#### The South-East Asia Perspectives on the Challenges to Energy Security and the Sustainable Use of Energy

Prepared by Energy Security Division Energy Studies Institute National University of Singapore

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# DRAFT

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Note by the Secretariat: The draft presented here is as per the original submission before the Consultation Meeting. The draft is being revised upon the comments made by the Consultation meeting held from 3-5 October 2012. The revised background document will be circulated among the participants of the Consultation Meeting prior to its finalization.

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### List of Acronyms

ACE	ASEAN Centre for Energy			
ADB	Asian Development Bank			
AFOC	ASEAN Forum on Coal			
APAEC	ASEAN Plan of Action for Energy Cooperation			
APG	ASEAN Power Grid			
ASCOPE	ASEAN Council on Petroleum			
ASEAN	Association of Southeast Asian Nations			
CBM	Coalbed Methane			
CO <sub>2</sub>	Carbon Dioxide			
EE	Energy Efficiency			
EECCHI	Energy Efficiency and Conservation Clearing House Indonesia			
EE&CO	Energy Effiency and Conservation Office (Vietnam)			
EE&C-SSN	Energy Efficiency and Conservation Sub-Sector Network			
EIB	Energy Information Bureau (Malaysia)			
EU	European Union			
E2PO	Energy Efficiancy Programme Office (Singapore)			
GDP	Gross Domestic Product			
GHG	Greenhouse Gasses			
GWh	Gigawatt-hours			
HAPUA	Heads of ASEAN Power Utilities/Authorities			
IEA	International Energy Agency			
KTOE	Thousand Tons of Oil Equivalent			
LNG	Liquefied Natural Gas			
LPG	Liquefied Petroleum Gas			
MTOE	Million Tons of Oil Equivalent			
MW	Megawatt			
NRSE-SSN	New and Renewable Sources of Energy Subsector Network			
SEA	South-East Asia			
SPP	Small Power Producer			
TAGP	Trans-ASEAN Gas Pipelines			
TWh	Terawatt-hours			
UAE	United Arab Emirates			
UNDAF	United Nations Development Assistance Framework			
VSPP	Very Small Power Producer			

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## **Chapter I: Introduction**

Energy Security is certainly one of the major preoccupations of all countries. They all need adequate amount of desired types of energy at an affordable price in a sustainable manner to ensure the normal operation of their countries and their economic and social development. Added to energy, various factors at the national, regional and international levels affect countries' quest for energy security to a varying extent, namely political, economic, social, military/security and environmental. Hence, energy security is a multi-dimensional issue complicated by the mentioned factors of which some are beyond the control of any given country. This reality is applicable to all countries, regions and subregions, including South-East Asia (SEA).

Against this background, the main objective of this report is to develop the South-East Asia's perspectives on the challenges to energy security and the sustainable use of energy. Towards this end, certain topics are covered each dealing with one aspect of the perspectives. Thus, Chapter II focuses on the major challenges relevant to enhancing energy security and the sustainable use of energy in SEA under which it discusses the major sustainable development challenges as well as the major energy challenges. It also elaborates on the linkages between sustainable development and energy challenges. Chapter III concentrates on the opportunities for the sub-region (SEA) to enhance energy security and the sustainable use of energy. It therefore analyzes certain issues, including the driving forces that could remove the barriers to achieving this objective as well as the existing initiatives. Actions that could be addressed through regional cooperation are also studied while providing an analysis of the existing activities by the major regional and international entities concerned with SEA. Chapter IV deals with the political commitments required for achieving energy security and the sustainable use of energy. For this matter, the critical elements that the sub-region would like to see reflected in the Ministerial Declaration and their justifications are provided. Finally, Chapter V offers certain proposed actions for which it prioritizes the challenges and opportunities.

Energy security takes place within a certain geographical framework with specific socioeconomic characteristics, which determines the challenges and the opportunities shaping countries' efforts towards this end. It is therefore necessary to discuss briefly the overall situation of SEA's forming countries and of course their energy situation as provided below.

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## A-Brief description of the Sub-region

SEA is a large sub-region stretching from the Bay of Bengal to the Philippine Sea sharing sea and land borders with the Asia-Pacific's large economies (Australia, China, India, Japan and South Korea). Scattered over a large area, together the regional countries account for a significant land area (almost 2.8 million km<sup>2</sup>) on which over 620 million people live. Its 11 forming countries have different economies in terms of size, complexity and diversification. However, within a degree of fluctuation, they have all experienced steady growth starting in the 20<sup>th</sup> century's last decade. Their GDP growth has been especially significant over the last decade as evident in their most recent rates (2011) provided in Table 1. Although they were all affected to a varying extent by the severe economic/financial crisis of 2007-2010 like all other regions and subregions, they have maintained their growth despite the continuity of the crisis to a differing extent in many regions and particularly the European Union (EU).

Country	**Area (square km)	*Population (million)	*GDP (\$US - billion)	*Economic Growth Rate (per cent)
Brunei Darussalam	5,765	0.405,900	12.37	2.6 (as of 2010)
Cambodia	181,035	41.31	12.88	6.9
Indonesia	191,093,1	242.3	846.8	6.5
Laos	236,800	6.288	8.298	8.0
Malaysia	330,803	28.86	278.7	5.1
Myanmar	676,578	48.34	**18.9	**4.8
Philippines	300,000	94.85	224.8	3.7
Singapore	710	5.184	239.7	4.9
Thailand	513,120	69.52	345.6	0.1
Timor-Leste	14,874	1.176	1.054	10.6
Vietnam	331,212	87.84	124	5.9
Source: Author's creation using data provided by The World Bank and UNDATA listed below. * The World Bank, Country and Economies, 2011. (http://data.worldbank.org/country; accessed on 12 September, 2012).				

**Table 1: Basic Indicators of Southeast Asia** 

\* The World Bank, Country and Economies. 2011. (<u>http://data.worldbank.org/country</u>; accessed on 12 September, 2012).
 \*\* UNDATA, Country Profile – 2009. (<u>http://data.un.org/</u>; accessed on 12 September, 2012).

The sub-regional countries are at different levels of social and economic development and thus have different needs to be met through their development projects. Yet, they all need the continuity of such development to address their underdevelopment in different areas such as infrastructure, agriculture, industry and service sectors. Added to this need, their large and growing population with improving living standards has guaranteed large and increasing energy consumption. As a result, meeting the energy needs of the SEA countries in a sustainable manner to ensure their continued growth has become a major preoccupation of the sub-regional governments to give prominence to energy security. It is therefore necessary to have a clear understanding about SEA's energy situation as follows.

The Asia-Pacific region of which SEA is a part is the world's largest energy-consuming region. Being much smaller in terms of economy and population than two other Asia-Pacific sub-regions (North-East Asia and South Asia), SEA follows the regional pattern of energy consumption as its sub-region to be discussed below.

## **B-Energy Situation**

This section elaborates on SEA's fossil energy (conventional and unconventional) and nonfossil energy resources, the sub-regional energy mix and supply and demand and the subregional pattern on energy dependency and trade.

### **1-Fossil Energy Resources of SEA**

The Association of Southeast Asian Nations (ASEAN) region is rich in oil, gas and coal resources as reflected in Table 2. In addition to conventional fossil energy reserves, it also has significant deposits of unconventional fossil energy such as coalbed methane (CBM).

Unconventional fossil energy exploration in this region (Table 3), however, is only at its stage of infancy unlike in North America.

#### • Conventional oil, gas and coal

The major ASEAN players with the largest regional oil reserves are Brunei, Indonesia and Malaysia. These resources make the three sub-regional countries excluding Indonesia meet their domestic needs while providing for their exports; Indonesia is a net importer of crude oil. Other sub-regional countries have either no oil resources at all or their reserves are too small to meet the bulk of their domestic oil requirements, let alone make them self-sufficient.

Country	Proved Oil Reserves in ASEAN + Timor Leste (Billion Barrels) – 2011	Proved Gas Reserves in ASEAN + Timor Leste (Trillion Cubic Meters) - 2011	Proved Coal Reserves in ASEAN + Timor Leste (Million Tones) - 2011
Brunei	1.1	0.3	Nil
Cambodia	Nil	Nil	Nil
Indonesia	4	3	5,529
Laos	Nil	Nil	Nil
Malaysia	5.9	2.4	4
Myanmar	***2.1	***25	2
Philippines	****0.14	***0.9	316
Singapore	Nil	Nil	NIL
Thailand	0.4	0.3	1,239
Timor-Leste	**0.9	**11.7	Nil
Vietnam	4.4	0.6	150

Table 2: Southeast	Asia's	Conventional	Fossil	Energy	Reserves
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NIL = Not available

Source: Author's creation using data provided by BP listed below.

BP Statistical Review of World Energy June 2012. (http://www.bp.com/statisticalreview; accessed 14 September 2012). \*\*Appendix 1: La'o Hamutuk. "Appendix 1. Oil and gas fields and near Timor-Leste." *Sunrise LNG in Timor-Leste: Dreams, Realities and Challenges,* Timor-Leste Institute for Reconstruction Monitoring and Analysis, February 2008. (http://www.laohamutuk.org/Oil/LNG/app1.htm; accessed on 13 September 2012).

\*\*\*\*'Myanmar Invites Foreign Energy Firms to Explore 23 Offshore Oil, Gas Blocks', *Dow Jones Newsire* in NASDAQ. 18 July 2012. (http://www.nasdaq.com/article/myanmar-invites-foreign-energy-firms-to-explore-23-offshore-oil-gas-blocks-20120718-00011; accessed on 14 September 2012).

\*\*\* World Energy Council. 2010 Survey of Energy Sources.

(http://www.worldenergy.org/documents/ser\_2010\_report\_1.pdf; accessed on 14 September 2012).

Indonesia and Malaysia possess the sub-region's largest gas reserves making them selfsufficient in gas with a strong export capability. Having much smaller gas deposits, Brunei is also a major regional exporter. Timor Leste whose gas resources are small is in the process of developing them also for export. Indonesia and Thailand have the region's largest coal reserves. Yet, Indonesia and Vietnam are the two sub-regional countries with export capabilities leading by the former.

#### • Unconventional fossil energy in the ASEAN region

SEA's unconventional fossil energy resources only exist in Indonesia, the Philippines, Thailand and Vietnam. These countries do not have any specific project for their development or are still at the very early stages of their exploration (Indonesia). Consequently, the production of such energy in SEA is very low. The four countries' unconventional oil exploration is hardly developed because of several reasons particularly its unavailability at a large scale. When it comes to natural bitumen, for instance, there is only one significant deposit with 4,456 million barrels of discovered reserves in Indonesia.<sup>1</sup> Hence, the unconventional oil, including natural bitumen, is unable to play a major role in SEA's unconventional energy industry.

However, there is a potential for faster growth of SEA's unconventional gas production, with a great potential for the CBM reserves in Indonesia, the Philippines and Vietnam. Indonesia started its CBM exploration in 2008. However, its specifics are unknown, including its current annual production. In Vietnam and the Philippines, the CBM industry is also emerging. Table 3 provides a summary of the regional unconventional resources.

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Country	Bitumen	Oil Shale	CBM (billion	Shale Gas
	(million	(billion tons)	cubic meters)	(billion cubic
	barrels)			meters)
Indonesia	4,456 <sup>1</sup>	Nil	$12,830^2$	$16,140^3$
Philippines	Nil	Nil	10.318-16.416 <sup>4</sup>	Nil
Thailand	Nil	18.668 <sup>5</sup>	Nil	Nil
Vietnam	Nil	Nil	$170-280^{6}$	Nil

#### Table 3: Southeast Asia's Unconventional Fossil Energy Reserves

Source: Author's creation based on the following sources:

NIL = Not available

1. World Energy Council, Survey of Energy Resources 2007 (London: World Energy Council, 2007), p. 133.

2. CBM Asia, *Indonesia*. (http://www.cbmasia.ca/s/Indonesia.asp; assessed on 2 February 2012)

3. Nurseffi Dwi Wahyuni, "Shale Gas Potential of Indonesia at 570 T Cubic Feet," *Indonesia Finance Today*, 27 May 2011. (<u>http://en.indonesiafinancetoday.com/read/5886/Shale-Gas-Potential-of-Indonesia-at-570-T-Cubic-Feet-</u>; assessed on 20 January 2012)

**4.** Romeo M. Flores, Gary D. Stricker, Ramon F. Papasin, Ronaldo R. Pendon, Rogelio A. del Rosario, Ruel T. Malapitan, Michael S. Pastor, Elmer A. Altomea, Federico Cuaresma, Armando S. Malapitan, Benjamin R. Mortos, and Elizabeth N. Tilos, *The Republic of the Philippines coalbed methane assessment: based on seventeen high pressure methane adsorption isotherms: U.S. Geological Survey Open–File Report 2006-1063, Reston, Virginia: U.S. Geological Survey, 2006. (http://www.usgs.gov/of/2006/1063; accessed on 27 April 2012)* 

5. Apiradee Suwannathong and Damrong Khummongkol, *Oil Shale Resource in Mae Sot Basin, Thailand*, paper presented at 27<sup>th</sup> Oil Shale Symposium 15-17 October 2007, Colorado Energy Research Institute. (<u>http://ceri-</u>

mines.org/documents/27symposium/papers/ma11-4suwannathong.pdf; accessed on 6 February 2012)

6. Do, Thai Son Do, Coal Bed Methane is Hot in Vietnam, Frost & Sullivan, 7 August 2008.

(http://www.frost.com/prod/servlet/market-insight-top.pag?docid=140182389; assessed on 6 February 2012)

2- SEA's Energy Mix and the Production and Consumption of Oil, Gas and

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