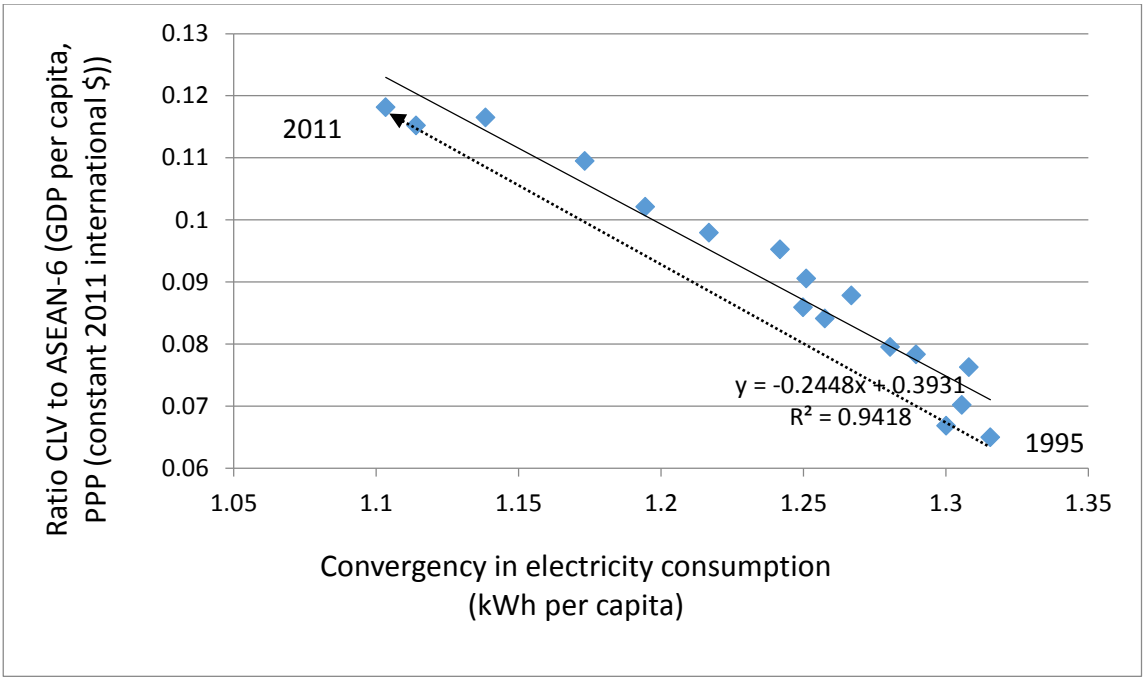
As seen from Figure 5, we have negative trend between the GDP per capita ratio and convergence energy use. If we compare the initial year (1995) and end year (2011), we obtain the direction move to the right. This indicates that between 1995 and 2011, there is indication that convergence in energy use correspond with increasing relative of GDP per capita growth on CLV country. Thus, we energy gap across the ASEAN countries can be reduce, the GDP per capita gap can also be reduce.

Similarly, as seen from Figure 6, we obtain that narrowing in electricity per consumption gap among ASEAN countries is corresponded with increasing the ratio of GDP per capita of CLV to the ASEAN-6 countries. Compare with convergence in energy use per capita, we obtain more strong relationship for electricity consumption per capita. Thus, the results indicates that if ASEAN countries can improve energy access for all, there is also strong indication that GDP per capita can also be reduced. AEMI can reduce gap in energy access across the countries, thus AEMI can promote economic growth for all countries.



Source: authors' calculation

Figure 5 Correlation between convergence in energy use and ratio of GDP per capita (1995-2011)



Source: authors' calculation

Figure 6 Correlation between convergence in electricity consumption and ratio of GDP per capita (1995-2011)

SECTION 4

RURAL ELECTRIFICATION PROGRAM

Map on energy poverty indicates that most of people without energy access live in rural area. Thus promoting energy access at rural level through the rural electrification program, become important. This section briefly share experiences from Vietnam, Malaysia, and Indonesia in implementing the rural electrification program.

Rural electrification in Vietnam

Missing or only little electrification is encountered in rural and sparsely populated areas in developing countries. For decades rural development enjoys special attention in the global development debate and electrification has since been a central factor for the same reasons energy or electricity are central to overall socio-economic development. Access to electricity can significantly improve consumers' quality of life and without electricity there are limits to any type of growth especially in rural areas (Cabraal et al., 2005, Alazraque -Cherni, Judith, 2008).

According to the World Bank (WB)'s assessment, Vietnam has achieved the highest rural electrification rate in the world as a developing country. World Bank's Country Director for Vietnam Victoria Kwakwa said that Vietnam was a typical example in terms of rural electrification and its program was one of World Bank's most successful projects in Vietnam. (Vietnam Energy, 2014)

Rural electrification has significantly grown. Only 2.5 percent of households used electricity in 1975 to 96.3% in 2009 and its figure increased to more than 98 percent in 2013. In particular, nearly 97 percent of rural households used electricity. Agricultural production index increased by 6.6 times in the 1998-2013 period and average income per person increased by 8 times in the same period. (Vietnam Energy, 2014). With the ASEAN region (Association of Southeast Asian Nations) reaching an average total electrification rate of 71,9% and 54,9% in rural regions, Vietnam shows an outstanding performance, although it is still behind more developed countries of the ASEAN like Brunei, Malaysia, Singapore or Thailand (Gencer et al., 2010).

The rural electrification program of Vietnam has been strongly developed. Together with investment capital from the state budget, donors have also actively contributed to bringing power to remote areas and improving the quality of rural low-tension power grid. Thanks to the rural electrification program, the face of regions has positively changed. According to Ha Tinh Provincial People's Committee Chairman Vo Kim Cu, to date, 100 percent of communes in the province have used power. The number of poor and nearly poor households has declined from 50 percent to below 10 percent. The rural electrification program has contributed 30-40 percent to socioeconomic development in rural areas, creating favorable

conditions to change the structure of the rural economy and improve people's living conditions (Vietnam Energy, 2014)

However, Deputy Prime Minister Hoang Trung Hai also said that challenges for the electricity sector in the implementation of the rural electrification program in the next time remain huge. 91 communes throughout the country have not yet used electricity. With the goals of 98 percent of rural households using electricity by 2015 and 100 percent of them using electricity by 2020, the electricity sector needs to make greater efforts. In the near future, ministries, departments and local governments need to meet set objectives. In particular, a focus on ensuring technical conditions and improving quality for the rural power grid is needed (Vietnam Energy, 2014)

There are many factors contributing to successful rural electrification in Vietnam. A handful of local factors can be considered instrumental in the rapid success of the program. One factor was unique to the country: Viet Nam's extensive hydropower resources were tapped quickly at a scale that generated sufficient electricity for the country. A large, indigenous source of renewable electricity is not a resource that all countries have, and Viet Nam has a clear advantage in this case.

A number of other factors also contributed to the success of rural electrification in Viet Nam. These factors include Viet Nam's strong national commitment to electrification, expressed in the government's dedicated rural electrification policies and institutions, and the premium placed on electrification in Vietnamese culture.

The rapid development of sources of energy, and indigenous energy resources, contributed greatly to Viet Nam's electrification, but it was the parallel development of the transmission and distribution system that enabled electricity to reach the whole country. The natural hydropower resources of Viet Nam also allowed for the development of complementary off-grid hydropower systems at mini and pico scales[24] (ADB, 2011).

Rural electrification in Malaysia

As seen from Table 6, Malaysia has the highest rank of EDI while Myanmar has the lowest rank within ASEAN (A total of 80 countries were ranked in the original list). Indonesia, Vietnam, and the Philippines have almost similar ranking; the same is true for Laos and Cambodia. However, although countries have almost the same EDI, it does not necessarily mean that they share the same problems at household level and community level.

Malaysia's top-ranking in ASEAN can be traced to its National Development Plans after its independence in 1957 which focused significantly on "Rural Development". The key

[24] Hydro power based on the size of power generating that can be produced are classified into six types as follows (IRENA, 2012): 1) large-hydro (more than 100 MW); 2) medium-hydro (20 MW – 100 MW); 3) small hydro (1 MW – 20 MW); 4)mini-hydro (100 kW – 1 MW); 5) micro hydro (5 kW – 100 kW0; and 6) pico-hydro (less than 5 kW).

objectives for Rural Development were the provision of essential services such as access roads, piped water supply and electricity supply to the rural communities. These essential utility services were intended to facilitate the provision of education, health services, communications and transport infrastructure to encourage overall economic development of these remote communities.

A concurrent but distinct initiative was to also enhance the growth of agriculture as a key revenue earning avenue for the predominantly under-privileged rural communities through government led commercial plantations such as for rubber and palm oil. These initiatives were supplemented with assistance for planting of cash-crops for the selected settlers while the larger plantation initiatives matured to generate the intended revenue streams.

Extension of electricity supply under a "Rural Electrification (RE)" program to the rural communities was a substantial component of the rural development under the national 5-year development plans, initially as Malaya Plans and then as Malaysia Plans after Malaysia was formed in 1963. An example of the RE development is shown in the figure below for RE projects completed in the utility's financial year 1981/82 (1st Sept 1981 to 3 1st August 1982).

Table 6 Progress of Rural Electrification up to 31 August 1982 (FY 1/9/81 – 31/8/82)

State	No. of projects under construction	Cost (RM mil)	No. of projects completed	Cost (RM mil)	No. of villages supplied	No. of houses supplied
Perlis	21	3.79	17	1.00	25	680
Kedah	111	27.00	62	9.22	102	5867
P. Penang	20	1.24	21	0.72	25	452
Perak	61	13.99	43	8.63	52	4767
Selangor	35	15.49	32	13.49	41	9403
Negeri Sembilan	41	9.01	38	6.20	59	2058
Melaka	47	4.24	41	1.44	42	549
Johor	157	49.59	78	16.35	145	10562
Pahang	48	32.59	44	13.96	62	8391
Trengganu	72	12.88	52	3.20	65	2241
Kelantan	102	37.57	73	4.54	133	6577

Source: Extracted from LLN Annual Report for 1981/82

This shows that 51,837 households were electrified during the financial year at a cost of RM 85.8 million (US$ 26.8 million at exchange rate of RM 3.2 to US$ 1.0). The electrification rate had slowed somewhat by the 1980s as the RE program had substantially covered the bulk of the Peninsular Malaysia area by then and was beginning to "wind down" in the 1980s. In the earlier decades (1960s and 1970s) the annual RE program electrified even over 100,000 households a year for many years, mainly in Peninsular Malaysia.

The overall rural development strategies, and in particular the RE program opened up large rural areas in most parts of Peninsular Malaysia for accelerated economic development by facilitating the establishment of "cottage industries" in the rural areas. These were mainly agriculture related processing activities, which allowed the agricultural produce to be processed for maximum utilization and distribution to the urban centers which had previously been "out of reach" to the producers.

Virtually all the RE projects were implemented with state funds (shared between the federal government, State governments and the local utility – Lembaga Letrik Negara [LLN] or the National Electricity Board, which was a federal Statutory Authority). The bulk of the RE power supplies was extended by grid extension but a part was by the establishment of isolated local small (mini) grids, operated by the utility LLN. A few isolated areas were electrified through licensing of private sector power generation and distribution entities, using diesel powered gen-sets. Consumers fed by such licensees had to pay a higher tariff than that charged by LLN.

Rural electrification of the remote areas attracted the enhancement of existing industries and development of small scale rural industries. Setting up of these successful and viable economic activities lagged behind the provision of electricity supply by varying periods at the different areas, predominantly according to proximity to the urban centers that they could serve. By 2010, the electrification status in Malaysia had extended electricity supply to approximately 99% of the population in Peninsular Malaysia, 77% of the population in Sabah and 67% of the population in Sarawak.

More recently, the Malaysian government has embarked on a more intense RE program for the remote populations in Sabah and Sarawak under a Rural Basic Infrastructure (RBI) Program (http://www.rurallink.gov.my/c/document_library/get_file?uuid=b7ca23df-7f4e-44bd-9ce6-baa2eef334fd&groupId=80191). This program aims to electrify about 140,000 rural households in the period 2010 to 2015, with about 95% of these being in Sabah and Sarawak. This program is fully funded by federal funds. Provision of "modern energy" to the remote communities, especially for the domestic and small commercial users has not been financially viable as private sector business enterprises. The RBI program also includes the upgrading and construction of about 7,000 km of rural roads, provision of 50,000 new and restored houses for the "poor and hard-core poor" and piping for the supply of clean or treated water to about 360,000 houses.

Rural electrification in Indonesia

Rural electrification (RE) program in Indonesia has been started since the late fifties and the program was based on small isolated diesel schemes (McCawley, 1978). McCawley (1978) said that the main reason for RE is the hope that productivity in agriculture and rural industries will improve. Munasinghe (1988) pointed out two objectives of rural electrification program such as promoting economic growth and creating equity. During his speech to celebrate the Gas and Electricity Day, in 1960, President Soekarno, said that in 1985 all of Indonesia would have been electrified. The director general of Department of Manpower, Transmigration, and Cooperative in 1976 also said that in 2000, Indonesia aimed to electrify the majority of its 60,000 villages. In 1978, for the first time President Soeharto mentioned electrification programme in the Indonesia's Broad Guidelines of State Policy (Garis-Garis Besar Haluan Negara, GBHN). However, Mohsin (2014) argued that during the new order regime, the rural electrification program or well-known as *Listrik Masuk Desa* had two functions. First, it is a tool to improve economic conditions of villages. Second, it is a political instrument for the GOLKAR party to secure votes (vote-buying strategy) from rural people in the general elections.

In 2014, the Indonesian government has targets to obtain 80% of electrification ratio and 98.9% of rural electrification ratio (Joko Widodo, the elected president said that electrification ratio needs to reach 100% in 2019). Rural electrification ratio is larger than the electrification ratio because by definition rural electrification is the ratio of people in the village having electricity to total number of villages. Thus if in the village, there is one household having electricity, means the ratio of rural electrification in that village is 100%. Extending the grid and off-grid connection has been done to obtain the targets.

Currently, there are two main agencies that intensively promote rural electrification program such as Ministry of Energy and Mineral Resources (MEMR) and PLN (state owned company for power sector). According to the Minister of Finance regulation No 201/PMK.07/2012 on 17 December 2012, the special allocated fund (*Dana Alokasi Khusus*/DAK) for rural energy in 2013 was provided for MEMR. The fund needs to be used to promote renewable energy at the local level and government allocates Rp 432.5 billion or US$ 43.25 million. Budget for rural energy is about 1.7% of total special allocated fund. To follow up this regulation, the Minister of Energy and Mineral Resources issued regulation No 3/2013 that consist of technical guide. The regulation said that the fund needs to be used for developing new micro hydro (less than 1 MW), rehabilitating micro hydro, conducting extension and improving the electricity services from micro hydro, developing solar panel (PV) (both concentrate and disperse)25, and installing biogas for households.

PLN develops two approaches such as extended on grid and off grid connection. For extended the grid connection, PLN planned to develop network infrastructure both for medium and low voltage (see Table 7). The total number of costumers that plan to be connected between 2012 and 2021 are about 2.2 million of households and 273,932 or about 12% of targeted household will obtain a cheap and power saving (*listrik murah dan*

25 Concentrate means the power is distributed and transmitted by cable to end user while disperse means direct use to end costumers. The minimum output for concentrate module is 100 Wp per unit while for disperse module is about 10 Wp.

hemat, LMH) program. The LMH program was launched by government in 2012. This program aims to help poor households in obtaining access on electricity. With this program, poor households obtain freely energy saving lamps and prepaid electric voucher for one month. Then, government also covers installation fee. Government said that in 2012, about 60,702 poor households are benefited from this program[26]. If we compare with the target in 2012, it seems that the rate of success from this program was about 73%. In 2013 and 2014, the program covered about 95,227 households and 71,429 households respectively.[27] This indicates that government's support for this program tends to decline.

Table 7 Summary of Rural Electrification Program in Indonesia 2012 – 2021

Year	JTM (kms)	JTR (kms)	Trafo		Number of customer (HH)	Number of LMH (HH)
			MVA	Unit		
2012	4,168	4,465	226	3,349	236,788	83,478
2013	6,345	4,736	398	3,446	220,170	95,227
2014	6,659	5,373	545	3,848	243,957	95,227
2015	6,863	4,964	632	3,576	223,404	0
2016	7,177	5,056	690	3,611	228,000	0
2017	7,417	5,112	729	3,635	230,493	0
2018	7,340	5,080	762	3,563	227,966	0
2019	7,532	5,143	807	3,524	230,679	0
2020	7,644	5,161	851	3,444	226,182	0
2021	7,303	4,481	882	2,979	170,617	0
Total	68,499	49,571	6,522	34,973	2,238,257	273,932

Note: Tahun or year; JTM = middle voltage network 20kv; JTR = low voltage network 220 v; Jumlah Pelanggan PLN = number of PT.PLN's customer, Listrik Murah & Hemat = Cheap and power saving; *DIPA= national budget.

Source: PT.PLN's business plan 2012-2021 (2012)

A massive solar PV program (off grid) is declared by PLN's letter No. 1227.K/DIR/2011. There are two types of supply and utilization of solar PV such as communal PV and autonomous (*mandiri*) PV. This program is called SEHEN stands for *Super Ekstra Hemat Energi* (Super Extra Energy Saving). PLN allocated about Rp 7 billion to support this program. There are two

26 Please refer to http://www.djlpe.esdm.go.id/modules/news/mbl_detail.php?news_id=3532, accessed 20 August 2014.

27 Ibid.

types of communal PV such as PV communal-autonomous and PV communal hybrid[28]. Table 8 indicates the characteristic of two types of PV. In the case of autonomous SEHEN, total electricity production per year is about 26.3 kWh per year.[29] The two programs aim to measure problem on electricity access, but they are different in program reach. Autonomous PV has lower capacity than the communal PV but it can reach household with longer distance from PLN's grid.

Table 8 Communal PV and Autonomous PV

Communal PV	Autonomous PV
1. Connected capacity Location is more than 5 km of PLN's grid 2. Population density relatively high 3. Costumer has income to pay the electricity bill 4. Total capacity 220 VA 5. PLN finances the program 6. Manage and supervise by PLN 7. The property belongs to PLN (except electricity equipments after the energy limiter) 8. Tariff for autonomous communal Rp 14.800 per month (plus connection fee). This follows the Presidential Regulation No 8/2011 (for S1 category) 9. Tariff for communal hybrid PV follows the Presidential Regulation No 8/2011 (plus connection fee)	1. Location is more than 10 km of PLN's grid or it is isolated due to sea, river chasm 2. The location need to be close between on costumer and other 3. Costumer has income to pay the electricity bill 4. The capacity only enough for 3 LED with total capacity about 3 watt 5. Total capacity 12 watt 6. Technical life span 15 years for solar PV 7. Technical life span 10 years for LED 8. LED belongs to PLN 9. PLN finances the program 10. This is a transition program before the customer is connected 450 VA 11. Manage and supervise by PLN 12. The property belong to PLN 13. Total monthly payment Rp 35.000 that consists of monthly fee (subscription Rp 14.800 per month) and rental cost of equipment Rp 20.200 per month)

Source: PLN's letter No. 1227.K/DIR/2011

We argue that grid connection is the best option to improve electricity access for rural community. Because it is managed by capable authority and it has higher voltage than off grid. However, promoting grid connection need huge investment cost and state owned company may not able to cover the investment spending. We also found that it is necessary to improve coordination between MEMR and PLN in implementing solar panel system. Based on our observation in East Nusa Tenggara Province, the solar home system (SHS) that funding by MEMR and SEHEN, we shared four major findings. First, the number of SEHEN's costumer increased by more than 113

[28] Communal autonomous is communal PV that is operated by individual; communal hybrid PV is communal PV that in terms of operation it is combined with non-solar energy in order to improve the efficiency level.

[29] It is calculated from: 12 watt x 6 hours x 365 days.

thousand households. This is a rapid increase in the number of PLN's costumer in very short period. As result, number of rural and electrification ratio can be improved. However, the voltage capacity of SEHEN is very low, and it is still below the standard of basic human need (see AEMI group report 2013). Second, SEHEN is managed by single authority (PLN) that responsible for maintenance and handling the technical problems. As consequence, customers need to pay monthly fee. However, there is almost zero maintenance fee for SHS. Third, head of local government is responsible on SHS program. However, local government does not have technical capacity to monitor the program, even there is lack in technicians to conduct monitoring and evaluation. SHS's recipients are responsible for any technical problems. Fourth, there is lack in coordination between MEMR and PLN to synchronize technical, administrative, and financial dimensions. As a result, the program seems competing one and another.

AEMI and Rural Electrification Program

By investigating the rural electrification (RE) program in Vietnam, Malaysia and Indonesia, there four main elements that can be follow up under AEMI's framework (please refer to Table 9)

Table 9 The Role of AEMI in Rural Electrification Program

Financing	Technical and Quality	Basic services	Economic opportunity
Most of RE program is finance by national budget. AEMI can provide more option on RE financing	It is important to ensure sustainability of RE program. Currently, ASEAN has a training centre for Small-Scale Hydropower. Capacity building also need to be promoted broadly to other areas such as solar panel, wind, biogas, etc.	Energy service (electricity and cooking fuel) is only one elements of basic infrastructure. The successful in RE program will also depend on availability of other infrastructures such as education, health, road, water, sanitation, and communication. AEMI's framework needs ensure sustainability of energy access.	Free flow of energy, products, services, investment, and labour can create economic opportunities. This may enable people to generate more income and create demand on energy.

Case Study from Indonesia[30] and Viet Nam

This section aims to evaluate the impact of electricity access on people welfare. We conducted survey in Satar Mese sub district, Manggarai, district, East Nusa Tenggara Province, Indonesia (see Figure 7). There are three villages that we focus on Tantong village (treatment group) and Damu village and Lungar village as a control group (see Table 10). We conducted preliminary survey (baseline study) in May 2013 before electricity was transmitted in Tantong village with total number of observation 311 household and we visited the same households in the three villages in June 2014 after the Tantong village obtained electricity by March 2014. Damu village has grid connection but in Lungar village, there is no grid connection. In Lungar some people used solar panel namely SEHEN.

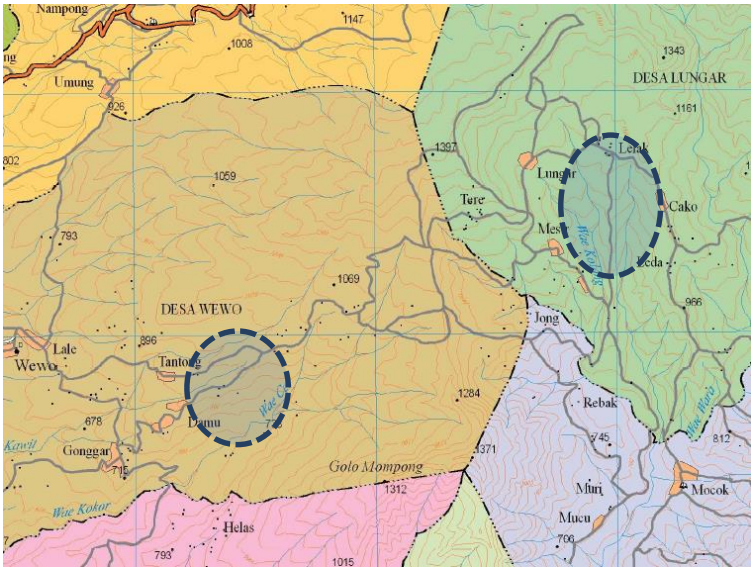


Figure 7 Geography of sample collection

30 This research project on the title '*Model dan Strategi Pengembangan Sektor Ketenagalistrikan di Daerah Dalam Upaya Pengentasan Kemiskinan* [Models and Strategies in Developing Electricity Sector in Region for Poverty Alleviation]' Year 2013-2014. Author is grateful to LIPI who provided the competitive research grant under the Sub-theme *Critical and Strategic Social Issues* (CSSI) program.

Tabel 10 Characteristics of Electricity Access (number of household)

Villages	2013	2014
Damu-on grid		
PLN-with meter	20	31
PLN-without meter	23	12
Number of household	43	43
Tantong-on grid		
PLN-with meter	0	47
PLN-without meter	21	0
Without electricity access	30	4
Total household	51	51
Lungar-off grid		
Connected	99	98
Not connected	85	55
Disconnected	-	13
New connection	-	21
Total household	187	187

Note: PLN = state electricity company

Source: primary data

We applied difference in difference estimation to measure the impact on electricity access on people welfare on grid connection. The econometric model we arranged as follows:

$$outcome\_\mathrm{var}_i = \beta_0 + \beta_1.period_i + \beta_2.treated_i + \beta_3.period_i.treated_i + \beta_k x_{k,i} + \varepsilon_i$$

$\hat{\beta}_0$ = average outcome for control group in baseline period

$\hat{\beta}_0 + \hat{\beta}_1$ = average outcome for control group after having access on electricity

$\hat{\beta}_2$ = the outcome difference between treatment and control group at baseline

$\hat{\beta}_1 + \hat{\beta}_2$ = average outome for treatment group at baseline

$\hat{\beta}_0 + \hat{\beta}_1 + \hat{\beta}_2 + \hat{\beta}_3$ = average outcome for treatment group after obtain electricity

$\hat{\beta}_3$ = difference in diference or impact from electricity access

We used four outcome variables namely expenditure as a proxy of welfare. There are four indicators for expenditure such as total expenditure, food expenditure, kerosene expenditure and non food and enery expenditure. We expressed the expenditure in real value. There are three explanatory variables such as total area of floor, access on food for the poor and number of family member. Table 11 indicates the DID results. As seen from the Table, due to having electricity access, the total expenditure in treatment group (Tantong village) is 25.2% higher than the control group (ceteris paribus). Further, electricity access also lower the kerosene spending in treatment group by 61% than the control group (ceteris paribus). Finally, in terms expenditure other than non-food and energy, the treatment village spend 60% higher than control group (ceteris paribus). As seen in Box 1, we explored other benefit from electricity access. Electricity access in Tantong village can reduce kerosene subsidy.

It is important to note that in 2005, the Indonesian government launched the energy conversion program from kerosene to 3-kg LPG31. This program aimed to reduce subsidy on kerosene that reached 57% of the state's total petroleum product subsidy. By 2012, government could save the subsidy by more than 6.9 billion US$.32 Then the experiences from Tantong village indicates that kerosene subsidy can also be realized by increase electricity access to rural community.

In the case of Viet Nam, Khander et al, (2013) investigated causality between development outcomes (income, expenditure and chidren's education) and rural electrification. The project on rural electrification was financed by the World Bank in 2000. The study cover six regions North East, North West, North Central Coast, South Central Coast, Central Highlands, and Mekong River Delta. In 2002, about 1,262 households were surveyed and 1,120 households were surveyed in 2005. This study finds that household elctrification can rise income and expenditure by as much as 28% and 23% respectively. The study also revealed that household electrification increases school attendence by 6.3% for boys and 9.0 for girls.

Tabel 11 Estimation from DID Model

Independent variables	Outcome							
	Total spending		Food spending		Kerosene spending		Spending non-food and energy	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Period	0.051	0.056	0.102	0.063	0.074	0.071	0.048	0.088
Treatment	-0.127	0.092	-0.119	0.102	0.118	0.098	-0.299	0.143**
Impact	0.252	0.129***	-0.232	0.144	-0.609	0.141*	0.603	0.202*
Number of observation	537		531		383		536	
Adjusted R^2	0.1745		0.1804		0.089		0.125	

Note: *significant at 1%; ** significant at 5%; ***significant at 10%

31 In 2007, the Indonesian government conducted an energy conversion program from kerosene to LPG for more than 50 million household within 5 years.

32 http://www.exceptionalenergy.com/uploads/Modules/Ressources/Kerosene%20to%20LP%20Gas%20Conversion%20Programme%20in%20Indonesia.pdf, 25 February 2014

BOX 1

Simple Calculation: The benefits from reduction on kerosene consumption

We calculate how much CO2 emission can be reduced by replacing kerosene lamp with

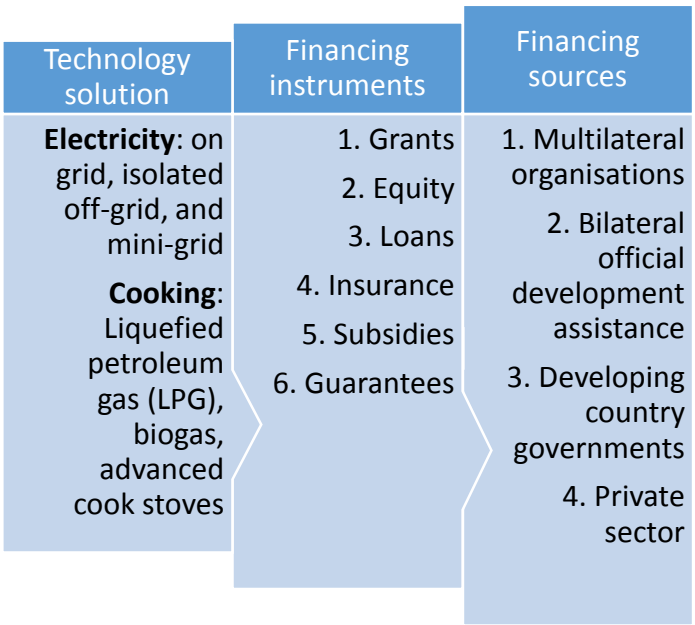
electricity from geothermal (we assume that geothermal consume small amount of fossil fuel). Between 2013 and 2014, the average kerosene spending decrease by IDR 15,100/family/month. The price of kerosene is IDR 4,000/litter. Thus one household can save kerosene by 3.8 liter per month (IDR 15,100 / IDR 4,000). In Tantong village there are 52 number of households, thus in a year Tantong village can reduce kerosene consumption by 2,371 litter (3.8 litter/month/household x 12 month x 52 households). If we convert 2,371 litter kerosene to CO2 emissions is about 5.4 ton CO2 (1 litter petrol = 2.3 kg CO2)[33]. The market price of kerosene is about IDR 11,000 per litter, then gap between economic price and subsidy price is about IDR 7,000 (IDR 11,000 – IDR 4,000). Thus total amount of subsidy that can be save is about IDR 16.6 million (USD 1,421; we assume IDR 11,600/USD). (Picture of Village Tantong, May 2013).

[33] http://www.sunearthtools.com/en/tools/CO2-emissions-calculator.php

SECTION 5

FINANCING ENERGY ACCESS FOR THE POOR

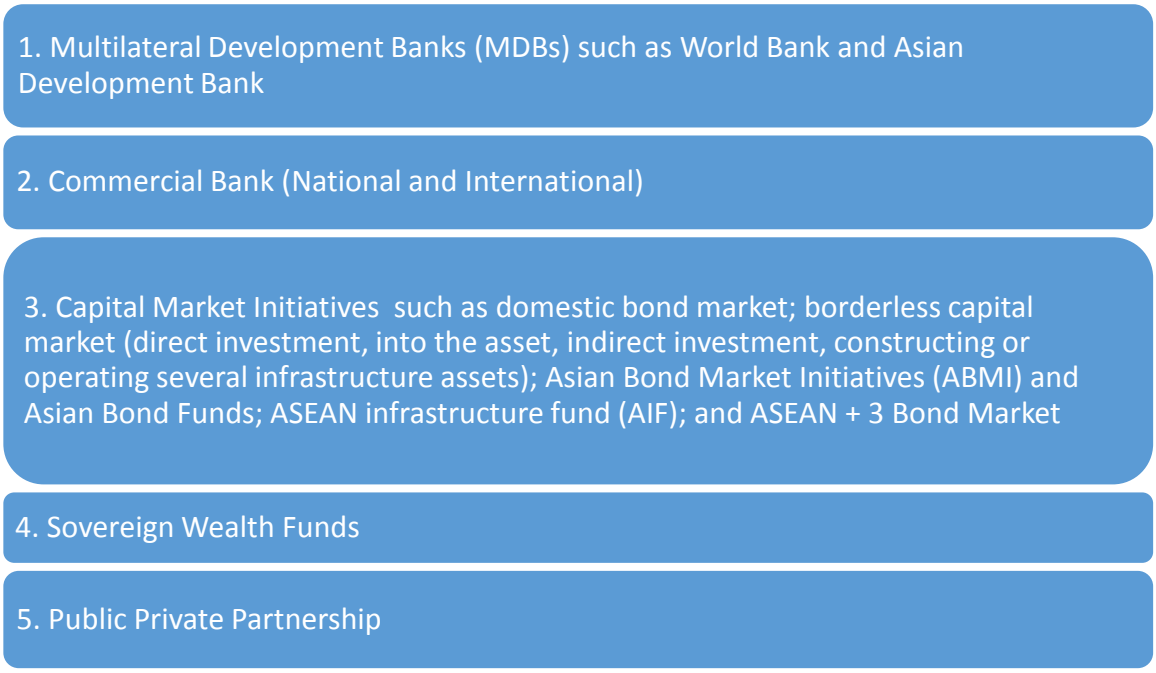
IEA (2011) provided several alternatives to finance universal energy access. Between 2010 and 2030, IEA estimated that about $ 296 billion of new investment is needed to support the universal energy access program. This investment will benefited 550 million people for electricity access and 860 million of people for clean cooking facilities. In the ASEAN between 2010 and 2020, total investment is about $ 596.1 billion (in 2008 US$ billion) and about 36.3% is allocated for power sector which is the highest among other sectors (transport, water and sanitation, and telecommunications) (Das and James, 2013).[34] As seen from Figure 8, there are six financing instruments such as grants, equity, loans, insurance, subsidies, and guarantees. Further, there are four financing sources that can be developed such as from multilateral organisation, bilateral official assistance, developing country government, and private sector. At the ASEAN level, we identify there are five channels of financing that can be promoted (see Figure 9). Even, currently, the new investment scheme such as Asian Infrastructure Investment Bank can be a new pipeline to strengthen the existing scheme.



Source: IEA (2011)

Figure 8 Financing Modern Energy Access at global scale

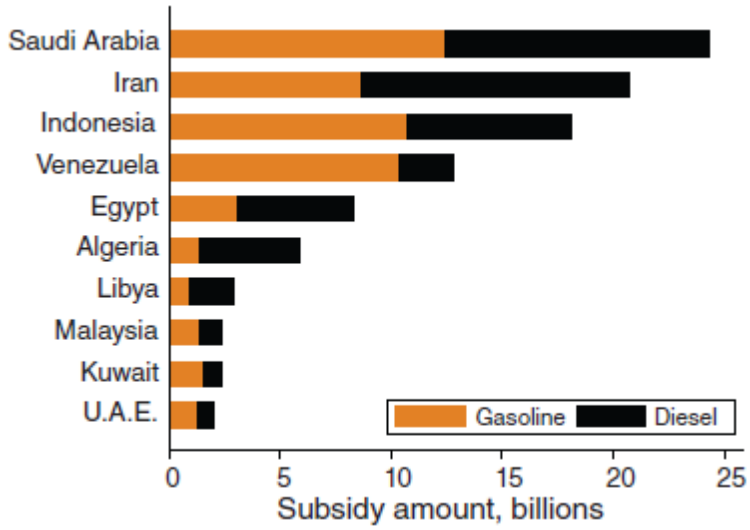
[34] http://www.iseas.edu.sg/ISEAS/upload/files/ISEAS-Perspective-2013-27-Addressing-Infrastructure-Financing-in-Asia.pdf, accessed 5 October 2014.



Source: Das and James, 2013

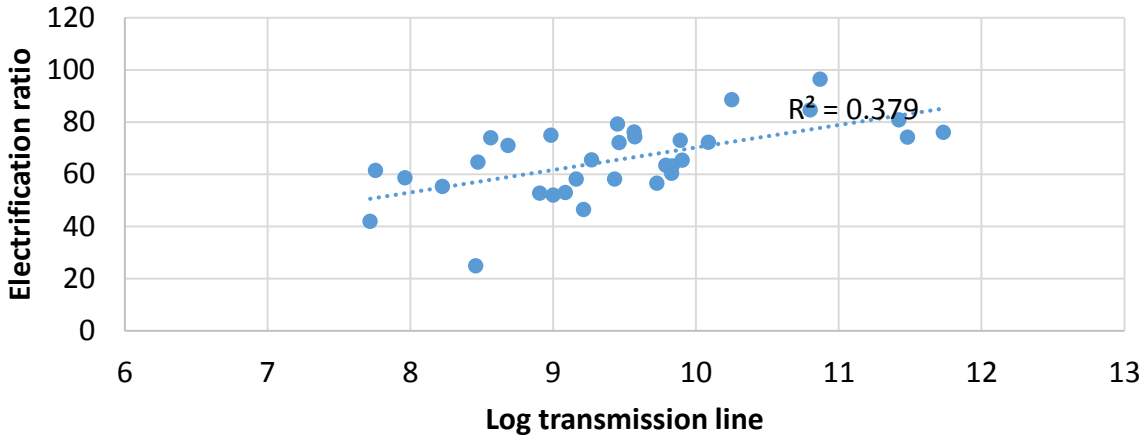
Figure 9 Source of investment funds to support energy for all in ASEAN

However, it is necessary to pick up the most suitable channel to finance universal energy access. We argue the there are five elements that need to be considers. *First* attempts to understand the technical and structural barriers. *Second* attempts to identify the potential buyers or customers. The level of income will determine a commercial-viable of the business model. *Third*, because most of government still provide subsidy on energy, promoting energy access can reduce subsidy burden by replacing the high cost energy sources such as kerosene and petrol to more affordable energy supply such as renewable energy. *Fourth*, due to decentralization, central government has substantially transfer fiscal autonomy to local governments. It is important to share responsibility between central and local government in promoting energy access. There are several participation that can be promoted such as in financing, providing land, easing tax and retribution, managing local organizations, strengthening rural cooperatives, and affirmative policy on local development banks to support energy access program. *Finally*, it is necessary to channel energy subsidy for the poor only. As seen from figure 10, Indonesia and Malaysia are among the top ten countries in the world in providing energy subsidy. Sadly, most of subsidy is enjoy by the rich. IEA (2011) indicated that less than 10% of subsidies go to lowest 20% income group. Energy subsidies should go to infrastructure development because as seen from Figure 11, lack in electricity access in Indonesia is correlated with low length of transmissions line. Furthermore, energy subsidy also has substantial social cost, as seen from Figure 12, taking into account the cost from CO2 emissions, local pollutants, traffic congestion, and accidents.



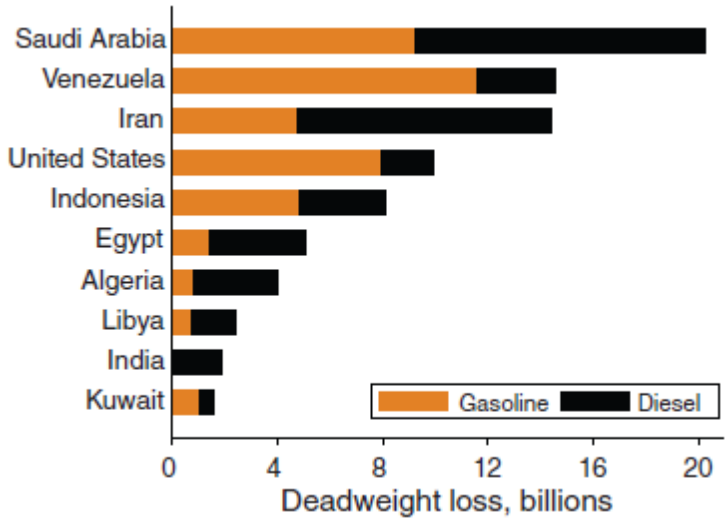
Source: Davis (2014, Figure 2)

Figure 10 Dollar Value of Fuel Subsidies in 2012, top ten countries



Source: author's calculation

Figure 11 Correlation between electrification ratio and transmission line in Indonesia 2012



Source: Davis (2014, Figure 4)

Figure 11 Deadweight loss relative to fuel social cost, top ten countries

SECTION 6

POLICY AGENDAS TO TOWARD MORE INCLUSIVE AEMI

AEMI can facilitate greater access on energy and propose energy access target such as in electrification ratio, modern access cooking fuel (LPG, city gas, and biogas), improved cook stove, and mechanical power. The area that AEMI needs to focus on promoting the rural electrification program. It is important to ensure that phase of APG and TAGP can move faster in the AEC era. However, there are limitations on APG and TAGP. Then, AEMI needs to find alternative pathway that can reach remote and isolated communities. It is necessary to implement small projects on energy access by optimizing the local endowment. AEMI can encourage the member country to develop the most cost effective way in tackling energy poverty.

A target on renewable energy (RE) could be an intermediate target for universal energy access. Currently, by 2015, ASEAN has a target on 15% renewable energy in total power installed capacity. Sambodo (2013) indicates that by 2020, it is possible for Philippines to reach 30% while for the same target can be reached in 2040. We expect by increasing target in RE, energy access for rural people will also increase. While target on renewable energy can be up graded, it is necessary to strengthen training centres on renewable energy, such as the Hydropower Competence Centre (HYCOM) as a training centre for Small-Scale Hydropower in ASEAN. However, it is necessary to expand the training program because now many rural areas also obtained benefit from solar panel, wind, and biomass. Behrens (2012) suggested that promoting renewable energy, small scale energy solution, and fitting the local needs and capacity are key areas for European Union in assisting energy access in rural areas. Promoting local small medium enterprises is important to scale up energy services and to increase developmental benefits (Behrens, 2012).

At national level, currently, financing has become the important challenge for rural electrification program. However, it seems that government needs to focus in preparing authority that can manage and synchronize rural electrification program. Experiences from Indonesia showed that PLN has capacity (administrative and technical skilled) but lack in financial capability, on the other hand, MEMR has allocation fund for rural electrification program, but lack in administrative and technical skilled. Both PLN and MEMR needs to work together for better allocation of resources. Considering the national constraints, AEMI can help the member countries in proposing the better way in developing organizational and institutional dimension. AEMI needs to create pool of public knowledge that possible for better understanding in managing the rural electrification program. For example, supporting rural electrification program needs strong support for microfinance. Supporting the micro financing link with the mega project financing needs to be connected one and other. It is possible that although electricity grid has been developed but people cannot

obtain electricity due to high connection cost. Microfinance and cooperative can provide financial assistance to those people. Reaching out credit access to rural community need substantial investment. Thus regional cooperation also need to develop the capacity of microfinance.

At the regional level, there are several financing instruments that can be promoted for infrastructure connectivity such as ABMI (Asian Bond Markets Initiatives), the Asian Bond Fund, and the Credit Guarantee and Investment Facilities, and the ASEAN infrastructure fund. However to ensure the instruments can work effectively, it is important to strengthen the regulatory framework such as on financial supervision. Before financing the infrastructure project it is important to conduct comprehensive assessments (economic, social, and ecology), and credit needs to be provided for projects that can bring more social inclusion and protecting the environment, although in terms of economic valuation is not attractive.

We argue that energy poverty is not only about economic dimension, but also it relates to politics, social, and environmental dimensions. Thus, it is necessary to prepare a guideline or criteria to ensure sustainability of energy access for the poor. Similarly, AEMI can enhance more collaboration works especially between ASEAN Economic Community Development and ASEAN Socio Cultural Community Development. It is necessary to integrate energy connectivity (physical) dimension with other dimension social, cultural, and political because one and others may not move in the same direction. Finally, by integrating the key elements of integration (politic-economic-social) the "RICH" ASEAN by 2030 can be realized.[35]

[35] RICH = Resilient, inclusive, competitive and harmonious. ADBI (2014:xxiv) said that "*resilience* refers to the capacity to handle volatilities and shocks from within or outside the region, reducing the likelihood of economic crises; *inclusiveness* refer to the need for ASEAN to achieve equitable economic development, providing opportunities through cooperation strategies that reduce income gaps within and across countries, and promoting citizen welfare; *competitiveness* requires a business environment where successful firms operate in efficient markets under effective national and regional regulation; and *harmony* stems from environmentally sustainable development and growth, with proper consideration of the need to mitigate and adopt to climate change".

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NATIONAL PERSPECTIVE – UNDERSTAND NATIONAL PERSPECTIVE IN JOINING ASEAN ENERGY MARKET INTEGRATION (AEMI)

Rashid Abdullah, Tran Van Binh, Aishah Mohd Isa, Endang Jati Mat Sahid.

Objective

The formation of an ASEAN Energy Market Integration (AEMI) can be an opportunity for an efficient energy market across this region, which may enable a better distribution of energy resources to the consumption points. The integrated energy market need to be design for a better production, conversion and end-use of the energy, where the population can have a better access to the energy supply at a better rate.

The objectives of this project paper are to:

(a) Provide an assessment of energy markets across ASEAN, which are at different stages of their development and have different structures and policies, covering the spectrum from the most liberalized markets to monopolistic structures.
(b) Review national perspectives in joining AEMI, highlight national benefits and challenges, and clarify to the governments what needs to be done and the minimum requirements for joining AEMI both at the policy and institutional levels.
(c) Formulate options for the deployment of AEMI, taking into account the ASEAN Member States (AMS) diversity and degree of preparedness. Such options include:
    - Sequencing, to allow each AMS to join AEMI at its own pace in a "progressive and incremental" approach; or
    - Gradual deployment, to allow AEMI components to be gradually deployed as all AMS are ready, through to 2030.

1. Introduction

ASEAN consists of countries with diverse cultures and economies. Some communities in this region use energy intensely while the other has limited access to energy. Some of those countries are net importer of energy for their daily need while the others has limited resources to extract the energy resources and rely heavily for external investment to exploit the resources.

The possibility to trade electricity through electical grids has been thought about some time ago and now has started to gain a higher momentum. In fact, the idea of power network interconnection has been developed since 1978 and it was approved by ASEAN's governments in 1997 in "ASEAN vision 2020". The power network interconnection has good opportunity to transport energy to a wider load centres across ASEAN nations. It will also provide a better supply security and many other economic benefits to the nation, if the network is deployed with a good market structure and mechanism.

This paper intend to cover the three main sections in order to meet its 3 objectives.

1.1 Section 1: An assessment of energy markets across ASEAN

This section will describe the country social-economic background, which are at different stages of development and have different market structures and policies. This section will cover the spectrum of the existing markets from the most liberalized markets to

monopolistic structures, as can be seen in a snapshot of the 6 countries reviewed in the next sections.

Subsequent work required to complete this section include the determination of:

- The trend and drivers in the perspectives of social, economics, technology, political & legal and environment & infrastructure.
- The opportunities areas for integrated market such as improve the local network performance for long haul energy distribution, wheeling charges, safety, investment to upgrade safety & standard and micro-grid development.
- The capabilities development in technical, legal support, research and cross-border trade, fit with skills, knowledge and production capability.
- The enablers including actions that address capability gaps and overcome barriers for successful AEMI.

This section would be concluded by the main observations on energy markets across ASEAN and identify how each may incorporate the market components for the successful AEMI.

1.2 Section 2: National perspectives in joining AEMI

This section will summarize the national perspectives in joining AEMI after carrying our literature survey and focus group discussion with key ASEAN energy market leaders. The summary would highlight:

- The national benefits and challenges
- The clarification required to the governments on what needs to be done.
- The minimum requirements for joining AEMI both at the policy and institutional levels.

1.3 Section 3: Formulate options for the deployment of AEMI

This section will first sought feeback from institution, agencies and industry to gauge the extent of policy reforms and institutional framework to support the AEMI. Therefrom, analyse the scenario to formulate the deployment options of AEMI framework and roadmap, taking into account the ASEAN Member States (AMS) diversity and degree of preparedness. The deployment options should consider:

- Diparity among the current policies.
- Sequencing, to allow each AMS to join AEMI at its own pace in a “progressive and incremental” approach. The sequence need a thorough study including the determination period of implementation.
- Gradual deployment, to allow AEMI components to be gradually deployed as all AMS are ready, through to 2030.
- Prepare a roadmap for the activities in the Trends & Drivers, Opportunities, Resources and actions over a time horizon of short, medium and long terms. The *Short Term* would spell out “where are we (ASEAN) now?”. The *Medium Term* would spell out “how can we (AEMI) get there?” and *Long Term* would spell out “where do we (ASEAN) want to be?”.

2. An Assessment of National Energy Markets.

This section is a preliminary review for Brunei, Singapore, Cambodia, Laos, and Myanmar. At the end of this section, a brief review for Vietnam, Malaysia, Thailand and Philipines is also given. This section is work in progress and need an update in the second part of the work. A logical framework approch is potentiall suitable for this purpose, which will cover headlines such as:

- Reform of Institutional Framwork.
- Create an integrated energy plan.
- Reform of energy companies.
- Formulation of National Energy Policy.
- Establish energy efficiency standars.
- Reform energy subsidies,

As a preamble, a brief summary of the country background are presented in the next few sections.

2.1 BRUNEI DARUSSALAM

Brunei Darussalam is a small country, located on the north-west coast of the island of Borneo, with a land area of 5765 square kilometres and has a 161-kilometre coastline along the South China Sea. Brunei's population is approximately 410 thousand, with more than 80% living in urban areas. Per capita gross domestic product (GDP PPP) is one of the highest in the world, at about $40492 [36].

Since discovery in 1929, oil and gas have dominated Brunei Darussalam's economy. Accordingly, the oil and gas sector is the economy's main source of revenue and constitutes around 95% of Brunei Darussalam's export earnings and around 68% of its GDP. In 2011, total primary energy supply in Brunei Darussalam was 3394 kilotonnes of oil equivalent (ktoe), of which 77% is from natural gas and the remainder from oil.

Energy in Brunei Darussalam is under the purview of the Energy Department, under the Prime Minister's Office (EDPMO). EDPMO is responsible for formulating Brunei's energy policy as well as presiding over matters related to energy. EDPMO envisions a "sustainable energy for Brunei prosperity" with a mission to "drive Brunei economy into sustainable future". Its goals include to strengthen and grow oil and gas upstream and downstream activities, ensure safe, secure, reliable and efficient supply and use of energy, and maximize economic spin-offs from energy industry. The recently released Brunei Energy White Paper

[36] APEC Energy Overview 2013 – Brunei Darussalam, http://aperc.ieej.or.jp/publications/reports/energy_overview.php

has set out ten Key Performance Indicators (KPI) towards reaching these three strategic goals for Brunei Darussalam[37].

At the operations level, energy is Brunei is mostly operated by monopoly. Upstream oil and gas development is dominated by the Brunei Shell Petroleum Co. Sdn. Bhd. (BSP), jointly owned by the Brunei Darussalam Government and the Royal Dutch/Shell Group of the Netherlands, with only one other concessionary; the French multinational oil company, Total E&P Deep Offshore B.V. For electricity, Brunei Darussalam has three power grids that are operated by two different utilities, the Department of Electrical Services (DES) and the Berakas Power Company Private Limited (BPC)[38].

Brunei is characterized by its energy subsidies; Brunei Darussalam's electricity price is ranked as the lowest among ASEAN economies at BND 0.06/kWh; half of the next lowest economies (Lao PDR, Thailand and the Philippines) and almost one-tenth of the highest ranked ASEAN economy, Myanmar[39]. This is one of the factors encouraging wasteful energy use in the Brunei which has lead to the economy becoming one of the highest energy consumer per capita in the region, as well as the fourth in the world for highest CO2 emissions on a metric ton per capita basis[40].

2.2 SINGAPORE

The Republic of Singapore is an island city-state located off the southern tip of the Malay Peninsula with a total land area of 714.3 square kilometres (km^2) and a population of 5.2 million, of which 1.4 million were non-residents. Despite its small land area and population, Singapore is one of the most highly industrialised and urbanised economies in Southeast Asia. In 2011, its gross domestic product (GDP) was USD 247.77 billion and per capita GDP was USD 47 797 (both in USD 2000 at PPP)[41].

Singapore is situated south of the Straits of Malacca on a major shipping route, well-located for the energy industry, therefore even though this ASEAN member state has negligible indigenous energy resources, it has emerged as the third largest oil and oil products trading hub in the world and a major regional supplier for oil and gas industry.

Singapore imports nearly all the fuel it requires for its energy needs, except for a small portion of energy produced from incinerating municipal waste. In 2011, the total primary energy supply was 20 587 kilotonnes of oil equivalent (ktoe), about 67% was oil and 32% gas.

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37 Brunei Energy White Paper, www.energy.gov.bn

38 APEC Energy Demand and Supply Outlook 5th Edition

39 APEC Peer Review on Energy Efficiency Policies– Brunei Darussalam, pg 40

40 The World Bank Database, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries

41 APEC Energy Overview 2013 – Singapore, http://aperc.ieej.or.jp/publications/reports/energy_overview.php

Singapore has 10,216 megawatts of thermal installed capacity and about 6000 kWp of solar photovoltaic system installations.

The Energy Market Authority (EMA), a statutory board under the Ministry of Trade and Industry, is the regulator for Singapore's electricity and gas industries, and also serves as the Power System Operator for the electricity transmission system. Both the electricity and gas industries have been liberalised—the electricity industry since 1995 and the gas industry since 2008. The gas pipeline network is owned and operated by PowerGas Ltd.

The electricity industry structure for Singapore is shown as below:

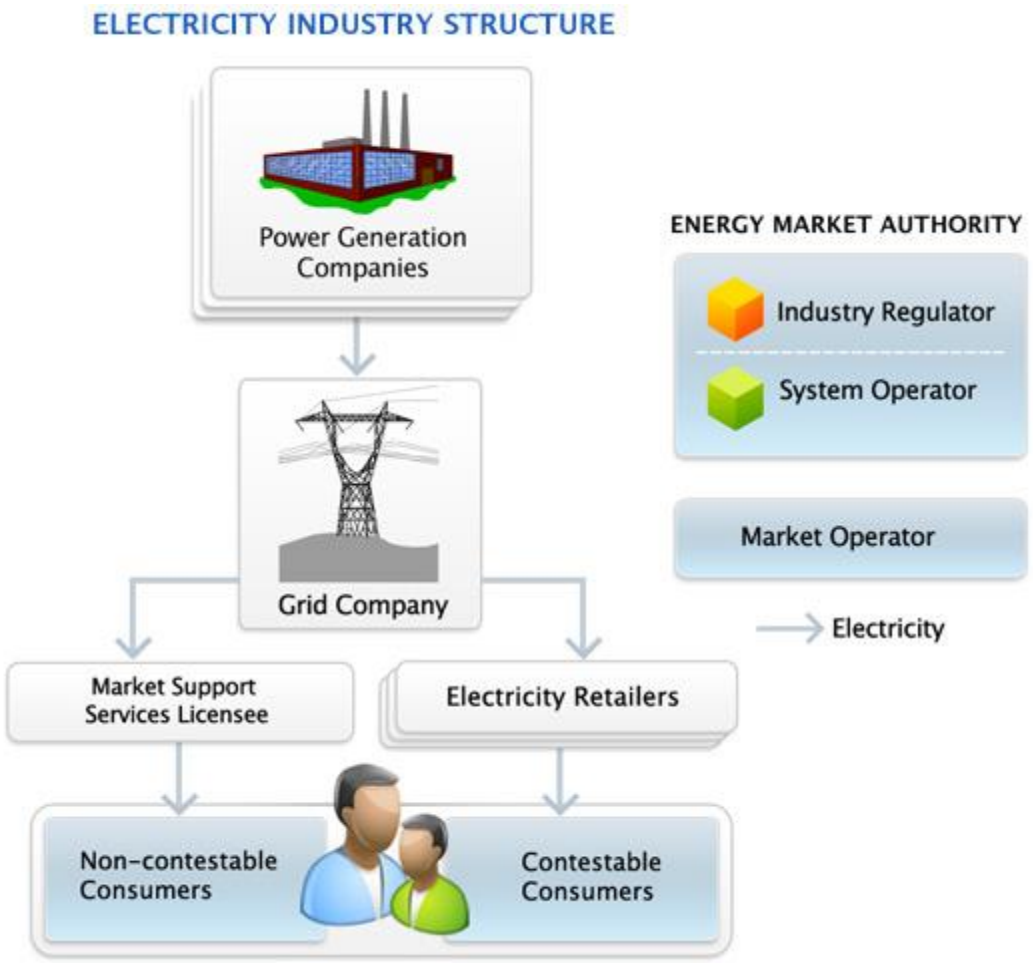


Figure: Singapore Electricity Industry Structure[42]

The National Electricity Market of Singapore (NEMS), a real-time electricity trading pool, commenced operation on 1 Jan 2003. Generation companies compete to sell electricity to the NEMS every half-hour. In addition to electricity, trading of operating reserves to maintain system security and reliability also takes place in the NEMS on a half-hourly basis. Electricity retailers buy electricity from the NEMS and offer packages to sell electricity to contestable consumers. The non-contestable consumers constitute 25% of the total

[42] http://www.ema.gov.sg/page/3/id:27/

electricity sales in Singapore and purchase their electricity from SP Services Ltd at a regulated tariff.

The gas system in Singapore consists of two separate gas pipeline networks namely, the town gas pipeline network and the natural gas pipeline network. The town gas pipeline network serves about 50% of the households in Singapore. Town gas, used mainly for cooking and water heating by domestic and commercial customers, is manufactured and retailed by City Gas Pte Ltd.

The structure for Singapore's gas industry is as below:

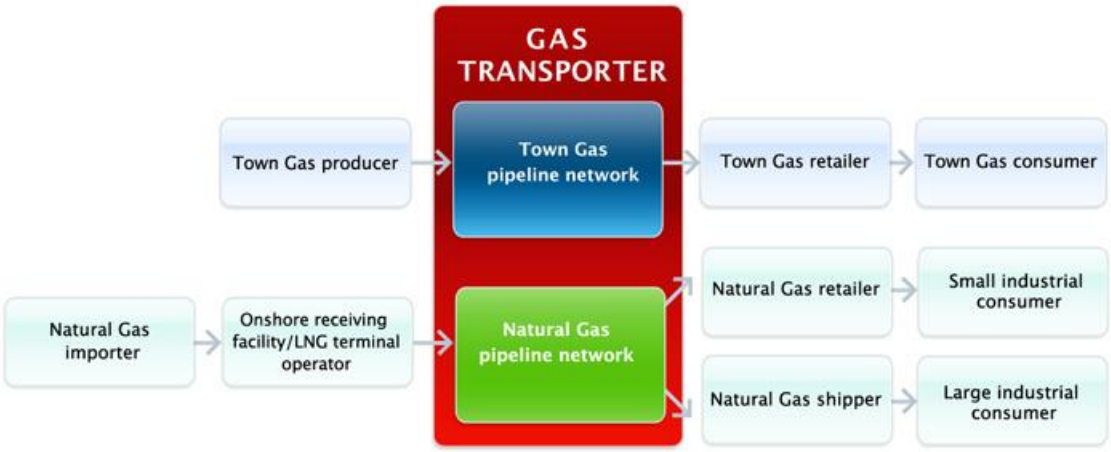


Figure: Singapore Gas Industry Structure[43]

The Singapore Government published the National Energy Policy Report in 2007. Under the policy, the economy has defined the following key energy strategies:

1. Promote competitive energy markets
2. Diversify energy supplies
3. Improve energy efficiency
4. Build an energy industry and invest in energy research and development
5. Promote greater regional and international cooperation
6. Develop a whole-of-government approach.

Energy efficiency is an integral part of Singapore's energy policy and the Energy Efficiency Programme Office (E^2PO) was established to promote and facilitate the adoption of energy efficiency in Singapore. E^2PO focuses on a sectoral approach to energy efficiency, targeting five sectors namely power generation, industry, transport, building and household.

In terms of interconnections, Singapore already has cross-border power interconnection with Malaysia and gas pipelines to fields in Indonesia and Malaysia. Given the high energy demands in the country and its negligible resources, Singapore continues to support ASEAN integration initiatives, particularly the Trans-ASEAN Gas Pipeline (TAGP) and the ASEAN

[43] http://www.ema.gov.sg/page/114/id:48/

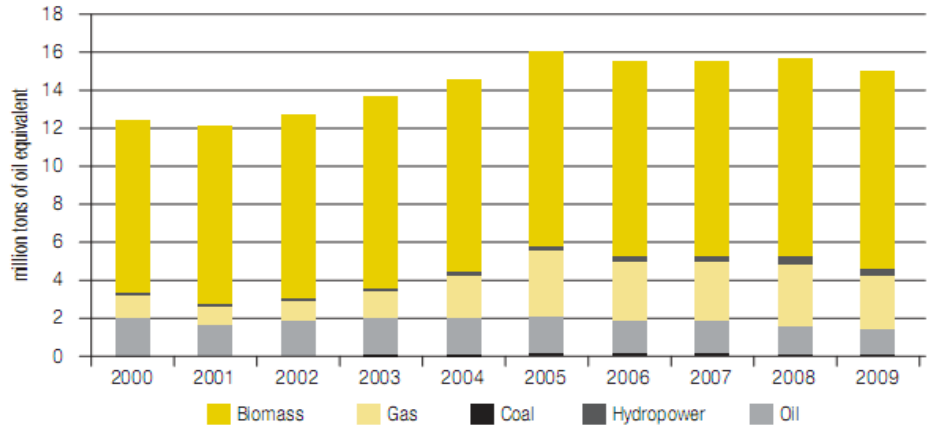
Power Grid (APG). Furthermore, given its free-market structure for both the power and gas industries, Singapore has an established institutional framework already in place to proceed with energy market integration.

2.3 MYANMAR

Myanmar is a large country, with a land area of 676,577 square kilometers (km2).Myanmar's population is approximately 60 million, with more than 70% living in rural areas. Per capita gross domestic product (GDP) is one of the lowest in Southeast Asia, at about $715[44].

Myanmar has abundant energy resources, particularly hydropower and natural gas. This country is one of the five major energy exporters in the region, particularly of natural gas. According to the latest data of IEA (2009), the total primary energy supply of Myanmar was about 15.1 million tons of oil equivalent(MTOE). The country's primary energy supply includes coal, oil, gas, hydropower, and biomass. But some two-thirds (69.9% or 10.5 MTOE) of Myanmar's energy supply was from biomass, followed by 18.2% (2.7 MTOE) from natural gas and 8.5% (1.3 MTOE) from oil. Coal and hydropower accounted for only small shares (0.9% and 2.4%, respectively) of total energy supply.

Figure 1 Myanmar's Total Primary Energy Supply, 2000–2009
(million tons of oil equivalent)



Source: International Energy Agency.

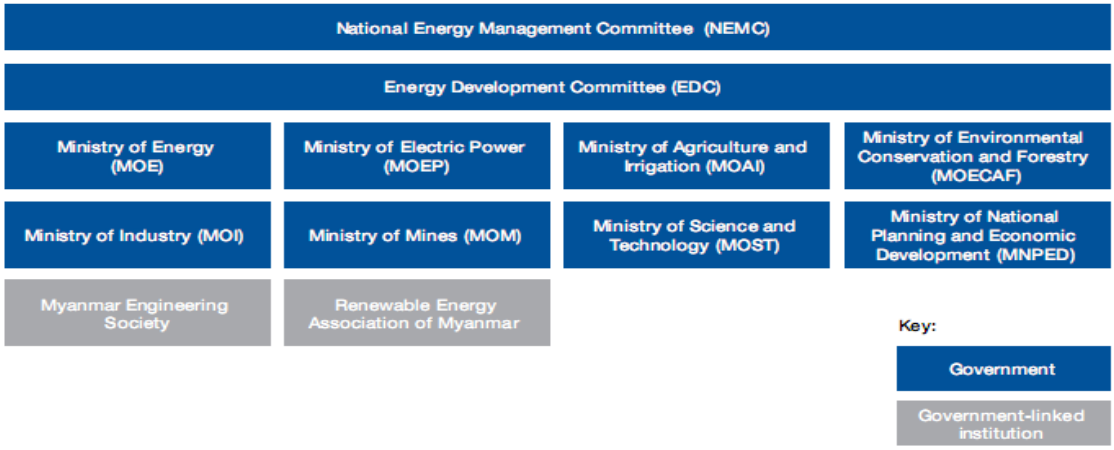
Concening the Policy framework and institutional structure, Four main goals form the basis of Myanmar's energy policy framework: (i) maintaining energy independence; (ii) promoting the wider use of new and renewable sources of energy; (iii) promoting energy eiciency and conservation; and (iv) promoting household use of alternative fuels.8 ministries in Myanmar are responsible for energy matters:

- Ministry of Energy is principally responsible for the oil and gas sector as well as for building and revising national energy policy.

[44] ADB Report (2012) : Myanmar : Energy Sector Initial Assessment

- Ministry of Electric Power (MOEP), which is responsible for hydropower, thermal power, and transmission and distribution.
- Ministry of Mines (MOM), responsible for coal production.
- Ministry of Agriculture and Irrigation (MOAI), responsible for biofuels and micro-hydropower for irrigation purposes.
- Ministry of Industry (MOI), responsible for energy efficiency.
- Ministry of Environmental Conservation and Forestry (MOECAF), which is responsible for fuel wood, climate change, and environmental standards
- Ministry of Science and Technology (MOST), responsible for research and development related to renewable energy technologies.
- Ministry of National Planning and Economic Development (MNPED)

To strengthen coordination and planning among the energy sector's institutionsin early January 2013, the National Energy Management Committee (NEMC) and an Energy Development Committee (EDC) were created. . The NEMC is a minister-level committee. It is responsible for formulating energy policy and plans in coordination with other key energy-related ministries. The EDC is broadly responsible for implementing the policies and plans of the NEMC. Institutional Framwork of Myanmar's energy sector is described in the following figure.



Source: ADB Report (2013): New Energy Architechture: Myanmar

In the operation level, energy system of Myanmar is organised complicatedly. There are three state-owned enterprises in Energy Ministry take the responsibility for oil exploration and mining (Myanmar Oil and Gas Enterprise – MOGE), oil refiner (Myanmar Petrochemical Enterprise - MPE) and petroleum products distribution (Myanmar Petroleum Products Enterprise - MPPE). Similarly, there are three enterprises in power sector take responsibility for electricity production, transmission and distribution for different regions of Myanmar.

According to evaluation of Asian Development Bank (ADB), some issues faced by Myanmar in energy sector are:

- Poor and inadequate infrastructure, institutional, and human resources capacity toprovide reliable and sustainable energy resources.
- Lack of coordination and poorlong-term integrated energy planning and development
- Ineffective energy institutions and lack of capability and capacity of staff

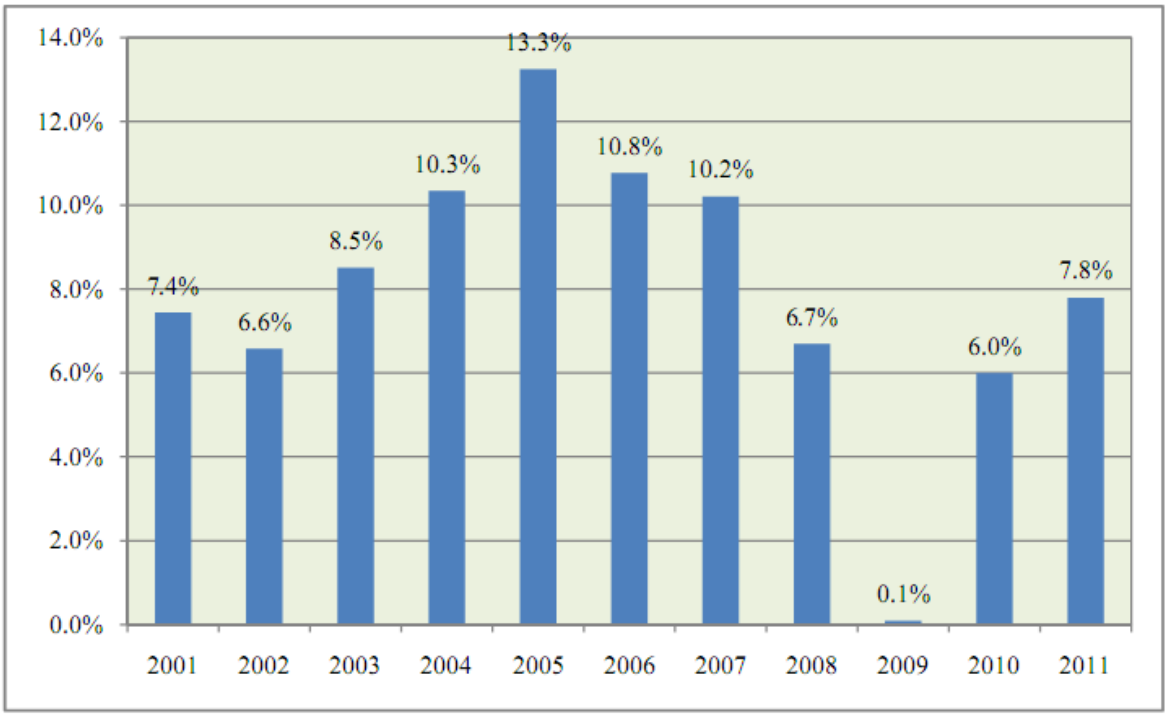
- Limited investment in energysector
- Lack of sector support forsocial, environmental, and economic sustainability
- There are some issues derived from above analyses need to handle in the integration:
- Create an integrated energy plan
- Establish institutions and frameworks to deliver the Integrated Energy Plan
- Reform energy subsidies
- Establish energy efficiency standards and regulations
- Develop a clear vision and legal framework for private investment
- Create an investment framework and reform state enterprises to expand domestic energy supply

2.4 CAMBODIA:

The Kingdom of Cambodia is located in the tropical region of Southeast Asia in the Lower Mekong region, with 800 Km border with Thailand in the west, 450 Km with Lao PDR in the north, 1,250 Km with Viet Nam in the east and a coastline of 440 Km long. Cambodia is a member of the Association of the Southeast Asian Nations (ASEAN) and Greater Mekong Sub-region(GMS).

In the last decade, Cambodia enjoyed exceptionally high rates of economic growth. The economy grew 8.0% per annum on average during 2001-2010. The economy experienced the highest growth rate at 13.3 percent in 2005. Later, it declined from6.7% in 2008 to 0.1% in 2009 due to global economic downturn in 2008/2009 because Cambodia's major economic sectors such as garment, tourism, and construction dramatically contracted. Real GDP growth started to edge up again to around 6.0% in 2010 and was estimated to realize a rate of 7.8% in 2011 (Khin, et al. 2012).

Cambodia's Real GDP Growth Rate over 2001-2011



Source: Data compiled from NIS and EIC estimate (2011).

Energy Resources and Production

Cambodia has substantial hydropower resources and indications of oil, gas an d coal deposits; there is an urgent needs to assess the extent of these energy resources. Other renewable energy sources are available and their use is being started, such as biomass, solar and mini-hydro. The problem is to diversify the sources of supply, and intensify the exploration for natural gas and the development of renewable energy resources.

Energy Sector Institutional Framework

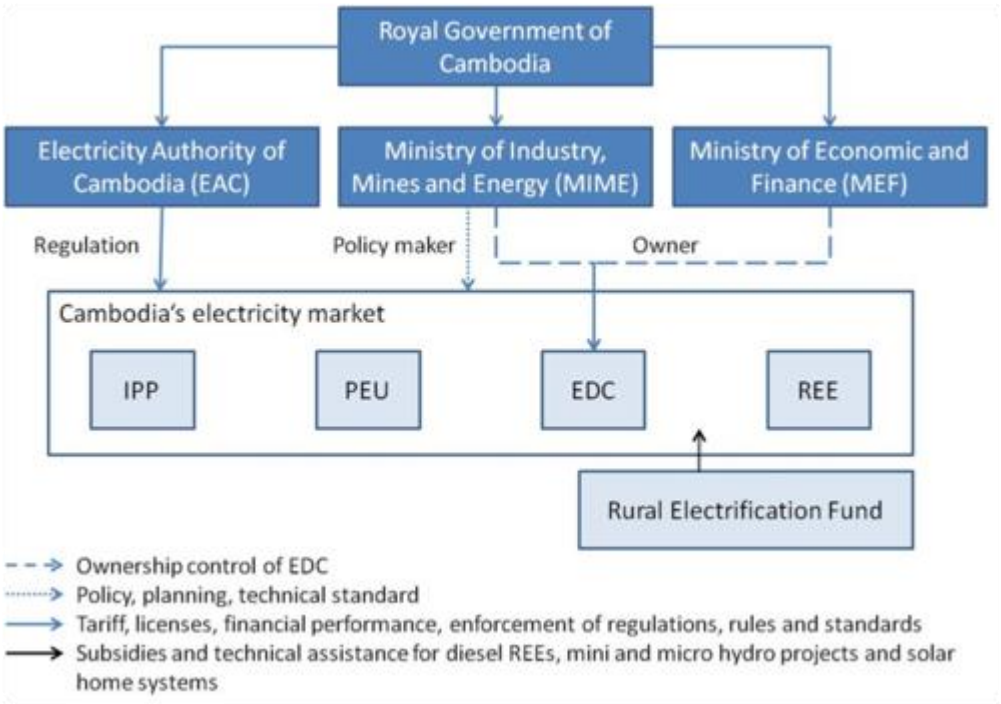
The main institutions involving in the Energy sector in Cambodia are the Ministry of Industry, Mines and Energy (MIME), Ministry of Economic and Finance (MEF), Electricité du Cambodge (EDC), the Electricity Authority of Cambodia (EAC), Provincial Electricity Utilities and private sector. EDC is owned and controlled by MIME and MEF.

a. Ministry of Industry, Mines and Energy: MIME has overall responsibility for policy formulation, strategic planning and Technical Standards. However, the oil and gas sector is handled by the Cambodian National Petroleum Authority (CNPA).As more specific responsibilities, the Ministry of Industry, Mines and Energy shall be responsible for setting and administrating the government policies, strategies and planning in the power sector.
b. General Directorate of Energy (MIME): The main objectives of energy policy (1995) cover the provision of adequate supplies of least cost energy for households, and to all sectors of the Cambodian economy, whilst minimizing environmental effects. To assist national development, energy planners must consider all economic,

financial, environmental and social factors. The Department of Energy Development is the principal government agency for the energy sector planning and consumption and data collection, and h as to work closely with other governmental departments.

c. Regulatory Authority (EAC): The Electricity Authority of Cambodia is the Regulatory Agency that was established according to the Electricity Law, and is becoming operational. The EAC performs the following duties: licensing, tariff setting, solving the disputes between producers/suppliers and consumers, setting up the uniform accounting standards, enforcing the regulation, review of planning and financing performance.
d. Ministry of Environment: The Ministry of Environment, an institution established in November 1993, after the National election, has a broad mandate to protect the natural resources of the country and to prevent environmental degradation, responsible for the sustainable management of national parks and protected areas. The long range goals of the ministry of environment include:
    - Management and protection of natural resources to ensure sustainable environmental development.
    - Strengthening cooperation with relevant ministries to control and improve environmental quality
    - Control and review of the environmental impact assessment (EIA) of all development projects within the country.

Overview of the institutional set-up of Cambodia's electricity sector



Some issues appeared in the energy market integration of Cambodia are:

- **Poor institutional synergies**: Cambodia, relatively a young democracy, is still in the process of building its institutions and the infrastructure is still remains poor.

- **Lack of policy and legal framework**: The legal environment in Cambodia is not yet strong, with many of the laws still being drafted.The legal and policy framework needs to be put in place.

2.5 LAOS

The Laos PDR is a country rich in natural resources. The population is only 6.4 million peoples. The key economic indicators for 2011 is in the following table:

Indicator	Unit	Value
Land area	km^2	236,800
Population	million	6.4
GDP	billion KN	64,960
GDP per capita	$	1,272

GDP = gross domestic product, km^2 = square kilometer.

Source: ADB. 2011. *Key Indicators for Asia and the Pacific*. Manila.

The data of energy resources, energy production and consumption of Lao in 2012 is:

Indicator	Unit	Value
Final energy consumption per capita	kgoe	366
Total electricity consumption	GWh	2,400
Total installed capacity	MW	2,570
Electrification rate	%	78.5
Per capita electricity consumption	kWh	376
Hydropower potential	MW	20,000
Coal resource	million tons	700
Renewable potential	MW (eq)	500

GWh = gigawatt-hour, kgoe = kilogram of oil equivalent, km^2 = square kilometer, kWh = kilowatt-hour, MW = megawatt.

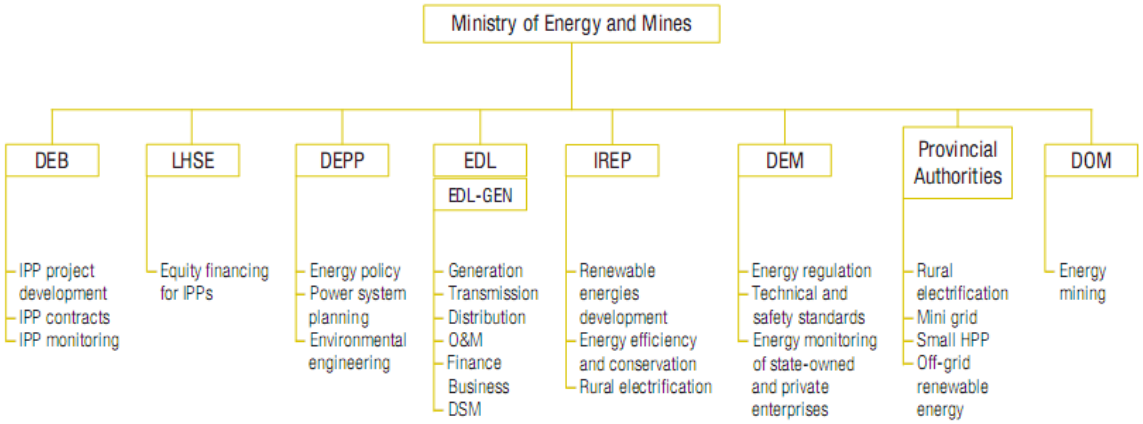
Source: Asian Development Bank (ADB).

The management of energy-related activities in the Lao PDR is mainly the responsibility of the Ministry of Energy and Mines (MEM), EDL, and Lao Holding State Enterprise (LHSE), with support from the Ministry of Finance and the Ministry of Natural Resources and the Environment (MONRE).

- The MEM is responsible for energy policy and overall strategic guidance, as well as management of sector development. In 2011, with technical assistance from ADB and other development partners, energy management in MEM is re-ogranised as follow:
  - ***Department of Energy Business***: Formerly the Department of Energy Promotion and Development, the Department of Energy Businesses (DEB) is in charge of private sector investments in the power sector.

- ***Department of Energy Policy and Planning***: The main responsibility of the Department of Energy Policy and Planning (DEPP) is formulating national energy policies and plans.
- **Department of Energy Management**: This newly created department is in charge of drafting energy-related laws, regulations, guidelines, and technical and safety standards.
- **Institute of Renewable Energy Promotion**: Equivalent to a department, the IREP is mainly responsible for promoting renewable energy and conservation by implementing the Renewable Energy Policy

- Electricité du Laos. EDL is a vertically integrated electricity utility and it performs the functions of generation, transmission, distribution, and services to all electricity customers served by the national grid in the Lao PDR.
- Lao Holdings State Enterprise. LHSE was established in February 2005 by the Government of the Lao PDR to facilitate investment in energy generation.



DEB = Department of Energy Business, DEM = Department of Energy Management, DEPP = Department of Energy Policy and Planning, DOM = Department of Mines, DSM = demand-side management, EDL = Electricité du Laos, EDL-GEN = EDL Generation Public Company, HPP = hydropower plant, IPP = independent power producer, IREP = Institute of Renewable Energy Promotion, LHSE = Lao Holding State Enterprise, O&M = operation and maintenance.

Source: Ministry of Energy and Mines.

Some issues appeared in the energy market integration of Lao are:

- The Lao PDR lacks a comprehensive national energy policy, setting out a systematic approach to energy planning, policy formulation, and sector development. Formulation of a national energy policy is urgently needed and is a priority for the MEM.
- The MEM's capacity to promote renewable energy and energy efciency is limited.

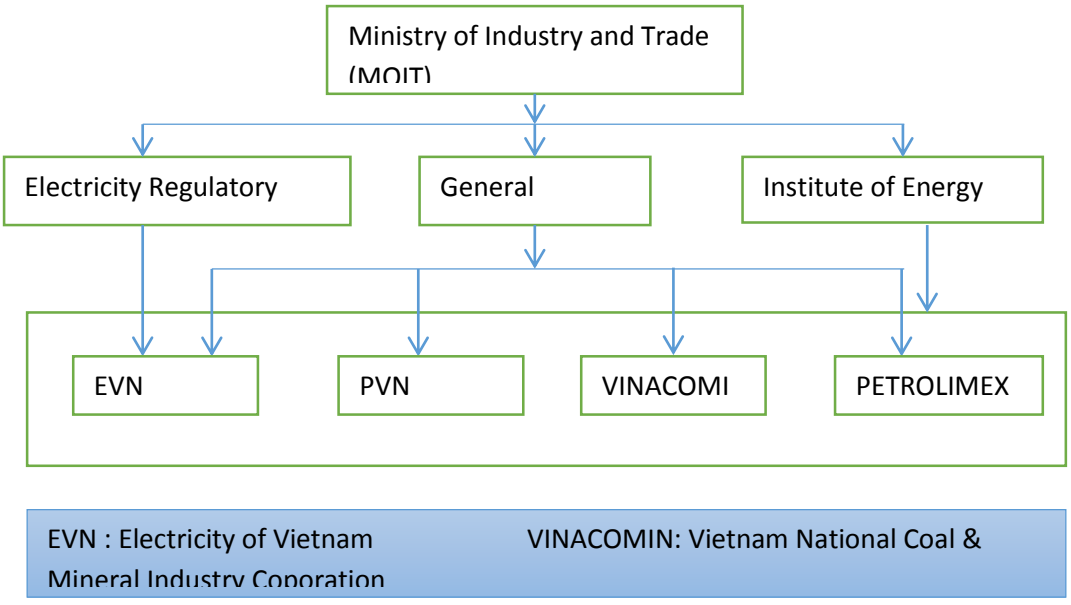
2.6 VIETNAM

General Information in 2010 (Prel)

Area	331150,4	Km2
Average population	88.927,7	Thous.pers
Population density	262,5	Person/km2
Number of Provinces	63	
Number of Households	22.673.159	
Average size of households	3,83	Persons
GDP(1994 Price)	551.609	Bill.dongs
GDP growth	6,78	%/year
GDP per capital	6.345,6	1000 VNdongs-1994/capital
Exchange rate	1USD=18.628 VNdongs	

The Ministry of Industry and Trade (MOIT) is the principal department of government for policy development in the energy sector. It is responsible for the review and submission of laws, regulations, master plans, and major investment projects for the Prime Minister's approval. Such materials generally need review and approval from the Ministry of Planning and Investment (MPI) and the Prime Minister's office, but MOIT is the initiator.

Present governmental management of energy system of Vietnam is described in the following figure:



EVN : Electricity of Vietnam VINACOMIN: Vietnam National Coal & Mineral Industry Coporation

On the up-stream, there governmental economic groups (EVN, PVN and VNACOMIN) are responsible for electricity, coal, oil and gas production. Vietnam is also deploying the pilot competitive generation in power market. However, EVN is the single buyer and the sole player in the power transmission and distribution. PVN, Vinacomin and other Independent Power Productions take part in the electricity generation. The Electricity Regulatory Authority of Vietnam (ERAV) is in charge to regulate the power market. PETROLOMEX is the other state-owned enterprise under the administration of the Ministry of Trade and Industry. The enterprise plays a key role in the distribution of petroleum products.

Some energy indicators of Vietnam:

Indicators	2006	2007	2008	2009	2010
Population (mill. persons)	83.3	84.2	85.1	86.0	86.9
GDP at 1994 prices (bill.VND)	425373	461344	490458	516566	551609
Total Energy Supply (ktoe)	45881	49670	53362	58370	64147
Total final Energy consumption (ktoe)	37449	40345	43277	46774	50547
Total final commercial Energy Consumption (ktoe)	22701	25619	28567	32070	35852
Total Electricity Consumption (ktoe)	4630	5275	5834	6614	7476
Total final commercial Energy Consumption per Capita (kgoe/capita)	272	304	336	373	412

Source: Energy Institute – Vietnam

2.7 PHILIPHINES

Philiphines has a land area of 298,170 square kilometers with an estimated population of 94.2 millions people in July 2014. Its key indicators in 2011 are GDP at current prices of 224.8 billion USD, GDP per capita of 2,386 USD, total primary energy supply was 40.5 MTOE, electricity consumption was 56.1 TWH, power generation capacity was 13.3 million kW (2010 figures), percapita primary energy supply was 0.429 TOE per person, energy intensity per GDP was 0.280 TOE/thousand USD, per capital electricity consumption was 596 kWh per person and electrification rate was 79% (2012 figures)[45].

[45] Prof. Rowaldo del Mundo, 1st ERIN meeting, Brunei, Sep 2014.

Indonesia has a land area of 1,811,569 square kilometers with an estimated population in July 2014 of 253,609,643 people[46]. It is highly dependence on fossil energy, in 2012, of which 49.7% oil, 24.5% coal, 201% gas and 5.7% renewable energy. In the same year, Indonesia export of energy are 82% coal, 42% gas and 37% crude oil. It electrification rate is 81%. It energy capacity has limited and it has started fast track program utilizing coal, geothermal, hydropower and gas pump.[47]

Malaysia has a land area of 328,657 square kilometers with an estimated population in July 2014 of 30,073,353 people (ref: www.cia.gov assesed on 28/10/14). It borders with neighbours Brunei 381 kilometers, Indonesia 1,782 kilometers and Thailand 506 kilometers. It final energy demand per capita in 2011 was 1.5 tonne of oil equivalent per capita and its primary energy intensity was 112 tonne of oil equivalent per GDP (RM Million) at 2005 prices. The country electricity demand was 3,708 kWh per capita. The primary energy intensity has increased from 99 tonnes of oil equivalent/RM Million in 1990 to 118 tonnes of oil equivalent /RM Million in 2000. This increase was attributed to the shift in the economic structure from an agriculture-based economy to manufacturing and service-based economy[48].

2.8 THAILAND

Thailand has a land area of 510,890 square kilometers with an estimated population in July 2014 of 67,741,401 people (ref: www.cia.gov assesed on 28/10/14). It borders with neighbours Burma 1,800 kilometers, Cambodia 803 kilometers, Laos 1,754 kilometers and Malaysia 506 kilometers. Thailand is highly dependence on natural gas for electric power generation. In 2013, Thai government has implemented feed-in-tariff to promote solar rooftop 100 MW for each communities and commercial/industry. The application for implementation in the former was much less than the set quota but in the latter case, the application exceed the quota. Among the barrier on solar PV implementation, found in a survey, was the inconsistent policy framework and high initial cost[49].

The present situation of Institutional, Energy Industry Struture and Energy Policy issues in Vietnam is presented in Appendixes.

Although Vietnam is energy export country, with the energy demand rose 12 to 14 percent per year, Vietnam would become a net energy importer around 2017 or even earlier. Many challenges faced by Vietnam are:

- Each energy sector (coal, oil, gas sector) has its own Mater Plan but the plans are exclusive. There is a need of creating an integrated energy plan.

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46 www.cia.gov assesed on 28th Oct 2014

47 Rachmi A, 1st ERIN meeting, Brunei, Sep 2014

48 Peninsular Malaysia Electricity Supply Industry Outlook 2013.

49 Dr. Dawan Wiwattanadate, 1st ERIN meeting, Brunei, Sep 2014.

- Energy sector in Vietnam is controlled by state-owned companies. The interference of Government causes barriers for set up and operation process of energy market.
- Activities relevant to energy conservation and saving are serious considered. Vietnam needs to establish Energy Efficiency Standards for production sectors.
- There is a need of mitigation energy subsidy policies.

Although there is energy policy, but:

- Each country has Master plan for individual energy sectors but there is a Lack of consideration of links among coal, oil, gas and electricity sectors.
- Unclear discussion on logic behind energy policy objectives and strategies
- There is a huge difference among countries in energy system management models.
- Energy trading market has not really formed. There is an existence of interference of government, especially in energy subsidy.
- Although there is a different of resources, development levels, four countries is evaluated that the weakness is energy system infrastructure.
  Energy efficiency is low in both production and consumption. All four countries have demand in building product standard, promoting activities relevant to energy conservation and efficiency at national level.

According to evaluation of Asian Development Bank (ADB), some issues faced by Myanmar in energy sector are:

- Poor and inadequate infrastructure, institutional, and human resources capacity toprovide reliable and sustainable energy resources.
- Lack of coordination and poorlong-term integrated energy planning and development
- Ineffective energy institutions and lack of capability and capacity of staff
- Limited investment in energysector
- Lack of sector support forsocial, environmental, and economic sustainability

Another example of resource rich country is Cambodia, who has a substantial hydropower resources and possibly oil, gas and coal deposits. The country also has potential renewable energy sources such as biomass, solar and mini-hydro. The main institutions involving in the Energy sector in Cambodia are the Ministry of Industry, Mines and Energy (MIME), Ministry of Economic and Finance (MEF), Electricité du Cambodge (EDC), the Electricity Authority of Cambodia (EAC), Provincial Electricity Utilities and private sector. EDC is owned and controlled by MIME and MEF. Some issues appeared in the energy market integration of Cambodia are:

- Poor institutional synergies: Cambodia, relatively a young democracy, is still in the process of building its institutions and the infrastructure is still remains poor.
- Lack of policy and legal framework: The legal environment in Cambodia is not yet strong, with many of the laws still being drafted.The legal and policy framework needs to be put in place.

In Laos, the management of energy-related activities is the responsibility of the Ministry of Energy and Mines (MEM), EDL, and Lao Holding State Enterprise (LHSE), with support from the Ministry of Finance and the Ministry of Natural Resources and the Environment (MONRE). The MEM is responsible for energy policy and overall strategic guidance, as well as management of sector development.

In Vietnam, The Ministry of Industry and Trade (MOIT) is the principal department of government for policy development in the energy sector. It is responsible for the review and submission of laws, regulations, master plans, and major investment projects for the Prime Minister's approval. Such materials generally need review and approval from the Ministry of Planning and Investment (MPI) and the Prime Minister's office, but MOIT is the initiator.

On the up-stream, there governmental economic groups (EVN, PVN and VNACOMIN) are responsible for electricity, coal, oil and gas production. Vietnam is also deploying the pilot competitive generation in power market. However, EVN is the single buyer and the sole player in the power transmission and distribution. PVN, Vinacomin and other Independent Power Productions take part in the electricity generation. The Electricity Regulatory Authority of Vietnam (ERAV) is in charge to regulate the power market. PETROLOMEX is the other state-owned enterprise under the administration of the Ministry of Trade and Industry. The enterprise plays a key role in the distribution of petroleum products.

Although Vietnam is energy export country, with the energy demand rose 12 to 14 percent per year, Vietnam would become a net energy importer around 2017 or even earlier. Many challenges faced by Vietnam are:

Each energy sector (coal, oil, gas sector) has its own Mater Plan but the plans are exclusive. There is a need of creating an integrated energy plan.

Energy sector in Vietnam is controlled by state-owned companies. The interference of Government causes barriers for set up and operation process of energy market.

Activities relevant to energy conservation and saving are serious considered. Vietnam needs to establish Energy Efficiency Standards for production sectors.

There is a need of mitigation energy subsidy policies.

Although there is energy policy, but:

- Each country has Master plan for individual energy sectors but there is a Lack of consideration of links among coal, oil, gas and electricity sectors.
- Unclear discussion on logic behind energy policy objectives and strategies
- There is a huge difference among countries in energy system management models.
- Energy trading market has not really formed. There is an existence of interference of government, especially in energy subsidy.
- Although there is a different of resources, development levels, four countries is evaluated that the weakness is energy system infrastructure.
- Energy efficiency is low in both production and consumption. All four countries have demand in building product standard, promoting activities relevant to energy conservation and efficiency at national level.

3. Review National Perspectives in Joining AEMI

To report in second part of this project.

4. Formulation of the recommendation on AEMI implementation

To report in second part of this project.

A brief review as a background material for discussion during brainstorming session.

4.1 Power Network Interconnection

The aim of setting up a Power Network Interconnection among AMS is to enhance energy security system for ASEAN region by common power network, in which the members can share the ability of supply, transmission. Therefore, the lack of electricity supply of one member can be fulfilled by the others through electricity trading.

The interconnection among 10 countries in ASEAN will bring a huge economical efficiency for both investors and users. It will also promote the development of power market, investment and ensure energy security for each country. It plays an important role in the process of meeting high energy demand during ASEAN modernization as the primary energy demand of the region are expected to increase approximately 3 times the from 2005 to 2030.

In the 27th ASEAN energy ministers Meeting held in Myanmar, The ASEAN Plan of Action for Energy Cooperation (APAEC) 2010 – 2015 was approved with the main content: *ASEAN Power Grid (*APG*); Trans-ASEAN Gas Pipeline (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 the ASEAN Energy Cooperation*, including:* ASEAN Council on Petroleum*(ASCOPE); ASEAN Power Utilities/Authorities (HAPUA);* **ASEAN Forum on Coal***(AFOC);* **Energy Efficiency and Coservation Sub-Sector Network***(EE&CSSN);* **Renewable Energy Sub-Sector Network***(RE-SSN);* Regional Energy Policy and Planning Sub-sector Network*(REPP-SSN) and;* **Nuclear Energy Cooperation Sub-Sector Network***(NEC SSN).*

However, from concept to reality is a long way with difficulties, constraints, and challengers that countries should overcome. The road to developing TAGP, ASEAN Power Grid, and other energy cooperation projects, however, has been quite slow, due to financial constraints, technical difficulties, differences in the industry regulatory frameworks among ASEAN countries, and some other factors.

4.2 Tranporting and Delivery Energy Products

Transporting and delivering gas, electricity, renewable energy and energy efficicient products from one country to another are similar to the trading of commodities. So they will be subject to national, regional and/or international regulations. These could be pipeline permits, territorial boundaries, other licenses, taxation, quality standards, environment regulations etc.

Each country has its own power market, tariff system that is different from others. Besides, the difference among technical standards of power system is also a barrier. In fact, the power grid of each ASEAN country is far different, while power transmission of ASEAN 6 is better, the ASEAN 4 is almost backward and unstable.

For a cross-border power project, technical standards are essential throughout both the construction and operation if it is to maintain operational integrity. Differences in standards and procedures may contribute to the unreliability of interconnected power grids. For example: unstable voltage, frequent power outages and unguaranteed power level at 220kV could seriously affect the overall power grid.

4.3 Tax and subsidy

Another challenger is tax construction. Each country has its own market design. Energy subsidy is applied in most of countries in the region. The reduction of subsidy process is faced with negative reaction from public opinion. Recently, there are the demonstrations in Indonesia when the Congress supports government in process of raising petroleum products price by 33 percent. Some countries have independent power operators, but in some countries, the power sector still rely on subsidies, that lead to electricity price in these countries does not reflect the actual price. Therefore, some countries have to adjust power price before connecting to the region grid.

There is a need of investment for infrastructure development, technical capacity enhancement. But to promote Energy Market Integration (EMI), it is necessary to introduce competition in domestic energy markets, which often requires the restructuring of vertically integrated energy utilities into separate functional companies.

4.4 Market organization, mechanism and politics

The monopoly status of the national energy companies in most of the ASEAN countries is a major obstacle in attracting private investment and foreign investment for energy infrastructure development in the region. Besides, a contradiction of the few countries in the ASEAN region, such as border conflict between Thailand and Cambodia or the debate between Vietnam, Cambodia and Laos, Thailand in the construction of Xayaburi[50] hydropower around the impact of hydroelectric dams to the lower Mekong environment, is the obstacle in the negotiation process of establishing cooperation among these countries. These conflicts will delay the whole process of forming the ASEAN power grid.

Political and national independency (security) issues – including relevant bilateral and regional territorial disputes between ASEAN and ASEAN+3:

Asean is the region relatively rich in energy resources, even though only a few countries are genuinely self-sufficient. Oil, gas, coal, hydro, geothermal and biomass are available in

[50] Nhina Le (2013): Xayaburi and the Mekong Critical Point: Over-Damming the Shared River and Bigger Threats to the Shared Future. University of San Francisco's Peace Review, Vol. 25 (2).

Indonesia. There are oil, gas and coal reserves in Malaysia and Thailand. Brunei has quite large reserves for oil and gas. There are potential reserves of oil, gas and hydro in Myanmar, while oil and hydro are found in Cambodia. Laos has quite large hydro potential. Vietnam has oil, gas, coal, hydro and biomass; whereas the Philippines has oil, gas, coal, hydro and geothermal. Singapore has no indigenous energy resources, but the country is very important as a major processing center for oil and petrochemical, and oil bunkers.

Energy cooperation within ASEAN is challenged by its individual member's energy priorities, bilateral trade partners and development dynamics beyond the borders. Indonesia delivers natural gas through a pipeline to Singapore and Malaysia. Laos sends electricity to Thailand, Vietnam and Cambodia, while Cambodia also imports electricity from Thailand and Vietnam. A joint development area for energy resources development was established between Malaysia and Thailand. ASEAN crude oil is sent to Singapore for refining and parts of the products are sent back to the producing countries.

A typical example of bilateral and regional cooperation in ASEAN in the field energy is grid connection among Greater Mekong Subregion countries (GMS countries). In 2000, with the support of ADB[51], Master Plan on Power Interconnection has been developed for the period 2000 to 2020 and then adjusted in 2010 within the framework of the Technical Assistance Project TA 6440-REG[52].

The proposal to develop power trade in the GMS is anchored on the principle that integration should proceed in four well-defined stages, as follows:

Stage 1: Bilateral cross-border connections through power purchase agreements (PPAs);

Stage 2: Grid-to-grid power trading between any pair of GMS countries, eventually using transmission facilities of a third regional country;

Stage 3: Development of transmission links dedicated to cross-border trading; and

Stage 4: Most of the GMS countries have moved to multiple sellers–buyers regulatory frameworks, so a wholly competitive regional market can be implemented.

Grid connection process among the countries in the GMS is promoted from high-demand countries such as Thailand, Vietnam through investment projects of building power plants (mainly hydropower exploitation) together with the power purchase agreement among the countries.

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

[52] ADB. 2007. Technical Assistance for Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion. Manila (TA 6440-REG, $5 million, approved on 19 December 2007, 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

Asean + 3 energy cooperation emerged from an agreement emong Asean + 3 energy ministers at the eighth International Energy Forum (dialogue between energy producing and consuming countries) in Osaka in September 2002.

In the recent meeting of ASEAN+3 energy ministers in the Kingdom of Cambodia on 12 September 2012, ASEAN+3 energy cooperation focuses on the fields: civilian nuclear energy, oil stockpiling, development of the region's gas/LPG market, coal and clean coal technologies.

To the field of Oil Market and Natural Gas, ASEAN+3 countries agree on setting up the channel to share the market information (support for the Joint Organisations Data Initiative - JODI) and and encouraging private sector participation in the natural gas sector.

On oil stockpiling, the +3 countries focus on supporting activities: (i) continuing studies and development of the Oil Stockpiling Road Map (OSRM); (ii) collecting annual information on the progress of each country's oil stockpiling activities; and (iii) organising workshops to promote the implementation of each ASEAN country's OSRM.

In the field of nuclear energy for civil purposes, Korea and Japan are supporting the projects: Development of Human Resources for Civilian Nuclear Energy and Center of Integrated Support for Nuclear Non-Proliferation and Nuclear Security.

On the clean coal technologies, countries in Asean + 3 agree to concentrate on developing cooperation programmes such as the upgrading of low rank coal technologies, carbon capture and storage (CCS), coal gasification and coal liquefaction.

4.5 Market for energy reserve

Associated with the energy market is the need for spinning reserve to ensure supply availability and mitigate risk. There were many market models in operation since the privatation of the electricity market era. Examples by various continents is shown in Table 1[53].

[53] Nurul Farhana, Rashid Abdullah, Noor Miza, 2nd National Graduate Conference 2013, Putrajaya, Malaysia

Table 1 – Example of Spinning Reserve Examples.

Continents	Spinning Reserve Practiced by
Oceana	Australia (AEMO)
	New Zealand (Transpower)
U.S.A	California ISO
	NYISO
	ERCOT
	ISO-NE
	MISO
	PJM Interconnection for RFC area
	Southwest Power Pool (SPP)
	WECC
EUROPE	ENTSO-E
Africa	South Africa (Eskom)
South East Asia	Singapore (EMA)
	Thailand (EGAT)
	Philippines (NGC)
	Malaysia (TNB)

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GEO-POLITICAL STRATEGY – DEVELOP A GEO-POLITICAL STRATEGY FOR ASEAN ENERGY SECURITY

Philip Andrews-Speed, Christopher Len, Seksan Anantasirikiat

1. Introduction

The central purpose of this paper is to formulate the elements of an external ASEAN energy policy to promote a unified and cohesive external position on ASEAN energy policy in the framework of AEMI. The focus is on external threats, geopolitical trends and events external to ASEAN, and on possible geopolitical strategies to address these challenges.

The paper is structured as follows:

- Section 2 provides a brief summary of the internal dynamics of ASEAN and its external relations.
- Section 3 provides a brief survey of global energy trends and examines in some detail the context of energy in the region, in ASEAN as well as in South and East Asia, looking ahead to 2030. In particular, it provides an account of behaviours of Asian actors in field of energy that affects ASEAN member states, including both investment and trade flows.
- Section 4 identifies the implications of the preceding analysis for ASEAN. It first examines three issues: security of external energy supply, the management of domestic energy resources, and clean and efficient energy supply and use. It assesses ASEAN's capacity to address these challenges and identifies the threats if ASEAN fails to take action.
- Section 5 we briefly examine the international experience of regional organisations in trying to develop coordinated external action in the field of energy, and identify the difficulties. This analysis draws on the experience of the European Union.
- The final section proposes some potential priorities for developing a coherent external energy strategy for ASEAN.

2. The regional economic and political context

2.1 Internal Dynamics of ASEAN

The Association of Southeast Asian Nations (ASEAN) was established in 1967 in light of Cold War circumstances. At first, ASEAN was politically translated into a grouping of anti-communist countries by five founders, Indonesia, Malaysia, Philippines, Singapore, and Thailand whose leaders were keen to establish a framework for inter-state dispute management between members. As collaboration expanded, the ASEAN Secretariat was established in 1981 to assume a coordinating role within the organisation. The organisation underwent gradual expansion with Brunei's admission in 1984 as the sixth member, followed by Vietnam in 1995, Laos and Burma in 1997 and finally, Cambodia as its tenth member in 1999. The process of community building has been fostered by institutionalizing ASEAN. In 2003, ASEAN leaders committed to build the community by setting three pillars of ASEAN which cover the political-security, economic, and socio-cultural cooperation. Another important leap of ASEAN's institutional development is the adoption of the ASEAN Charter in 2008. It bestowed legal entities to ASEAN. The groundwork for ASEAN regional structure and governance has been laid in the Charter to strengthen the capacity of ASEAN to meet external and internal challenges.

As noted in the ASEAN Political-Security Community (APSC) Blueprint, ASEAN has been envisaged to be 'a dynamic and outward-looking region in an increasingly integrated and independent region'. This objective covers the concept of ASEAN centrality in regional

cooperation and community building; the promotion of ties with external parties; the consultations and cooperation on mutual issues of concern. Adding to that, the ASEAN Economic Community (AEC) Blueprint also draws attention to external economic relations and global supply networks to reinforce the idea of 'Global ASEAN'.

To make ASEAN more integrated, ASEAN leaders adopted the Master Plan on ASEAN Connectivity (MPAC) in 2009. It noted three main concepts of connectivity comprising logistics; institutional; and people-to-people connectivity. A very important issue of the relations between the concept of ASEAN Connectivity and ASEAN's dialogue partners is that MPAC itself aims to reinforce a more 'internally' integrated ASEAN but it requires a large number of economic engagement and assistance from the dialogue partners. It should be noted that many development projects are funded by ASEAN's dialogue partners.

2.2 ASEAN's External Ties

Throughout 47 years of its inception, ASEAN has gradually evolved and adapted in response to global and regional developments. Institutional development of ASEAN can be considered from the establishment of the ASEAN Regional Forum (ARF) in 1994 which focused on the security issues in the Asia-Pacific region.

Over the years ASEAN's external relations have expanded and external parties may be conferred formal status as Dialogue Partner, Sectoral Dialogue Partner, Development Partner, Special Observer, Guest, or other status to countries, regional and international organisations and institutions. Table 1 provides a summary of the ASEAN's relationship with key external parties.

Table 1. ASEAN's relationship with key external parties

External Parties	**Relationship**
Australia	Dialogue Partner (1974)
Canada	Dialogue Partner (since 1977)
China	Dialogue Partner (1996)
European Union	Dialogue Partner (since 1977)
India	Dialogue Partner (since 1995)
Japan	Dialogue Partner (since 1977?)
South Korea	Dialogue Partner (since 1991)
New Zealand	Dialogue Partner (since 1975)
Russia	Dialogue Partner (since 1996)
United States of America	Dialogue Partner (since 1977)
UNDP	Dialogue Partner (since 1977)
Pakistan	Sectoral dialogue status (in 1993)
ASEAN + 3	China, South Korea and Japan (1997)
Source: http://www.asean.org/asean/external-relations	

The Asian Financial Crisis in 1997-1998 provided the urgency and justification for ASEAN member states to develop closer economic links with external parties, especially China, Japan and South Korea in the Northeast Asian region through the ASEAN+3 framework. A key outcome from this framework is the Chiang Mai initiative which is the multicurrency swop arrangement to ensure the financial stability of the region.

Japan and Republic of Korea have played an active role in ASEAN member countries notably in the Greater Mekong Sub-region (GMS) from 1980s to the present. They promote logistical and institutional connectivity by funding road and rail construction, providing technical assistance and innovation to CLMV countries (Cambodia, Laos, Myanmar and Vietnam), and training officials and staffs from these countries. Large amounts of outward foreign direct investment in GMS come from Japan and Republic of Korea. Japanese and Korean companies also draw a great attention to oceanic ASEAN especially Indonesia due to great purchasing power and size of market. The statistics from JICA (2013) stated that Japan and Republic of Korea seized the highest amount of two non-ASEAN members' foreign direct investment in Indonesia in 2012, which is US$2,457 million and US$1,950 million respectively.

Apart from Japan and Republic of Korea, China is another main player in the region. The signing of the Declaration on the Conduct of Parties in the South China Sea in 2002, and China's subsequent signing of the ASEAN's Treaty of Amity and Cooperation in 2003 heralded a new phase of improved relationship between China the ASEAN politically, economically and socially. However, since 2008, there have been rising concern over China's influence in Southeast Asia due to Beijing's growing assertiveness and enforcement activities in the South China Sea, and the fact that negotiations for a Code of Conduct for the South China Sea has yet to be finalised between China and fellow Southeast Asian claimants.

ASEAN's external linkages have also extended to include India, Australia, New Zealand similarly through the ASEAN Plus Framework. ASEAN has also entrenched its position as Southeast Asia's key political and economic regional organisation through a number of free trade agreements signed with China, Japan, South Korea, and Australia-New Zealand.[54] Table 2 provides information on the Top Ten ASEAN Trade Partner countries/regions at the end of 2013. According to this table, China was ASEAN's largest trading partner in 2013 accounting for 14 per cent of total ASEAN trade. The EU was second place at 9.8 percent, while Japan was third with 9.6 per cent, followed by the USA and Korea.

[54] Overview of the various FTAs can be found here: http://www.fta.gov.sg/sg_fta.asp and here: http://www.asean.org/communities/asean-economic-community/category/free-trade-agreements-with-dialogue-partners

Table 2. Top Ten ASEAN Trade Partner countries/regions in 2013

Table 20 ASEAN Statistics

Top ten ASEAN trade partner countries/regions, 2013

as of 24 July 2014

value in US$ million; share in percent

Trade partner country/region[1/]	Value			Share to total ASEAN trade		
	Exports	Imports	Total trade	Exports	Imports	Total trade
ASEAN	330,379.3	278,253.1	608,632.4	26.0	22.4	24.2
China	152,521.1	197,962.5	350,483.6	12.0	16.0	14.0
EU-28	124,434.3	121,780.7	246,215.0	9.8	9.8	9.8
Japan	123,040.8	117,903.9	240,944.7	9.7	9.5	9.6
USA	114,509.8	92,439.4	206,949.2	9.0	7.5	8.2
Korea, Republic of	52,801.9	82,172.6	134,974.6	4.2	6.6	5.4
Taiw an	35,236.9	66,220.0	101,456.9	2.8	5.3	4.0
Hong Kong	82,085.0	13,135.9	95,221.0	6.5	1.1	3.8
Australia	45,505.6	22,531.3	68,037.0	3.6	1.8	2.7
India	41,936.7	25,937.3	67,874.1	3.3	2.1	2.7
Total top ten trade partner countries	1,102,451.5	1,018,336.8	2,120,788.3	86.7	82.1	84.4
Others[2/]	168,621.7	222,139.5	390,761.2	13.3	17.9	15.6
Total	**1,271,073.2**	**1,240,476.3**	**2,511,549.5**	**100.0**	**100.0**	**100.0**

Source: ASEAN Merchandise Trade Statistics Database (compiled/computed from data submission, publications and/or websites of ASEAN Member States' national ASEAN Free Trade Area (AFTA) units, national statistics offices, customs departments/agencies, or central banks)

Notes

- \- not available as of publication time
- x not available/not compiled

Some figures may not sum up to totals due to rounding off errors.
1/ identified/ranked based on share of total trade
2/ includes trade of all other countries and those that could not be attributed to specific countries

Source: http://www.asean.org/resources/2012-02-10-08-47-55/asean-statistics/item/external-trade-statistics-3

A number of ASEAN-linked regional economic arrangements have emerged over the years thereby making ASEAN the regional hub for FTAs in Asia. As noted by one observer, such economic diplomatic alignments play a role in reaffirming closer political ties. In addition to lowering trade and investment barriers, they also enable improving technology and skill transfer and infrastructure investment. Asia's economic rising powers are thus able to channel their resources from power politics to softer, more peaceful and influential politics. On the other hand, the growth in economic relations could also give rise to negative economic pressure as countries when countries face political disagreements.[55]

Besides the ASEAN + 1 FTAs and the Regional Comprehensive Economic Partnership (RCEP), there are also agreements that do not cover all ASEAN members states such as the Trans-Pacific Partnership (TPP). The FTA initiatives follow four tracks: (1) global, WTO-based; (2) trans-regional, APEC and TPP-based; (3) regional, ASEAN+1[56] and ASEAN+6 (or RCEP)-based and (4) bilateral initiatives[57]. Singapore has the largest number of bilateral and plurilateral

[55] Sanchita Basu Das, "Growing Economic Diplomacy in ASEAN: Opportunities and Threats" ISEAS Perspectives, No. 22, 10 April 2014.

[56] For elements of the ASEAN Plus 1 Free Trade Agreements, refer to Suthiphand Chirathivat and Piti Srisangnam, The 2030 Architecture of Association of Southeast Asian Nations Free Trade Agreements, ADB Institute Working Paper Series, No. 419, April 2013, pp. 15-17, http://www.adbi.org/files/2013.04.25.wp419.architecture.asean.free.trade.agreements.pdf

[57] For elements of the ASEAN member states bilateral trading arrangements, refer to Suthiphand Chirathivat and Piti Srisangnam, The 2030 Architecture of Association of Southeast Asian Nations Free Trade Agreements, ADB Institute Working Paper Series, No. 419, April 2013, pp. 19-21, http://www.adbi.org/files/2013.04.25.wp419.architecture.asean.free.trade.agreements.pdf

FTAs that are signed and in effect among the ASEAN member states, followed by Malaysia and Thailand, while Cambodia and Myanmar have the least.[58]

Table 3. FTA status of Individual Asian Economies, 2013

	Proposed	Under Negotiation		Signed but not in effect	Signed and in effect	Total
		Framework Agreement Signed	Negotiation Launched			
ASEAN						
Brunei	6	2	2	0	8	18
Cambodia	4	0	2	0	6	12
Indonesia	6	1	6	2	7	22
Laos	4	0	2	0	8	14
Malaysia	7	1	6	1	12	27
Myanmar	4	1	2	0	6	13
Philippines	7	0	2	0	7	16
Singapore	6	1	10	2	19	38
Thailand	8	3	6	0	12	29
Vietnam	4	1	6	0	8	19

Note: the data is as of July 2013

Source: Free Trade Agreement Database, Asia Regional Integration Center (ARIC)

(Source: Sanchita Basu Das, "Growing Economic Diplomacy in ASEAN: Opportunities and Threats" ISEAS Perspectives, No. 22, 10 April 2014, http://www.iseas.edu.sg/documents/publication/ISEAS_Perspective_2014_22-Growing_Economic_Diplomacy_in_ASEAN.pdf)

This has led observers to comment on the "noodle bowl" of Asian trade agreements.[59] The multiplicity of trade agreements, while underscoring the recognition of ASEAN's economic potential by external parties, also reflects an ASEAN dilemma - it attempts to engage all external parties, have ironically disrupted the regional grouping's economic integration process. The multiple trade agreements also reflect a degree of strategic rivalry among the external parties as they seek to engage ASEAN. While this has enable ASEAN to leverage its position through such rival courtship, it has also had the effect of diluting of ASEAN resources.

In November 2011, the 10 ASEAN member states and its 6 free trade partners (China, Japan, South Korea, India, Australia and New Zealand) decided to establish a region-wide FTA under the ASEAN-led Regional Comprehensive Economic Partnership (RCEP) framework that is

[58] Sanchita Basu Das, "Growing Economic Diplomacy in ASEAN: Opportunities and Threats" ISEAS Perspectives, No. 22, 10 April 2014, http://www.iseas.edu.sg/documents/publication/ISEAS_Perspective_2014_22-Growing_Economic_Diplomacy_in_ASEAN.pdf.

[59] http://www.eastasiaforum.org/2012/08/27/asias-regional-comprehensive-economic-partnership/

WTO-consistent and would further enhance economic integration between ASEAN member states as well as between ASEAN and its partners.[60] The target date for completion for such negotiations is by end-2015 which appears to be optimistic given the complex nature of this agreement.

Table 4. Size of ASEAN FTAs, 2012

	Total Population, 2012	Total GDP, 2012		Total Trade to the World, 2012
	Persons in billion	US$ trillion	PPP$ trillion	US$ trillion
ASEAN-Australia-New Zealand FTA	*0.65*	*4.04*	*4.92*	*3.06*
ASEAN-China FTA	*2.0*	*10.55*	*16.09*	*6.34*
ASEAN-Japan CEP	*0.75*	*8.29*	*8.41*	*4.16*
ASEAN-RoK FTA	*0.67*	*3.46*	*5.43*	*3.54*
ASEAN-India FTA	*1.8*	*4.17*	*8.55*	*3.26*
RCEP (ASEAN+6)	*3.4 (48)*	*21.2 (29)*	*27.8 (32)*	*10.5 (28)*

Note: PPP – Purchasing Power Parity; RoK – Republic of Korea; CEP – Comprehensive Economic Partnership; FTA – Free Trade Agreement
Numbers in the bracket give % share in world total
Source: World Economic Outlook, October 2013 Database, IMF; World Trade Organisation Database; Authors' estimate

(Source: Sanchita Basu Das, "Growing Economic Diplomacy in ASEAN: Opportunities and Threats" ISEAS Perspectives, No. 22, 10 April 2014, http://www.iseas.edu.sg/documents/publication/ISEAS_Perspective_2014_22-Growing_Economic_Diplomacy_in_ASEAN.pdf)

Besides RCEP, the other mega-regional trade agreement (RTAs) is the Trans Pacific Partnership (TPP) which is being negotiated among twelve countries (Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States and Vietnam) but does not include major powers like China and India and key ASEAN members such as Indonesia; Thailand and the Philippines are still considering whether to join. The aim of TPP is to liberalise trade in goods and services, encourage investments, promote innovation, economic growth and development and support job creation and retention.[61] The TPP is known to be difficult to conclude and missed its December 2013 deadline. While there have been discussions that RCEP and TPP could be combined to lead to the creation of a free trade area for Asia-Pacific (FTAAP), the political rivalry between the US and China over Asia-Pacific will make it difficult to combine the two mega-RTAs.

60 http://www.asean.org/news/item/asean-framework-for-regional-comprehensive-economic-partnership

61 http://www.iseas.edu.sg/ISEAS/upload/files/Paper-ASCCC-2014-SBD.pdf

3. The global and regional energy context to 2030

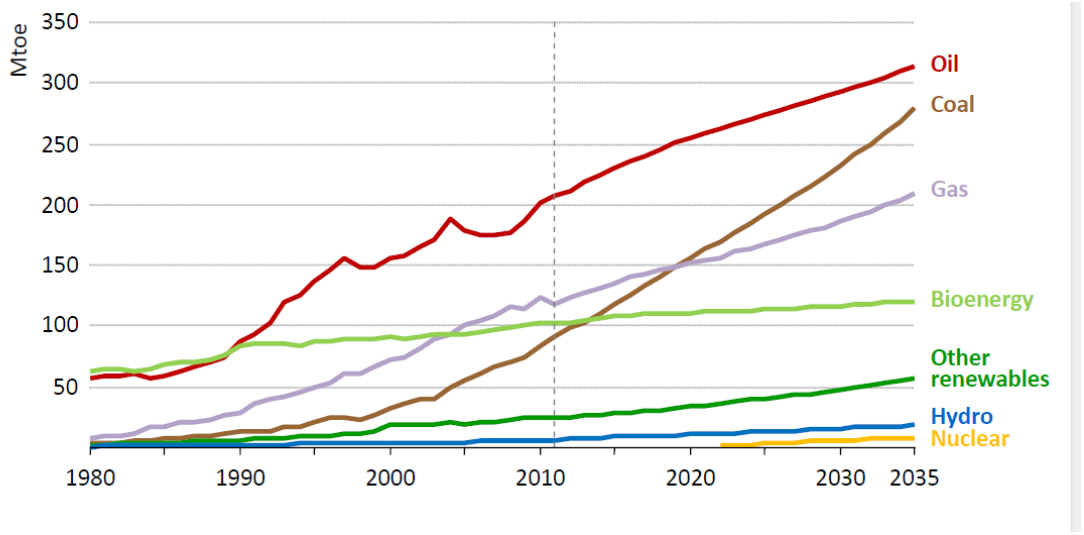
3.1 Global and regional energy trends

This section identifies those trends in global and regional energy supply, demand and flows and investment requirements that have the greatest potential significance for ASEAN (This section draws heavily on two sources: IEA, World Energy Investment Outlook, 2014. IEA, South East Asia Energy Outlook 2013).

3.1.1 Energy demand.

A combination of economic growth and population increase will drive rising demand for all forms of primary energy, especially gas, but also coal, oil and renewables. Sixty percent of this demand growth will occur in China, India and Southeast Asia. In ASEAN alone, energy demand may grow by 60% between 2011 and 2030. The absolute quantity of energy used and the energy mix will depend greatly on policy decisions taken by governments to improve energy efficiency and reduce the share of coal and other fossil fuels in the energy mix. The consumption of coal demand will grow across Asia, and most rapidly in Southeast Asia and India where it will be used for power generation and industry (Fig.1). Gas demand in Asia could increase more than two-fold to 2030, mostly in China, but also India and Southeast Asia.

Figure 1. ASEAN primary energy demand by source, IEA New Policies Scenario



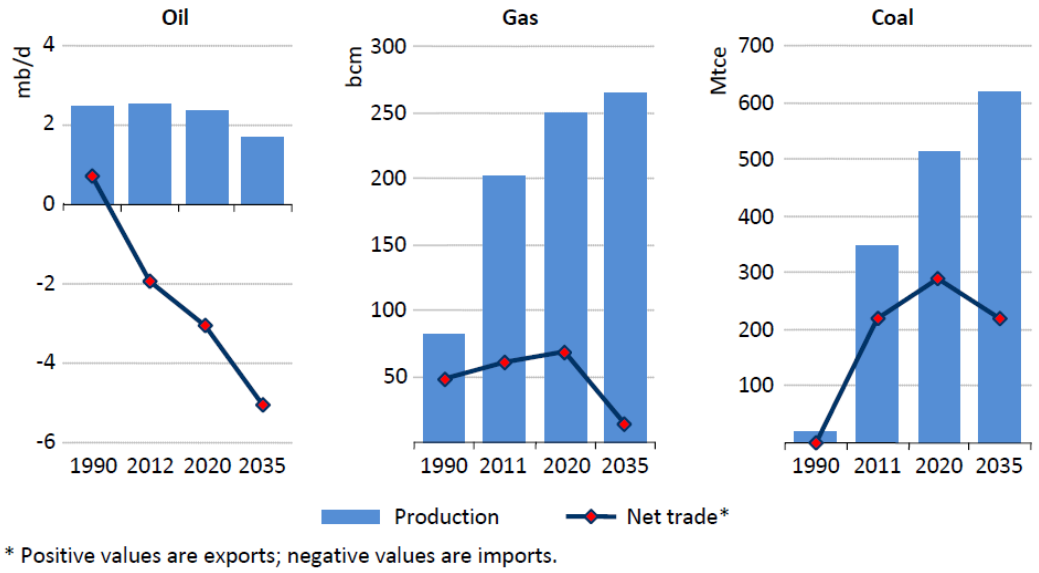
Source: IEA, South East Asia Energy Outlook 2013

In addition to the problem of changing the energy mix, governments across Asia face two energy challenges with a strong societal component. The first is to gradually reduce fossil fuel subsides in order to constrain demand growth and reduce the burden on the national budget. In 2012, the total amount of subsidies for fossil fuels in ASEAN is estimated to have reached US$51 billion. The second is to to provide electricity and clean cooking energy to the hundreds of millions of people in South and Southeast Asia. Within ASEAN in 2011, it is estimated that 134 million people, or 22% of the population, lacked access to electricity, and 279 million (47% of the population) were cooking using traditional biomass.

3.1.2 Energy production

The Middle East will remain the key oil producing region in the world, but North America will become increasingly important. Oil production within ASEAN will decline (Fig. 2). Likewise, incremental coal production will become increasingly concentrated in Asia, mainly China, India and Indonesia, and in Australia. In contrast, incremental production of natural gas will be distributed among a number of regions, notably the Middle East, Africa, China, Central Asia, the USA and Russia, in part due to the rise of unconventional gas. Renewable electricity generation other than hydroelectricity could start to make a major contribution to global electricity generation over the next 25 years, rising from 4% of total electricity generation in 2011 to 15-20% by 2030. China and, to a lesser extent, India and Southeast Asia will be major centres of growth for renewable energy. Although China and India both have ambitious plans for nuclear energy, its role on ASEAN is likely to remain very small over the period to 2030.

Figure 2. ASEAN fossil fuel production and trade



Source: IEA, South East Asia Energy Outlook 2013

3.1.3 Energy trade

The coming two decades will see dramatic shifts in the patterns of global trade in energy commodities as well as the continued growth in the quantity of trade. On the one hand, China's and India's net import requirements for oil and gas will keep growing. On the other hand, North America becomes a net exporter of oil and gas. The Middle East, Africa, Russia and the Caspian region will remain as net exporters of oil and gas, and this quantity of exports will increase, with the exception of some countries where domestic demand will take a growing share of production. Russia and Middle East will be sending more gas and oil to South, Southeast and Northeast, and Africa is set to become a new gas supplier to Asia. Developing Asia (China, India and Southeast Asia) changes from being a marginal net exporting region for gas in 2011 to a major importer by 2025, with net imports reaching more than 320 billion cubic metres per year, or 31% of gas consumption. ASEAN's net

imports of oil will continue to grow, whilst its capacity to be a net exporter of coal and natural gas is likely to reach a peak over the next 15-20 years (Fig. 2).

Along with changing trade flows, the nature of international gas markets will continue to evolve. The next 25 years will see a gradual increase in share of internationally-traded gas that is priced based on gas-to-gas competition, but this is mainly in Europe and North America. In Asia, prices for LNG have tended to be benchmarked against oil and are significantly higher than in Europe. But even here, there is a long-term trend towards more market based pricing, growth of spot markets and development of one or more Asian gas hubs.

3.1.4 Energy and the environment

Greenhouse gas emissions are set to continue rising, notably in the industrialising nations of Asia, not least because of coal use. India, China and Southeast Asia could account for 45% of global greenhouse gas emissions by 2035, though emissions intensity (emissions per unit of GDP) will decline. The growing use of coal and oil in ASEAN will add substantially to local and regional atmospheric pollution.

3.1.5 Technology

A wide range of technologies will be required across the world and in ASEAN. Some of these are already commercialised and require diffusion, others have been developed but have not been commercialised, whilst yet others are still at an early stage of development (Table 5). Within ASEAN, the priority over the next two decades should be to promote the diffusion of what are today the best available commercialised technologies along with best practices. In the case of energy efficiency, such policies would result in a reduction of total energy demand of 13% in 2035 compared to a less efficient scenario (IEA, 2013).

Table 5. Examples of energy technologies To be expanded at next brainstorming session

Commercialised	**Not commercialised/early commercialisation**	**Under development**
Shale gas, coal bed methane extraction	Smart grids	Fourth generation nuclear energy
Wind power and solar PV	Ultra High Voltage transmission	Carbon capture and storage
Small-scale LNG, floating LNG	Electric cars	Large scale electricity storage
Building insulation	Integrated gasification combined cycle technology	Methane hydrate production
Ultra-super critical technology		Fourth generation solar technology
Energy efficient industrial technologies		
Energy efficient vehicles technologies		
Energy efficient lighting		

3.1.6 Investment

In order to meet the world's energy demand, a massive amount of investment is required in energy supply and energy efficiency. Annual investment needs to increase from US$ 1.7 trillion in 2013 to US$ 2.5 trillion in 2035 in real terms. This amounts to a total of about US$ 48 trillion over the period to 2035 (Table 6). Whilst the investment needed in ASEAN's energy sector is only 4% of this total, this still amounts to US$ 2.0 trillion, or about US$ 100 billion per year in 2012US$ terms. Much of this investment will have to come from outside ASEAN, from international companies and international financial institutions, as well as from state-owned enterprises and their home governments.

Table 6. Estimates of total investment needs to the year 2035 for the world and for ASEAN, in billions of 2012 US$.

		World	**ASEAN**
		Total 2014-2035	**Total 2013-2035**
Fossil fuel supply	Oil	13,700	205
	Gas	8,800	460
	Coal	1,000	40
	Sub-total	23,400	705
Electricity supply	Power generation	10,000	440
	T and D	7,000	550
	Sub-total	17,000	990
Total energy supply		40,000	1,695
Energy efficiency		8,000	330
Total investment requirement		**48,000**	**2,025**

Sources: IEA, World Energy Investment Outlook, 2014. IEA, South East Asia Energy Outlook 2013.

3.2 Regional energy actor behaviours

This section will examine the recent and current behaviours of key energy actors across South and East Asia, with special reference to the governments and energy companies of China, Russia, India, Japan and South Korea, but also the Middle East. It will highlight the significant and growing engagement of Asian energy companies in the ASEAN region in a manner that has some neo-mercantilist characteristics. (Main source: unpublished ESI database of investments in ASEAN)

The engagement of these countries and their companies in ASEAN usually takes one or more of the following forms:

- Investment in the production of primary energy such as oil, gas, coal and hydro-electricity, as well as rare earth metals.
- Investment in energy transformation infrastructure such as oil refineries, gas liquefaction plants, and thermal power stations.

- The provision of construction and technical services relating to primary energy production, transformation and transportation.
- Trade in energy raw materials such as coal, oil and natural gas, as well as electricity.

3.2.1 Investment in the production of primary energy

Oil and gas. ASEAN is rich in primary energy resources and foreign investment in the extraction of these resources dates back to the 1890s when the founders of the company that would later become Royal Dutch Shell discovered oil in North Sumatra. Since that time, major international oil companies (IOCs) and many smaller independent companies, in partnership with Pertamina since 1957, have contributed to making Indonesia the largest producer of oil and gas in ASEAN. Oil production in Malaysia and Brunei also dates back to the beginning of the twentieth century. Each ASEAN country has its own national oil company (NOC) which plays an important role in either production or sector management, or both.

With the exception of a small number of licenses awarded Japanese companies in Indonesia and Thailand in the 1960s and 1970s, the IOCs in partnership with host country NOCs have dominated oil and gas exploration and production in ASEAN. In the meantime, in 1981 the Soviet Union had established Vietsovpetro as an oil and gas joint venture between Zarubezhneft and PetroVietnam which has played a major role in developing Vietnam's oil industry. The late 1980s and early 1990s saw renewed interest on the part of Japanese companies as they expanded into Vietnam, Malaysia, Cambodia and Myanmar, as well as the first investments in ASEAN oil and gas assets by companies from China, Korea (ROK) and India. Chinese NOCs took out licenses in Indonesia and Thailand, marking the first steps of what was to become a massive programme of overseas investment, whilst ONGC Videsh (OVL) of India and the Korean National Oil Company (KNOC) joined IOCs in the search for oil offshore Vietnam.

The marked increase in international oil prices in 2003 and 2004 triggered an upsurge of overseas investment in oil and gas assets by companies from the importing nations of Asia, notably China, Japan, Korea and India. China has been the most prominent actor, with a large number of onshore and onshore oil and gas projects in Indonesia and Myanmar, and minor interests in Thailand and Cambodia. Japanese companies have built up their ongoing presence across ASEAN, OVL took out new blocks in Vietnam and Myanmar, and KNOC acquired assets in Indonesia, Thailand and Cambodia. For the first time, the Overseas Petroleum Investment Corporation (OPIC) of Taiwan (Republic of China) started to invest in the region, partnering with IOCs in Indonesia and with China's Sinopec in Myanmar. Though from an oil and gas exporting country, Russian oil companies have also been showing greater interest in ASEAN resources, signing new contracts in Vietnam and starting to build a presence in Indonesia.

Despite the long period of their engagement in ASEAN's oil and gas sector, these external Asian oil companies have never played a prominent role in any one country, with the exception of Russian companies in Vietnam and Chinese companies in Myanmar before the first international licensing round was held in 2013.

With the exception of Russia, the motivations for these overseas investments are multiple. The government are supporting their oil companies in order to gain access to overseas sources of oil and gas supply in the (arguably mistaken) belief that this will enhance national

security of supply. For the companies, the objectives include a mix of internationalising their businesses, making profits and secure supplies for their downstream activities in their home countries. In these respects, their investments in ASEAN are part of global oil and gas strategies in which ASEAN plays a relatively minor role on account of the small size of its remaining resource. As Russia is a major exporter of oil and gas, its motivations are probably limited to corporate business goals and the government's desire to build influence in the region.

Hydro-electric dams. Chinese companies are involved in more than 100 hydro-electric dam projects across ASEAN, of which about 30 have a capacity greater than 500 MW. The largest projects exceed 7,000 MW and are in Cambodia and Myanmar. The Sinohydro Corporation is by far the largest actor. Other investors include the China International Water and Electric Corporation, China Power Investment Corporation, Guodian, Huaneng and the Three Gorges Corporation as well as companies from border provinces such as Yunnan and Guangxi. The involvement of these Chinese companies generally takes one of two forms: either a build-operate-transfer (BOT) contract, which is a true investment, or a construction only arrangement. Japan is the other country with a significant dam building on ASEAN but at a much smaller scale than China, whilst Russia and Korea have a very low level of activity. In most cases the projects receive financial support from the foreign country, through the government or state-owned banks

In all these cases, it is difficult to obtain sufficient information to determine whether individual projects involve investment by these foreign companies or just construction contracts. The motivations for undertaking the investment projects include corporate goals of profits and international business development as well as government objectives of development aid and regional influence. China is one exception, as electricity generated from neighbouring countries in Southeast Asia can be transmitted back to satisfy its growing domestic demand for energy.

Coal. In addition to oil and gas, Indonesia has substantial reserves of coal and both Chinese and Japanese mining companies have entered into joint ventures with local mining companies. Though the reserves are much smaller in these countries, Vietnam has received investment in its coal mines from Japan and Myanmar has Chinese investors. The corporate objectives are threefold: to internationalise their business, to make profits and to help satisfy their home countries needs for imported coal.

Nuclear energy. (Main sources: World Nuclear Association documents**)** No ASEAN member state has a nuclear power plant in commercial operation. The Fukushima accident put a temporary halt to development in those ASEAN states which had aspirations, but a number of governments have recently revitalised plans or are assessing their options. In all cases, the construction of a nuclear power plant will require technologies and skills from outside ASEAN and, in many cases, financial support. Japanese, Korean, Russian and, more recently, Chinese companies are all actively promoting their interest in these projects. In most cases, the foreign government is aiming to support the export of its companies' technology and expertise and could provide financial assistance to the projects.

Vietnam is the furthest ahead with plans for four reactors, two of Russian design and two of Japanese design. Korea is also reported to be in discussions to construct a plant in Vietnam. Construction of the first Russian plant was due to start in 2014 or 2015, but early in 2014 the Vietnamese government announced that this was being postponed by up to six years on safety grounds. In Thailand, the national power development plan has identified the

potential for nuclear power since 2007 and agreements have been signed with Japanese and Chinese nuclear power companies. Feasibility studies have been underway, but in August 2014 the government ruled out the nuclear option. Both Korean and Japanese companies have been working with the Indonesian government for several years to assess the options for nuclear power plants, and have identified a number of possible locations. More recently, Russia has been proposing the use of floating nuclear power plants for use by Indonesia's small islands. The Malaysian government has identified possible sites, is planning a feasibility study for nuclear power and has been in discussion with Korean and Russian companies. The Philippines built a reactor of US design as far back as 1985, but it was never put into operation on account of safety concerns. The government is now considering whether to refurbish and commission it and construct other plants. Myanmar also announced in 2014 that it wishes to revitalise its nuclear programme which dates back to earlier research and training cooperation with Russia's Rosatom.

Rare earth metals. Although not a source of energy in themselves, rare earth metals are vital inputs to appliances which produce and use energy. After China's curtailment of rare earth metal exports in 2010, both Japanese and Korean companies have been seeking to develop overseas sources of supply. This has included investigating mining opportunities in Vietnam and Myanmar, both of which have deposits of rare earth metals.

3.2.2 Investment in energy transformation

Most oil refineries and petrochemical plants, LNG liquefaction plants and thermal power stations in ASEAN are owned and operated by the companies from the host country itself or by international companies from outside of Asia. Involvement in ASEAN's energy transformation sector by companies from other Asian countries appears to be quite limited.

Oil refineries and petrochemical plants. China's companies are the most active with PetroChina owning a large majority of the shares of the Singapore Petroleum Company since 2006 and getting involved in the construction of petrochemical plants in Myanmar, and the privately-owned Zhejiang Hengyi Petrochemicals Company investing in an oil refinery and aromatics complex in Brunei.
NOCs from the Middle East have yet to take a strong position in ASEAN. Saudi Aramco sold its 40% stake in Philippines' Petron in 2008. Kuwait Petroleum has a 35% stake in a consortium which started construction of a refinery and petrochemical complex in Vietnam in 2013 after 5 years of negotiation. Mitsui and Idemitsu from Japan are the other foreign partners. Both Kuwait Petroleum and Saudi Aramco signed initial agreements with Pertamina in 2010 to build two new refineries by 2018, but in late 2013 the negotiations were terminated.

Liquefied natural gas (LNG). China National Offshore Oil Company (CNOOC) purchased a share of the Tangguh LNG project in Indonesia from BP in 2003, and a number of Japanese companies own. Much of this LNG is sent to China and Japan.

Thermal power stations. Both Chinese and Japanese companies are investing in thermal power plants in ASEAN, but at a very limited scale. Chinese companies have power plants associated with coal mines that they operate in both Indonesia and Myanmar. A Chinese company is also building a thermal plant alongside an aluminium smelter in Indonesia. Japanese companies are involved in coal-fired plants in Vietnam and Indonesia.

The aims of most of these projects appear to be corporate internationalisation and profits. In the case of the Tangguh LNG plant, these investments reflect the broader strategy of Chinese and Japanese companies to be involved in the full LNG supply chain back to their home countries.

3.2.3 The provision of construction and technical services

Oilfield services. In the past, oil field services across ASEAN were provided either by subsidiaries of the NOCs or by international services companies from Europe and the USA. The restructuring and internationalisation of China's NOCs in the 1990s led to a massive growth in the overseas activities of the subsidiaries of these NOCs, especially those of CNPC/PetroChina.

Pipeline construction. China's CNPC has great experience in building long-distance pipelines and was the key member of the consortia that constructed the oil and gas pipelines from Myanmar to China. These consortia also included companies from Korea and India.

Hydro-electric dams. As described above, companies from China, Japan, Russia and Korea are all involved in the construction of dams in ASEAN member states to a varying extent. Some projects involve investment whilst others are purely construction contracts.

3.2.4 Trade in energy raw materials

(Main sources: ASEAN Statistical Yearbook 2013; BP, Statistical Review of World Energy, 2014; IEA, Coal Information 2012 edition)

ASEAN lies between the Middle East, a major energy exporting region, and Northeast Asia, a major energy importing region. ASEAN is heavily dependent on the Middle East for crude oil imports. This dependence has grown in recent years from 42% by value in 2008 to 69% in 2012, and is likely to grow further as net oil imports grow. Crude oil imports from Russia and Azerbaijan are also increasing. The total volume of imports of oil products to ASEAN member states is also rising rapidly, as is the share provided by the Middle East which increased from about 4% in 2008 to 9% in 2012. Malaysia and Brunei continue to export crude oil. A growing proportion of these exports flows to Northeast Asia and Australasia, reaching 66% by value in 2012, but only 20% by value of the crude oil exports flow to other ASEAN member states. ASEAN member states also export a significant quantity of oil products. The share of these products which are sent to other ASEAN member states rose from 48% to 58% by value between 2008 and 2012. Over the same period the flow to Northeast Asia declined from 23% to 17% of total oil product exports.

Northeast Asia is also the major market for ASEAN's LNG exports, with 98% going to China, Japan, Korea and Taiwan and these countries relying on ASEAN for 30% of their LNG imports. In addition a new pipeline takes gas from Myanmar to China. Thailand became ASEAN's first importer of LNG in 2011. By 2013 it was importing 2 bcm/yr, of which 80% came from the Middle East and none from within ASEAN.

There are also strong connections between ASEAN and Northeast Asia in the coal trade. Indonesia accounts for nearly all of ASEAN's coal exports, as Vietnam is about to become an importer of coal having been an exporter for many years.60% of Indonesia's coal goes to

Northeast Asia, with 24% going to India. At the same time, about 30% of Northeast Asia's coal imports come from Indonesia. Of the total exports of coal from Indonesia approximately 14% by value went to other ASEAN member states in 2012, and this accounted for 80% by value of the coal imports of these countries.

Although the total volume of energy trade between ASEAN and Northeast Asia is relatively small, ASEAN lies astride the sealanes along which Northeast Asia's energy imports pass. More than 70% of the oil imports and about 45% of the LNG imports of China, Japan, Korea and Taiwan travel through ASEAN seas, principally the Malacca Straits from Middle East and Africa. A further 15% of northeast Asia's LNG travels from Australia through ASEAN seas further to the east. Coal imported to North Asia from South Africa and Australia also passes through ASEAN waters

4. Implications for ASEAN

4.1 ASEAN's external energy security challenges

From the evidence presented in the previous section we identify ASEAN's external energy security challenges under three headings:

- Security of external energy supply;
- Management of domestic energy resources
- Clean and efficient energy supply and use

4.1.1. Security of external oil supply

Security of external energy supply is most relevant to oil, as net oil imports to ASEAN continue to grow and the region is likely to remain a net exporter of coal and gas for to at least 2030. The security of oil supply is a threat to oil importers that has been recognised since the OPEC oil embargos of the 1970s. The threat has two inter-related components: a substantial physical interruption of oil supplies lasting for a significant period of time, and a sharp increase if oil prices. For ASEAN, as for many other regions, the most important location of a physical interruption of any size is the Straits of Hormuz through which a significant and growing share of ASEAN's oil imports flow (Mitchell, 2014).[62] A prolonged interruption at this point would have serious economic consequences for most ASEAN nations as oil prices was rise markedly. The Malacca Straits is another choke point which could be blocked easily, though the consequences for ASEAN would be less serious that from a closure of the Straits of Hormuz, as ships could take alternative routes to their destinations. This would raise costs and add time, but cause no sustained interruption.

A sustained high level of prices or sudden spikes in oil prices are much more likely than a significant physical interruption. Such price increase can be driven by a wide range of economic and political factors occurring anywhere in the world as well as by natural disasters or military action. The economic consequences can be just as dire for ASEAN member states as a physical interruption at a single location because of the high level of subsidies on oil products sold in most ASEAN member states (See AEMI paper No.1 on prices

[62] Mitchell (2014) estimated that the share of national crude oil consumption passing through the Straits of Hormuz amounted to 88% for Singapore, 33% for Thailand, 29% for Malaysia and 15% for Indonesia

and subsides). The higher the level of fuel subsidies, the greater the impact on the national budget. Conversely, the higher the level of fuel tax, the less the impact on the consumer.

4.1.2 Management of domestic energy resources

Despite the declining output of crude oil, ASEAN is relatively rich in other primary energy resources such as coal, natural gas and hydro-electricity, and probably has significant resources of unconventional gas (coal bed methane shale gas and possibly methane hydrates) and geothermal energy.

As described in section 3.1, ASEAN has a massive requirement for investment in the production, transformation and transportation of primary energy in order to satisfy its rising energy demand. Much of this funding will need to come in the form of foreign direct investment or as bilateral or multi-lateral aid. Whilst traditional international energy companies are still investing in ASEAN, national and state-backed companies from other ASIAN countries are playing a growing role. Such countries include China, Japan, Korea, Russia, India, and the Middle East.

Such investment is to be welcomed, in principle, provided that (1) the energy produced is made available to the host nation and to the wider ASEAN community, (2) the environmental and social impacts of the projects are managed in a responsible way, (3) the technology used is the best available and/or most appropriate, and (4) the construction and operating practices meet international standards.

Concerning the first point, the construction of hydro-electric dams by Chinese companies in Myanmar and on the Mekong River in ASEAN member states and of a gas pipeline in Myanmar is being undertaken with the explicit purpose of sending energy from ASEAN member states to China. Whilst this may bring economic benefit to the host ASEAN member state in the short-term, such investments create the risk that limited ASEAN energy resources are being sent abroad rather than being kept to satisfy demand within ASEAN. Some of these same projects have caused significant dissatisfaction among local populations, notably in Myanmar, on account for the poor management of social and environmental impacts.

In order to ensure the long-term sustainability of its energy sector, ASEAN should ensure that all energy projects use the best or most appropriate technologies and apply international standards to construction and operation. Whilst these requirements apply equally to all sources of energy and along the full supply chain, the energy source that is causing the greatest concern is nuclear energy. In this industry, Russia, Japan, Korea and China are all competing to win projects in ASEAN countries. It is up to ASEAN and its member state governments to ensure that the suppliers and contractors meet the highest standards.

Two further issues relating to domestic primary energy resources also relate to countries in Northeast Asia. The first concerns the maritime territorial disputes in the South China Sea and China's persistence in proclaiming its historic rights over a vaguely defined area bounded by a nine-dashed line that it backs up with active oil exploration. Legal grounds (though not definitive) exist for a number of ASEAN member states to claim sovereign rights over energy resources that lie within the area of the nine-dashed line. Were it decided that such resources belonged to one or more ASEAN member states, this would in principle enhance ASEAN's security of energy supply.

The second issue concerning Northeast Asian countries arises from the large proportion of ASEAN's energy exports which go to this region and, conversely, the high level of dependence of Northeast Asian states on energy which flows from ASEAN suppliers and through ASEAN maritime waters.

Taken together, these considerations highlight the growing degree of interaction and interdependence between ASEAN member states, on the one hand, and governments and energy companies from Northeast Asia (China, Japan, Korea and Russia) as well as from India and the Middle East, on the other hand. This phenomenon provides opportunities in terms of investment, technology and skills, but poses a range of risks if these relationships are not managed well.

4.1.3 Clean and efficient energy supply and use

In addition to the massive investment in to raise the scale of energy supply, ASEAN also faces to need to boost investment in energy efficiency and clean energy along the supply chain. This will require funds, technology and skills, much of which is likely to come from outside ASEAN, at least over the next few years. If ASEAN can develop into a single market for energy technology, goods and services, this is likely to encourage investment and the provision of energy services from outside ASEAN.

4.2 ASEAN's current capacity to meet these challenges

In order to assess ASEAN's capacity to address these external challenges, we examine three aspects of energy governance in ASEAN:

- Progress towards ASEAN energy market integration.
- The nature of (energy) diplomatic relations between ASEAN and key external actors and organisations.
- The capacity of ASEAN to act cohesively and communicate externally with a single voice on energy matters.

4.2.1 Progress towards ASEAN energy market integration.

ASEAN energy market integration provides a number of regional public goods, one of which is enhanced security of energy supply (Andrews-Speed and Hezri, 2013; other AEMI 2 papers). This benefit arises through the free movement of energy commodities, energy services, technologies, investment and skilled labour across the region. Effectively managed, energy market integration enhances long –term energy security through the more effective allocation of resources between ASEAN member states of complementary energy endowments and capacities. It also boosts the region's ability to react to short-term crisis through sharing of energy supplies and emergency stocks.

Whilst progress has and continues to be made towards ASEAN energy market integration, progress has been slower than might have been hoped in a number of respects (Andrews-Speed and Hezri, 2013; other AEMI 2 papers):

- The Trans-ASEAN Gas Pipeline and the ASEAN Power Grid are behind schedule, constraining physical inter-connection between member states.

- The ASEAN Trade in Goods Agreement may have removed most tariffs but many non-tariff barriers to trade in energy remain in place.
- The ASEAN Comprehensive Investment Agreement has country specific annexes which list many exemptions relating to energy. These restrictions on investment flows within ASEAN are exacerbated by regulatory and fiscal measures at national level which constrain the flow of inward investment in energy regardless of the source of the funds.
- A revised ASEAN Petroleum Security Agreement (APSA) was signed in 2009 and ratified in March 2013. It provides for voluntary (not obligatory) measures in times of supply crisis, including emergency energy-saving measures and the sharing of oil or gas. It allows for, but does not oblige member States to construct oil stockpiles either individually or jointly. The sharing mechanism has never been implemented as supply problems have been solved bilaterally between ASEAN members, with non-ASEAN oil producers or through oil traders (Nicolas, 2009). As a result, it is very uncertain how the APSA mechanism would work in a supply crisis (Mitchell, 2014).
- One of the objectives shared by the strategies for renewable energy and energy efficiency is to promote the development of manufacturing capacity and trade across ASEAN in the relevant technologies and appliances. Progress in this regard has been hampered by a number of factors, such as weak technological capabilities and the lack of national technical standards (ASEAN Centre for Energy, 2013).

More fundamentally, energy does not appear to have been identified as a priority for the ASEAN Economic Community (AEC), either in official documents nor in published accounts which assess progress towards the AEC (cite books published in 2014).

Unless the pace of ASEAN energy market integration is accelerated, the capacity to manage external energy challenges will remain low.

4.2.2 The nature of (energy) diplomatic relations between ASEAN and key external actors and organisations.

Whilst ASEAN has a relatively good track record of external engagement relating to general political and economic issues, it is has been much less active on matters relating to energy. This is not to say that ASEAN members do not recognise the importance of international engagement to attain greater regional energy cooperation. The 2010 ASEAN Plan of Action for Energy Cooperation 2010-2015 adopted in July 2009 noted that the 25th and the 26th ASEAN Ministers of Energy Meetings held in November 2007 in Singapore and in August 2008 in Bangkok, Thailand had provided guidelines and directives towards enhancing regional cooperation on energy. The 2010 Plan of Action reiterated the call to,

> "Expand external energy cooperation and to continue joint programs under the ASEAN+3
> and the East Asia Summit (EAS) energy cooperation programs and dialogue partners, such as, the European Union, Japan, Australia, Germany, etc."[63]

63 2009 ASEAN Plan of Action on Energy Cooperation 2010-2015 adopted on 29 July 2009 in Mandalay, Myanmar by the Energy Ministers, Pg 11,, http://cil.nus.edu.sg/2009/2010-asean-plan-of-action-on-energy-cooperation-2010-2015/

Back in 1998, the East Asia Vision Group (EAVG) - composed of eminent intellectuals from the ASEAN Plus Three member states – was tasked with drawing up a vision for mid-to-long term cooperation in East Asia for the 21st century.[64] The EAVG Report was submitted to the leaders attending the 2001 ASEAN Plus Three Summit.[65] The report called for closer energy cooperation at the East Asian regional level. It called on East Asian governments, "to strengthen and increase efforts towards institutionalizing environmental and energy cooperation in the region" and had dedicated an entire section under the "Energy Cooperation" where it called for the region to "jointly develop and explore new sources and supplies of energy within the region, and promote the efficient use of energy", and called for a framework "to help the region develop a broad regional consensus for energy policies and strategies both for the short and long term".

Over a decade later, the East Asia Vision Group II (EAVG II) was established in 2010 and the EAVGII Report with recommendations titled, *Realising an East Asia Economic Community by 2020* was submitted to the ASEAN Plus Three Summit leaders in Phnom Penh, Cambodia in 2012. The authors in this report again called for,

> "Strengthening of cooperation efforts in the efficient supply and use of natural resources, energy saving practices, oil stockpiling, civilian use of nuclear energy, and development of green technology".[66]

The EAVGII report noted that ASEAN Plus Three Ministers had agreed in 2002 to a five point initiatives for energy cooperation among members, consisting of: (1) the creation of emergency energy security network, (2) the development of oil stockpiling, (3) joint studies on the APT oil market, (4) the improvement of natural gas development and (5) the improvement of energy efficiency and renewable energy. It went on to note that progress in these five areas remained limited,

> "Most of the initiatives are at very preliminary stage such as APT oil market, natural gas development and the improvement of energy efficiency and renewable energy. Some other initiatives such as oil stock piling are on voluntary and non-binding, causing a big gap between developed member countries and least developed member countries."

This observation by the EAVGII has highlighted the slow pace in developing these five energy cooperation initiatives over the past decade and raises the question on whether substantial progress can be achieved by 2020. It served to demonstrate how ASEAN's slow decision-making process has also hampered the organisation's ability to engage with its closest three neighbours, China, Japan and Korea.

ASEAN has recognised energy cooperation as a key area for external engagement and cooperation with external parties. Three examples are provided here relating to India, Russia

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64 ASEAN Plus Three Cooperation, 22 January 2014, http://www.asean.org/asean/external-relations/asean-3/item/asean-plus-three-cooperation

65 Towards and East Asian Community – Region of Peace, Properity and Progress (2001), http://www.mofa.go.jp/region/asia-paci/report2001.pdf

66 Report of the East Asia Vision Group II (EAVGII), 19 November 2012, http://www.mfa.go.th/asean/contents/files/asean-media-center-20130312-112418-758604.pdf

and Canada. During the 8th ASEAN-India Summit in Hanoi, Vietnam, in October 2010, ASEAN and India agreed on a Plan of Action Plan of Action To Implement the ASEAN-India Partnership for Peace, Progress and Shared Prosperity (2010-2015) which had called for greater energy cooperation between ASEAN and India.[67] In the case of Russia, the ASEAN-Russia Energy Cooperation Work Programme 2010 – 2015 was adopted in Danang, Vietnam, in August 2010 with focus on "capacity building programmes, development of alternative and renewable energy resources, energy infrastructure, peaceful use of nuclear energy, coal, and oil and gas exploration."[68] With Canada, ASEAN also had a *Plan of Action to Implement the Joint Declaration on ASEAN-Canada Enhanced Partnership* issued in July 2010, in Hanoi, Vietnam.[69] This plan similarly called for strengthen energy cooperation between the two sides and expressed support for the implementation of the ASEAN Plan of Action on Energy Cooperation (APAEC) 2010-2015.

Such Plan of Actions covering energy cooperation with the external parties are intended to facilitate the deepening of cooperation between ASEAN and the external parties. While holding great promise, they all also remain at the preliminary stage. One of the key reasons for the slow progress is probably because the ASEAN Secretariat has inadequate human and financial resources to manage the expanding energy cooperation agenda with multiple external parties. Another key reason is likely to be due to the slow progress in the implementation of the ASEAN Plan of Action on Energy Cooperation (APAEC) 2010–2015 between ASEAN member states themselves. Given that internal regional conditions remain inadequate, the contributions by external parties have also been limited as a result.

ASEAN has concluded a number of Free Trade Agreements with North-East Asian States (China, Japan, Republic of Korea and Taiwan), as well as with Australia, New Zealand and India. The 10 ASEAN members and their Free Trade Agreement partners – Australia, China, India, Japan, Republic of Korea and New Zealand – have also launched a new economic initiative called the Regional Comprehensive Economic Partnership (RCEP). This is a 16-party Free Trade Agreement aimed at broadening and deepening economic engagements with its FTA partners. ASEAN's growing interest in North-East Asia stimulated the formation in 1997 of ASEAN+3 (Japan, China and the Republic of Korea). This grouping started with its focus on financial and economic recovery, but later expanded to cover many fields, including infrastructure, energy, the environment, food, disease control and maritime piracy.

ASEAN+3 soon led to the creation of yet another, even larger cluster that became known as the East Asian Summit (EAS) with the objectives of (a) facilitating confidence-building and discussions on broad strategic issues that concern the region and (b) developing East Asian regionalism in an inclusive manner (Desker, 2005). At its first meeting in 2005, EAS

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67 Plan of Action To Implement the ASEAN-India Partnership for Peace, Progress and Shared Prosperity (2010-2015), http://cil.nus.edu.sg/rp/pdf/2010%20Plan%20of%20Action%20To%20Implement%20the%20ASEAN-India%20Partnership%20for%20Progress%20and%20Shared%20Prosperity%20(2010-2015)-pdf.pdf

68 ASEAN-Russia Dialogue Relations, June 2012 , http://www.asean.org/asean/external-relations/russia/item/asean-russia-dialogue-relations

69 Plan of Action to Implement the Joint Declaration on ASEAN-Canada Enhanced Partnership, http://www.asean.org/archive/documents/Plan%20of%20Action%20to%20Implement%20the%20Joint%20Declaration%20on%20ASEAN-Canada%20Enhanced%20Partnership_f.pdf

comprised the 13 members of ASEAN+3 and Australia, New Zealand and India. The United States of America and the Russian Federation joined in 2011. The agenda is mainly to promote strategic dialogue and cooperation in East Asia, including energy issues, but concrete progress is constrained by differences of opinion on the membership, role and objectives of EAS, and on its relationship with ASEAN+3 (Dent, 2008).

In addition, ASEAN participates in the Asia Cooperation Dialogue Pacific Economic Cooperation Council and in the Asia Pacific Economic Cooperation (APEC). It also has bilateral arrangements with other regional organizations such as the Gulf Cooperation Council (GCC), MERCOSUR, the Southern African Development Community, the Shanghai Cooperation Organization, and the Organisation for Economic Co-operation and Development as well as a number of United Nations organizations.

Although ASEAN has succeeded in building this wide web of general political and economic relations, in most cases these interactions are relatively shallow (references) and few have a strong focus on energy. In this respect it is notable the ASEAN has little engagement with key energy organisations. Indonesia and Thailand are the only two ASEAN member states which have close relations with the International Energy Agency (IEA), but ASEAN itself has no formal engagement with the IEA, nor with other energy-related international organisations such as the Energy Charter Treaty or the International Energy Forum IEF). Only the Philippines and Brunei are members of the IEF. ASEAN's window on the Middle East oil suppliers is provided through its formal relationship with the GCC, but this partnership seems to pay little attention to oil. The ASEAN-GCC Two-Year Action Plan 2010-2012 mentions the promotion of investment in energy, including alternative and renewable energy, but this is just one of many sectors including agriculture, tourism and construction.[70]

4.2.3 The capacity of ASEAN to act cohesively and communicate externally with a single voice on energy matters.

In this section we assess ASEAN's capacity to act and communicate cohesively on four types of issue:

- Response to energy supply crises
- Engagement with state-backed energy companies from outside ASEAN.
- South China Sea
- Sealane security

The most important contribution to alleviating a global oil supply crisis is effective communication by all actors. No ASEAN member states are members of the IEA, ASEAN has no formal engagement with the IEA, and the APSA is at a very early stage of development and has no binding obligations. As a consequence, at the time of an international energy crisis, the world will be looking to ASEAN and similar regional organisations to provide accurate and unambiguous up-to-date information about a range of matters including the state of energy supply, measures to constrain demand, the availability of strategic stocks, and plans for release of these stocks. It is not evident that ASEAN at present has the coherence to provide such information at short notice.

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[70] http://www.asean.org/archive/documents/ASEAN-GCC%20Two-Year%20Action%20Plan%20as%20of%201%20June%202010.pdf

A growing proportion of inward investment to ASEAN's energy sector is coming from state-owned and state-backed companies, notably from China, Japan, Korea and Russia. Whist such investment is to be welcomed, there are a number of risks involved, as discussed in Section 3.2. Whilst each sovereign state has the right to make its own choice of inward investors, ASEAN as a group has a role to play to ensure that such investments do not undermine collective interests. In particular, investment opportunities should be open to tender and not decided on the basis of political objectives, and energy flowing from such investments should be made available to the ASEAN energy market and not be committed to long-term export to the home country of the investor. If an effective ASEAN energy market were established, then such bilateral deals with a strong political element would be precluded.

One pressing area in which ASEAN has singularly failed to act cohesively relates to engagement with China over the South China Sea. In particular, Vietnam and the Philippines, which are actively confronting and challenging China's claims, have indicated that they would like to see ASEAN take a stronger stance over the South China Sea. However, the role of ASEAN in these disputes has been limited. This is because not all ASEAN members are directly involved in such disputes with China and it is therefore difficult for ASEAN as a consensus-based organisation to motivate all member states to adopt a collective stance. In fact, the ASEAN member states recognise that their relationships with China are multi-dimensional and they are thus mindful not to let the maritime disputes overshadow overall relations. Furthermore, ASEAN does not have much experience in resolving such a complex dispute.

Essentially, ASEAN's role is to serve as a facilitator by providing a framework for all parties to resolve their disputes peacefully, without resort to the use of force. It does not take a position on the respective claims and has instead repeatedly urged all disputing parties to finalise the long-delayed Code of Conduct as a way to reduce tension in the region. The organisation's focus in relation to these disputes is to ensure freedom of navigation and flight in the region, that the rule of law is applied as competing claimants assert their claims, and, most importantly, that Southeast Asia remains an open region and does not become beholden to any single external power.

4.3 External challenges to ASEAN's energy security

If ASEAN fails to act cohesively to address these challenges it faces a number of threats which include:

- Growing vulnerability to and dependence on the actions of other powerful Asian nations with respect to energy supplies.
- Growing vulnerability to and dependence on the actions of other powerful Asian nations as they gain access to ASEAN's energy resources.
- Greater vulnerability to the economic, social and political consequences of a major interruption to energy supplies, both for ASEAN as a group and for individual ASEAN member states.
- A shortage of inward investment and service provision in the energy sector across ASEAN, especially in the field of clean energy and energy efficiency.

One of the biggest challenges for ASEAN, both currently and looking ahead, would be its management of the relationship with China. ASEAN needs to strike a careful balance to ensure that the Southeast Asian region would benefit from China's growing economic and

political influence, while not becoming over-reliant on China to the extent where the organisation loses its central position in driving the evolution of the East Asian institutional architecture, which covers political, economic, and socio-cultural cooperation. In dealing with China, ASEAN also has to strike a fine balance in managing the varied expectations of the different member states, to ensure that ASEAN remain able to provide a common strategic vision for its members.

The South China Sea is suspected of holding significant resources of oil and natural gas, and may also host deep-marine gas hydrates. However, this sea is also home to a large number of maritime boundary disputes (reference). Most disputes between ASEAN member states have either been resolved or have been set aside in favour of establishing joint development arrangements for oil and gas. In contrast, China's claims to "historic rights" over a large area of the South China Sea bounded by a "nine-dashed line" means that it has overlapping claims with Vietnam, the Philippines, Malaysia and Brunei. Already there have been direct confrontations at sea between China and its immediate neighbours, Vietnam and the Philippines. Chinese oil companies have been carrying out geophysical surveys over the disputed parts of the South China Sea for several years, and in 2014 made the first move to drill an exploration well in waters claimed by Vietnam using the first deep-sea drilling rig to be made in China.

5. The international experience of multi-lateral cohesive action and effective communication on external energy matters

Rather than address the issue of energy market integration itself, this section focuses on how a group of nations have worked together successfully and unsuccessfully to address external energy challenges and opportunities such as those faced by ASEAN. We have chosen the example of the European Union (EU) in the first instance because it is a long-established regional group and has for many years tried to develop a coherent external energy policy, but with mixed success. Whist the EU can claim some success in launching strategic initiatives to support energy security, it has faced a number of profound challenges in implementation, mainly arising to differences of outlook among member states.

Whilst internal energy policy and energy market integration is managed by the Directorate-General for Energy,[71] it is the External Action Service which drives external energy policy.[72]The EU's external energy policies are focused strongly but not exclusively on security of supply. The European Commission has carried out extensive analysis and numerous policy documents are publically available.[73]

The EU has established or has been instrumental in establishing a number of instruments and institutions. These include:

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71 See http://ec.europa.eu/dgs/energy/index_en.htm

72 See http://www.eeas.europa.eu/index_da.htm

73 See for example:
http://ec.europa.eu/energy/international/security_of_supply/cooperation_en.htm

- The EU in 1968 set up requirements for all member states to build oil stock piles equivalent to 65 days of net imports. This was then raised to 90 days after the establishment of the International Energy Agency in 1972 (see paper 10).[74]
- The EU was the prime mover in creating the Energy Charter Treaty which was signed in 1994. The aim of this treaty was to support investment and trade in energy across the Eurasian continent, but especially between Europe and the countries of the Former Soviet Union.[75]
- The Energy Community was established by Treaty in 2005 by the EU as an international organisation dealing with energy policy. Membership includes the EU plus those Balkan states which are not EU members, Ukraine, and Moldova, with Norway, Turkey and Armenia as observers.[76]

The EU has formal energy dialogue or partnership relations with Russia, Algeria, Brazil, China, India, Iraq, Japan, Norway, South Africa, Turkey, Ukraine and the USA. It has regional energy partnerships in the 'near abroad' across the Mediterranean Sea and with countries in the Caucasus and central Asia. Finally, the EU has formal partnerships with the IEA, the International Energy Forum, the International Atomic Energy Agency (IAEE), the Organisation of Oil Exporting Countries (OPEC), the Gulf Cooperation Council (GCC), the Energy Charter Treaty, and the G8 and G20 groups of nations.[77]

Despite these steps being taken over several decades, it was only in 2011 that the European Commission published its first comprehensive external energy strategy document.[78] In addition to consolidating the thinking behind the measures already implemented, it included the need to more effectively share information between member states and promote a coherent EU external energy policy, and to promote the safe, sustainable and environmentally sound production and use of energy across the world.

Arguably the most important and most urgent measure within this external energy policy document was to promote greater investment in infrastructure to import energy and to transport it within Europe with the aim diversifying gas supplies away from Russia. The "Southern Gas Corridor" lies at the heart of this strategy. The concept of the "Corridor" was developed in the late 1990s and comprises a series of pipelines which would bring gas from Azerbaijan and Central Asia to Europe. However, the project has repeatedly been delayed by financial and political obstacles, in particular, by the competition between different options for routes.[79] Recent tensions with Russia have added urgency to the project,[80] and on 21st

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[74] See http://europa.eu/legislation_summaries/energy/external_dimension_enlargement/l27071_en.htm

[75] See http://www.encharter.org/

[76] See http://www.energy-community.org/

[77] See http://ec.europa.eu/energy/international/index_en.htm

[78] See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0539:FIN:EN:PDF

[79] See: http://www.eurodialogue.eu/energy-security/Europe-southern-gas-corridor-The-great-pipeline-race; Sartori, 2012 file:///C:/Users/ESICPA/Downloads/iaiwp1201.pdf

[80] See http://www.huffingtonpost.com/david-koranyi/revitalizing-the-southern-gas_b_5214501.html

September 2014 a ground-breaking ceremony was held near Baku, Azerbaijan, to mark the start of construction of a pipeline which will eventually take gas to mainland Europe.[81] In addition, the EU's LNG regasification capacity has risen from 175 bcm/yr in 201 to 217 bcm/yr in 2014, and is projected to grow to 355 bcm/yr by 2020.[82] This growing ability to import seaborne LNG will further reduce the EU's reliance on Russian gas, especially as total energy demand is projected to remain flat or decline over the next twenty years.

The most prominent source of division among EU member states over external energy policy relates to Russia. In simple terms, those states closest too and most directly reliant on Russian gas tend to take a different approach from those states which are more distant and less directly reliant. The European countries' perception towards Russian dependence is also coloured by their historical relationship with Russia. The European Commission is trying to make the EU less dependent on Russian gas which currently accounts for approximately 39% of EU natural gas imports and 27% of EU gas consumption in 2013.[83] Attempts to wean Europe off Russian gas and negotiate against Russia as a bloc have also been thwarted by the competing interests of individual European countries. For instance, Austria is very keen to develop a new gas pipeline connecting Russia via the Black Sea to Bulgaria and on to Central Europe called the "South Stream", which would bypass Ukraine. Meanwhile, Brussels have prevented the Nord Stream pipeline which connects Russia with Germany via the Baltic Sea and bypasses the traditional ex-Soviet transit countries from operating in full capacity. These cases show the challenges involved in attempting to develop a unified and coherent regional energy policy in the face of differing views and competing interests among different state actors.

Since the start of the crisis in Ukraine in 2014 the importance of the EU's energy relationship with Russia has been complicated by wider and more urgent strategic concerns. Following Russia's new assertive approach towards Ukraine, Russia is not regarded more as a strategic challenge, rather than a strategic partner to Europe. This has raised question on whether Russia would eventually become a direct threat to the EU and NATO members, particularly towards Poland and the Baltic states. The spectrum of views among European leaders and EU agony on how best to respond to Russia's activities against Ukraine as some leaders fear an economic fallout has shown the how some crises can threaten the cohesiveness even of a regional grouping with a relatively coherent external energy strategy.

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81 See http://www.oilandgastechnology.net/pipeline-news/bp-begins-construction-southern-gas-corridor-pipeline-between-azjerbaijan-europ

82 See file:///C:/Users/ESICPA/Downloads/IFRI_deschuyteneer28414final.pdf

83 European Energy Security Strategy, European Commission, 28 May 2014, http://ec.europa.eu/energy/doc/20140528_energy_security_communication.pdf

6. Towards an external ASEAN energy strategy

(We would really like to leave completion of this section till we see other reports and have the next brain storming session)

To set ASEAN's ambition in creating a cohesive regional energy strategy and the suggestion of an external ASEAN energy strategy in context, it is useful to consider the amount of time European integration took. The European had instituted supranational governance enabling the creation of binding rules for member states. This process could be traced way back to the Treaty of Paris in 1952, and it was only four decades on with the signing of the Maastricht Treaty in 1992 that the EU was established in 1993. It was only in 2009, - another further 16 years – before the EU created the role of a Representative of the Union for Foreign Affairs and Security Policy (HR), which is likened to be a EU foreign minister post for the EU.

On the subject of a common international energy policy, it has taken the Europeans decades to establish an internal energy market, and plan at the EU-level for the bloc's strategic energy imports , greenhouse gas emissions reduction plan, energy technologies development and finally, to speak with a single voice on international energy issues.[84] Even then, the EU's agony and internal debate over sanctions towards Russia has revealed the divisive nature of international energy politics.

The only other regional bloc in the world that is attempting to create a regional energy strategy besides the EU is ASEAN, which is neither a supranational organisation, nor possesses the human and financial resources to manage the expanding energy cooperation agenda both domestically and externally. Furthermore, given that ASEAN member states have traditionally been unable to present a united front due to narrow self-interest calculations, ASEAN's has typically prioritised agreement by consensus and the adoption of the lowest common denominator. This approach has undercut the bold and visionary approach set out by the EAVG to strengthen ASEAN.[85] Given the limited sense of community among ASEAN members, the organisation can only remain a modest institution.

This final section will identify the main elements of an external ASEAN energy policy which would promote a unified and cohesive external position in the framework of AEMI and which would enhance ASEAN energy security.

For each element or task, the text will describe:

- its objectives,
- the nature of the task,
- the political and institutional requirements,
- the current constraints on implementation,
- options for overcoming these constraints.
- the benefits of undertaking the task.

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[84] http://europa.eu/legislation_summaries/energy/european_energy_policy/l27067_en.htm

[85] Barry Desker, "Is the ASEAN Charter necessary?", RSIS Commentaries, 21 July 2008, http://www.rsis.edu.sg/wp-content/uploads/2014/07/RSIS0772008.pdf

Likely headings:

- Develop a coherent approach to external relations with large Asian energy importers and their energy companies
- Develop a coherent approach to managing disputes in the South China Sea
- Develop a coherent approach to relationships with key oil and gas exporters, especially in the Middle East
- Develop a coherent approach to speaking with one voice in the event of a supply crisis
- Develop a coherent approach (and international market) for attracting inward investment, technology and services relating to clean energy and energy efficiency
- Consolidate existing Free Trade Agreements

Key requirements:

- In order to develop these capabilities, the ASEAN Secretariat must have much greater capacity in terms of personnel, skills and authority.
- Member states must be able to set aside their individual narrow interests for the sake of larger regional interests in order to achieve a higher level of cooperation through ASEAN.

References

To be added later