Energy and Security in Asia.

Assessing the Situation, Evaluating the Responses.

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A thesis presented in partial fulfilment of the degree of Master of Philosophy in Defence and Strategic Studies at Massey University.

Tyson Charles Schmidt.

1999.

This thesis is dedicated to the memory of Associate Professor Norman Austin, who never accepted half-hearted efforts from me. I hope this thesis is acceptable to you Norman.

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List of Figures and Tables.

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Abbreviations.

ACE	ASEAN Centre for Energy.
ADB	Asian Development Bank.
ANRE	Agency of National Resources and Energy (Japan).
APEC	Asia-Pacific Economic Cooperation.
APEC EWG	APEC Energy Working Group.
APERC	APEC Energy Research Centre.
ARF	ASEAN Regional Forum.
ASCOPE	ASEAN Council on Petroleum.
ASEAN	Association of South East Asian Nations.
BP	British Petroleum.
bpd	barrels per day.
CNPC	China National Petroleum Company.
CO_2	Carbon Dioxide.
CSCAP	Council for Security Cooperation in the Asia Pacific.
CWC	Chemical Weapons Convention.
EIA	Energy Information Agency.
FBIS	Foreign Broadcast Information Service.
FEER	Far Eastern Economic Review.
FPDA	Five Power Defence Arrangements.
FSU	Former Soviet Union.
GATT	General Agreement on Tariffs and Trade.
GDP	Gross Domestic Product.
GNP	Gross National Product.
IAEA	International Atomic Energy Agency.
IEA	International Energy Agency.
IEO	International Energy Outlook.
IMF	International Monetary Fund.
JNOC	Japan National Oil Corporation.
KEDO	Korean Peninsula Energy Development Organisation.
LNG	Liquefied Natural Gas.
mbd	million barrels of oil per day.
MITI	Ministry of International Trade and Industry (Japan).

MOTIE	Ministry of Trade, Industry and Energy (South Korea).
mt	million tonnes.
MTCR	Missile Technology Control Regime.
mtoe	million tonnes of oil equivalent.
NEPA	National Environmental Protection Agency (China).
NEPC	National Environmental Protection Committee (China).
NESO	National Emergency Sharing Organisation (Japan).
NIE	Newly Industrialised Economies.
NOC	National Oil Company.
NO_x	Nitrus Oxide.
NPT	Nuclear Non-Proliferation Treaty.
NT2	Nam Theun 2 Hydroelectric Project (Laos).
OECD	Organisation for Economic Cooperation and Development.
OPEC	Organisation of Petroleum Exporting Countries.
SO_2	Sulphur Dioxide.
TPES	Total Primary Energy Supply.
TWh	Terra Watt hours.
UN	United Nations.
UNCLOS	United Nations Convention on the Law of the Sea.
VLCC	Very Large Crude Carrier.
WEC	World Energy Council.
WEO	World Economic Outlook.
WTO	World Trade Organisation.

Introduction.

This thesis analyses the security and strategic implications of increased energy demand in Asia and asks whether the solutions being considered by Asian countries are able to deal with these problems.[1] It is divided into two main sections. First, this thesis investigates how increased reliance on specific energy resources by Asian countries can impact upon issues such as sea lane security, geopolitical relations, and the environment. Second, it analyses the solutions available and assesses their ability to lessen the impact of increasing energy demand upon security. In addition, the second section examines the degree to which the solutions are being applied within the region and which solutions are likely to be prominent in the future.

Energy's importance to national well-being, the need to transport forms of it over borders and international waters, and its environmental implications mean that energy issues have the ability to affect the security and strategic concerns of nations. This is emphasised within Asia, with its potential for rapid increases in energy demand and the mix of energy rich and energy poor countries within the region. Asian countries must ensure adequate supplies of energy for achieving national goals whilst balancing this with the strategic and security implications that come with ensuring energy supply. If this balance is not achieved, the potential exists for a range of issues to impact upon the economic, political, and strategic stability of the region.

It is hard to refute that energy is a challenge for Asia. Recent economic growth within the region which has been accompanied by greater industrialisation and urbanisation within a number of countries has led to major changes in regional energy patterns.[2] As a region Asia lacks the energy reserves to meet this increasing demand. Simply put, demand is outstripping supply. A region that aspires to high levels of economic growth, starting with a full recovery from an economic speed bump experienced in 1997/98, will not settle for energy shortfalls. As the economies pick up speed again so to will energy demand. Writing in 1998, Yergin, Eklof and Edwards note that 'after what will most likely be a temporary pause, Asian energy

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[1] For the purposes of this thesis, Asia includes China, Japan, North and South Korea, Taiwan, Hong Kong, Macau, Thailand, the Philippines, Singapore, Malaysia, Indonesia, Brunei, Myanmar, Laos, Vietnam and Cambodia. The countries of the Indian sub-continent are excluded.

[2] Ji Guoxing, 'Energy Security Cooperation in the Asia-Pacific', *Korean Journal of Defense Analysis*, 8:2 , (Winter 1996), p.269.

consumption will again rise sharply in two or three years.'[3] The challenges generated by this increase will place pressure on regional security and stability if they are not addressed and managed appropriately.

The strategic studies literature has recognised the Asian energy problem. Articles are replete with detailed analyses of production and consumption rates, projections of long term demand, estimations of reserves and figures detailing investments. The literature assumes that continued pre-crisis levels of economic growth will drive up regional energy demand. For example, Mamdouh Salameh points to China's increasing demand for oil, requiring five million barrels per day (mbd) by the year 2000, half of which will need to be imported.[4] Valencia notes that natural gas demand for countries such as Japan, South Korea and Taiwan will almost triple by 2010 as they move away from the use of oil.[5] Calder points to a growing middle class in China and South Korea driving up demand for transportation fuels whilst Yergin et al foresee increased urbanisation pushing up electricity demand across Asia.[6]

The majority of the discussion centres on the security implications of this demand for the Asian region. Tensions over reserves in the region's maritime areas, including the Spratly Islands, Mischief Reef and Paracel Islands, receive a lot of attention from the authors.[7] Valencia mentions that regional political tensions may hinder the development of Asian oil and gas pipeline networks that are important for supplying the increase in demand. Michael May's and Kent Calder's works consider the security concerns of increased reliance upon nuclear power for electricity generation.[8] Geopolitical considerations such as the increased involvement of Asian nations in the Middle East are also raised by some authors.[9]

The literature also presents a number of solutions. Authors such as Yergin, Eklof and Edwards see markets, international investment and commercial deals as being the best way to relieve energy security pressures in an increasingly

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[3] Daniel Yergin, Dennis Eklof and Jefferson Edwards, 'Fuelling Asia's Recovery', *Foreign Affairs*, 77:2 (Mar/Apr 1998), p.35.
[4] Mamdouh G. Salameh, 'China, Oil and the Risk of Regional Conflict', *Survival*, 37:4 (Winter 1995/96), p.137.
[5] Mark J. Valencia, 'Energy and Insecurity in Asia', *Survival*, 39:3 (Autumn 1997), p.86.
[6] Kent E. Calder, 'Asia's Empty Tank', *Foreign Affairs*, 75:2 (Mar/Apr 1996), p.56; Yergin et al, p.38.
[7] Especially in Salameh, Valencia, and Gouxing.
[8] Valencia, pp.87ff; Calder, pp.62ff; Michael May, *Energy and Security in East Asia*, Stanford:Asia/Pacific Research Centre, 1998, pp.28ff.
[9] Calder, p.56; Yergin et al, pp.43ff.

economically interdependent region.[10] They note that '[s]ome countries, including Japan, Thailand, and the Philippines, are moving away from the traditional security strategies of the 1970s and 1980s and looking instead to privatisation, competition, and open markets to supply energy, capital and infrastructure.'[11] Guoxing, Valencia, and Alice D. Ba all consider differing forms of cooperation between regional governments as being the way to address the challenges that rising energy demand will place upon international relations in the region.[12] However, other authors such as Kent Calder and Michael May suggest that through mechanisms such as long term contracts and the implementation of energy security policies government action will remain the main instrument in dealing with energy and security issues.[13]

The literature, however, is deficient in a number of areas. The wide range of security and strategic implications of increased energy demand in Asia is not covered in a comprehensive manner by any single study. Even the larger works by Kent Calder and Michael May do not bring all the implications together.[14] Other studies, such as Mamdouh Salameh's *China, Oil and the Risk of Regional Conflict* limit the range of implications considered by focussing on only one fuel, in his case oil. Keun Wook Paik considers a wide range of issues, but limits his discussion to Northeast Asia.[15] In addition, the solutions discussed are not looked at in any detail, and the authors often focus on only one of the number of available solutions. What results is the promotion of single solutions that would fail to satisfactorily deal with the number of security and strategic problems arising from increased energy demand.

This thesis is a response to these deficiencies. It answers three main questions. Firstly, it analyses the energy challenges faced by Asian countries and asks how the countries are presently dealing with them. Secondly, it examines what impact the measures put forward in the existing literature can have upon Asia's energy challenge. This second question will look at the scope of the challenge and the solutions, examine whether or not the solutions are wide enough to effectively

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[10] Yergin et al, pp.35ff.
[11] Yergin et al, p.37.
[12] Guoxing, Valencia, and Alice D. Ba, 'China, Oil, and the South China Sea: Prospects for Joint Development', *American Asia Review*, 12:4 (Winter 1994), pp.121-67.
[13] Calder and May.
[14] Kent E. Calder, *Pacific Defense. Arms, Energy, and America's Future in Asia*, New York: William Morrow and Company, 1996; May, 1998.
[15] Keun Wook Paik, *Gas and Oil in Northeast Asia. Policies, Projects and Prospects*, London: Royal Institute of International Affairs, London, 1995.

deal with the problem, and determine which of the three solutions is more prominent in the reactions of Asian countries to the challenges.

The third question concerns the concept of energy security as it applies to Asia. Has the concept of energy security changed for Asian nations? Commentators such as the International Energy Agency's director Robert Priddle have stated that energy security has changed and that it is a concept continually in flux.[16] Daniel Yergin notes that circumstances have changed substantially since energy security first came to the fore in the early 1970s, and that this change necessitates a redefinition of the concept.[17] Over the following pages, a picture will emerge of how Asian countries are viewing the concept of energy security as it applies to them.

Two terms are important to this thesis, each carrying a slightly different emphasis. 'Energy security' refers specifically to ensuring a sufficient and secure supply of energy so that shortages do not jeopardise national interests. It encompasses environmental concerns, the matter of supply security, and developing mechanisms to deal with the disruptions of supply that can lead to economic and political costs for nations.[18] 'Energy and security' is a term that denotes the link between energy matters and the security of countries and regions.[19] This term moves beyond the idea of supply security and considers the impacts upon other areas of security concerns, such as geopolitical relationships and the impact upon foreign policy issues. 'Energy security' is not concerned with issues such as the threat of proliferation of nuclear materials whilst 'energy and security' is. There is a certain amount of overlap between the two terms, however, in areas such as security of sea lanes of communication or the security aspects of pipelines.

This thesis consists of five chapters. The first chapter assesses Asian energy demand. It looks at the connections between economic growth and energy demand in order to determine whether the predicted growth in energy demand will still occur in Asia. From here, Chapter Two investigates the impact rising energy demand can have upon the security and strategic interests of Asian nations, at the international,

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[16] Robert Priddle, *Energy Security: A Vital Concept, A Changing Definition*, Speech to the Energy Security Group of Foreign Relations Council, Washington D.C., September 22 1998, <http://riceinfo.rice.edu/projects/baker/publications/efcac8.html>.
[17] Daniel Yergin, 'Energy Security in the 1990s', *Foreign Affairs*, 67:1 (Fall 1988) p.111.
[18] Yergin, 'Energy Security in the 1990s', p.112.
[19] The wider term 'Energy and Security' is used by authors such as Michael May and John Calabrese, 'China and the Persian Gulf, Energy and Security', *Middle East Journal*, 52:3 (Summer 1998), pp.351-66.

regional and national levels. Much emphasis has been placed on the impact upon maritime issues which many analysts see as having the potential to cause regional conflict. Chapter Two expands on the issues found in the literature and extends this analysis to other areas such as the use of hydroelectric power and the regional environmental consequences of energy use.

The remaining three chapters address the range of solutions available. Chapter Three looks at how government measures can influence the energy situation within Asia. The chapter outlines a number of ways in which governments can shape the energy sector, including regulatory measures, state control, government intervention in contracts, and policy responses such as increasing efficiency or environmental measures. Chapter Four looks at what the market can offer Asian countries in their search for the balance between energy and security. Allowing the market to set prices and opening the energy sector up to liberalisation and privatisation can yield a number of energy security benefits for nations, but raises issues such as the need for financial and legal liberalisation and regional competition for funds which impact on the wider concept of security. The last chapter concentrates on regional cooperative measures between governments, which may help address problems such as competition for resources and the financial, technological, and safety issues that the region faces. Economic and security cooperation measures are considered along with energy cooperation, as these wider measures have the ability to impact upon the wider context in which energy developments occur.

This thesis is based on an exhaustive study of the existing literature which deals with the Asian energy situation. In addition, energy data from a range of sources such as the International Energy Agency (IEA), Asia Pacific Energy Research Centre (APERC), World Energy Council (WEC), British Petroleum Statistical Review of World Energy, and economic data from the World Bank, Organisation for Economic Cooperation and Development (OECD) and the Asian Development Bank (ADB) provide the raw material to build from and support the core authors' predictions. The Internet has allowed access to a number of otherwise unattainable materials, including FBIS documents.

Chapter One.

Confirming Assumptions: Defining the Problem.

This chapter sets out to understand the present situation of energy within the Asian region. It confirms that an energy problem in the form of increasing demand does exist within Asia and analyses the reasons for this increase. The chapter begins by confirming that economic growth is returning to Asia. The link between economic growth and energy demand growth is then explained, showing that Asia will experience energy demand growth. Finally, the supply and demand characteristics of the main fuels are discussed, completing the picture of Asia's energy situation.

The starting assumption for all analyses is economic growth within the region. Calder writes that if 'buoyant economic growth' is maintained severe strains are likely to develop amongst Asian countries due to increased competition for energy supplies.[1] Gouxing clearly states that '[e]conomic growth dominates the future pattern of energy demand.'[2] These two statements raise two important questions. First of all, what level of economic growth exists within the region? Second, what effect does this growth have upon the region's energy demand?

Before the 1997 crisis high levels of economic growth were experienced throughout Asia. The newly industrialising countries known as the 'Asian Tigers' were posting annual economic growth figures of well over 5%. China led the way in Asia with growth of more than 9% per annum since reform began in 1978.[3] But seemingly overnight the 'Asian miracle' turned sour. The influx of foreign capital into countries with weak financial and corporate regulations left them vulnerable and generally unable to combat the financial crisis that came about when these inflows of funds reversed.[4] Regional currencies plummeted and national debts soared as the economic turmoil continued to spread.[5] In less than a year the regional average for annual economic growth of 6.6% had slowed to 5% and by 1998 it had slumped to -2.8%.[6]

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[1] Calder, 'Asia's Empty Tank', p.55.
[2] Gouxing, p.284.
[3] Calder, *Pacific Defense*, p.105.
[4] World Bank, *Global Economic Prospects and the Developing Countries 1998/99. Beyond Financial Crisis*, Washington D.C.: International Bank for Reconstruction and Development, 1999, pp.2 & 55.
[5] Michael Leifer, 'So Far So Good? Political Change and the East Asia Crisis', *The World Today*, 54:3 (March 1998), p.69.
[6] 'Economic Indicators', *FEER*, December 10 1998, pp.74-5; 'Economic Indicators', *FEER*, March 18 1999, pp.60-1.

Countries such as Thailand and Malaysia turned to multilateral institutions such as the Asian Development Bank (ADB) and the International Monetary Fund (IMF) to fund recovery and reconstruction.[7] Others looked towards cutting regulations that favoured monopolies, stopping widespread corruption and introducing better regulated but still investment attractive financial systems.[8] All countries have allowed foreign investors into their markets to a greater degree.[9] Efforts have also been directed towards restructuring financial sectors. In particular, governments have implemented a number of measures to strengthen the banking sector, whose previous weaknesses most analysts believe to have been a leading cause of the financial crisis.[10] These government measures have led to Asian business conglomerates enforcing their own reforms such as shedding non-essential parts of their businesses in an attempt to reach financial stability.[11]

Yergin, Eklof and Edwards are convinced that the crisis is only a temporary 'downturn', a miracle on hold.[12] This view is generally supported by economic commentators and forecasters. Pessimism at the start of 1998 has increasingly given way to positive assessments.[13] The feeling now is that the Asian economies have 'bottomed out' and that recovery is imminent, though uneven and not immediate.[14] Recovery is already here for some Asian economies. The Philippines is forecast to post a 3% growth figure for the year 2000, and South Korea has staged what the *FEER* has called an 'amazing economic recovery', outperforming most analyst's predictions.[15] Taiwan escaped the financial crisis relatively unscathed, the biggest effects coming from the flow on effects of other economies' downfalls.[16] These recoveries are looked at

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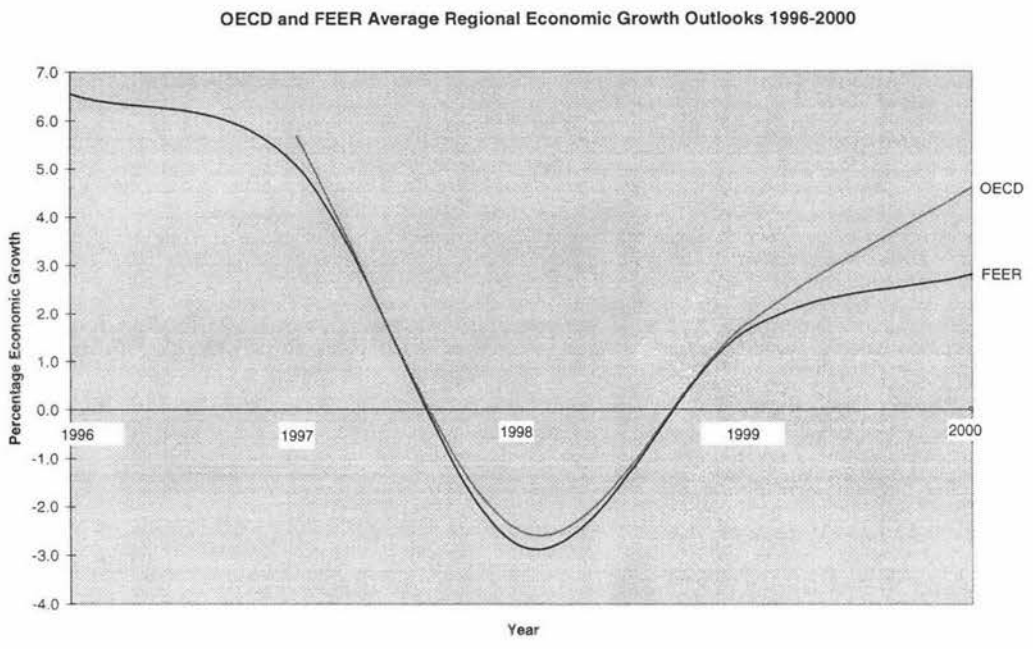
[7] 'Resuscitating Asia', *FEER*, June 18 1998, pp.10.
[8] *FEER*, June 18 1998, pp.10-11; 'A Lost Decade', *FEER*, June 18 1998, pp.12-15; Robert B. Zoellick, 'Economic and Security in the Changing Asia-Pacific', *Survival*, 39:4 (Winter 1997-98), pp.29.
[9] World Bank, *East Asia. The Road to Recovery*, Washington D.C.: World Bank, 1998, p.42.
[10] World Bank, *East Asia. The Road to Recovery*, pp.7ff.
[11] 'Asia Goes to the Net', *FEER*, September 2 1999, p.39.
[12] Yergin et al, 'Fuelling Asia's Recovery', p.34.
[13] For example, the negative is shown in 'Recession in Asia', *Asiaweek*, January 9 1998, pp.40-44; through to the mixed, 'What's Ahead for Asian Economies', *Asiaweek*, July 17 1998, pp.52-55. Also see 'At the Turning Point', *FEER*, October 22 1998, p.66.
[14] *Asian Wall Street Journal*, Thursday March 25 1999, p.6; *Asian Wall Street Journal*, Wednesday 24 March 1999, p.1; 'Time is Needed for Economic Recovery in Asia', *Beijing Review*, January 4-10 1999, pp.13-14.
[15] 'Cause for Exuberance', *FEER*, September 16 1999, p.67; 'Economic Indicators', *FEER*, September 16 1999, p.66.
[16] World Bank, *East Asia. The Road to Recovery*, p.126.

cautiously however, with analysts noting that reforms must continue to ensure that economic growth is not a short-term phenomena.[17]

The figures produced by prominent agencies support the written commentaries. A report by the Development Bank of Singapore published in April 1999 forecasts that key ASEAN nations would recover to achieve positive growth in 1999 and 2000.[18] The December 1998 *OECD Economic Outlook* projects that all the 'Dynamic Asian

Figure One.[19]



Economies' will post positive real GDP growth figures for the year 2000, placing China at the top with 7.2%.[20] For the longer term, the International Energy Agency projects that GDP will grow in East Asia at an annual rate of 4.5% until 2020, with China growing at 5.5%.[21] As Figure 1 clearly shows, the short term trend towards recovery is obvious in both OECD and *FEER* figures. According to the World Bank, Asia will return to its pre-crisis status as the world's fastest growing region in terms of real GDP

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[17] *FEER*, September 2 1999, p.39.
[18] *Evening Post*, Wednesday April 7 1999, p.14.
[19] *FEER*, December 10 1998, pp.74-5; *FEER*, March 18 1999, pp.60-1; OECD, *OECD Economic Outlook*, p.125.
[20] OECD, *OECD Economic Outlook*, France: OECD, December 1998, p.125. The OECD classes Indonesia, Hong Kong, China, Malaysia, the Philippines, Singapore, Taiwan and Thailand as the 'Dynamic Asian Economies'.
[21] International Energy Agency, *World Energy Outlook 1998 Edition*, France: OECD, December 1998, pp.280 & 304.

and per capita GDP by 2007.[22] The interim, however, will yield lower economic growth than previously expected.[23]

It can therefore be seen that the assumed basis for an energy problem, economic growth, has to a degree returned. This growth will continue to build within the region in the medium term. Before discussing the effects of this growth upon the regional energy equation, it is important to consider the connection between economic growth and energy demand. The economic growth/energy demand relationship is not as elementary as some analysts would have it.[24] The effect of growth upon energy consumption in a country like Japan, whose GDP per capita has already reached OECD levels and whose government maintains an energy policy aimed at high levels of efficiency, would not be the same as in China, where growth would create an unprecedented surge in transportation and electrical consumption by a growing middle class. Energy coefficient figures (figures linking future energy growth directly to economic growth) are also not necessarily transportable, meaning one figure cannot be used to extrapolate the demand for several countries within a region.[25] Each country would have a unique coefficient due to different configurations of economies and fuel usage patterns.[26] A country with a higher usage of oil in its total energy consumption would have a lower coefficient, whilst a country reliant on heavy industry utilising a lot of coal would have a larger coefficient whilst still consuming the same amount of energy.

It is generally taken that at the early stages of economic development economic growth and energy demand growth are closely linked. According to Michael May, '[g]rowth in energy consumption is both a consequence of and an essential contributor to economic growth.'[27] It is a complex relationship which is affected by numerous factors. Once a certain level is reached in terms of per capita wealth and energy efficiency, the two rates of growth are no longer so strongly linked.[28] Thus, according to this theory, serious energy demand growth will occur in countries such as China as it

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[22] World Bank, *Global Economic Prospects*, p.194-5.
[23] IEA, *WEO 1998*, p.32.
[24] Salameh's economic to energy growth ratio of 1.42 for example; Salameh, pp.133-46.
[25] Len Brooks and Peter Chapman, *Energy and the World Economy*, Great Britain: Open University Press, 1975, p.40ff.
[26] Brooks and Chapman, p.40; National Academy of Sciences, *Energy in Transition 1985-2010. Final Report of the Committee on Nuclear and Alternative Energy Systems*', San Francisco: W.H. Freeman Co., 1980, p.767.
[27] May, p.1.
[28] May, p.1.

attempts to raise its per capita income levels to those of first world standard. Anthony Cordesman notes that by 2020 China will require three times as much supply as Japan, and almost twice as much as the rest of Asia.[29]

The linkage of energy to economy is not as strong as some would have. The idea that economic vitality requires steadily increasing energy consumption has been described as a myth.[30] The model had been developed from the western nations' experience over the last century. Much has been learnt about the energy/economy relationship over this period. This pattern does not have to be repeated by economies with the benefit of this education and the added benefit of access to technology and expertise not available in earlier days. Indeed, China has shown glimpses of breaking away from it. Despite its comparatively low level of development, 'China's primary energy demand grew at more than 5% pa, significantly less than the economic growth rate of over 9%' between 1981 and 1995.[31] The IEA predicts that China's primary energy demand will grow at 3.5% pa until 2020, a lower growth rate than experienced over the last fifteen years.[32] This decoupling of energy growth and energy consumption, which is most pronounced in higher income OECD nations, has been driven by a determined effort towards energy conservation and efficiency by central government.[33] However, China's total final energy consumption by 2020 is still expected to be more than four times that of North America's and three times that of Europe's.[34]

A better way to understand energy growth within a region such as Asia is to consider not just the economic growth figures, but to look deeper at the sectoral composition of the various economies with relation to GDP growth. According to the ADB, '[d]iffering productive activities require different amounts of energy to create a unit of value added. Changes in the structure of an economy would, therefore, cause total energy consumption to increase or decrease, even if total GDP remained the same.'[35] What is important then, is where this growth occurs. Growth in less energy

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[29] Anthony Cordesman, *The Changing Geopolitics of Energy Part One - Key Global Trends in Supply and Demand 1990-2020*, Washington DC: CSIS, 1998, <http://www.csis.org/mideast/reports/geoenergy.html>.
[30] Joseph J. Romm and Amory B. Lovins, 'Fuelling a Competitive Economy', *Foreign Affairs*, 71:5 (Winter 1992/1993), p.47.
[31] IEA, *WEO 1998*, pp.274-5.
[32] IEA, *WEO 1998*, p.282.
[33] Zhong Xiang Zhang, 'Energy Conservation in China. An International Perspective', *Energy Policy*, 23:2 (February 1995), p.159.
[34] IEA, *WEO 1998*, pp.177 & 208.
[35] Asian Development Bank, *Energy Policy Experience of Asian Countries*, Manila: ADB, 1987, p.37.

intensive sectors such as services does not affect energy demand as much as growth in heavy industry sectors which require more energy to produce an output unit. Energy demand will thus be higher in countries with a greater proportion of heavy industries to supply, with all other things being equal.[36]

Analysing each country on a sectoral basis would take more space than is possible here. It is possible to divide the region into four tiers on the basis of GDP per capita, which often reflect different stages of sectorisation.[37] At the top sits Japan, the most developed country within the region by OECD standards, despite a recent drop in per capita GDP. The second tier comprises the 'four tigers', namely Singapore, Taiwan,

Table One. Division of Regional Countries into Four Tiers.[38]

Country	1998 Per capita GDP in US$
First Tier	
Japan	$23,100
Second Tier	
Singapore	$26,300
Hong Kong	$25,100
Taiwan	$16,500
South Korea	$12,600
Third Tier	
Malaysia	$10,300
Thailand	$6,100
Philippines	$3,500
Indonesia	$2,830
Fourth Tier	
China	$3,600
North Korea	$1,000

[36] National Academy of Sciences, p.103.

[37] This follows Paul Horsnell's divisions with the addition of a fourth tier; Paul Horsnell, *Oil in Asia. Markets, Trading, Refining and Deregulation*, Oxford: Oxford University Press, 1997, p.12. An advanced stage of sectorisation is taken to mean a higher proportion of service industries than of heavy manufacturing.

[38] Central Intelligence Agency, *World Factbook 1999*, January 1 1999, <http://www.odci.gov/cia/publications/factbook/index.html>.

Hong Kong and South Korea. Malaysia, Thailand, Indonesia and the Philippines constitute the third tier, known as the 'newly industrialising economies' (NIEs). The final tier contains the developing economies of the region such as China and North Korea. The tiers contain some overlap when utilising GDP as a comparison, but for the purposes of this study the divisions will suffice.

Japan is the largest oil market in Asia and the second largest energy consumer in the world.[39] It has reached a stage where its energy consumption can be considered mature in the sense that it is highly developed in terms of urbanisation, transport and infrastructure, and therefore will not induce rapid energy demand growth from further economic growth. Energy intensive heavy industries, such as iron and steelworks, automobile and heavy engineering industries, have largely been relocated to other countries, releasing a lot of energy demand.[40] Whilst industry still accounts for 39% of GDP output, heavy industries such as steel making and ship construction contribute only half as much towards total industrial output as the less energy intensive manufacturing sector (which accounts for 65% of industry).[41]

Table Two. Sectoral Contributions to GDP for Japan (Percentage).[42]

	1970	1980	1990	1995
Agriculture	6	4	3	1
Services	45	54	57	60
Industries	49	42	40	39

Japan is also very energy efficient and maintains a strong energy conservation programme.[43] Romm and Lovins note that smarter technologies and better policies allow Japan to use half as much energy per dollar of Gross National Product (GNP) than America.[44] The result of all of this is that economic growth does not cause vigorous energy demand growth. Total final energy consumption is predicted to grow at 1.0% pa

[39] Horsnell, p.66; IEA, *WEO 1998*, p.227.
[40] IEA, *WEO 1998*, p.232.
[41] World Bank, *World Development Indicators 1997*, Washington D.C.: International Bank for Reconstruction and Development, 1997, p.136.
[42] World Bank, *World Development Indicators 1997*, p.136; Bernard Eccleston et al (eds), *Asia-Pacific Profile*, London and New York: Routledge, 1997, p.120.
[43] International Energy Agency, *Energy in Developing Countries. A Sectoral Analysis*, Belgium: OECD Publications, 1994, p.204; IEA, *WEO 1998*, p.227; May, p.11.
[44] Romm and Lovins, p.50.

through to 2020, some 0.8% slower than GDP.[45] Electricity will provide the bulk of this increase, with demand for oil falling away.[46]

Economic expansion for the second and third tier countries has been based mostly upon non-energy intensive activity including light manufacturing of goods such as electronics in Singapore and toys and plastics in Hong Kong, or in the case of third tier countries, labour intensive rather than energy intensive activities.[47] Industry is expected to move towards less energy intensive higher-value-added industries due to an emphasis on higher skill rates and wages.[48] The service sector contributes at least half of GDP for the four second tier countries.[49] However, the strongest growth recently (over 1990-96) for some second and third tier countries came from the industrial sector (see Table Three). South Korea maintains a large (44.5% of GDP) industry sector heavily weighted towards energy intensive steel, shipbuilding and petrochemical activities. Heavy industry is also a big feature in Taiwan's economy.[50] The Malaysian government has encouraged a move away from labour intensive production towards heavy industries and to capital and technologically intensive production.[51] This restructuring will result in an increased energy demand over and above that fuelled by economic growth.

As economies expand the movement of goods and people increase leading to an increase in transportation demand which drives up the demand for hydrocarbon fuels.[52] This is due to the fact that there are no readily available fuels to substitute for oil and its distillates when it comes to powering and lubricating the internal combustion engine. At present none of the second or third tier countries come close to the number of motor vehicles per capita in Japan. Whilst countries like Hong Kong and Singapore have limited geography as a restriction to motor vehicle growth, the geographically larger countries will undoubtedly experience rapid transport sector growth as per capita incomes rise and infrastructure improves as a consequence of and requirement for economic growth. Calder notes that South Korea has a middle class that is 'ever more

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[45] IEA, *WEO 1998*, p.231.
[46] IEA, *WEO 1998*, p.231.
[47] Horsnell, p.24.
[48] IEA, *WEO 1998*, p.306.
[49] ADB, *Asian Development Outlook 1997-98*, Oxford: Oxford University Press, 1997, p.228.
[50] Calder, 'Asia's Empty Tank', p.58; ADB, *ADO 1997-98*, p.228; World of Information, *Asia and Pacific Review 1998. The Economic and Business Report*, 17th Edition, Essex: Walden Publishing, 1998, p.261.
[51] World of Information, p.127.
[52] IEA, *Energy in Developing Countries*, p.69.

addicted to driving'.[53] By 2020 the number of cars in South Korea is expected to double to 405 per 1,000 people.[54] As a region Asia leads the world in the growth of automobile numbers. In 1996 the number of cars in Asia grew by 15%. This is in contrast to the car markets of America, Japan and Western Europe which only managed 2%.[55] With the World Bank predicting annual GDP per capita growth for the whole of Asia to be around 4.3% through to 2007 (almost three times higher than the world average), this trend is likely to continue.[56] APERC predict that by 2010 demand for transportation in Southeast Asian countries will increase by 65% (3.4% a year).[57]

Urbanisation, especially in the less urbanised third tier countries, will add to this transport sector growth whilst also putting demand on electricity supply.[58] Malaysia's urban population rose by a million between 1991 and 1996. Between 1990 and 1996 Indonesia's urbanised population grew from 30.9% to 36.6%, a total of about 12 million extra people living in cities.[59] The regional average is near 45% and continues to rise.[60] Third tier countries will also move away from traditional fuels (biomass substance such as wood and peat, as well as low grade oil for lighting and heating) as they urbanise and develop. Malaysia currently relies on traditional fuels for 87.5% of its energy supply, whilst Japan and the second tier countries are less than 1% reliant (see Table Three). Demand for electricity and heating distillates will all increase as the level of traditional fuel usage decreases. For the countries of ASEAN the problem according to Yergin, Eklof and Edwards lies in meeting the growing demand for electricity.[61] Vietnam has started to ration power supply in its cities, due to a short fall estimated to grow to 4,000 megawatts within two years.[62] Brownouts and blackouts are not only inconveniences for residents, but more importantly they disrupt vital services and affect economic growth.[63]

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[53] Calder, 'Asia's Empty Tank', p.58.
[54] Energy Information Agency, *International Energy Outlook 1999. Transportation*, Washington D.C.: U.S. Department of Energy, April 1999, <http://www.eia.doe.gov/oiaf/ieo99/transportation.html>.
[55] Linda Starke (ed.), *Vital Signs 1997*, New York: W.W. Norton and Co., 1997, pp.18 & 74.
[56] World Bank, *Global Economic Prospects*, p.195.
[57] Asia Pacific Energy Research Centre, *APEC Energy Demand and Supply Outlook*, Tokyo: APERC, September 1998, p.6.
[58] IEA, *Energy in Developing Countries*, p.69.
[59] United Nations, *UN 1996 Demographic Yearbook*, New York: UN, 1998, pp.167-9.
[60] UN, *UN 1996 Demographic Yearbook*, pp.167-9.
[61] Yergin et al, 'Fuelling Asia's Recovery', p.38.
[62] 'Quest for Power', *FEER*, June 11 1998, pp.55-6.
[63] Yergin et al, 'Fuelling Asia's Recovery', p.38.

China will account for the bulk of energy demand in Asia. It is at a difficult stage of modernisation in terms of energy development.[64] Whilst it has shown glimpses of lower energy demand compared to economic growth, the future holds challenges which could disrupt this trend. It must also be noted that China's sheer size in geographic and population terms means that energy development is required on a scale never seen before. As Calder notes, with a population of more than one billion it is not unreasonable to estimate a middle class in excess of 200 million within one generation.[65] The resulting commercial demands for electricity, transport and petrochemical products will put heavy pressure on policy makers and energy markets. As per capita incomes rise in line with economic growth the demand for electrical goods will rise as will demand for all forms of transport. The Chinese government has pledged to invest strongly in the countries transport infrastructure, adding some 3,400 miles of railroad and 68,000 miles of road by the beginning of the next century.[66] If China only rises to the average of second and third tier countries in terms of vehicles per thousand people it would mean an extra 100 million automobiles.[67]

Table Three. Sectoral Contributions to GDP for China (Percentage). [68]

	1970	1980	1996
Agriculture	42.2	25.6	18.1
Services	13.2	22.7	27.7
Industries	44.6	51.7	54.2

China's industrial sector provided the greatest growth as part of its economy between 1990-96 (see Table Five) as well as the largest component of GDP over the last thirty years (see Table Seven). The IEA *World Energy Outlook 1998* notes that the industrial sector consumes double the OECD average percentage of total energy due partly to heavily intensive steel industries.[69] These trends are likely to continue. Only the eastern coast of China has developed industrially, and when the population residing inland wishes to partake in the rising living standards, levels of industrialisation must

[64] May, p.5.
[65] Calder, 'Asia's Empty Tank', p.56.
[66] EIA, *International Energy Outlook 1999 Transportation.*
[67] My own calculations from figures in Table Four.
[68] ADB, *Outlook 1997-98*, p.228.
[69] IEA, *WEO 1998*, p.283.

Table Four. Motor Vehicle and Urbanisation Rates in Asian countries 1980-1996.[70]

	Motor Vehicles per 1,000 people		Urbanisation			
			1980		1996	
	1980	1996	Millions	% of pop	millions	% of pop
1st Tier						
Japan	323	552	89	76	98.4	78
2nd Tier						
Singapore	n/a	167	2.3	100	3	100
Hong Kong	54	78	4.6	92	6	95
South Korea	14	195	21.7	57	37.5	82
3rd Tier						
Indonesia	8	22	32.9	22	71.6	36
Malaysia	n/a	152	5.8	42	11.2	54
Philippines	n/a	13	18.1	38	39.5	55
Thailand	13	106	7.9	17	12.2	20
4th Tier						
China	2	8	192.3	20	377	31
Comparisons						
U.S.A	n/a	767	167.5	74	202.5	76
Australia	502	604	12.6	86	15.5	85
New Zealand	492	562	2.6	83	3.1	86

Table Five. GDP per unit of energy use and traditional fuel use within Asian countries 1980-1996.[71]

	GDP per unit of energy use (1987$ per kgoe)		Traditional Fuel Use (% total energy use)	
	1980	1996	1980	1996
1st Tier				
Japan	5.5	6.1	0.1	0.5
2nd Tier				
Singapore	2.3	2	0	0
Hong Kong	5.3	5.4	0.9	0.3
South Korea	1.8	1.8	5.7	0.7
3rd Tier				
Indonesia	2	1.6	51.6	29.9
Malaysia	2.4	1.9	85.2	87.4
Philippines	2.5	2	35.8	30.5
Thailand	2.8	2.1	48.3	32.7
4th Tier				
China	0.3	0.7	8	5.6
Comparisons				
U.S.A	2.1	2.6	1.2	4.2
Australia	2.4	2.8	2.1	3.8
New Zealand	3.4	2.8	0.2	n/a

[70] World Bank, *World Development Indicators 1998*, Washington D.C.: World Bank, 1998, pp.158-60, 154-6 and 146-8.
[71] World Bank, *World Development Indicators 1998*, pp.158-60, 154-6 and 146-8.

Table Six. Percentage growth in GDP and the Agricultural sector in Asian countries 1980-90 and 1990-96.[72]

	GDP		Agriculture	
	1980-90	1990-96	1980-90	1990-96
1st Tier				
Japan	4	1.4	1.3	-2
2nd Tier				
Singapore	6.6	8.7	-6.2	1.8
Hong Kong	n/a	n/a	n/a	n/a
South Korea	9.4	7.3	2.8	1.8
3rd Tier				
Indonesia	6.1	7.7	3.4	2.8
Malaysia	5.2	8.7	3.8	1.9
Philippines	1	2.9	1	1.7
Thailand	7.6	8.3	4	3.6
4th Tier				
China	10.2	12.3	5.9	4.4
Comparisons				
United States	2.9	2.4	4	3.6

Table Seven. Percentage change in the Industrial and Service sectors in Asian countries 1980-90 and 1990-96.[73]

	Industry		Services	
	1980-90	1990-96	1980-90	1990-96
1st Tier				
Japan	4.2	0.2	3.9	2
2nd Tier				
Singapore	5.4	9.1	7.6	8.5
Hong Kong	n/a	n/a	n/a	n/a
South Korea	13.1	7.5	8.2	8
3rd Tier				
Indonesia	6.9	10.2	7	7.4
Malaysia	7.2	11.2	4.2	8.5
Philippines	-0.9	3.1	2.8	3.2
Thailand	9.9	10.3	7.3	7.9
4th Tier				
China	11.1	17.3	13.6	9.6
Comparisons				
United States	2.8	1.2	2.9	1.6

[72] World Bank, *World Development Indicators 1998*, p.176-8.
[73] World Bank, *World Development Indicators 1998*, p.176-8.

increase. The growth of energy intensive industries, as in previous years, will be crucial to the development of national infrastructure projects such as railways, roading, and bridges. It is a priority for the Chinese government to ensure that this growth occurs.[74] Whilst other countries such as Vietnam and North Korea face a similar picture, China's sheer size means that it will deliver the greatest impact in terms of regional energy demand. It is expected that by 2010 China's industrial sector will require some 715 million tonnes of oil equivalent (mtoe) per year, which is greater than the aggregate requirement expected of all other Asian nations.[75]

All of these factors will cause energy demand within the region to rise. Economic growth, though slower, will return to the 'Asian Tigers' allowing these trends to continue. Over and above this energy growth in line with economic growth is the extending circumstances due to raised per capita incomes and economic sectorisation. Whilst the bulk of demand will arise from China's economic growth, the third tier countries will also strive for OECD levels of development and will contribute to regional energy demand. According to the IEA, East Asian energy demand will grow at 4.1% pa over the next twenty years, requiring a supply of 1275 mtoe per year by 2020.[76] China itself will require nearly twice this amount by 2020.[77]

As Yergin, Eklof and Edwards note, it is surprising that economic growth in the recent decades occurred at all considering that the fastest growing countries suffered from the highest resource scarcity.[78] As a region, Asia lacks the reserves needed to fulfil its energy demands, especially in terms of oil. In 1997 the four tiers consumed 756.1 million tonnes (mt) of oil between them, of which the region could only supply 329.1 mt.[79] Yergin, Eklof and Edwards predict that Asia will require an additional 40 mbd between 1996 and 2010, and even with optimistic outlooks for new discoveries, is destined to import at least half of this figure.[80] According to Salameh, 'in the absence of

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[74] Calder, *Pacific Defense*, p.55; Asia-Pacific Centre for Security Studies, *Energy Security in the Asia-Pacific: Competition or Cooperation?*, Hawaii: APCSS, January 15 1999, <http://www.apcss.org>.
[75] APERC, *Energy Balance Tables*, calculated from tables on pp.15, 19 & 27. This is based on APERC's business as usual (BAU) baseline 1998 (B98) case scenario.
[76] IEA, *WEO 1998*, p.303; The IEA includes Bhutan, Myanmar and Papua New Guinea in East Asia but excludes China. China is treated separately by the IEA.
[77] IEA, *WEO 1998*, p.281.
[78] Yergin et al, 'Fuelling Asia's Recovery', pp.34-5.
[79] British Petroleum, *Statistical Review of World Energy June 1998*, London: BP, 1998, pp.9 & 6.
[80] Yergin et al, 'Fuelling Asia's Recovery', pp.39-40; Amy Myers Jaffe and Robert A. Manning, 'The Myth of the Caspian 'Great Game': The Real Geopolitics of Energy', *Survival*, 40:4 (Winter 1998/99), p.123.

new reserves, an 8% annual growth rate would exhaust China's existing proven reserves in 20 years'.[81] Malaysia's status as oil exporter is threatened by declining production in the near future, and Indonesia, the region's only member of the Organisation of Petroleum Exporting Countries (OPEC), is expected to face a decline in production in the medium to long term.[82] The IEA predicts that East Asian oil production will almost halve by the year 2020.[83] Whilst oil's percentage of total primary energy supply (TPES) is predicted to decline by 2020, in real terms an extra 400 mt will be consumed by East Asian countries, with China alone requiring a similar figure.[84] As Kemp notes, with this increase China's import requirements would reach up to 5 million bpd.[85] Having said this, in terms of supply, oil is expected to be one of the slowest growing primary fuels.

Coal presently services three quarters of China's energy demand.[86] By 2020 this figure is expected to decrease to below two thirds, but due to the overall TPES increase an extra 800 mtoe of coal will be utilised in 2020.[87] Consumption of coal in China will almost double by 2020 due to the fact that China possesses significant reserves, second only to those of Russia.[88] As part of overall Asian demand by 2010, coal is a large percentage, but when China is removed from the equation coal is no longer as significant, dropping from 42% to 19%.[89] Indonesia is the only other large producer of coal within the region, though nowhere approaching China in terms of production or reserves. Japan is a large consumer of coal, importing a significant amount from Australia, the world's largest coal exporter.[90]

Electricity will be the fastest growing energy resource in China (5.4% pa, quadrupling by 2020) whilst for East Asia it is expected to be slightly less at 4.9%.[91] Gas will provide the biggest increase in East Asia (also 5.4% pa).[92] Nuclear power is predicted to be the popular form to supply the increase in electricity, tripling its share of TPES through 1995-2020 in East Asia, and in China supplying eleven times more

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[81] Salameh, p.141; This article is pre-crisis and so tends to over estimate growth rates.
[82] IEA, *WEO 1998*, p.315.
[83] IEA, *WEO 1998*, p.316.
[84] IEA, *WEO 1998*, pp.281 & 303.
[85] Geoffrey Kemp, 'The Persian Gulf Remains the Strategic Prize', *Survival*, 40:4 (Winter 1998/99), p.132.
[86] Gouxing, p.282.
[87] IEA, *WEO 1998*, p.281.
[88] IEA, *WEO 1998*, p.291.
[89] APERC, *Energy Balance Tables*, calculated from pp.15, 21 & 27.
[90] IEA, *WEO 1998*, p.244.
[91] IEA, *WEO 1998*, pp.283, 287 & 307.
[92] IEA, *WEO 1998*, pp.283, 287 & 307.

energy than in 1995.[93] Along with nuclear power, the demand for gas is expected to quadruple in East Asia as it replaces oil in power production.[94] Unlike other fuels, gas will require extensive infrastructure in the way of dedicated transport and distribution facilities most often in the form of pipelines, which in the East Asian case will need to be trans-national in nature.[95]

In answering the question 'is there an energy problem within the Asian region' it is imperative that the answer does not focus purely upon meeting the growing demand. This is only one aspect of the energy problem that Asia faces due to its continued economic growth. The problem originates in the form of security matters relating to supply such as geopolitics, proliferation, environmental problems and sea-lane security. These will differ for the various countries within the region due to their varied stages of development. This economic/energy growth relationship and its differing effects partially explain the different emphases prevalent in the writings. For the more developed countries such as Japan, regional energy growth will offer up a different set of problems linked less to meeting the demand and more to security of supply and geopolitics. The next section shall look at the security problems arising from the increased regional energy demand.

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[93] IEA, *WEO 1998*, pp.281 & 305.
[94] IEA, *WEO 1998*, p.306.
[95] IEA, *WEO 1998*, p.317.

Chapter Two.

Altering the Landscape. The Effects upon Security.

Meeting the increased energy demand within Asia raises several security concerns. As Calder notes, 'virtually all foreseeable futures pose unsettling dilemmas for Asia.'[1] This chapter analyses security issues which are likely to appear in the near future as a direct result of fulfilling increasing energy demand. It looks at four fuels; oil, gas, nuclear power and hydro power, and assesses the impacts that increased reliance on each can have upon security and strategy. These include geopolitical, environmental and maritime issues. In addition, the connection between the environmental effects of energy use and exploitation such as carbon emissions and ecological damage is examined. The choices taken in terms of fuel choice and policy directions will shape the degree to which these issues impact upon regional and international security.

Oil.

As Daniel Yergin makes clear, oil has had a huge impact on domestic and international security and strategy over the last century and a half.[2] Its importance as a resource to industry and transportation and thus economic well being has resulted in a blending of politics and economics.[3] Oil's ability to be transported across borders and seas to serve major markets means that it has featured strongly in international relations: 'Oil, more than any other commodity, is intimately entwined with nationalism and national power, and is subject to political and military struggles for its control.'[4] It will continue to shape relations in Asia in the face of increasing energy demand.

The Asia Pacific Energy Research Centre (APERC) predicts that Asia will need to import over 700 million tonnes (mt) of oil per year by 2010.[5] By 2020 Yergin et al predict that this could reach 1000mt of oil per year, half of all regional oil

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[1] Calder, 'Asia's Empty Tank', p.56.
[2] Daniel Yergin, *The Prize. The Epic Quest for Oil, Money and Power*, New York: Simon and Schuster, 1991.
[3] Gawdat Bahgat, 'Oil Security in the New Millenium: Geo-economy vs. Geo-strategy', *Strategic Review*, 26:4 (Fall 1998), p.22.
[4] Yergin, 'Energy Security in the 1990s', p.112.
[5] Asia Pacific Energy Research Centre, *APEC Energy Demand and Supply Outlook Energy Balance Tables*, Tokyo: APERC, September 1998, taken from business as usual tables (B98) for 'China', 'Southeast Asia' and 'Other Asia', pp.15, 19 & 27.

consumption.[6] These predictions introduce several regional security issues that will impact upon Asia's maritime environment, geopolitical relations, and the region's energy markets.

Maritime Environment.

There are three main ways that an increased reliance upon oil can impact upon Asia's maritime environment. Firstly, oil is one of the many reasons behind the tensions over maritime claims throughout Asia. It is part of a complex milieu that includes maritime strategic goals and the desire to acquire resource deposits. Secondly, increasing oil traffic means that sea lane security is of greater importance for oil importing countries. Lastly, with more oil tankers operating within the region the risk of environmental accidents increases. These accidents can be a security issue as they can affect a country's economic vitality through impacting upon the commercial viability of maritime resources and tourism.

Increased demand for oil and the desire for a degree of energy self sufficiency means that deposits in disputed maritime areas become vital resources. All Asian countries (except landlocked Laos) are engaged in some form of maritime claim with another regional country.[7] These persisting claims have led to conflict between nations, even the use of minor military force.[8] In 1996 attempts to reinforce claims led to confrontation between Japan, South Korea and China over the Tok-do (Takeshima) islands in the Sea of Japan and the Senkakus (Diaoyudao) in the East China Sea.[9] Malaysia, Brunei, Indonesia, the Philippines, Vietnam and China are in dispute over the Spratly (Nansha) Islands in the South China Sea.[10] The Philippines have recently sought to internationalise and multilateralise the issue, something the Chinese do not view as a satisfactory course of action.[11] These claims and counterclaims have intensified since 1996, with states utilising the United Nations Convention on the Law of the Sea (UNCLOS) that allows an extended economic zone to be claimed as a basis to claim

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[6] Yergin et al, 'Fuelling Asia's Recovery', pp.39-40.
[7] Valencia, 'Energy and Insecurity', p.93; Alan Dupont, 'Environmental Conflict in East Asia: Some Issues for the Region', in Alan Dupont (ed.), *The Environment and Security. What are the Linkages?*, Canberra Papers in Strategy and Defence No.125, Canberra: Australian National University, 1998, p.27.
[8] Michael Leifer,'Chinese Economic Reform and Security Policy: The South China Sea Connection', *Survival*, 37:2 (Summer 1995), p.46.
[9] Guoxing, p.288.
[10] Valencia, 'Energy and Insecurity', p.93.
[11] 'Damned If You Do', *FEER*, April 8 1999, p.33.

more seabed and maritime jurisdiction.[12] The result is an increase in overlapping claims that further complicates the region's maritime issues.

It is debatable whether energy demand is the major factor in Asia's territorial disputes. No one is certain as to the amount of oil the disputed sea beds actually contain. Yergin, Eklof and Edwards register the span of estimates for the South China Sea as ranging from 6 billion barrels of oil all the way up to 105 billion barrels.[13] Calder mentions that western analysts are sceptical over the impact South China Sea oil reserves could have upon Asia's future energy situation.[14] Moreover, oil is only one factor in the South China Sea disputes.[15] Other issues such as the ability to protect sea lanes of communication and the ability to acquire a foothold in the strategic waters, along with other national maritime interests, are more likely to be the major reasons behind the establishment of maritime jurisdictions by Asian nations.[16] However, whether oil is a driving force or not, the fact that there may be oil deposits means that the stakes are raised.

Guoxing notes that the need to ensure energy sea lane security could spark a naval arms race along the sea lanes, especially when a quarter of the world's maritime trade already passes through the South China Sea.[17] According to Eric Hyer, '[t]he South China Sea forms the strategic core of Southeast Asia.'[18] The powers that control the heart of the South China Sea can exert political, military and economic pressure over states who border the sea and whose trade routes pass through it. The volume of energy being shipped through Asian waters is expected to triple over the next fifteen years.[19] As Russia and the United States scale down their deployments in the area the opportunity exists for regional powers to become more involved in maritime security. It is natural for nations to seek the security of their vital sea routes, the question for Asia is what form this will take and whether it will add to stability or not.

An indicator of the realisation of the strategic importance of sea lanes for Asian nations is an increased naval capability. Mark Valencia notes that assuring a secure

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[12] Mark J. Valencia, 'Troubled Waters', *The Bulletin of the Atomic Scientists*, 53:1 (January/February 1997), pp.49-54.
[13] Yergin et al, 'Fuelling Asia's Recovery', p.46.
[14] Calder, 'Asia's Empty Tank', p.61.
[15] Valencia, 'Energy and Insecurity', p.95.
[16] Valencia, 'Energy and Insecurity', pp.92 & 97.
[17] Guoxing, p.291.
[18] Eric Hyer, 'The South China Sea Disputes: Implications of China's Earlier Territorial Settlements', *Pacific Affairs*, 68:1 (Spring 1995), p.36.
[19] Guoxing, pp.290-91. Bruce and Jean Blanche, 'Oil and Regional Stability in the South China Sea', *Jane's Intelligence Review*, 7:11 (November 1995), p.511.

energy supply includes the security of the sea lanes carrying the fuel.[20] Seventy percent of the oil supply to Japan, Taiwan and South Korea passes through the South China Sea.[21] With outdated or little maritime capability, nations are unable to protect their energy supply routes on their own. Coupled with other maritime issues, this realisation has led to a number of maritime related military acquisitions within the region.

Countries such as Indonesia, Malaysia and Thailand have extended their fighter and air surveillance capabilities as well as surface combatants, including an aircraft carrier for Thailand.[22] Submarines have been acquired by Singapore and South Korea.[23] Japan continues to increase its amphibious capability whilst looking towards the United States to supply *Aegis* cruisers and a helicopter carrier.[24] The Chinese Navy has begun to look at acquiring a blue water role through seeking to purchase an aircraft carrier which will enable it to play a more prominent role in regional affairs.[25] Countries within the region are cautious as to China's intentions as well as the effect such a development would have on inter-Asian affairs.[26] Maritime air power is being upgraded throughout the region. Mark Farrer states that all Asian nations now possess some form of maritime air power, ranging from coastal surveillance to blue water capable surveillance planes.[27] Vietnam, the main challenger to China's claims over the Spratly Islands, has recently acquired a number of maritime strike capable Su-27 aircraft from Russia.[28]

It is unlikely that these acquisitions constitute an Asian arms race. Gary Klintworth argues that the regional trend in defence funding is downwards and that the trend is towards solving problems through discussion and cooperation.[29] However, an increasing number of Asian countries can now influence maritime issues beyond their own coastal areas. This ability, partially caused by the desire to ensure energy transport

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[20] Valencia, 'Energy and Insecurity', p.86.
[21] APCSS, *Energy Security in the Asia Pacific*. Valencia mentions that 80% of Japan's supply comes through the South China Sea, 'Energy and Insecurity', p.98.
[22] Valencia, 'Energy and Insecurity', pp.94-5.
[23] Brian Cloughly, 'Some Strategic Considerations in South-East Asia', *Asia-Pacific Defence Reporter*, 23:7 (January 1998), p.12.
[24] Valencia, 'Energy and Insecurity', p.92.
[25] Mark Farrer, 'Regional Maritime Air Power Evolves', *Asia-Pacific Defence Reporter*, 25:2 (February/March 1999), p.19.
[26] For example see J.N. Mak, 'The Chinese Navy and the South China Sea: A Malaysian Assessment', *The Pacific Review*, 4:2 (1991), pp.150-61.
[27] Farrer, p.18.
[28] Gary Klintworth, 'Vietnam's Offshore Capabilities Get A Boost', *Asia-Pacific Defence Reporter*, 25:7 (December/January 1999), p.6.
[29] Gary Klintworth, 'China's First Defence White Paper – A Credible Statement of Non-Hostile Intent', *Asia-Pacific Defence Reporter*, 24:6 (October/November 1998), p.9.

security, has implications for other maritime issues such as the various territorial claims mentioned above.

Increased oil tanker traffic raises the risk of environmental disasters. The most common source of tanker-related oil pollution is the discharge of tank washings, a small residue (1,000 tonnes from a 200,000 tonne vessel) of the tanker's cargo which is released into the sea.[30] Less frequent, but more devastating, are catastrophic oil spills that can empty thousands of tonnes into the ocean environment. In 1993 two tankers collided at the entrance to the Straits of Malacca, punching a hole into *The Maersk Navigator* releasing an undisclosed amount of oil.[31] The Russian tanker *Nahodka* broke in two in the Sea of Japan in early 1997 causing severe environmental damage to the coast of Honshu.[32]

Concern over the possibility of environmental accidents has seen countries like Malaysia and Indonesia call for certain restrictions on shipping through nearby straits. Such restrictions have strategic and economic implications. In 1977 Indonesia demanded that Very Large Crude Carriers (VLCCs) must use a longer route through the Lombok Strait.[33] This was grudgingly accepted by Japan even though it increased the cost of shipping.[34] Indonesian control of maritime choke points does not sit well with the American Navy. [35] Under the Indonesian interpretation of 'rights of passage' American submarines must sail on the surface, weapons and surveillance systems must be switched off and aircraft carriers must keep their planes deck-bound.'[36] The fact that U.S. Navy ships would in some cases have to sail three hundred miles before becoming 'battle-ready' does not sit well with American naval officials.[37] Indonesia has twice tried to close the Straits of Lombok and Sunda as a way of asserting a degree of sovereignty over the straits, at one time dropping depth charges over a Soviet submarine which refused to surface.[38] The extra costs of diversion through another route also

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[30] Valencia, 'Energy and Insecurity', p.100.
[31] 'Tanking Up', *FEER*, April 28 1994, p.34; 'Tanker Collision Spills Crude Oil Off Sumatra', *Oil and Gas Journal*, January 25 1993, p.54.
[32] Valencia, 'Energy and Insecurity', p.101.
[33] Michael Leifer, 'Security of Sea-lanes in Southeast Asia', in Kusuma Suitworyse and Sukhumbhand Paripatra (eds), *The Invisible Nexus. Energy and ASEAN's Security*, Singapore: Executive Publications, 1984, p.131.
[34] Leifer, 'Security of Sealanes', p.131.
[35] 'Water of Strife', *FEER*, February 29 1996, p.30.
[36] *FEER*, February 29 1996, p.30.
[37] *FEER*, February 29 1996, p.30.
[38] Guoxing, p.292; *FEER*, February 29 1996, p.30.

impacts on other nations utilising the straits as oil supply routes.[39] What this demonstrates is the need for a region wide policy to maintain the standards of ships carrying crude oil and proper sea lane navigation rights and regulations.

Regional Energy Markets.

The Asian oil market will undergo potentially destabilising changes as the roles of regional countries change with the onset of increased competition for supply. Presently Japan accounts for over 60% of Asia's oil imports.[40] By 2010 this figure is expected to halve to 30%, with China becoming a net importer of oil.[41] Countries such as Indonesia and Brunei, whilst still maintaining exporter status, will be increasingly lost amongst an expanding number of suppliers from outside the region. This, combined with the possible change from the present system based on long-term supply contracts (with a certain degree of flexibility in setting prices) to a freer floating market system, provides challenges for energy policy within the region.[42] If this market change does not occur, the competition for secure long-term supply agreements could impinge upon political relationship within the region.[43] For Brunei, which currently relies on oil exports for virtually all its export earnings and a large percentage of its GDP, price fluctuations due to regional competition for supply could destabilise its economy.[44] Indonesia, whilst not as reliant on oil exports for such a large percentage of its income, must still prepare for a similar situation.

More developed countries are also affected by increased liberalisation of the oil industry. Singapore, at this time the third largest refining centre in the world, will have to work hard in the face of increased competition to maintain a comparative advantage in refining.[45] The impacts of this go beyond economic concerns. If, as Horsnell implies, Singapore is in a privileged enough position to act as the channel for the oil trade into Asia, and thus has at least some influence upon price levels, such a move would impact upon international relations due to the importance of refined products for economic health.[46] Singapore could utilise its influence over petroleum product prices as political

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[39] Valencia, 'Energy and Insecurity', p.102.
[40] Calculated from APERC's *Energy Balance Tables*.
[41] Calculated from APERC's *Energy Balance Tables*.
[42] For an indepth discussion of these issues refer to Horsnell's book, *Oil in Asia*.
[43] Guoxing, p.290.
[44] Hans C. Blomqvist, 'Brunei's Strategic Dilemma', *The Pacific Review*, 6:2 (1993), pp.171-5.
[45] Horsnell, p.160.
[46] Horsnell, p.133.

leverage in disputes or conflicts. Japan provides another angle. As it is heavily dependent on imports to meet its oil demand, increased competition within the region could have political impacts. Blocking out Japan from major producer markets by another consumer such as China, whose reliance upon imports is not as acute, could generate tension.[47] Guoxing predicts that it will not be long before acute rivalry over oil will eventuate between the poorer and the more affluent countries.[48]

Asia is not devoid of potential oil reserves. China's Tarim Basin and Russia's Sakhalin fields are expected to yield considerable amounts of oil.[49] The problem, as with the off shore fields, lies in securing the capital needed to develop the reserves effectively and efficiently. The competition for investment funds to develop much needed reserves could very well create friction between countries.[50] A cash-strapped China has not taken Japanese moves to develop Russian oil fields lightly.[51] Diversion of funds to develop Caspian pipelines that lead into China at the expense of Russian reserves would add strain to Sino-Russian relations.[52] Valencia mentions that Russia is using the prospect of South Korean investment in Russian energy resources as a counterweight to Japan's indecision over the development of Sakhalin oil deposits.[53] He also notes that China may well have opened the East China Sea up for exploration as a move to distract Japan and South Korea from putting development funds into Russia's oil reserves.[54]

Geopolitical Relations.

The increased importance of Middle Eastern relations for Asian nations, particularly China, is of concern to Western analysts. It is predicted that by 2010 95% of Asia-Pacific's oil imports will come from the Middle East.[55] By 2020 China will rely upon the Middle East for up to 90% of its crude imports, a total of around 4.6 mbd.[56] This dependence will mean an increased interest in the Middle East for China and other

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[47] Guoxing, p.291.
[48] Guoxing, p.291.
[49] Calder, *Pacific Defense*, p.52.
[50] APCSS, *Energy Security in the Asia-Pacific*.
[51] Paik, *Gas and Oil*, pp.173ff.
[52] Keun-Wook Paik, 'Energy Cooperation in Sino-Russian Relations: the Importance of Oil and Gas', *The Pacific Review*, 9:1 (1996), pp.90ff.
[53] Valencia, 'Energy and Insecurity', p.87.
[54] Valencia, 'Energy and Insecurity', p.88.
[55] Guoxing, p.290; Calder, 'Asia's Empty Tank', p.60.
[56] Kemp, p.138; Energy Information Agency, *International Energy Outlook 1999. Oil Outlook*, Washington D.C.: U.S. Department of Energy, April 1999, <http://www.eia.doe.gov/oiaf/ieo99/oil.html>.

Asian nations as they confront the same energy security risks which have faced large Western importers. Political and economic ties are likely to strengthen.

China maintains good diplomatic relations with nearly all Middle Eastern countries.[57] The region is already China's fourth largest trading partner and new deals are being sought.[58] China has made oil supply contracts directly with Middle Eastern countries rather than through international oil companies. Iraq has clear intentions to substantially increase oil production through seeking investment from foreign countries once sanctions from the Gulf War have been lifted.[59] China and Asian states will play a big part in this investment.[60] Other Asian countries have sought out upstream (crude production) facilities in Iran and Iraq.[61] In return, Middle Eastern countries are looking at downstream facilities (refineries) in Asia.[62]

Some authors, like Kent Calder, state that '[t]he global implications [of Asia-Middle Eastern relations] are unsettling'.[63] Their views are tinted with visions of arms proliferation between China and Middle Eastern countries. China's arms trade activities which peaked during the period of the Iran-Iraq war of the 1980s, have decreased in recent times.[64] However, China remains the third largest supplier of arms to the Middle East (behind the U.S. and Russia).[65] With increasing energy demand and a lack of currency to pay for oil imports, arms transfers will be a tempting exchange. China has been caught illegally transferring technology twenty one times since 1992, including high-grade steel pipes to Iran which were able to be used in chemical weapons manufacturing.[66] China has been brought under the auspices of the Nuclear Non-Proliferation Treaty (NPT), the Missile Technology Control Regime (MTCR) and the Chemical Weapons Convention (CWC). However, China still cooperates with Middle Eastern countries in nuclear power development schemes and other arms deals.[67]

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[57] Kemp, pp.118-9.
[58] Jonathon Rynhold, 'China's Cautious New Pragmatism in the Middle East', *Survival*, 38:3 (Autumn 1996), p.102.
[59] EIA, *IEO99 Oil Outlook*.
[60] EIA, *IEO99 Oil Outlook*.
[61] 'A Shift Worth Watching', *Energy Economist*, 192 (October 1997), p.5.
[62] *Energy Economist*, 192 (October 1997), p.5.
[63] Calder, 'Asia's Empty Tank', p.60.
[64] Rynhold, p.110.
[65] Rynhold, p.110.
[66] 'United States: Asia Gets Too Close For Comfort', *The Economist*, May 23 1998, p.26; 'Stealthy Deal', *FEER*, July 31 1997, p.24.
[67] Calabrese, pp.363-4; Rynhold, p.108.

Increased involvement by China in the Middle East adds another dimension to Sino-U.S. relations. Until recently, China's interest in the Middle East has been driven less by a desire to challenge Western interests in a strategic way and more by the requirements of modernisation.[68] This situation is now changing. An increased strategic interest in the area means that any transfers must now take into consideration wider security issues.[69] The Americans continue to dominate the supply routes of the Persian Gulf and maintain a degree of stability through military deployments. China fears that Russia's declining power in the Gulf region will allow America to dominate the Middle East and from there attain great leverage over China and other developing nations.[70] China's engagement with Iran is the direct opposite approach to the United States' policy of containment. For China, the inclusion of Iran in Gulf and Central Asian affairs would be far more productive than exclusion.[71] So far China has avoided confronting America and the West directly on Middle East issues, perhaps because 'Third World sympathy [is] no substitute for Western trade and technology.'[72] At present China does not have the military capability to maintain a physical presence in the Gulf area but it awaits to be seen whether a China with a stronger navy becomes involved in the maritime and military security of the Gulf region.

Conversely, Asia's dependence on Middle East oil may induce China to cooperate with the U.S. for a stable Middle East region.[73] A Cold-War style policy of strategic denial of the U.S. in the Middle East would seem to be against China's needs at this stage of development. China may believe that the way the United States operates within the region in order to maintain security is generally unhelpful. China stopped short of supporting the American led military intervention into Iraq and Kuwait (as did Russia), losing standing with Egypt and the Gulf states as well as with Western nations.[74] But this does not mean that it does not desire a peaceful and stable Middle East itself. The Gulf War of 1991 saw China working for a peaceful solution in backing diplomatic efforts, seeking an 'Arab solution' to the crisis.[75] The question is to what degree will the clash of policies designed to instigate stability affect Sino-U.S. relations.

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[68] Rynhold, p.102.
[69] Rynhold, p.110; *China Business Review*, March/April 1994, p.49.
[70] Lillian Craig Harris, 'The Gulf Crisis and China's Middle East Dilemma", *The Pacific Review*, 4:2 (1991), p.117
[71] Calabrese, p.361.
[72] Rynhold, p.103.
[73] 'Benefit Seen in China's Dependence on Mideast Oil', *Oil and Gas Journal*, August 28 1995, p.105.
[74] Harris, p.116.
[75] Rynhold, p.103.

Michael May notes that it is necessary for China and America to arrive at some type of 'strategic understanding' in order to negate differences turning into conflict.[76] The end goal of a peaceful Middle East is commonly shared, it is the means which remain disputed.

Central Asia and the Caspian is another area, like the Middle East, where Asian involvement would have strategic implications. International interest in the region could blossom into competition for control of resources. Energy access issues in Central Asia have the potential to raise international tensions. There are uncertainties about Russia's intentions and abilities concerning its former provinces. Already the region is the scene of political competition between the United States, Russia, Turkey and Iran over exit routes for the region's energy reserves and for regional influence.[77] Central Asia has the potential to supply a substantial amount of oil to Asia.[78] The transportation of oil from Central Asian producers to Asian markets requires pipelines to traverse several countries, presenting the problem of regional relationships, geopolitical competition to determine pipeline routes and the issue of ethnic conflicts.[79]

Chinese participation in the Caspian geopolitical competition could further complicate matters. China has recognised the importance of Iran in the future of Caspian energy and sees their bilateral relationship as pivotal for future supply, impacting upon the Sino-U.S. relationship.[80] The break up of the USSR has left uncertainties over control of the Caspian Sea, previously held by Iran and Russia.[81] Many of the new Central Asian states do not have established governments.[82] The role of rising Indian demand may add additional complications into the equation.[83] S. Frederick Starr notes that what is needed is one or more strong centres in the Central Asian region to 'create a healthy balance'.[84] Once the region has its own nations fill the political vacuum which now exists, foreign encroachment like that of earlier days in the Middle East will be less likely.

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[76] May, p.37.
[77] Kemp, p.142.
[78] International Energy Agency, *Caspian Oil and Gas. The Supply Potential of Central Asia and Transcaucasia*', France: OECD, 1998, pp.94ff.
[79] Jaffe and Manning, pp.114-5.
[80] Calabrese, p.362.
[81] Kemp, p.142.
[82] 'Central Asia Survey', *The Economist*, February 7 1998, Special Section.
[83] Yergin et al, 'Fuelling Asia's Recovery', pp.45-6.
[84] S. Frederick Starr, 'Making Eurasia Stable', *Foreign Affairs*, 75:1 (January/February 1996), p.81.

Economic development of the Central Asian region also raises a number of economic concerns. An investment tug-of-war may develop over whether to transport oil westward towards Europe, making it more expensive for Asian nations as they have to bring it back, or eastwards out through China.[85] Rosemarie Forsythe notes that the uncertainties of Russian policy towards the region are the biggest barrier to involvement by other interested parties such as the United States and Asian countries.[86] Russia is particularly enthusiastic to gain a foothold in the pipeline race as the resulting energy would be a boon for its struggling economy. Chinese or Japanese pipeline projects may undermine Russian authority and control over regional resources, and may well mean a shift from development of Siberian reserves, resulting in tension over investments.[87] There are already Chinese plans to invest in Kazakhstan to develop fields and build a 1,900 mile pipeline through the eastern Chinese province of Xinjiang, costing $4 billion.[88]

Gas.

Asian countries see gas as the preferred fuel of choice for the future. It is environmentally more attractive by releasing fewer emissions when generating the same amount of power as other fossil fuels. Gas is also more attractive for investors and government policy makers as it is less controversial than nuclear power. It is also versatile enough to substitute for other fuels not only in power generation but also in transport and heating. As such, gas has the potential to significantly decrease a country's dependence on oil. Most importantly gas is not in short supply. Proven world reserves are close to those of oil and new deposits continue to appear.[89]

By 2020 the EIA predicts that gas use within Asia will more than triple, despite the recent regional economic slowdown.[90] China and Japan are expected to lead this trend along with South Korea whose infrastructure programs will increase the amount

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[85] Valencia, 'Energy and Insecurity', p.87.
[86] Rosemarie Forsythe, *The Politics of Oil in The Caucasus and Central Asia*, Adelphi Paper No.300, London: Oxford University Press, 1996, p.60.
[87] APCSS, *Energy Security in the Asia-Pacific*.
[88] Yergin et al, 'Fuelling Asia's Recovery', p.42.
[89] *BP Statistical Review*, p.20; World oil reserves total 140,900 mt, gas reserves are approximately 132,812 mtoe (calculated from figures on pp.4 & 20).
[90] Energy Information Agency, *International Energy Outlook 1999. Natural Gas Outlook*, Washington D.C.: U.S. Department of Energy, April 1999, <http://www.eia.doe.gov/oiaf/ieo99/nat_gas.html>.

consumable in that country.[91] However, the increased usage of gas brings with it security implications of primarily a political nature. The inflexible nature of gas transportation and storage presents unique supply security problems. The transportation of natural gas by pipeline or liquefied natural gas (LNG) by tanker will generate international and regional security problems.

Gas has only two forms for transportation and storage; the natural gaseous form and LNG form. LNG can be shipped and is used in relatively large quantities within Asia which has historically made up over two-thirds of world LNG trade.[92] This trend can be expected to continue.[93] Whilst regions such as Europe and North America have been able to develop large pipeline infrastructures, due partly to higher standards of development and more stable political areas, Asia has had to rely on shipping due to its lack of such an infrastructure.[94] Thus, countries with large LNG imports (Japan, for example, accounts for over 60% of world LNG imports, with South Korea at about 9%)[95], have an added interest in sea lane security throughout the Asian region.

Pipelines are less flexible than shipping. Whilst it is possible to divert tankers from potential trouble during their journey, a pipeline does not possess this characteristic. An effective Asian regional pipeline network would cross many borders and traverse a number of seas and straits.[96] If the supply needed to come from the Middle East, Central Asia, or Russia, the issue of security is heightened. Any supply of gas to Asia from the Middle East or Central Asia would have to traverse the presently unstable states in those regions before having to cross the expanse of China, with its numerous ethnic minorities and autonomous regions.[97] The political issues multiply with every border that the pipeline crosses, especially if these are within unstable regions.

Multiple pipelines would not be built to serve the same passage due to cost. Thus, if an Asian country was dependent to some degree upon natural gas it would have to maintain a strong interest in the security of the pipeline which feeds its demand. This

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[91] Calder, 'Asia's Empty Tank', p.68; EIA, *IEO 99 Natural Gas Outlook.*
[92] International Energy Agency, *Asian Gas Study*, France: OECD Publications, 1996, p.58.
[93] IEA, *Asian Gas Study*, p.58.
[94] Other reasons include greater urbanisation as well as more established trading agreements. Interestingly, one of the reasons for a lower overall gas demand in Asia, especially South and South-East Asia, is climatic, meaning lower demand for domestic heating. However, the use of gas for power generation and industrial purposes will lead to future demand growth.
[95] IEA, *Asian Gas Study*, p.33.
[96] Calder, *Pacific Defense*, p.58.
[97] Valencia, 'Energy and Insecurity', p.87.

would be hard for smaller countries such as Malaysia or Vietnam. Recognising the hegemony of a regional power, whether it be China, Japan or the U.S., could be the only way of ensuring this security. [98] It even raises issues for more influential powers such as Japan who would have to consider influence by proxy through the U.S. or more directly on its own. Such moves would have implications for the regional and global balance of power.

A pipeline network would also have to take into account regional political instabilities. As Valencia notes, *détente* in Japanese-North Korean relations would be required before any overland pipeline ventures through the Korean peninsula could be undertaken.[99] The *détente* would have to be extended beyond Japan if the pipeline was to be part of a regional network. Underwater pipelines (considerably more expensive) would at once come under the maritime influence of a number of the region's nations, raising maritime security issues once again. If most of Asia's imported natural gas had to pass through China by pipeline, as seems likely, Beijing would have a degree of leverage over Asian nations who utilise this gas.[100] The issue may not be the fear of supply disruption by the Chinese government (though the case may be disruption by China's ethnic minorities) but rather the fact that the Chinese government could use the promised security of the pipeline as a tool to assert a degree of regional hegemony.[101]

Over seventy percent of the world's gas reserves reside in the Middle East and the former Soviet Union.[102] The Russian Federation alone holds 33.2% of world reserves, Iran the next largest with 15.8%.[103] The dominance of reserves by these countries means that it would be hard for Asian countries to avoid deepening relations with them if natural gas was to increase as part of general consumption.

Closer energy relations between the Russian Federation and Asian countries are emerging. Russia has huge gas potential in its far-eastern provinces, greater than all the Middle Eastern countries combined.[104] The fields of Sakhalin are very close to the Japanese market. Irkutsk and the Siberian deposits sit above the northern provinces of

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[98] Yossef Bodansky, 'Asia Prepares for Energy Crisis', *Strategic Policy*, 24:6-7 (June/July 1996), p.2.
[99] Valencia, 'Energy and Insecurity', p.87.
[100] In Valencia's list of proposed trans-Asian gas pipelines only the Sakhalin field pipeline does not pass through China's territory at some stage ('Energy and Insecurity', p.88.). This is also the case for those put forward in FBIS Daily report, *Japan: Feasibility of NE Asian Gas Pipelines*, FBIS-EAS-99-006, January 1 1999.
[101] Bodansky, p.8.
[102] *BP Statistical Review*, p.20.
[103] *BP Statistical Review*, p.20.
[104] *BP Statistical Review*, p.20; *Oil and Gas Journal* July 6 1998, p.30.

China which are economically stagnating due to a lack of energy supply.[105] Energy cooperation between China and Russia is already underway in various energy forms.[106] Japanese cooperation with Russia has occurred but is hampered by the dispute between the two nations over the Kurile islands.[107] Despite this, the proximity of the reserves means that Japanese interest will always be there.

Utilising Russian energy reserves to fulfil Asian demand carries with it security and strategic implications. Over reliance on Russian gas and/or oil results in an increase in the degree of Russian leverage over the region. Development of Russian gas reserves, especially those in the Sakhalin region by countries such as Japan and South Korea would mean less investment is available for pipelines from the Middle East, Central Asia, and China's western provinces.[108] Such a development would have repercussions on China's overall energy supply and thus economic development and could lead to a cooling in relations between China, Russia and Japan. The opposite trend could also develop. China's efforts to encourage investment by Japan in its western focused energy projects have to be calculated so as not to agitate Sino-Russian tensions.[109] The energy development of Russia's far-eastern areas would lead to increased economic wealth. Moscow's control over these provinces, who already challenge the border agreements made with Beijing this decade and the division of power between Moscow and its local authorities, [110] could come into question in the face of unequal economic development of the nation. This could lead to tension or even conflict between Russia and China.

Nuclear.

Nuclear power is an attractive option in the bid to supply enough electricity to Asia's economies. Japan presently relies on nuclear power for a third of its electricity generation while South Korea relies on it for slightly more.[111] The IEA predicts that the amount of electricity generated by nuclear power in China will increase almost tenfold between 1995 and 2020, from producing 13 terawatt hours (TWh) to 127 TWh.[112] In the

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[105] Paik, 'Energy Cooperation', p.18.
[106] Paik, 'Energy Cooperation', p.18; Rajan Menon, 'The Strategic Convergence Between Russia and China', *Survival*, 39:2 (Summer 1997), p.104.
[107] Menon, p.104.
[108] Valencia, 'Energy and Insecurity', p.87.
[109] Paik, 'Energy Cooperation', p.89.
[110] Menon, p.103.
[111] Calder, 'Asia's Empty Tank', p.62.
[112] IEA, *WEO 1998*, p.287.

rest of Asia, though decreasing as a percentage of total primary energy supply (TPES), nuclear power usage will more than triple.[113] This is at a time when the western industrialised nations are slowing their nuclear programmes due to public pressures based on the Chernobyl and Three Mile Island incidents.[114]

Michael May notes that '[n]uclear safety can be an international matter, as the Chernobyl accident demonstrated'.[115] The strict safety regulations such as those of the International Atomic Energy Agency (IAEA) greatly reduces the likelihood of such a disaster. The coal industry causes more deaths worldwide each year than the nuclear power industry ever has.[116] Despite this fact, the environmental consequences of the disposal and storage of nuclear waste and the dangers of nuclear proliferation are of utmost concern to lobby groups and the public, as well as to the major powers of the world.[117]

This is aptly demonstrated by the recent nuclear plant accident in Tokaimura, 135km northeast of Japan's capital, Tokyo. The mishandling of uranium 235 at the nuclear processing plant caused the authorities to order 300,000 people to stay in their homes as radiation levels around the plant reached 15,000 times higher than normal.[118] In the last years there have been fourteen nuclear incidents in Japan, not helped by a 'plodding government [unable] to come to grips with a huge nuclear power industry riddled with safety flaws.'[119] Four days after this nuclear accident, a radioactive water leak at a South Korean nuclear reactor exposed twenty two workers to radiation.[120] Authorities were slow to react, and questions have been raised over the region's nuclear power safety programmes and the transparency of the programs.[121]

The environmental issues associated with the requirement to create, ship, store and dispose of nuclear materials is a major barrier to the widespread use of nuclear power. The dumping of nuclear waste in the Sea of Japan has already generated tensions in Northeast Asia.[122] The Russian Navy dumped its nuclear waste in the Sea as recently as 1996, drawing protests from Japan and South Korea even though Japan itself dumps

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[113] IEA, *WEO 1998*, p.314; Calder, 'Asia's Empty Tank', p.63.
[114] Energy Information Agency, *International Energy Outlook 1999. Nuclear Outlook*, Washington D.C.: U.S. Department of Energy, April 1999, <http://www.eia.doe.gov/oiaf/ieo99/nuclear.html>.
[115] May, p.28.
[116] May, p.28.
[117] May, p.28.
[118] *Time*, October 11 1999, p.36.
[119] *Time*, October 11 1999, pp.36-7.
[120] 'Nuclear Alert for Asia', *FEER*, October 14 1999, p.18.
[121] *FEER*, October 14 1999, p.18.
[122] Valencia, 'Energy and Insecurity', p.102.

considerably more than the Russians do in the same area.[123] Taiwan is also experiencing problems in finding places to dump nuclear waste from its three nuclear plants.[124] This has already taken on an international scope as it hunts for countries willing to store its waste. Japan has been shipping nuclear fuel and waste through the seas of East Asia since 1992, raising concerns from other countries about the environmental safety of such practices.[125] Malaysia has threatened to deny passage through the Straits of Malacca to the Japanese plutonium carrier *Akatsuki* on environmental grounds.[126] The ability of ship borne waste containers to resist the heat of a fire at sea or remain intact at deep sea pressures if sunk are debated by environmentalists.[127] Increasing the number of nuclear reactors in the region increases the amount of waste, exacerbating the problems outlined above. Adding the increased shipping of nuclear waste by Taiwan, Japan and South Korea to the overall growth in general maritime traffic would greatly emphasise the problem of environmental security.

Plutonium is often one of the by-products of nuclear power generation. A process known as the complete fuel cycle regenerates this 'waste' to a sufficient state where it can be reused either as reactor fuel or in weapons. The proliferation of this weapons grade plutonium is of international concern.[128] In an effort to reduce waste and outside sources of fissile material, Asian countries may well utilise the complete fuel cycle process. China already has a military reprocessing plant whilst Japan has a civilian run plant.[129] Southeast Asian countries are also looking towards nuclear power to meet their electricity needs, and may find this complete fuel cycle attractive.[130] With up to one third of world nuclear capacity in East Asia by 2025, fears of proliferation and nuclear terrorism from complete fuel cycle production are of national and international concern.

Hydro.

Hydroelectric dams are another popular source of electricity generation for Asian countries. Usage has steadily increased over the last ten years and presently stands at

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[123] Valencia, 'Energy and Insecurity', p.101.
[124] 'Other Fish in the Sea', *FEER*, September 14 1995, p.70.
[125] Valencia, 'Energy and Insecurity', pp.100-1.
[126] McDonald, p.19.
[127] Valencia, 'Energy and Insecurity', p.101.
[128] May, p.28.
[129] May, p.29; Calder, 'Asia's Empty Tank', p.63.
[130] Guoxing, p.287.

44.1 mtoe, nearly 20% of the world's total consumption.[131] The IEA predicts that in East Asia hydropower capacity will double by 2020, whilst in China it is expected to quadruple.[132] China has planned to complete more than twenty hydro projects by 2020. This would result in 200 gigawatts of electricity being generated by hydropower, some 20% of China's total electricity generation in 2020.[133] Additional projects are also under way in Malaysia, Myanmar, Indonesia, Laos and Thailand.[134]

The extensive use of hydropower raises three main security-related issues. The environmental effects are the most well known. The Three Gorges Dam on the Yangtze river will require 1.2 million people to be relocated, and its 500 foot deep lake will permanently alter the environment both upstream and downstream.[135] Critics note that the dam will trap a large amount of pollutants that are now washed out to sea.[136] Malaysia's proposed dam on the Selangor River near the capital Kuala Lumpur has caused uproar from the public over its potential environmental consequences.[137] The dam would severely disrupt a number of tourist attractions as well as engulfing what are possibly Malaysia's earliest settlements.[138] In other Asian countries, the dependence on rice production is being threatened by hydro projects.[139] These scenarios are being repeated throughout the region.[140] The environmental issues pose a threat to internal political stability, one of the prerequisites for a stable region.

Hydropower also causes trans-national problems as can be seen with existing and proposed projects on the Mekong river. The Mekong and its tributaries traverse several countries including Vietnam, Myanmar, Laos, Cambodia, Thailand and China. China has already constructed two dams on the upper Mekong and plans five more.[141] Myanmar and Laos are both planning to build hydroelectric schemes on the upper Mekong and its tributaries.[142] The Laotian Nam Theun 2 Hydroelectric Project (NT2)

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[131] *BP Statistical Review*, p.36.
[132] IEA, *WEO*, pp.312 & 288.
[133] IEA, *WEO*, p.288.
[134] Energy Information Agency, *International Energy Outlook 1999. Hydro Outlook*, Washington D.C.: U.S. Department of Energy, April 1999, at <http://www.eia.doe.gov/oiaf/ieo99/hydro.html>; IEA, *WEO 1998*, p.314.
[135] 'Size Matters', *Harvard International Review*, 20:3 (Summer 1998), p.31.
[136] EIA, *IEO 99 Hydro Outlook.*
[137] 'Damned If You Do', *FEER*, April 8, 1999, p.44
[138] *FEER*, April 8, 1999, p.45.
[139] Paul F. Macek, *Mekong River Dam*, Trade and Environment Database Case 258, March 1996 <http://gurukul.ucc.american.edu/ted/MEKONG.htm>.
[140] IEA, *WEO 1998*, p.314.
[141] Macek, *Mekong River Dam.*
[142] EIA, *IEO 99 Hydro Outlook.*

on the Mekong is of vital importance to the economy of Laos, in that it enables it to export a substantial amount of electricity to Thailand.[143] The trans-national character of the Mekong river, however, means that upstream developments and management have a direct impact upon downstream countries. Chinese visions to secure power generation from its part of the Mekong will alter the levels and nature of the river further downstream.[144] This is a vital concern for Vietnam, where the river finally exits into the sea after being tapped by numerous other countries' dams.

Thirdly, dams are notoriously expensive projects. China's Three Gorges Dam is estimated to cost anywhere between US$30 to 75 billion, whilst the Xiaolangdi Dam upon the Yellow river is cheap by comparison at $4.2 billion.[145] Indonesia's small Cirata plant in West Java required World Bank and Australian funding of $852 million, now generating a capacity which is not needed due to the economic recession.[146] The huge investments needed and the problems of viability, environmental stability and construction workmanship do not mix well. This has international consequences. Laos' hydro projects are teetering on the financial edge due to Thailand's financial crisis affecting its ability to purchase Laotian power. American companies are scrambling for a piece of the action at the Three Gorges Dam but concerns over human rights and the environment by the U.S. Government has created obstacles.[147] Bank credits, guarantees and loans from governments which are required by China to allow foreign company investment are not forthcoming from the U.S., although European governments are backing their companies.[148] These issues impact upon the ability of Asian countries to supply the increase in electricity demand.

Energy Use and the Environment.

Energy use and the exploitation of energy resources can impact upon security. The environmental consequences of transporting oil, the reliance on nuclear power, and the utilisation of hydropower have already been noted. In addition to these, the usage of

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[143] Jennifer S. Wolf, *Laos and Hydroelectric Power*, Trade and Environment Database Case 463, December 1997, <http://gurukul.ucc.american.edu/ted/LAOSDAM.htm>.
[144] *FEER*, September 16 1999, p.20.
[145] *Harvard International Review*, 20:3 (Summer 1998), p.31; 'The Damned', *The Economist*, November 1 1997, p.43.
[146] EIA, *IEO 99 Hydro Outlook*.
[147] 'Dam!', *Fortune*, November 10 1997, p.183.
[148] *Fortune*, November 10 1997, p.183.

fuels such as coal, oil and biomass fuels can cause irreparable environmental damage which affects a country's future economic prospects. Increasing emissions from industrial centres impacts upon health issues, and acid rain from these emissions directly affects agricultural potential. Climatic change due to global warming has the ability to alter a country's ability to feed itself.[149] This has the potential to degrade the ability of the region's poorer nations to feed their populations as these mostly agricultural based economies become increasingly polluted.

Environmental problems can also undermine the social and political stability of a country. Internationally, the environment is being recognised as a possible cause of future conflict.[150] Trans-national pollution has the ability to create tension between states, as seen in the recent forest fires in Indonesia. In 1997 the forest fires spewed smoke over neighbouring Singapore and Malaysia, costing the region an estimated one billion dollars through falling tourism, lower industrial output and the economic effects of forced airport closures.[151] The long term health costs are more likely to be just as devastating as bronchial problems increase in Malaysia and doctors predict an increase in cancer cases in twenty to thirty years.[152]

There are a number of other energy related environmental problems which can increase tension between Asian countries. Environmental exhaustion from energy extraction and usage could generate greater interstate competition for ever-scarcer resources as basic as fresh water.[153] This is not an exaggeration, especially for South-East Asian countries which rely on trans-national river systems such as the Mekong for a large percentage of their needs.[154] As Alan Dupont notes, environmental issues 'may be the spark which ignites a combustible mix of social, political, ethnic or religious tensions within [and between] states.'[155] Indonesian farmers are becoming agitated over the destruction of their livelihoods by forest fires, as well as the lack of clean drinking water.[156] What is clear is that the environmental consequences of increased energy consumption could have a destabilising effect upon regional security.

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[149] Michael H. Shuman and Hal Harvey, *Security Without War. A Post-Cold War Foreign Policy*, San Francisco: Westview Press, 1993, p.37.
[150] Peter H. Gleick, 'Environment and Security: The Clear Connections', *The Bulletin of the Atomic Scientists*, 47:3 (April 1991), pp.17-21; Dupont, 'Environmental Conflict', p.23.
[151] 'Yes Again', *FEER*, March 19 1998, p.22.
[152] 'Fire in the Sky', *FEER*, October 9 1997, pp.74-5.
[153] Shuman and Harvey, p.36.
[154] *FEER*, September 16 1999, p.20.
[155] Dupont, 'Environmental Conflict', p.32.
[156] *FEER*, March 19 1998, pp.22-3.

The IEA predicts that China's carbon dioxide (CO_2) emissions related to energy will double by the year 2010, totalling more than all the emissions from industrialised Europe.[157] A large portion of this is driven by the reliance upon coal for electricity generation, which while decreasing as a percentage of total energy consumption, increases in real terms by 800 mtoe by 2020.[158] China's ample coal reserves mean that it is a very secure source of energy, even if transport infrastructure hampers effective distribution.[159] However, 90% of sulphur dioxide (SO_2), 85% of CO_2, 87% of nitrus oxide (NO_x) and 70% of particulates in Chinese cities are a direct result of the burning of coal for electricity or heat.[160] The increased burning of oil and its distillates for electricity and transport will add to the problem throughout the region. According to APERC, the fastest CO_2 emissions growth will come from Southeast Asia, adding to a 42% increase in emissions for APEC countries to 2010.[161] Sulphur and Nitric oxide are major contributors to acid rain and smog. The costs to abate the emissions from burning fossil fuels may well be too much for countries whose first priority is meeting energy demand.[162]

The region is already under an ecological cloud due to its emissions from coal and oil. A World Bank report estimates that 10% of China's southern regions are threatened by acid rain.[163] Japanese environmental degradation as a result of Chinese particulate emissions is another example of trans-national environmental problems. Emissions from the southern Chinese areas are the direct cause of 40% of the acid rain that falls on Japan and South Korea.[164] This is only 5% of China's emissions, the other 95% falls on China itself and costs an estimated 10% of GDP.[165] The United Nations Environmental Programme has estimated that the emissions from Bangkok's traffic jams cost $1 billion a year in medical costs.[166] The lesser developed countries such as Malaysia and the Philippines rely heavily upon biomass for energy (see Chapter One Table Five), consumption of which produces a significant amount of emissions.[167]

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[157] IEA, *WEO 1998*, p.53.
[158] APERC, *APEC Energy Demand and Supply Outlook*, p.14.
[159] APCSS, *Energy Security in the Asia-Pacific*.
[160] John Byrne and Bo Shen, 'The Challenge of Sustainability', *Energy Policy*, 24:5 (May 1996), p.458.
[161] APERC, *APEC Energy Demand and Supply Outlook*, p.15.
[162] Joseph Stanislaw and Daniel Yergin, 'Oil: Reopening the Door', *Foreign Affairs*, 72:4 (September/October 1993), p.89.
[163] FEER, *Asia 1999 Yearbook*, Hong Kong: Review Publishing, December 1998, p.61.
[164] APCSS, *Energy Security in the Asia-Pacific*; May, p.26.
[165] May, p.26.
[166] 'All That Gas', *The Economist*, June 18 1994, p.16.
[167] See Chapter One, Table Five.

Energy resource exploitation could also take its toll on the region's ecological systems. The 'reckless exploitation' of Russia's Sakhalin oil and gas reserves has turned 'one of the last great wildernesses on Earth into an ecological disaster area.'[168] If the damage caused by exploiting just a small amount of the possible reserves in Sakhalin have created a disaster, the development of even more fields could lead to severe pollution of a trans-national character. China's heavy reliance on coal as an energy source has led to large amounts of environmental degradation as a result of mining for the resource.[169] Chinese environmental protection policies target issues such as air pollution and industry emissions, largely ignoring the ecological effects of industries such as coal mining.[170] Even if such cases of resource exploitation do not create tension between states, there is a possibility that they would generate internal social and political tensions.

The environment is also seen as important in Sino-U.S. relations.[171] U.S. interests such as the internal stability and security of China as well as the prosperity of the Asian region as a whole are affected by environmental concerns. Issues stemming from environmental degradation such the ability to feed a nation's population, the ability to produce economic goods, medical concerns, access to clean air and water, all have an influence over the internal stability of a country and therefore have implications for a region.[172] Whilst international issue carbon emissions are unlikely to cause conflict, the long range dispersal of sulphur dioxide and particulates can have not only regional consequences, but also international effects.[173]

The security and strategic issues raised by the increasing energy demand of Asia can be categorised in many ways. To begin with they could be divided between those which have internal, regional, and global impacts. Environmental issues such as acid rain and the pollution of trans-national rivers such as the Mekong belong in the regional division, whilst carbon emissions and greenhouse concerns fall into the global category. Environmental issues can also be internal concerns, in the case of China causing

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[168] Frank Pearce, 'The Scandal of Siberia', *New Scientist*, 140:1901 (November 27 1993), p.28.
[169] Michel Potier, 'China Charges For Pollution', *OECD Observer*, 192 (February/March 1995), p.20.
[170] Potier, p.19.
[171] Elizabeth Economy, 'Painting China Green. The Next Sino-American Tussle', *Foreign Affairs*, 78:2 (March/April 1999), pp.14-18.
[172] Alan Dupont, 'Environmental Conflict', p.23.
[173] Lin Gan, 'Energy Development and Environmental Constraints in China', *Energy Policy*, 26:2 (February 1998), p.123.

significant losses in GDP. In the case of Indonesia, oil is closely linked to internal political and social stability. Territorial disputes such as the South China Sea and Kurile Islands are regional concerns, with wider issues such as the convergence of Asian and Middle Eastern interests having global implications, especially for countries such as the United States and European powers.

The security implications can also be divided into those which are part of larger pre-existing issues and those that raise issues specific to themselves. Increased energy consumption adds to the complexity of the territorial disputes in areas such as the South China Sea. Energy does not constitute the sum of these problems, but has become a complicating part. The same is noticeable in the case of the way that rising energy demand increases the amount of traffic in Asian sea lanes. The safe passage through these waters is already a problem given concerns over piracy and environmental effects. Increased oil tanker traffic adds to the problem. On the other side are issues such as the politics of gas pipelines or the matter of nuclear power. Both of these can provide solutions to other problems, such as environmental or political convergence issues, but also raise issues specific to themselves. Energy will be the key factor in the development of closer Middle Eastern-Asian relations. A more comprehensive view of security demands that the role of energy in such an area be recognised and understood as being a contributory factor along with the more direct security issues derived from increasing energy demand.

The number of themes that can be drawn from the range of security problems raised displays that Asia's energy challenges are complex and multifaceted. This produces a number of questions when considering solutions to the problems. Can a single solution cover the range of issues raised, from internal to global and from singular through to multiplying factors? Are certain solutions suited to specific problems or fuels, or are the problems too wide and diverse to be approached specifically? These questions need to be kept in mind when considering the next chapters, which analyse the solutions put forwards by energy analysts.

Chapter Three.
Government Solutions.

This chapter examines the role of regional governments in tackling the issue of increasing energy demand within Asia. It is divided into a number of sections. Firstly, a quick overview of government responses to the oil crises of the 1970s provides a platform from which to compare recent developments. The second section describes the varied reasons for government involvement in the energy sector, and covers issues such as economic nationalism, development strategies, and market structure. This is followed by two sections which deal with the current approach being taken by Asian governments with regards to the energy and security relationship. These sections consider the market structure of Asian energy sectors, followed by an analysis of the government's involvement in energy security issues. An assessment of what government involvement means for the wider concept of energy and security completes the chapter. This final section answers two questions based on the evidence presented within the chapter; to what degree is the government being utilised within Asia to deal with the energy and security challenges, and to what extent does this differ from earlier periods?

Government Responses to the First Crises.

In response to the oil crises of the 1970s, state involvement in the energy sector increased in many countries throughout the world. A number of countries such as France, Britain and Italy gave additional support to national oil companies in an effort to ensure supply.[1] France placed great emphasis on national control of energy, instigating government to government contracts for oil and increasing its commitment to nuclear power as a move to greater energy self-sufficiency.[2] The American government also undertook moves to involve itself more heavily in the energy sector. Examples of this were 'Project Independence' which favoured increased domestic

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[1] Peter F. Cowhey, *The Problems of Plenty. Energy Policy and International Politics*, Berkeley: University of California Press, 1985, pp.136-7.
[2] G. John Ikenberry, *Reasons of State. Oil Politics and the Capacities of American Government*, London: Cornell University Press, 1988, p.7.

production and a proposal for the creation of the Energy Resource Finance Corporation to direct huge amounts of investment into alternative energy technologies.[3]

Within Asia the reaction to the first oil crises were similar. Japan sought to gain a high level of control over energy.[4] The Japanese government, however, followed a different path towards developing energy security than western countries. Japan entwined the goal of lowering consumption and thus dependence on oil with wider macroeconomic policies.[5] Industrial policy was altered to accommodate energy security concerns to the point where short-term slower economic growth was acceptable for long term energy security gains. The government 'sought to work on the consumption side of the energy problem by encouraging industrial adaptation.'[6] Taiwan followed a similar consumption side approach to energy security, developing regulations which prohibited the 'establishment or expansion of energy intensive industries.'[7]

Asian governments also instigated a number steps to reduce dependence on a single fuel. Actions included energy efficiency and conservation measures as well as encouraging diversification in fuel types. Fuel switching was the most emphasised policy in general.[8] Supporting the development of gas, nuclear power and indigenous fuels such as coal through government incentives was common. These measures are still considered important to lessen the impact of increasing energy demand upon the region.[9] Efficiency and conservation measures were applied to a lesser degree. In the case of the Thailand, these measures were lifted after prices returned to normal.[10] The Philippines, Taiwan, and South Korea all utilised tax incentives as ways to encourage energy conservation.[11] These same three countries also developed policies that sought to set efficiency standards for energy equipment and appliances.[12]

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[3] Ikenberry, p.11.
[4] Odell, Peter, *Oil and World Power. Background to the Oil Crisis*, Third Edition, Middlesex: Penguin Books, 1974, p.191.
[5] Cowhey, p.207.
[6] Ikenberry, p.9.
[7] ADB, *Energy Policy Experience,* p.95.
[8] ADB, *Energy Policy Experience*, p.81.
[9] APERC, *Energy Demand and Supply Outlook*, p.15.
[10] ADB, *Energy Policy Experience,* p.78.
[11] ADB, *Energy Policy Experience,* p.93.
[12] ADB, *Energy Policy Experience,* p.95.

Reasons for State Involvement.

The question of the involvement of governments in the energy sector is part of a larger debate over the 'role and significance of the market in the organisation of society and economic affairs.'[13] Economic nationalism with its emphasis on economics as subordinate to state interests and politics faces off against the more liberal view of the market being separate from politics and operating independently of the government in order to deliver the greatest material (and also social) benefits. Overall, government participation is maintained because of the perception that the alternatives do not take into consideration a state's varied national interests. This is not to say that the market and state are in direct competition. The debate is over the degree to which the market is allowed to operate and the form that government involvement will take.

There are four overarching reasons for government intervention in the energy sector. The first is derived from the fact that the energy sector is strongly linked to other national goals, including economic development and social objectives.[14] Government intervention is thus designed to operate the energy sector in the context of wider national goals and objectives. As Yergin notes, energy is the basis of society.[15] Changes in the energy industry have the ability to affect all other sectors of an economy to a degree that few other commodities do. As such, national control of the energy industry is seen as an important measure of control over national development by regional governments.

The second reason for government involvement in the energy sector derives from the international nature of energy resources. It is rare for a country to be self-sufficient in energy resources. The fact that energy resources are unevenly distributed amongst nation-states has meant that strategic concerns are a constant consideration when dealing with energy. The need to transport oil, gas, nuclear waste, and electricity across boundaries means that political concerns are a factor when dealing with energy policy. Trans-national pollution and global warming are adding to this importance. That a country's energy use can impact upon, and be influenced by, other countries, has meant that government retains a role in the sector.

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[13] Robert Gilpin, *The Political Economy of International Relations*, New Jersey: Princeton University Press, 1987, p.25.
[14] Cowhey, p.37.
[15] Yergin, 'Energy Security in the 1990s', p.132.

Thirdly, the nature of the energy industry has meant that it requires a degree of regulation. The energy industry has monopolistic tendencies as a result of the high technical costs of production and distribution of energy resources.[16] These costs mean that it is only cost effective for a single firm (or a small number of firms) to operate in the industry. Thus, unlike other sectors where there are a large number of producers and consumers, and thus the market mechanism effectively sets prices and determines supply, the lack of participants in the energy industry distorts the efficiency of competition within the industry.[17] Government intervention is aimed at controlling the impact of such a monopolistic structure upon prices in such a vital industry.

The last factor that encourages governments to intervene is the belief that the market is short-sighted in its visions of the future and does not take into consideration other public goods such as the environment.[18] Long term energy security developments are often not considered in an industry where the development of alternative sources and fuels requires substantial amounts of money. The market is also often not given to developing alternative technologies that require substantial amounts of time and investment. The World Energy Council (WEC) has observed that with increased privatisation, energy research and development funding has dropped significantly.[19] Governments intervene in order to develop these alternative sources and fuels in response to the short-sightedness of the market, and to balance the fact that the low prices for more conventional fuels often negates the usage of these alternatives.

Market Structure.

There are two main ways that the government can intervene in order to protect the state and consumers from a energy market monopoly. First, the state can nationalise the energy sector, operating the sector for the public good rather than for the goal of amassing profits. As outlined below, this form of intervention exists within Asia to a large degree. Becoming more common throughout the world, and emerging slowly in Asia, is the situation where private firms operate within a market that is subject to government regulation. By splitting the monopoly's vertical structure, competition can

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[16] Cowhey, p.37.
[17] Lloyd Jensen and Lynn Miller, *Global Challenge*, Texas: Harcourt Brace, 1997, p.834.
[18] Cowhey, p.36.
[19] Murray, Jan, *The Benefits and Deficiencies of Energy Sector Liberalisation*, presentation to the 2nd ASEAN Energy Business Forum, December 2 1998, <http://www.worldenergy.org/wec-geis/publications/open.plx?file=archives/speeches/spc981201.htm#top>.

be introduced at the relevant levels. The government can be involved in this type of situation in varying degrees, up to the point where the industry is completely privatised and has no government oversight. This extreme does not exist within Asia, with all governments maintaining some degree of control over the energy sector.

The control of the coal industry in China and North Korea, the electricity sectors of Myanmar, Laos, Taiwan and Cambodia, and oil industries of China and Indonesia are modern examples of nationalised energy industries in the region. China, which derives more than two thirds of its energy from coal, maintains total state control of the industry. The government controls prices and inefficient companies are subsidised in order to maintain indigenous production.[20] Whilst foreign investment is now being encouraged, the Chinese government still remains the major influence in the industry as the owner of the companies. The same applies for China's oil industry. Reorganisation in 1998 saw national oil and gas assets placed under two vertically integrated companies, China National Petroleum Company (CNPC) and Sinopec.[21] This move was intended to strengthen state control over the domestic oil sector.[22]

A lack of hard currency and the policy of self reliance adhered to by North Korea's communist government has meant that imports of fuel are insignificant. The local coal industry provides 83% of the country's primary energy consumption, with another 11% coming from hydroelectricity.[23] All sectors of North Korea's energy industry are state owned, in line with its non-market economy. North Korea is one of the few examples of a nation pursuing energy security through a policy of self-sufficiency. Facing the need for modernisation and the requisite rise in energy needs, North Korea is looking toward nuclear power in order to maintain its self-sufficiency policy whilst delivering the required energy.[24]

Within Asia electricity supply is considered especially valuable due to its importance to industry and urbanisation. The electricity sectors come under a high

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[20] World Energy Council, *The Benefits and Deficiencies of Energy Sector Liberalisation Volume II*, Coal Section London: WEC, 1999, <http://www.worldenergy.org/wec-geis/members_only/registered/open.plx?file=publications/default/current_cls/ClsCoal.stm#top>.

[21] EIA, *Country Analysis Brief China*, U.S. Department of Energy, June 1999, <http://www.eia.doe.gov/emeu/cabs/china.html>.

[22] EIA, *Country Analysis Brief China*.

[23] EIA, *Country Analysis Brief. North Korea*, U.S. Department of Energy, September 1998, <http://www.eia.doe.gov/emeu/cabs/nkorea.html>.

[24] Kent Calder, *Energy and Security in Northeast Asia's Arc of Crisis*, Policy Paper 35:2, University of California Institute on Global Conflict and Cooperation, 1998, <http://www-igcc.uscd.edu/IGCC2/PolicyPapers/pp3502.html>.

degree of government dominance within Asia with only Hong Kong, South Korea and Japan allowing private ownership within the industry.[25] The governments of these countries still maintain a high degree of participation through regulation. In Cambodia and Laos the electricity sectors are totally state-owned with minimal foreign investment and few plans for extensive liberalisation.[26] The only major outside participation comes from Thailand which buys electricity from these nations.[27] The Taiwan Power Company (Taipower) is also a state owned monopoly at present, but privatisation is planned through a 30% float of the company by 2001.[28] This is intended to generate much needed revenue for infrastructure and generation capability development. The government will retain control of the remaining 70% of the company as it will remain responsible for transmission and distribution.[29]

Whilst other areas of the Indonesian economy are being liberalised, the energy sector remains deeply nationalised.[30] Oil and gas exports are Indonesia's largest foreign currency earners, accounting for about 35% of total export earnings and 30% of total government revenues.[31] The Indonesian oil and gas monopoly, Pertamina, is the symbol of state ownership and control. Indonesia's government faces strong domestic political opposition to deregulation of the energy sector and the move to market prices, especially at this time of economic and political hardship for the country.[32] The recent demand by the IMF for Indonesia to cut subsidies to the energy sector was met with riots and civil disobedience, prompting their reinstatement by the then Habibie government.[33] As the former Minister for Mines and Energy in Indonesia, Kuntoro Mangku-subroto has stated, '[f]or us, gas is the backbone of our future development'.[34] With the energy industry being a central part of Indonesia's aim of raising its per capita income, and such a symbol of national pride, government control is seen as the best way to manage the nation's direction. All contracts with Pertamina by foreign companies are

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[25] WEC, *Benefits and Deficiencies*, Electricity Section.
[26] WEC, *Benefits and Deficiencies*, Electricity Section.
[27] WEC, *Benefits and Deficiencies*, Electricity Section.
[28] WEC, *Benefits and Deficiencies*, Electricity Section.
[29] WEC, *Benefits and Deficiencies*, Electricity Section.
[30] Philip Barnes, *Indonesia. The Political Economy of Energy*, Oxford: Oxford University Press, 1995, p.144.
[31] Barnes, p.22; Hydrocarbons accounted for 80% of total exports in 1981.
[32] EIA, *Country Analysis Brief Indonesia*, U.S. Department of Energy, January 1999, <http://www.eia.doe.gov/emeu/cabs/indonesia.html>.
[33] EIA, *Country Analysis Brief Indonesia*.
[34] 'Slippery Road', *FEER*, December 24, 1998, p.42.

first approved by the government.[35] Liberalisation by disintegrating the structure of Pertamina in order to introduce competition is being worked on. However, the government will retain ownership of these new entities, with deregulation only affecting the refining and distribution sectors.[36]

Indonesia, Malaysia, Japan, South Korea, the Philippines, Thailand, Vietnam and Singapore all maintain state-owned oil and electricity companies for energy security reasons. The formation of the Japan National Oil Corporation (JNOC) was a key to ensuring supply security for Japan. JNOC is responsible for supporting oil exploration both overseas and domestically as well as researching and developing technology for exploration and production.[37] Malaysia's NOC Petrona fulfils a similar role, organising contracts and investing in overseas exploration and production deals to maintain a suitable supply of petrochemicals.[38]

Foreign ownership within the region's energy sector is strictly regulated through various forms of government contracts. There is a variety of arrangements through which governments can allow private participation whilst also retaining overall control. Companies such as Exxon, Texaco, and Shell are involved in oil exploration and energy infrastructure development in China. This foreign investment is only allowed by Beijing if the Chinese partner holds the controlling interest.[39] These types of agreements, which include production sharing agreements and joint venture arrangements, are designed to maintain a government controlled majority interest. In South Korea, the Ministry of Trade, Industry and Energy (MOTIE) governs contracts to foreign companies for development and exploration.[40] In the gas sector, private companies distribute and sell natural gas through exclusive rights to defined areas, determined by the government.[41] In Taiwan, Independent Power Producers (IPPs) are allowed to generate electricity through fossil-fuels and hydropower. However, government regulations state that all power must be sold to the state monopoly, Taipower, which thus remains responsible for generation.[42]

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[35] Barnes, p.144.
[36] *FEER*, December 24 1998, p.43.
[37] International Energy Agency, *The Role of IEA Governments in Energy*, 1996 Update, France: OECD/IEA, 1996, p.198.
[38] Energy Information Agency, *Country Analysis Brief Malaysia*, U.S. Department of Energy, May 1999, <http://www.eia.doe.gov/emeu/cabs/malaysia.html>.
[39] EIA, *Country Analysis Brief China*.
[40] IEA, *Energy Policies of the Republic of Korea*, p.25.
[41] IEA, *Energy Policies of the Republic of Korea*, p.30.
[42] WEC, *Benefits and Deficiencies*.

Build-Operate-Transfer (BOT) agreements are also operating within the region.[43] Vietnam is looking towards these agreements to deliver much needed electricity.[44] Under these contracts, infrastructure and generation plants are built by private companies and operated for a specified length of time. Often there is no limit on the amount of foreign ownership in these contracts. This is due to the fact that at the end of such an agreement ownership of assets is transferred to the government. As such, these agreements are attractive to governments who wish to maintain ownership of the nation's energy assets but do not have the capital to develop them themselves.

There are few examples of market structures within Asia that differ from those mentioned above. Japan, despite its import dependence, has an energy industry with heavy involvement by the private (but not necessarily foreign) sector.[45] In recent deregulatory steps the Japanese government has been seeking to increase this private sector involvement.[46] However, in maintaining the correct balance of energy policy objectives, which include reducing dependence on oil and diversifying energy sources, government intervention is still seen as a necessity.[47] The Japanese government has moved away from a role of control to one of guidance, offering subsidies and investing in energy efficiency, energy conservation and environmental programs.[48]

Energy Security Measures.

Energy security issues are associated with the belief that government control is the best approach to managing the energy sector. According to this approach, by having a large degree of influence over the energy sector the government is better able to manage energy security concerns such as energy efficiency and energy conservation. Reducing energy consumption emerged as a critical part of energy security after the crises of the 1970s. For Asian countries the reduction of energy consumption through conservation and efficiency measures remain an important part of energy security. Reducing consumption has a number of security benefits. Lowering the amount of fuel used either directly through conservation methods or by utilising the inputs more efficiently is an

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[43] Fred Burke and Neil Donoghue, 'Opportunities in Vietnam', *Independent Energy*, 24:9 (November 1994), p.31.
[44] *FEER*, June 11, 1998, pp.55-6.
[45] IEA, *Role of Governments*, p.197.
[46] IEA, *Role of Governments*, p.197.
[47] IEA, *Role of Governments*, p.207.
[48] May, p.11.

important way of reducing dependence and increasing the ability to meet demand. In addition, environmental goals can be achieved through more efficient burning of fuels such as coal, or the decreased need for nuclear reactors and hydroelectricity dams due to lower demand as a result of conservation.

The Chinese government views conservation and efficiency programmes as vital in addressing the energy supply shortages that have begun to constrain provincial development plans.[49] The Ninth Five-Year-Plan outlines further technological and policy initiatives through to 2010.[50] Apart from fiscal measures such as taxes and the adherence to market prices to bring about conservation, large amounts of investment are needed to upgrade facilities and introduce new technology. This is especially the case for efficiency improvements.[51]

The South Korean government is also focusing on energy conservation and efficiency as a way to reduce consumption. A major part of this policy is the raising of prices to discourage consumption after a long period of maintaining low prices to sustain economic development.[52] In addition, government initiatives such as providing financial aid for investing in energy saving facilities and the launch of an energy saving campaign seek to reduce the country's reliance on imported energy.[53] Thailand has also committed itself to conserving energy as a way to reduce dependence. In 1996 the Energy Conservation Promotion Act was passed by the Thai government, outlining energy conservation standards which industries and other businesses must adhere to.[54] This initiative may conserve as much as 25% of the energy currently used, and if combined with more vigorous moves towards investing in more efficient equipment, the secretary general of Thailand's National Energy Policy Council predicts a saving of up to 60%.[55]

Governments can also help reduce over-dependence on certain energy markets. Diversification of sources, most notably away from the Middle East, has emerged as a supply security objective of Asian governments. This is a feature of the South Korean oil import controls, where approvals of import contracts have been refused by the

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[49] Zhong Xiang Zhang, p.159.
[50] Cao Zhengyan, 'Improving Energy Efficiency in China', Keynote presentation to *Energy Efficiency Improvements in China*, Conference Proceedings, December 3 & 4, 1996, Beijing, pp.43-46.
[51] APERC, *Energy Supply and Demand Outlook*, p.17.
[52] 'Conservation is Key to Relieving Reliance On Imported Energy', *Business Korea*, 15:11 (November 1998), p.52.
[53] *Business Korea*, November 1998, pp.52-3.
[54] Lisa Suprenant, 'Soft Path of the Tiger', *Asian Business*, 32:12 (December 1996), p.58.
[55] Suprenant, p.59.

government because of a perceived over-dependence on certain sources.[56] Governments can favour particular importers because of wider political motives, and subsidies to transport energy from these areas or offers of more favourable contracts can be subsidised by the state.[57] The Korean Ministry of Industry, Trade and Energy (MOTIE) offers funding to refiners buying oil from non-Middle East sources.[58] Singapore, through development deals with Indonesia's NOC Pertamina, is seeking to diversify its supply of gas for electricity generation away from its main supplier, Malaysia.[59] JNOC has encouraged Japan to diversify supply away from the Middle East, including measures such as assisting China with exploration in areas such as Xinjiang.[60]

In the search for supply security, government to government long-term contracts have been favoured within Asia.[61] These bilateral energy arrangements are often not directly government-to-government deals, but instead facilitated through the respective state owned energy companies. In the case of gas the Japanese government has been negotiating with the Russian government over the joint development of the Sakhalin fields to the north of Japan.[62] Such deals allow the government to have an influence over the source of the supply.

Governments can also use global markets to improve access to energy supplies. China's two major oil companies, CNPC and China National Offshore Oil Company (CNOOC), are investing in international ventures in countries such as Venezuela, Peru and Sudan.[63] China's policy makers say this is a way that the global market allows China to 'mitigate its energy dependence'. [64] Indeed, military force is not being used to seize these fields, nor is political coercion. But Beijing still guides the investments as the state owns both of these companies. The global market is being utilised by the Chinese government to achieve energy policy goals, namely filling a supply shortfall and diversification of supply. This is completely different to relinquishing control to private companies acting within a global free market.

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[56] IEA, *Energy Policies of the Republic of Korea*, p.34.
[57] Fereidun Fesharaki et al, *Promoting Energy Security in APEC Through Improved International Fuel Market Operations*, Hawaii: East-West Centre, April 1998, p.10.
[58] Horsnell, p.375.
[59] EIA, *Country Analysis Brief Singapore*, U.S. Department of Energy, December 1998, <http://www.eia.doe.gov/emeu/cabs/singapor.html>.
[60] McDonald, p.18.
[61] Fesharaki et al, *Promoting Energy Security*, p.12.
[62] Paik, *Gas and Oil*, p.173.
[63] Yergin et al, 'Fuelling Asia's Recovery', pp.41-2.
[64] 'Beijing Gusher', *FEER*, February 26 1998, p.46.

A major part of energy security for governments is the need for sufficient legal and institutional frameworks for emergency preparedness and to maintain stockpiles. Governments can enact legislation requiring private operators to maintain adequate stockpiles in addition to the government's own stocks as a way to limit the economic impact of any supply disruption.[65] Japan's and South Korea's high dependence upon imported oil mean that these two countries have well-established emergency response measures. In Japan the government maintains its own stockpiles, and under the Petroleum Stockpiling Law of 1983 requires the industry to maintain reserves.[66] In case of an emergency, the National Emergency Sharing Organisation (NESO) would be formed under the auspices of the Agency of Natural Resources and Enegy (ANRE) and the Ministry of International Trade and Industry (MITI). South Korea operates a similar policy.[67] In addition to stockpiling, both countries provide for emergency measures such as restricting usage, price controls, and rationing.[68]

Governments also seek to guard against the market's tendency to not take into account the need to diversify fuels as part of energy security. With low oil prices there is little reason for the market to develop alternative fuels.[69] This was part of the reason that caused oil to become so prominent in the energy mix of western nations leading up to the crises of the 1970s. As Asian economies continue to grow, governments have recognised that in meeting the increased demand it will be important to not be overly reliant on a single fuel. This consideration increased Japan's desire to develop nuclear power in order to reduce dependence upon oil imports in the 1970s.[70] A good example of this fuel diversification is the development of renewable energy resources. Private investment is often encouraged through government initiatives and resources put into research and technologies. Such initiatives are often undertaken for broader development goals, but are still an important part of reducing reliance on specific fuels.[71]

Two fuels stand out in the current move for diversification; gas and nuclear power. Natural gas is seen by many energy analysts as being the answer to reducing

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[65] APERC, *Energy Demand and Supply Outlook*, p.15.
[66] IEA, *Role of Governments*, p.200.
[67] IEA, *Energy Policies of the Republic of Korea*, pp.55-6.
[68] IEA, *Role of Governments*, passim; IEA, *Energy Policies of the Republic of Korea*, passim.
[69] 'The Next Shock', *Economist*, March 6 1999, p.17.
[70] Richard J. Samuels, *The Business of the Japanese State: Energy Markets in Comparative and Historical Perspective*, London: Cornell University Press, 1987, p.246.
[71] David J. Jhirad and Kenneth Langer, 'Accelerating China's Renewable Energy Program', in *Energy Efficiency Improvements in China*, Beijing: Conference Proceedings, December 3 & 4 1996, pp.419-430.

dependence on oil.[72] The IEA predicts that gas will increase more than any other fuel as part of Asia's total energy supply through to 2020.[73] The Japanese government subsidises the increased usage of gas through various fiscal measures designed to make gas more attractive to investors.[74] The South Korean government regulates the price of gas in order to ensure that it remains an economically attractive fuel, thus promoting it as a diversity choice.[75] In Vietnam the government has recognised natural gas as an important source to fuel its future increase in energy demand, reducing its reliance on imported oil.[76] Thailand has recently introduced policies to encourage the use of natural gas in an effort to move away from oil and coal.[77] However, this move has prompted concerns that the country may replace dependence on oil with dependence on a different fuel.[78]

A similar pattern is noticeable in the move toward nuclear power. Asia is the only region where nuclear power is expected to increase as a percentage of total energy supply through to 2020.[79] As noted in Chapter Two, nuclear power remains highly politicised because of environmental concerns and proliferation issues. Companies specialising in the construction of nuclear plants are therefore closely watched and tied to their respective governments, much like the earlier oil companies were. Thus nuclear deals are typically between countries, rather than through the open market. China has reactor deals with Canada, France and Russia.[80] The United States has used the supply of nuclear technology to China as diplomatic leverage to gain an assurance that China will cease to assist with Iran's nuclear programme.[81] Both Japan and South Korea maintain national companies invested with the responsibility of plant design and equipment manufacture.[82] Other Asian countries contemplating a nuclear future as a way to develop security of electricity supply include Vietnam, Indonesia, and North Korea.

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[72] Yergin et al, 'Fuelling Asia's Recovery', pp.36-7; Guoxing, p.285.
[73] IEA, *WEO 1998*, p.305.
[74] IEA, *Role of Governments*, p.201.
[75] IEA, *Energy Policies of the Republic of Korea*, p.46.
[76] Energy Information Agency, *Country Analysis Brief Vietnam*, U.S. Department of Energy, December 1998, <http://www.eia.doe.gov/emeu/cabs/vietnam.html>.
[77] Energy Information Agency, *Country Analysis Brief Thailand*, U.S. Department of Energy, January 1999, <http://www.eia.doe.gov/emeu/cabs/thailand.html>.
[78] EIA, *Country Analysis Brief Thailand.*
[79] IEA, *WEO 1998*, p.75.
[80] 'China Goes For Nuclear Power', *Financial Times World Energy*, June 8 1998, pp.18-25.
[81] EIA, *Country Analysis Brief China.*
[82] IEA, *Energy Policies of the Republic of Korea*, p.31; IEA, *Role of Governments*, p.203.

Government intervention is also driven by the belief that the market does not take into account factors that impact upon the wider public good. Externalities such as pollution from energy production or consumption are current examples of this problem. Government intervention in the form of pollution taxes are designed to limit pollution by including the social cost into the production costs for the energy industry.[83] Non-fiscal policies can involve setting environmental standards for power plants and for the transportation industry. Efficiency improvements are also a vital part of reducing emissions.

Japan is one of the leading countries in the region, indeed the world, in terms of environmental policies.[84] Whilst taxes are not currently used for environmental purposes, a range of programs, initiatives and subsidies are utilised to attain environmental goals. Government agencies such as MITI and ANRE co-ordinate programs aimed at increasing energy efficiency and lowering CO_2 emissions.[85] Subsidies are aimed at encouraging the development of more environmentally friendly technology such as clean coal technology and alternative fuel development.

China also sees environmental goals as one of the most important issues for the future. Broad environmental institutions and policies have been set up which form the basis for a sound environmental policy.[86] The National Environmental Protection Committee (NEPC) is the highest government body dealing with such issues. The Committee's Agency (NEPA) is responsible for implementing the various policies enacted by the NEPC, including the imposition of emission standards, pollution charges, taxes and permits.[87]

Regional Security Considerations.

It would have to be conceded that the government retains a leading role in assuring security of supply throughout Asia. The examples above emphasise one theme: the centrality of the energy sector to a developing country's future prosperity lends itself to a high degree of government intervention. Government intervention can continue after

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[83] Jensen and Miller, p.836.
[84] EIA, *Japan Environmental Review*.
[85] IEA, *Role of Governments*, p.197.
[86] Weijiong Zhang, Ilan Vertinsky, Terry Ursacki and Peter Nemetz, 'Can China Be a Clean Tiger?', *Pacific Affairs*, 72:1 (Spring 1999), p.30.
[87] Zhang et al, pp.30 & 32.

economic development if, as in the case of Japan, high levels of import dependence pose a significant problem for a country's economy.

The persistence of government involvement in supply security issues has implications for regional affairs. Calder suggests that increasing energy demand will lead to a situation where an increased number of countries will compete for energy imports in the world market.[88] Encouraging adherence to open markets and free trade in energy is seen by some energy analysts as being able to lower the possibility of conflict.[89] According to these analysts, reducing the supply of energy to a simple matter of bidding on commodity markets for supply contracts would de-politicise supply security, moving conflict away from a matter of politics to one of economics.

This change seems to be taking place in Asia, although there are notable exceptions. A number of other countries are pursuing adoption of market strategies at various rates. As Fesharaki et al note, Asian nations are realising that 'while government intervention may be inevitable or even necessary at times, the best mechanism to ensure energy security is a watchful eye over the market and a consistent, collective effort to ascertain that energy markets function properly'.[90]

Whilst the adoption of markets may allow governments to resign to a guiding role, governments are still the main instruments in ensuring the stability of these markets. Military and diplomatic influence over vital regions, and for the security of sea-lanes continues to be a vital part of energy security for nations. America retains the pre-eminent position in securing some form of stability in the Middle East and the security of the vital sea-lanes from the Persian Gulf through diplomatic and military methods.[91] The presence of the United States Navy in Asian waters also provides a valuable stability for energy markets. Japan has relied on the United States for this part of its energy security policy, whilst undertaking its own diplomatic efforts to secure access.[92] Governments retain a diplomatic and political role in the push for supply security, whilst also remaining the key providers of market stability in countries where financial infrastructure is very much undeveloped. Governments also maintain a strong influence in energy security where market forces do not take into account long-term

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[88] Calder, 'Asia's Empty Tank', pp.58-60.
[89] Yergin et al, 'Fuelling Asia's Recovery'.
[90] Fesharaki et al, *Promoting Energy Security*, p.16.
[91] Kemp, p.132.
[92] Ukeru Magosaki and Yasumasa Kuroda, 'Japanese-Gulf Relations Toward the Year 2000' in Charles F. Doran and Stephen W. Buck, *The Gulf, Energy, and Global Security. Political and Economic Issues*, Boulder and London: Lynne Rienner, 1991, pp.185-6.

security issues, such as diversification of fuels, diversification of supply, and the reduction of consumption through energy efficiency and conservation.

With increasing dependence upon the Middle East for energy, 'the Gulf is no longer of peripheral significance to China'.[93] It was noted in Chapter Two that China has been taking an increasing political interest in the Middle East in an effort to secure energy supplies. From its interests in developing commercial ties of the 1980s China has moved towards the furthering of political ties with all Middle Eastern countries.[94] Understandably, China wishes to have input into the stability of a region on which it relies so heavily, and this is seen as being best achieved politically. Whilst there is a commonality of interest in regards to this stability between China and the United States, there has been little in the way of cooperative measures emerging so far.[95]

The change has been in the way which governments achieve energy security in some areas. In a number of areas, most notably pricing, the government has retreated to a regulatory role. Here, the market is being used as a tool used to achieve national energy goals that the governments consider inappropriate for other mechanisms. Governments are willing to let markets operate as far as they fulfil the state's energy security goals. But it is wrong to imply that markets now have control. In cases where the market has been embraced, Asian governments retain a large degree of control through regulation, but not heavy handed state intervention. There still remain a number of countries where the market is not prominent, including North Korea, Laos, and Cambodia. China, the country with the potential to consume more energy than any other country in the world, still holds onto the idea of heavy state involvement in the energy sector.

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[93] Calabrese, p.352.
[94] Calabrese, p.366.
[95] China has participated in the Middle East peace process, attending sessions and hosting multilateral talks in Beijing. Rynhold, p.105.

Chapter Four.
Market Solutions.

This chapter examines the benefits that market mechanisms offer Asian countries in their search for the energy and security balance. It considers two main approaches, pricing and liberalisation of the energy sector, and assesses the degree to which these mechanisms are being adhered to within Asia. The pricing of energy has a direct impact on the level of consumption, making it a vital part of a country's energy policy. Liberalisation of the energy sector generates other benefits, including access to foreign funds for expansion of generation capacity or hydrocarbon exploration as well as energy security benefits such as efficiency from increased competition. The chapter concludes by looking at what a move towards the market could mean for Asian countries in terms of security and strategy.

Pricing.

Conventional economic theory states that the market system is the most efficient way of allocating resources, setting prices and supplying goods. Left clear of intervention the market will deliver what is demanded at the appropriate price, dictated by the various economic laws including supply and demand. In a perfect international market system, the amount and type of energy resource used by a specific consumer (a particular country for example) would be determined by supply and demand. Such a perfect market system does not exist.[1] However, the idea of a perfect market is the basis of the thinking of authors such as Yergin, Eklof and Edwards when they state that the '[energy] problem can only be solved by accelerating the trend toward market-based energy strategies'.[2]

These strategies are aimed at two major outcomes; increasing the efficiency of energy allocation and usage and attracting investment to finance energy projects and technologies. There are several ways of achieving these outcomes. A key strategy for achieving these goals is the move towards market pricing. Having a price setter independent of the central government is seen by some energy economists as the best

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[1] David B. Audretsch, *The Market and the State. Government Policy Towards Business in Europe, Japan and the USA*, New York: Harvester Wheatsheaf, 1989, pp.7ff.
[2] Yergin et al, 'Fuelling Asia's Recovery', p.34.

way to curb demand and increase efficiency.[3] By contrast, in an artificial, government driven low-priced market there is often no incentive to conserve energy or to utilise it more efficiently.

In reaction to the oil crises of the 1970s Asian countries retained government control of energy pricing in line with national development plans and prevailing economic policies. Fixing energy prices below cost became common, whether for industrial competitiveness, social development or other reasons.[4] Governments in countries such as Thailand cushioned the price increases of the 1970s to reduce potential impacts on the economy such as rising inflation and lower economic growth.[5] In other countries such as the Philippines, Taiwan and South Korea, governments passed on energy price increases to the consumers more fully,[6] but energy taxes and subsidies still allowed some control on prices. As the ADB notes, these countries gave 'considerable weight to cost in setting energy prices, but ... also consider[ed] other economic and social factors.'[7]

Today, the state sets energy prices low in countries such as China in order to encourage usage as part of wider development plans. Subsidies are utilised to compensate for the difference between international market prices and those set by the government.[8] With domestic prices lower than the international market price, there is no incentive for consumers to be efficient in their usage of energy. Low pricing combined with economic growth has seen energy demand increase so much that supply shortages are now occurring.[9] The adoption of market pricing could halt this practise and relieve shortages through the reduction of consumption. Indeed, some authors such as Salameh offer the curbing of demand by such methods as the answer to reducing the pressures that arise from increasing levels of consumption.[10] He admits that this would be at the expense of economic growth but sees this as a necessary trade-off. It remains to be seen whether countries such as China agree with this view.[11] Coal subsidies in China are slowly being removed, raising the price which consequently encourages conservation

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[3] Yergin, 'Energy Security in the 1990s', p.132.
[4] ADB, *Energy Policy Experience*, p.91.
[5] ADB, *Energy Policy Experience*, p.89.
[6] ADB, *Energy Policy Experience*, pp.91-2.
[7] ADB, *Energy Policy Experience*, p.91.
[8] Weijong Zhang et al, p.36.
[9] Zhang, p.159.
[10] Salameh, p.137.
[11] Salameh, p.137.

and more efficient use.[12] However, other sectors of the energy industry in China retain the artificially low prices subsidised by government. In addition, if international prices are low, the change to market prices may not offer any substantial efficiency gains for the state.

Other Asian countries such as Thailand, the Philippines and Taiwan are following the international trend towards allowing the market to set prices. Market pricing in most Asian countries is being used as a way to attract investment, especially from foreign sources, and increase capacity in the areas of electricity and hydrocarbon exploration. This move to market pricing has meant that governments who wish to maintain a strong role over energy efficiency and conservation must take up a position of regulator. The Philippines provide a good example of this pattern. Whilst privatisation and market pricing do generate some efficiency improvement their prime objective was to fulfil the government's policies of increasing electricity capacity and the introduction of foreign technology and funds for the national oil company to pursue a greater degree of self-sufficiency.[13] Through the Department of Energy the government maintains the major role in the promotion of energy efficiency programs, fulfilling the key energy policy of attaining the 'judicious and efficient utilisation of energy'.[14]

Leaving control of pricing to the market also impacts upon energy conservation. Whilst efficiency is concerned with gaining the most output for each energy input, conservation simply aims to restrict the amount of energy used, especially within the domestic transport sector. Just as low prices will encourage consumption, high prices lead to a reduction in general consumption. Governments therefore maintain conservation policies at times of low prices similar to the energy efficiency measures as well as through fiscal measures such as taxes. Japan taxes gasoline over and above the general consumption tax in an effort to constrain usage in the transportation sector.[15] In addition to this consumption taxation, South Korea maintains a vehicle registration tax based on the size of the vehicle's engine.[16] Taxation holds other energy security benefits. Japan supports diversification in the electricity sector through its consumption

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[12] Jonathon E. Sinton, Mark D. Levine and Wang Qingyi, 'Energy Efficiency in China: Accomplishments and Challenges', *Energy Policy*, 26:11 (September 1998), p.826.
[13] WEC, *Benefits and Deficiencies*, Oil and Gas Section.
[14] WEC, *Benefits and Deficiencies*, Oil and Gas Section.
[15] IEA, *Role of Governments*, p.199.
[16] IEA, *Energy Policies of the Republic of Korea*, p.41.

taxes, using fiscal methods to encourage a move away from oil towards gas and nuclear power.[17]

The creation of a transparent oil market where price is determined independently of government actions is seen by advocates of the market as the best way to cope with supplying the rising demand for oil and gas to the Asian region.[18] An Asian oil market would remove the need for countries to compete for long-term contracts directly with suppliers. These long-term contracts are often preferred by states as they offer a secure supply over a long length of time, up to twenty years in some cases. Suppliers also benefit in that they have a guaranteed market for this length of time. This is presently the major way of trading primary fuels in the Asian region.[19]

Despite the preponderance of such contracts within Asia, trading markets such as futures, options, spot and swap markets hold many benefits. These markets facilitate the trade in commodities such as oil, and in the case of futures markets have added benefits for participants beyond immediate price setting. Futures markets are good indicators of the future price of a commodity, in this case oil and gas, allowing markets a degree of adjustment before feeling the effects of fluctuations in price.[20] In addition, more efficient methods of risk management are offered by futures markets.[21] The ability to transfer risk to a party more willing to accept that level gives the system a degree of flexibility. In some cases futures markets can lower the overall risk involved for all parties.

According to market theory, there will always be enough supply to meet demand. If supply disruptions occur the result is not physical shortfall but a price impact.[22] Despite praising the virtues of the open market, Daniel Yergin still admits that 'the question is not whether there will be events that could threaten energy supply, for surely there will...but rather how resilient energy markets themselves will be and how effective energy security measures will prove.'[23] As Fesharaki says, 'if you can afford it, there will always be oil'.[24] The question is whether Asian countries will accept the fact that they might not be able to afford their needed supplies in the future. The fact

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[17] IEA, *Role of Governments*, p.203.
[18] Fesharaki, Fereidun, 'Oil Markets and Energy Security in Northeast Asia', IGCC Policy Paper 35, University of California, 1998, <http://www-igcc.uscd.edu/IGCC2/PolicyPapers/pp3503.html>.
[19] Fesharaki et al, *Promoting Energy Security*, p.5.
[20] Robert W. Kolb and Ricardo J. Rodriguez, *Financial Markets*, Oxford: Blackwell, 1996, pp.247ff.
[21] Kolb and Rodriguez, p.248.
[22] Horsnell, p.5.
[23] Yergin, 'Energy Security in the 1990s', p.111.
[24] Fesharaki et al, *Promoting Energy Security*, p.4.

that supply disruptions result in price increases in a market environment does not remove the damage that they can cause. Instead of problems caused by actual physical shortage, damage can be inflicted upon countries in the form of economic effects, such as increased costs of production leading to rising inflation and weakening balance of payments figures.[25]

Markets themselves have the tendency to be volatile and unpredictable at times. Horsnell and Mabro note that oil prices have had a long history of volatility, the oil market being 'prone to sharp fluctuations since its birth.'[26] This volatility takes place even outside times of political crisis, driven by a number of factors which upset the traditionally held concept of 'market efficiency'.[27] Added to this inherent market volatility are political and military influences upon the market. At the time of Britain's investment in the Anglo-Persian Oil Company (now BP) Winston Churchill noted that '[t]he price of oil does not depend wholly or even mainly on the ordinary workings of supply and demand'.[28] The existence of NOCs and the continued United States military presence in the Middle East is testimony that this statement still has a degree of truth in today's energy markets.

In this era of low oil prices and an oversupply of energy resources, are we underestimating the drive of nations to ensure their standards of living through obtaining energy supplies? If prices begin to climb and the markets for oil and gas tighten, the possibility exists that nations will resort to non-market mechanisms such as political influence or more *dirigiste* energy policies to ensure supply.

Liberalisation.

Liberalisation is another way of utilising market mechanisms in the energy sector. The introduction of competition into previously non-competitive markets, such as a monopolistic power generation industry, or the opening up of industries to foreign investment are the two main forms of liberalisation noticeable in the Asian energy sectors. Neoclassical economic theory holds that this competition will increase the

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[25] ADB, *Energy Policy Experience*, p.41.
[26] Paul Horsnell and Robert Mabro, *Oil Markets and Prices. The Brent Market and the Formation of World Oil Prices*, New York: Oxford Institute for Energy Studies, 1993, p.171.
[27] Horsnell and Mabro, p.171 and Chapter 9, pp.121-153; Robert J. Shiller, *Market Volatility*, London: MIT Press, 1993, pp.14ff.
[28] J.E. Hartshorn, *Oil Companies and Government. An Account of the International Oil Industry in its Political Environment*, London: Faber and Faber, 1967, p.255.

efficient use of resources through increasing competition.[29] This liberalisation can also be aimed at opening industries to the price setting mechanisms of the market, thus improving the overall economic performance and efficiency of the energy sector as described above.[30]

Liberalisation is an important part of attracting the investment needed for energy projects. The market can be utilised by countries whose domestic investment potential is not enough to finance much-needed energy projects. Markets are an important way to ensure the necessary financing for developing new capacity in areas such as electricity generation. Attracting investment is also another important way to improve efficiency and of reducing environmental side effects through technological improvements.

Liberalisation was not one of the reactions to the energy crises of the 1970s. The movement towards liberalisation of the energy sector is a more recent one, even for the more developed western nations. The first liberalisation came with Margaret Thatcher's move towards market economics, transforming the British energy sector in the late 1980's. A number of other countries have undertaken energy market liberalisation in an attempt to gain the benefits including New Zealand, Norway and Argentina.[31] Within Asia the move is not as pronounced. Countries such as Singapore have parts of their energy sector that are more liberalised than others (oil more than electricity)[32], but no Asian country has a fully liberalised energy sector. However, the move towards more liberalisation within Asia is underway.

In countries such as Japan and South Korea liberalisation aims to remove or refocus government control over the industry in an effort to increase efficiency. Japan, whose energy concerns derive largely from its import dependency, still perceives the energy sector as vital to the achievement of national objectives.[33] It is willing to utilise the market to achieve a more efficient energy sector, to generate a more accurate pricing system, and to encourage an integrated regional market.[34] But such liberalisation does not mean the complete withdrawal of government intervention. The supply of energy is

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[29] Douglas Brooks and Soo-Nam Oh, 'Financial Liberalisation in Asia: Analysis and Prospects', in Douglas H. Brooks and Monika Queisser, *Financial Liberalisation in Asia: Analysis and Prospects,* France: OECD and Asian Development Bank, 1999, p.73.

[30] Murray, Jan, *The Benefits and Deficiencies of Energy Sector Liberalisation*, presentation to the 2nd ASEAN Energy Business Forum, December 2 1998, <http://www.worldenergy.org/wec-geis/publications/open.plx?file=archives/speeches/spc981201.htm#top>.

[31] Murray, *Benefits and Deficiencies.*

[32] WEC, *Benefits and Deficiencies*, Electricity Section..

[33] IEA, *Role of Governments*, p.207.

[34] Horsnell, pp.74ff.

still very much controlled by the government, especially in the case of electricity.[35] Thus, the market is being seen as a way to achieve national objectives, but is still very much subservient to these.

Singapore regards its electricity generating capacity as a critical national asset and retains state control over this part of the energy sector. The industry is state owned and prices are regulated by the government. No market mechanism exists.[36] However, plans to privatise the electricity market are being put forward in an effort to allow more competition into the sector.[37] This liberalisation is aimed at reducing electricity prices in order to decrease production costs in the country's industry sector.[38] This is also the case for Japan. Japan's electricity costs are more than double the OECD average, due to the inefficient way that the sector is structured.[39] The introduction of competition, privatisation and the operation of IPPs in the electricity industry is seen as a way to lower these costs to international standards, thus making the industry and the country more competitive.[40]

China has introduced competition into its oil industry by creating a number of state owned oil companies, reorganising these companies into vertically integrated entities.[41] The resulting competition between them is seen as accomplishing energy conservation goals by the national government, as well as being able to better manage the exploration and extraction of new resources.[42] Before this restructuring the Chinese oil sector was devoid of competition. Private firms operated under production sharing contracts with the state oil companies and not in direct competition.[43] The introduction of private firms will increase the level of competition, raising the importance of efficiency and accountability for the state owned companies.

Regional energy projects such as the construction of oil and gas pipelines, refineries, power plants, national energy infrastructure, and the exploration and extraction of resources require multi-billion dollar investments.[44] The World Bank estimates that Asia will need $1.5 trillion for energy development funding in the decade

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[35] IEA, *Role of Governments*, p.202
[36] WEC, *Benefits and Deficiencies*, Electricity Section..
[37] EIA, *Country Analysis Brief Singapore.*
[38] EIA, *Country Analysis Brief Singapore.*
[39] Energy Information Agency, *Country Analysis Brief Japan*, U.S. Department of Energy, May 1999, <http://www.eia.doe.gov/emeu/cabs/japan.html>.
[40] OECD, *Economic Survey. Japan 1997*, France: OECD, 1997, pp.95ff.
[41] EIA, *Country Analysis Brief China.*
[42] EIA, *Country Analysis Brief China.*
[43] WEC, *Benefits and Deficiencies*, Oil and Gas Section.
[44] Valencia, 'Energy and Insecurity', p.90.

up to 2004.[45] As domestic investment is often not enough to finance such large undertakings, foreign investment is essential if the projects are to be realised. Power generation investment requirements in Asia up to 2005 are expected to be $50 billion more per year than domestic savings can supply.[46]

With the majority of Asian governments actively promoting natural gas usage the market is being utilised to provide the necessary capital and investment to be able to fund the necessary infrastructure. The Philippines has initiated joint ventures with foreign companies to increase the amount of gas involved in power generation, expanding later to include the industrial, household and transport sectors.[47] Indonesia is currently exploiting reserves of natural gas with the help of major oil companies and intends to develop a domestic market infrastructure with the help of foreign firms.[48] Even China, which traditionally relied on national companies to develop energy resources, is signing agreements with foreign companies to allow the construction of oil and gas pipelines.[49] This is a common trend throughout Asia, with governments recognising the value of natural gas for energy security but being unable to fund the necessary investments themselves.

The Vietnamese government has looked towards IPPs in the form of foreign investors to make up for the country's power shortages. These shortages have caused blackouts and have required the rationing of power in Vietnam's major cities.[50] There is a similar problem in Taiwan. Power shortages have reached levels that threaten to encroach upon economic growth.[51] The introduction of IPPs is seen by Taiwanese officials as the most efficient way of increasing capacity. In addition to IPPs operating in Taiwan, the disintegration and privatisation of the state owned Taipower has been mooted in a move to introduce more competition into the power generation sector.[52] The government plans to offer 30% of the shares in Taipower to the general public by 2001.[53]

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[45] Atsushi Kido, 'Trends of Nuclear Power Development in Asia', *Energy Policy*, 26:7 (June 1998), p.580.
[46] International Energy Agency, *Energy Investment*, 1998, <http://www.iea.org/g8/invest/index.html>.
[47] FBIS Daily Report, *Philippines: Report Views Future of Natural Gas Industry*, FBIS-EAS-97-011, January 16 1997.
[48] EIA, *Country Analysis Briefs Indonesia*.
[49] FBIS Daily Report, *Construction of 4,200-km Gas Pipeline Pushed Ahead*, FBIS-EAS-1999-0418, April 18 1999; EIA, *Country Analysis Brief China*.
[50] 'Allow Us', *FEER*, September 14, 1995, p.66.
[51] *FEER*, September 14, 1995, p.66.
[52] Valencia, 'Energy and Insecurity', p.90.
[53] WEC, *Benefits and Deficiencies*, Electricity Section.

Faced with the need to deliver substantial amounts of electricity generation capacity in order to avoid shortfalls in supply, the Chinese government has made a number of policy changes aimed at introducing foreign funds and technology into the Chinese electricity sector.[54] This has become necessary due to the failure of the domestic market to generate sufficient amounts of capital to finance projects and the absence of the required technology to ensure that the new capacity is efficient and environmentally sound. The Chinese government has therefore found it necessary to utilise the foreign private sector to not only supply funds but also to deliver generation equipment which is more thermally efficient than domestically produced plants.[55] This is also the case for the oil sector. Kang Wu and Binsheng Li note that after years of self-sufficiency in oil, China is now opening its onshore area to foreign investment in an effort to develop new capacity.[56] Offshore, China has utilised more than a billion US dollars of foreign investment attempting to discover significant hydrocarbon reserves.[57] The need for foreign funds has brought pressure from investors to remove government control over prices and to further develop the country's transport and other infrastructure.[58]

Some countries have embraced liberalisation more fully than other. In contrast to its electricity sector, the Singaporean government has utilised the market to effectively develop itself as a key part of the Asian oil industry. Since independence in 1959, Singapore has been seen by multinational oil companies as a safe place to set up business. This is mainly due to the government's encouragement of foreign operators through incentives such as tax exemptions and government support.[59] Government initiatives aimed at reducing 'restrictive price regulations, excessive bureaucratic red tape and the threat of partial or total nationalization' [60] set Singapore apart from other countries within Asia. The result was an attractive liberalised market that fostered foreign investment and facilitated the development of Singapore's oil reserves. The Singaporean oil industry is a good example of how the market can be used to effectively develop an area of the energy sector that the government may have otherwise been

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[54] Binsheng Li and James P. Dorian, 'Change in China's Power Sector', *Energy Policy*, 23:7 (July 1995), p.620.
[55] Li and Dorian, p.625.
[56] Kang Wu and Binsheng Li, 'Energy Development in China. National Policies and Regional Strategies', *Energy Policy*, 23:2 (1995), p.170
[57] Wu and Li, p.170.
[58] Wu and Li, p.171.
[59] Horsnell, p.19.
[60] *FEER*, June 11 1998, p.55.

unable to. It could well serve as a successful example for other Asian countries considering liberalisation of their energy sectors.

Broader Security Considerations.

The market holds a number of benefits for countries faced with rising energy demand. Primarily it is an effective way of achieving economic goals such as efficiency and improving the ability of sectors to attract investment. This is especially so when domestic investment is insufficient and foreign investment is needed to expand capacity. In addition, the market provides an instrument through which prices can be determined without distortions in the form of subsidies and government protection. Through these methods, the market is able to reduce consumption and increase efficiency in energy sectors previously laboured by economic redundancies. For countries who are experiencing shortages of supply in regards to electricity, the market offers an adept way to access the necessary capacity to bridge the shortfall.

Markets, however, do not take into consideration energy security issues such as diversity of supply.[61] The inability to switch fuels in vital sectors such as industry and transportation and the long lead times needed to develop alternative sources of fuels increases vulnerability to sharp price increases, possibly induced by heightened competition for supply from regional players. A country is stuck with higher prices until alternatives are developed, impacting upon both growth and development. The development of gas networks or nuclear power would be delayed by market mechanisms as long as the price of oil or coal remain low enough to not warrant investment in other fuels.[62] What is missing is the long-term view of energy security issues.

When considering liberalisation countries face questions that have wider implications. To attract foreign investment for energy development other sectors of the economy may also need to be opened to liberalisation.[63] For example, liberalised legal and financial institutions are often a prerequisite for foreign investment. This leaves the country more sensitive to the fluctuations in foreign currency and financial markets and policies. Recent regional experience with financial liberalisation has not all been

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[61] Patrick Clawson, 'Energy Security in a Time of Plenty', Strategic Forum No.130, National Defence University, October 1997, <http://www.ndu.edu/inss/strforum/forum130.html>.
[62] 'Drowning in Oil', *The Economist*, March 6 1999, p.21.
[63] Fesharaki et al, *Promoting Energy Security*, p.90.

positive. Financial liberalisation had been singled out by some analysts as being a major factor in the regional financial crisis that began in June 1997.[64]

Problems arise not only in countries receiving foreign investment. There are fears that Japanese funds being used to invest overseas are degrading Japan's domestic economy.[65] The 'hollowing out' of the economy due to more competitive returns available internationally threatens the economic well being of the country. Competition for these investment resources can impact upon other parties.

The prospect of a shortage of funds is raised by the questionable availability of finance for required energy projects.[66] International competition for a limited amount of funds could lead to increased international tension.[67] Politics, rather than pure economics, could become the deciding factor in where investment is directed. Keun Wook Paik states that 'Japan's commitment to both China's and the FSU's [Former Soviet Union] oil and gas development has been fundamentally influenced by power relations rather than development economics.'[68] Implications include Russian interests taking offence at Chinese attempts to lure Japanese funds to develop their own resources.[69] Paik notes that China has been using crude oil exports to Japan for this purpose since 1973.[70] The ability of a country such as China to use its international influence to draw investment away from smaller nations such as Vietnam or Thailand could also heighten political tension.

In a fully liberalised market every energy project becomes just another prospective investment opportunity amongst all other projects.[71] Developments such as increased LNG production and transportation for Asia must compete with other projects such as natural gas pipelines or the formation of a regional electricity grid. This can pose a problem for countries such as Japan, which relies on LNG and wishes to increase LNG's share in its energy mix.[72] Being geographically isolated from the proposed Asian power grid (mainly Southeast Asia and lower China) means not being able to benefit from that development. Energy security plans such as diversification to LNG may not

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[64] Brooks and Soo-Nam Oh, p.85.
[65] Tamim Bayoumi and Gabrielle Lipworth, 'Japanese Foreign Direct Investment and Regional Trade', *Journal of Asian Economics*, 9:4 (Winter1998), pp.581-2.
[66] Valencia, 'Energy and Insecurity', p.90.
[67] Huang Fanzhang, 'China's Utilization of Foreign Capital and the Related Policies', *Journal of Asian Economics*, 6:2 (Summer 1995), pp.231-2.
[68] Paik, *Gas and Oil*, p.173.
[69] Paik, *Gas and Oil*, pp.175-6.
[70] Paik, *Gas and Oil*, p.31.
[71] Fesharaki et al, *Promoting Energy Security*, p.91.
[72] Valencia, 'Energy and Insecurity', p.86.

be as attractive to investors as the opportunity to develop and operate a regional power grid, meaning Japan could lose a vital part of its energy security plan.

The political and social structure of a country also comes under scrutiny from investors and other countries if these structures threaten to disrupt or escalate the risks involved in financing projects. The World Bank refuses to fund China's Three Gorges hydroelectricity project due to political and social issues such as human rights.[73] Financial assistance for energy projects in North Korea are unlikely to be forthcoming unless that country reforms politically and adheres to international community norms. This point is emphasised when multinational companies are eager to invest in projects but are blocked by governments or international institutions. The United States' policy on investment in China has meant that many U.S. companies have missed out on lucrative opportunities in the energy industry, especially with the Three Gorges Dam.[74] China is justifiably frustrated at such occurrences, as foreign involvement would allow more advance technology to be utilised and increase the quality of workmanship.

Indonesia has recently experienced the problems that arise when internal political and social issues impinge upon energy security efforts. Pressure from a public seeking to distance themselves from the corruption of the Suharto years has begun to put pressure on IPP arrangements.[75] Indonesia's state power company is asking for its contract with Paiton Energy to be annulled by the courts, meaning a loss of some fifteen billion dollars worth of payments for foreign contractors.[76] This impacts upon the country's ability to obtain future funding for its much needed electricity expansion plans. The issue goes beyond the purely commercial realm and has affected political relations as well. The U.S. Government has attempted to block substantial amounts of development funds to Indonesia until the power payments issue has been resolved to their satisfaction.[77]

The push for liberalisation and globalisation also raises the issue of regional and international interdependence. Asian economies are being drawn into the globalisation of the world economy driven by the spread of international trade, global communications and capital flows, and the operation of multinational corporations.[78] A

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[73] Dupont, 'Environmental Conflict', p.66.
[74] EIA, *IEO 99 Hydro*.
[75] 'Trouble on the Grid', *FEER*, October 21 1999, pp.63-4.
[76] *FEER*, October 21 1999, p.63.
[77] *FEER*, October 21 1999, p.64.
[78] Roger LeRoy Miller, *Economics Today*, Seventh Edition, New York: Harper Collins, 1991, p.470.

vital part of this globalisation movement is the liberalisation of finance, trade, and other sectors of the economy in order to allow the assumed benefits of global and regional interdependence to be absorbed by the country's economy.

While interdependence means that benefits are shared, it also means that turmoil can spread more quickly. Asia's recent financial crisis is a prime example of this. The effects of the Thai baht devaluation spread quickly through the region and reached markets as far afield as South America. Jensen and Miller mention several cases where interdependence can lead to tensions between states.[79] States feel more inclined to comment on the internal workings of another economy as this directly affects the return on investments within that state and more broadly the well being of the whole community. Fears that big business will be the guiding motive behind foreign policy are strong. In addition, the spread of market capitalism brings with it a degree of cultural imperialism. The need to adopt common principles with concern to legal and financial institutions, as well as the resulting importation of goods and services, has been seen by some as watering down their own culture. It has been noted in the U.S. Congress that the Chinese government view cultural interdependence as being more threatening than other forms of interdependence.[80]

While privatisation and the reduction of monopolistic structures of the electricity industries is needed for all the above reasons, this would mean a significant alteration in the role that the government would play in the sector. This shift may conflict with national development plans. Any degree of liberalisation reduces the amount of autonomy that a government has in formulating policy.[81] Liberalisation of the energy sector would therefore need to be undertaken with respect to the nation's policy aims. Within Asia, liberalisation is being utilised only as far as it serves this purpose.

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[79] Jensen and Miller, pp.279-81.

[80] Wendy Frieman and Thomas W. Robinson, 'Costs and Benefits of Interdependence: A Net Assessment' in Joint Economic Committee, U.S. Congress, *China's Economic Dilemmas in the 1990s. The Problems of Reforms, Modernization, and Interdependence*, New York: M.E. Sharpe, 1999, p.720.

[81] Manmohan Singh, 'Globalisation and the Asia-Pacific Region: Challenges and Opportunities in the Twenty-First Century', *Asia Pacific Development Journal*, 4:2 (December 1997), p.5.

Chapter Five.
Regional Cooperation.

A number of scholars see regional cooperation as an important part of dealing with the implications of rising energy demand within Asia. The trans-national nature of energy issues (such as pollution, sea-lane security and nuclear fuel cycles) often means that they require inter-governmental cooperation to be managed satisfactorily. A number of frameworks and institutions are seen by analysts as being able to facilitate communication and consultation on the energy challenges that Asia faces. These range from energy security agencies to organisations and forums which focus on wider economic and security issues.

Whether cooperation is for collective security, arms control, economic development or environmental aims, it is based on the commonality of interest between the actors and the belief that cooperation can deliver mutual benefits. According to Keohane, cooperation is not an end in itself, but a means to other ends.[1] Cooperation will be undertaken when all participants hold the goal as being beneficial and where each will gain from the action. However, according to some scholars, cooperation can be stifled if actors view the gains as being disproportionately distributed, supplying more gain to one party than others.[2] Cooperation is also entwined with an idealist view that international organisations have the ability to overcome the anarchic situation prevalent in international affairs.[3] Whilst states may have realist goals in mind when utilising cooperative measures they are still contributing to a liberal idea of the establishment of rules and codes by which nations are compelled to act.

Cooperative frameworks and institutions exist within Asia which could be utilised to manage the problems that arise with increased energy demand. Energy security cooperation could resolve specific energy issues such as energy efficiency and nuclear safety. Security cooperation can be seen as providing the framework to deal with the emergence of issues such as sea-lane security, territorial disputes, and the general tensions and suspicions that arise between regional powers because of

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[1] Robert O. Keohane, *After Hegemony, Cooperation and Discord in the World Political Economy*, Princeton: Princeton University Press, 1984, p.11.
[2] Duncan Snidal, 'Relative Gains and the Pattern of International Cooperation' in David A. Baldwin (ed.), *Neorealism and Neoliberalism. The Contemporary Debate*, New York: Columbia University Press, 1993, p.172.
[3] Jurg Martin Gabriel, *Worldviews and Theories of International Relations*, New York: St Martin's Press, 1994, p.65.

competition over resources or through the trans-national nature of energy. Finally, economic cooperation could facilitate energy related investment and technology transfer between nations as well as enhancing security by increasing economic interdependence. Some of these mechanisms exist within Asia, whilst others operate at the global level or have the ability to be 'copied' for use within the region.

Energy Cooperation Measures.

The major cooperative response to the energy crises of the 1970s was the creation of the International Energy Agency (IEA). The goals of the IEA were to reduce members' vulnerability to future shocks through establishing a number of co-ordinated measures; including emergency sharing schemes, long term cooperative measures on conservation, the development of alternative sources of energy, cooperation on research and developments and a variety of other emergency response measures.[4] Initially there were high hopes for the IEA to act as a device to recapture the pre-crisis petroleum market order.[5] Whilst it did not meet all of these expectations, it still played an important part in promoting energy security and raising relevant energy issues to the appropriate policy levels. Japan is currently the only Asian member of the IEA, maintaining emergency reserves and having a number of emergency response measures in place.[6] Other Asian countries, such as China and South Korea, maintain dialogue with the IEA but are not fully-fledged members.

The International Atomic Energy Agency (IAEA) was set up in 1956/57 under the auspices of the United Nations as the predominant global multilateral organisation to deal with nuclear safety issues. It presently has 131 members, including ten Asian nations.[7] The IAEA's stated aim is to enhance the peaceful application of nuclear energy through a number of agency functions, such as assisting research and development, technology and information transfer and education exchanges.[8] It also maintains a standard of safety for nuclear reactor operation that is applicable to all members, and monitors the nuclear fuel cycle to ensure non-proliferation of fissionable

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[4] Priddle, *Energy Security: A Vital Concept, A Changing Definition.*
[5] Ikenberry, p.10.
[6] IEA, *Role of Government*, p.199.
[7] IAEA, *Member States of the IAEA*, September 28 1999, <http://www.iaea.org/worldatom/About/member.html>.
[8] IAEA, *Statute*, September 28 1999 <http://www.iaea.org/worldatom/glance/profile/statute.html>.

material which could be utilised in nuclear weapons programmes.[9] Compared to other regions Asia receives the second largest amount of funding for technological cooperation and development from the IAEA, with China being the biggest recipient of funds within Asia.[10]

Multilateral energy cooperative measures within Asia have been slow to emerge. The Association of South East Asian Nations (ASEAN) Energy Minister's Meetings have established several cooperative measures between members. ASEAN members are bound by the 1986 ASEAN Petroleum Security Agreement that allows for an emergency petroleum sharing scheme, including measures in case of oversupply where members would buy from other members to maintain a stable level of exports.[11] The Petroleum Security Agreement is unique among energy security organisations, being designed to serve the interests of both importers and exporters.[12] The ASEAN Plan of Action on Energy Cooperation 1999-2004 was recently implemented.[13] This plan outlines a number of broad objectives, including cooperative work on the establishment of trans-ASEAN energy networks such as a power grid and gas network.[14] ASEAN also maintains a number of energy specific groups such as ASCOPE (ASEAN Council on Petroleum) and ACE (ASEAN Centre for Energy) which are responsible for the implementation of the Plan of Action and other agreements.[15] Whilst other Asian countries maintain national oil stockpiles, ASCOPE remains the only cooperative measure to achieve supply security within Asia.

The only other notable energy related group in the Asia-Pacific is maintained by the Asia Pacific Economic Cooperation (APEC) forum. The APEC Energy Working Group (EWG) concentrates on the energy sector's role in regional economic performance. One of the Group's strategies involves establishing cooperative activities that promote a wide range of energy issues.[16] An important part of the APEC EWG is the support of the Asia Pacific Energy Research Centre (APERC), established in 1996. Its primary tasks are to compile regional energy data and generate outlooks for APEC,

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[9] IAEA, *Statute*.
[10] IAEA, *Technical Cooperation Report-Implementation Summaries*, September 28 1999, <http://www.iaea.org/worldatom/GC/gc41/documents/is.html>.
[11] ASEAN website, <http://www.aseansec.org/>.
[12] ASEAN website, <http://www.aseansec.org/economic/poa_ener.htm>.
[13] ASEAN website, <http://www.aseansec.org/economic/poa_ener.htm>.
[14] ASEAN website, <http://www.aseansec.org/economic/poa_ener.htm>.
[15] ASEAN website, <http://www.aseansec.org/economic/poa_ener.htm>.
[16] APEC Energy Working Group website, <http://www.affa.gov.au/resources.energy/energy/apec/ewg_background/objectives.html>.

provide comments on policy issues such as energy security, energy efficiency and infrastructure requirements, and to provide 'relevant analytical inputs to...policy discussions.'[17] It does not initiate programs or have any binding security arrangements. As an APEC extension, the EWG has a bias toward private sector involvement in the energy sector. As such it has an important role in getting Asian countries to liberalise and thus facilitate investment in energy projects and promoting regulatory reform of the energy sector.[18] This bias could also prove to be its limiting factor.

Mark Valencia and Keun Wook Paik state that the creation of a multilateral energy regime within Asia could deliver mutual benefits by matching the capital and technology of countries like South Korea and Japan with the untapped reserves of China and Russia.[19] Valencia suggests the creation of 'a political, legal and, if necessary, financial instrument to include substantial transfers of capital, management ability, expertise and technology transfer necessary for the rational development of the medium- and long-term supply and consumption of energy in North-east Asia.'[20] Paik's Northeast Asian Energy Forum (NAEF) is a similar concept, but would provide 'institutional comfort for potential investors in the event of political problems.'[21] The feasibility of this IEA-like regional organisation is questionable. Members of the IEA are all democratic and affluent OECD nations, and to apply the IEA model to Asia with its disparities in income and political systems may not be possible. Simply extending the IEA to include Asian nations would also face the question of how expansive the organisation could get and still maintain the necessary effectiveness.[22]

Kent Calder notes that there is a need within Asia for a multilateral nuclear agency to develop 'a far sighted Asian energy security policy' to deal with nuclear proliferation, operational safety, and the storage of nuclear material.[23] There have already been a number of calls from within the region to establish a nuclear oversight agency. In the face of increased regional usage of nuclear power South Korea has called for the establishment of an Asian nuclear safety body that would also cover

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[17] APERC, *Energy Demand and Supply*, pp.vi & 1.
[18] APERC, *Energy Demand and Supply*, p.18.
[19] Valencia, 'Energy and Insecurity', pp.102-3. Paik, *Gas and Oil*, p.18.
[20] Valencia, 'Energy and Insecurity', p.103.
[21] Paik, *Gas and Oil*, p.xix.
[22] Symposium on Pacific Energy Cooperation, *Regional Cooperation on Energy Supply, Efficient Energy Use, and Environmental Protection Symposium Summary*, Tokyo, October 17-18 1994, p.32.
[23] Calder, 'Asia's Empty Tank', p.67.

compensation for damages caused by nuclear accidents.[24] In response to a reactor accident in Japan in 1997 the Philippines also called for the establishment of a complement to the IAEA, an Asian nuclear watchdog based on the European Atomic Energy Community (Euratom).[25] Both of the proposed organisations would have been multilateral in nature, encompassing China, Japan, Taiwan, both of the Koreas, the United States, Russia, Canada, and the ten members of ASEAN. The challenge for either of these organisations would have been to incorporate North Korea into the agreement and to balance the differing views on disposal of nuclear waste in the area. Such a body has not yet been established, and dialogue remains at the level of the numerous conferences on nuclear power which are held within the region.

Michael May disagrees with Calder over the ability of a regional nuclear agency to deal with the security issues raised.[26] May notes that the 'global nature of the nuclear connections of the East Asian countries' means that a global forum like the IAEA is more appropriate to address 'agreed goals of safety, security, transparency and accounting'.[27] The IAEA has played an important role in monitoring the activities of North Korean nuclear facilities and has provided a suitable neutral ground for United States-North Korean dialogue over nuclear power issues.[28] However, the recent nuclear accidents in Japan and South Korea have brought the IAEA's ability to monitor the nuclear situation within Asia into question.

Cooperative measures for the development, exploration and production of energy resources exist within Asia. The Korean Peninsula Energy Development Organisation (KEDO) is a multinationally sponsored organisation aimed at providing North Korea with a suitably safe and monitored nuclear power program.[29] This is the only example of multilateral cooperation concerning nuclear power development presently under way in Asia. The United States, South Korea, Japan, North Korea, and other countries such as New Zealand participate in the agreement. KEDO will build two nuclear reactors for North Korea by the year 2005 and supply heavy fuel oil for power

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[24] FBIS Daily Report, *ROK to Propose Establishment of Asia Nuclear Safety Body*, FBIS-EAS-97-301, October 28 1997.
[25] FBIS Daily Report, *Philippines, Japan: Asian Conference Hears Siazon Call for Nuclear Watchdog*, FBIS-EAS-97-095, May 16 1997.
[26] May, p.39.
[27] May, p.39.
[28] 'Kim Il Sung's Legal Loophole', *FEER*, July 7 1994, p.30.
[29] Ron Hagen, 'The Future of Nuclear Power in Asia', *Pacific and Asian Journal of Energy*, 8:1 (June 1998), p.17.

generation before the completion of the reactors.[30] KEDO demonstrates the role of energy issues in the wider move towards engagement with North Korea.

Bilateral energy arrangements are more common between Asian nations. China and Russia have developed formal prime ministerial level meetings to encourage cooperation on the peaceful use of nuclear power.[31] The cooperation ranges across scientific, technological, industrial and economic fields as well as the conversion of defence technology to civilian production.[32] Japan and Russia have established track-two dialogue on nuclear issues through holding joint conferences with a view to future cooperation.[33]

China and Japan have already cooperated on energy issues, including JNOC being allowed access to the Tarim basin to explore for oil.[34] Cooperation has also taken place between Japan and China concerning alternative fuels. Japan's experience in the use of solar technology has been instrumental in developing solar energy power stations in China's less developed areas, such as Tibet's capital Lhasa.[35] Due to the success of the initial project, Chinese local officials state that China and Japan will continue such cooperation.[36] Japan and Russia have attempted to work on supply and development agreements for Sakhalin gas, but have been slowed by territorial disputes between the two of them.[37] In Southeast Asia bilateral arrangements exist between ASEAN members including a number of agreements on trade in electricity between neighbours, as well as the supply of gas for electricity generation.[38] In 1998 Malaysia and Thailand agreed to share offshore natural gas produced in an area that both claim as their territory.[39] The challenge is to extend these bilateral and localised agreements to incorporate more members and span the whole region.[40]

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[30] Hagen, p.17.
[31] FBIS Daily Report, *China: Sino-Russian Nuclear Talks Held in Moscow*, FBIS-CHI-97-142, May 22 1997.
[32] FBIS Daily Report, *China: Sino-Russian Nuclear Talks Held in Moscow.*
[33] FBIS Daily Report, *Japan: Japan-Russia Fast Breeder Conference*, FBIS-EAS-98-077, March 18 1998.
[34] McDonald, p.18.
[35] FBIS Daily Report, *Japan Helping on Tibetan Solar-Energy Power Station*, FBIS-CHI-1999-0601, June 1 1999.
[36] FBIS Daily Report, *Japan Helping on Tibetan Solar-Energy Power Station.*
[37] Paik, *Gas and Oil*, pp.36ff.
[38] EIA, *Country Analysis Brief Indonesia.*
[39] World of Information, p.128.
[40] Paik, *Gas and Oil*, p.264.

Desmond Ball sees bilateral arrangements as 'building blocks' for later multilateral efforts.[41] The bilateral arrangements are an important way of developing trust and increasing transparency, and can be expanded to trilateral and multilateral arrangements.[42] Yukio Satoh has recognised this pattern in the development of KEDO.[43] Previous policy coordination between the United States, Japan and South Korea served 'as a catalyst for broader international cooperation aimed at preventing nuclear proliferation on the Korean Peninsula.'[44] Satoh goes on to state that KEDO itself could be a building block for multilateral Northeast Asian security dialogue.[45] Building block theory holds benefits for cooperative measures such as nuclear safety, regional pipeline infrastructure programs and the development of regional energy security coordination. Mark Valencia states that the 'web of bilateral government and non-government relations could eventually evolve through a loose multilateral network to a more formal multilateral organisation.'[46] In the case of resource development it would be unlikely that countries would want to multilateralise and thus spread the resources so thinly. However, the existence of successful bilateral cooperation on resource issues could well encourage other nations to undertake bilateral arrangements, generating more transparency and confidence building within the region.

A number of analysts mention that the environment has become the latest factor in the concept of energy security. Richard Scott argues that the environment has only been a factor in energy security since the late 1990s.[47] Robert Priddle states that the environment did not play a part in the 1970s concept of energy security, which focused only an oil supply emergency.[48] This is misleading. Environmental concerns existed as part of energy policy at the time of the first oil crisis, and were partly responsible for the move away from coal as the primary energy source by industrialised countries.[49] What is correct is that the environment has gained more prominence in other policy areas and

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[41] Desmond Ball, *Building Blocks for Regional Security: An Australian Perspective on Confidence and Security Building Measures (CSBMs) in the Asia/Pacific Region*, Canberra Papers on Strategy and Defence No.83, Canberra: ANU, 1991, pp.35ff.
[42] Ball, *Building Blocks for Regional Security*, p.37.
[43] Yukio Satoh, *Policy Coordination for Asia-Pacific Security and Stability*, Strategic and Defence Studies Centre Working Paper No.305, Canberra: ANU, November 1996, p.1.
[44] Satoh, p.1.
[45] Satoh, p.11.
[46] Valencia, 'Energy and Insecurity', p.104.
[47] Richard Scott, 'The International Energy Agency: Beyond the First 20 Years', *Journal of Energy and Natural Resources Law*, 13:4 (November 1995), pp.240-1.
[48] Priddle, *Energy Security: A Vital Concept, A Changing Definition.*
[49] Mason Willrich, *Energy and World Politics*, New York: Free Press, 1975, pp.141ff.

has thereby increasingly influenced energy security, and that the methods for dealing with the environmental problems have changed. Cooperation has begun to develop into a significant forum for the development of world wide environmental initiatives. These include United Nations conferences such as the Earth Summit in Rio de Janeiro in 1992, through to the Kyoto Agreement on the UN Framework Convention on Climate Change of 1997. The environment also plays an important role in track two arenas, such as the IEA's ministerial meetings or the various conferences held throughout the world and the Asia region.[50] A number of Asian nations participate in the international conferences concerning the environment, including China,[51] but there is a distinct lack of regionally focussed environmental cooperative groups dealing with issues such as the environmental consequences of hydroelectric dams, oil, nuclear power, and the burning of coal. These remain the domain of track two processes in the form of conferences and publications.

Regional Security Cooperation.

Regional security cooperation can encompass issues raised in Chapter Two such as sea lane security and the management of the region's maritime disputes. Scholars place a lot of emphasis on the maritime disputes prevalent within Asia and their effects upon stability within the region. The security of the Asian sea-lanes is another security preoccupation of governments. Regional naval capabilities are increasing as Asian nations seek to have some influence over maritime security. Some energy analysts see security cooperation as being able to negate tensions arising from maritime issues. Cooperation, however, has been elusive on these issues.

ASEAN is the principal multilateral arrangement within Asia that deals with security issues. There is debate over the completeness of ASEAN's security focus due to no external threat being recognised by the group and the lack of defence arrangements between them.[52] Michael Leifer identifies it as a form of 'collective internal security'.[53] The aim of the group is to reduce the likelihood of conflict between

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[50] FBIS Daily Report, *Advanced Economies Call for Asia's Support on Energy*, FBIS-EAS-1999-0525, May 25 1999.
[51] Chang-chin Chen, 'Beijing's Environmental Diplomacy', *Issues and Studies*, 33:10 (October 1997), p.73.
[52] Sheldon Simon, 'The Limits of Defense and Security Cooperation in Southeast Asia', *Journal of Asian and African Studies*, 33:1 (February 1998), p.63.
[53] Michael Leifer, *ASEAN and the Security of South-East Asia*, London: Routledge, 1989, p.3.

members by providing a framework within which to build a sense of community and consensus. Its overriding goal is to facilitate cordial relations amongst its members.[54] Dialogue is maintained with a number of countries that are of importance to association members through formal consultation channels. These have been institutionalised in the 'Post Ministerial Meetings' which occur immediately after ASEAN's annual meetings.[55] These meetings have been an important instrument in placing ASEAN in a wider context and developing interregional and international links.

The effectiveness of these meetings with regards to the implications of increasing energy demand is questionable. Michael May notes that China has participated in a number of ASEAN-supported workshops on the South China Sea problems but nothing constructive has emerged from any of them.[56] ASEAN has also taken into consideration the security of Asia's sea-lanes but has failed to generate an ASEAN-wide agreement.[57] In a cooperative effort separate from ASEAN and its branch agencies, Indonesia, Malaysia and Singapore issued a joint statement 1971 recognising the principle of innocent passage through the Straits of Malacca and Singapore even though they are not international straits.[58] Alice D. Ba notes that ASEAN has also failed to 'extract a firm commitment to cooperation from all claimants' concerning the region's maritime disputes.[59] With formal multilateral cooperation being unable to produce the answers, informal avenues will be the only way to reduce tensions.[60]

Gouxing puts forward the possibility that energy security could become part of a wider regional security dialogue such as the ASEAN Regional Forum (ARF), an important development from the ASEAN Post Ministerial Meetings.[61] ARF has a wide membership, including the United States, Japan and China. It focuses upon defence and security issues, though still 'dedicated to reassurance, not deterrence, and confidence building rather than confrontation.'[62] As such, it promotes building dialogue, transparency, trust and cooperation among members. An important part of ARF's structure is the non-official track two process known as the Council for Security

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[54] Simon, pp.64-5; FBIS Daily Report, *ASEAN Assessed, Trusting Relations With Beijing Stressed*, FBIS-CHI-97-077, January 13 1997.
[55] Norman D. Palmer, *The New Regionalism in the Asia and the Pacific*, Toronto: Lexington Books, 1991, p.72.
[56] May, p.39.
[57] May, p.39.
[58] Leifer, 'Security of Sealanes' p.131.
[59] Ba, p.167.
[60] Ba, p.167.
[61] Guoxing, p.292.
[62] Simon, p.71.

Cooperation in the Asia Pacific (CSCAP). Academics, government officials, defence personnel, business people, media, and other specialists all contribute to the analysis of issues under the guise of CSCAP.[63] More than twenty 'track-two' channels for multilateral dialogue now exist across Asia Pacific, with CSCAP being the most important for security concerns.[64] Track Two cooperative processes such as CSCAP have also recognised regional maritime cooperation as being vital to maintaining sea-lane security should the American presence decline but have failed to generate any binding agreements or institutions to deal with these issues.[65]

Criticisms have been levelled at the region's multilateral security institutions concerning their inability to constitute a 'solid regional architecture'.[66] References have been made to 'the ASEAN way' which is prevalent within the region.[67] This informal approach to multilateral dialogue emphasise confidence building measures rather than direct conflict resolution. Such attitudes have meant that regional institutions are relatively ineffective in dealing with some regional issues, with the financial crisis and the maritime territorial claims given as evidence.[68]

Michael Leifer noted that in the 1980s the security of Asian sea-lanes was secured through informal cooperation in the form of a network of interdependence between regional nations.[69] Despite these moves, steps to formalise the cooperation needed to maintain this security have failed mainly due to the numerous maritime disputes the region's countries are engaged in. Asian sea-lane security seems destined to remain dependent on an American naval presence and the ability of individual nations to project influence. The U.S. military presence within Asia is still significant despite recent withdrawals, and serves to maintain the defence links with Japan, South Korea and Taiwan. This vestige of the Cold War continues to play a large part in maintaining Asian maritime security.

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[63] Terence O'Brien, 'Track Two: Creating a Melting Pot', *New Zealand International Review*, 20:4 (July/August 1995), pp.10-12.
[64] Jorn Dosch, *PMC, ARF and CSCAP: Foundations for a Security Architecture in the Asia-Pacific?*, SDSC Working Paper 307, Canberra: ANU, June 1997, p.12.
[65] Ramses Amer, 'Towards a Declaration on "Navigational Rights" in the Sea-lanes of the Asia-Pacific', *Contemporary Southeast Asia*, 20:1 (April 1998), p.94.
[66] Simon, p.73.
[67] Busse, 'Constructivism and Southeast Asian Security', *Pacific Review*, 12:1 (1999), p.47.
[68] Michael Leifer, *The ASEAN Regional Forum*, Adelphi Paper 302, New York: Oxford University Press, 1996, pp.17-8; Gary Klintworth, 'Positive Strategic Developments in the Asia-Pacific Region', *Asia-Pacific Defence Review*, Annual Reference Edition, 25:1 (1999), p.12.
[69] Leifer, 'Security of Sealanes' p.140.

Economic Cooperation.

Economic cooperation can facilitate access to the investment that is required for Asian energy projects. Kent Calder, for example, identifies international assistance in the form of the funding of cooperative projects as being vital to the development and efficiency of the energy sectors of countries like China.[70]

Michael May views China's entry into the World Trade Organisation (WTO) as a key option in the United States' East Asia energy policy.[71] The World Trade Organisation (WTO) is a multilateral forum which focuses on economic liberalisation.[72] Its basis is that all nations will mutually benefit from such a liberal economic order of free trade and investment. According to May, linking China into the WTO will provide it with the necessary access to export markets whereby China could pay for energy fuels and technologies from export revenues.[73] The WTO has provided South Korea with the framework and mechanisms to begin the liberalisation of the oil refining, service station, and power generation sectors.[74] Encouragement for the liberalisation of the energy sector rather than funding energy projects is the aim of the WTO.

Yergin et al state that access to the global marketplace is vital if Asian countries are to finance their energy needs.[75] APEC is the leading international economic organisation in the region.[76] It brings together a number of regional powers such as the United States, China, Taiwan, Japan, ASEAN, Australia and New Zealand, in a multilateral framework of a scale not seen in the region before. APEC's agenda is firmly based on economic interdependence through economic and trade liberalisation. It utilises a series of working groups, committees, ministerial meetings and senior official's meetings (SOMs) to reach their aim of economic cooperation in what has been described as an 'ad hoc' fashion.[77]

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[70] Calder, 'Asia's Empty Tank', p.66.
[71] May, p.36. This has since been agreed on.
[72] Jensen and Miller, pp.151-2.
[73] May, p.36.
[74] 'The Government's New Energy Policy: An Interview with Assistant Minister for Energy Policy, MOTIE', *Business Korea*, 13:8 (August 1996), p.45.
[75] Yergin et al, 'Fuelling Asia's Recovery', p.50.
[76] Xavier Furtado, 'APEC: What is It? An Attempt to Demystify the Form and Function of the Asia Pacific Economic Cooperation Forum', Institute for Asian Research, <http://www.iar.ubc.cu/apecrin/furtado.html>.
[77] Furtado, Introduction.

However, there has never been any suggestion that funding for energy projects could be supplied by APEC. Whilst recognising energy as the driving force behind economic recovery and development, APEC sees the responsibility for gaining access to investment as being a matter for individual countries.[78] The best method for gaining access to the hundreds of billions of dollars needed for regional energy infrastructure is through building markets and the development of 'predictable, transparent institutional and regulatory framework to enhance the investment climate.'[79] According to APEC, energy investment is to come from the private sector, not through development agencies or as part of agreements between governments.[80]

The Asian Development Bank (ADB) is one of the oldest multilateral organisations in Asia, formed in 1965-6. Apart from North Korea, all Asian countries are involved in the Bank's operations along with fifteen extra-regional members, including the United States, Canada and European countries.[81] It has a number of development objectives, including economic growth, combating poverty, and protection of the environment.[82] Its comprehensive membership allows it to provide assistance to a number of regional nations. Whilst not overtly pushing for cooperative measures, the ADB still seeks to develop a sense of regionalism and community. It presently funds sixteen energy projects throughout the region.[83] These include power sector restructuring programs in Indonesia and the Philippines with loans of nearly US$700 million, funding of US$60 million for a wind power project in China's Xinjiang province, and US$30 million worth of loans for a gas sector development program in Bangladesh.[84]

The World Bank recognises the development of energy infrastructure as an important part of alleviating poverty and stimulating growth within a country.[85] The Bank sees itself as both an agent of change and a provider of finance through various instruments such as loans, credits, guarantees and advisory services.[86] The financing of

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[78] APEC Energy Ministers, *Energy: Driving Force for Economic Recovery and Development*, Japan, October 9-10 1998, <http://www.apecsec.org.sg/virtualib/minismtg/mtegewg98.html>.
[79] APEC Energy Ministers.
[80] APEC Energy Ministers.
[81] Palmer, p.149.
[82] Asian Development Bank website, <http://www.adb.org/About>.
[83] Asian Development Bank, *Energy Projects Profiles*, November 6 1999, <http://www.asiandevbank.org/work/Projects/Profiles/pp-loan.asp?cd=02>.
[84] ADB, *Energy Projects Profiles*.
[85] The World Bank, *Energy and Development. The Bank's Perspective*, 1999, <http://www.worldbank.org/html/fpd/energy/subenergy/bank_perspectives.htm#link4>.
[86] The World Bank, *Energy and Development. The Bank's Perspective*.

projects is seen as a last resort by the World Bank, preferring countries to consider options such as maximising private participation and the adoption of 'arms length regulation' by the government.[87] The Bank still funds a number of energy projects within the region. It has invested substantial amounts of money into electricity projects in China, Laos, Thailand and Vietnam.[88] Most of these projects involve developing power infrastructure to provide electricity to poorer areas and the improvement of generation efficiency.[89] In addition to these, the World Bank has also funded alternative energy development such as solar and wind power in north-west China.[90] The Bank also provides guarantees for foreign investors in a number of power projects throughout the region.[91] With its stated aim of supporting economic and social development, the World Bank is not of great value for the more developed countries within Asia who wish to undertake projects for energy security reasons like the development of Sakhalin gas reserves.

Regional Security Considerations.

Michael May describes the region as being entwined in a mixture of rivalry and cooperation.[92] Cooperation will take place on important issues but it will occur in the context of a struggle for influence and power within the region. The manoeuvrings for influence and power are far from settled as the region searches for a suitable international structure in the uncertainties of the post-Cold War world. As Michael Leifer points out, the prerequisite for a successful multilateral forum may well be the existence of a stable balance or other distribution of power in the region which would allow a forum to proceed in 'circumstances of some predictability'.[93]

In such an environment issues gain symbolism beyond their immediate appearance. Alice D. Ba's assessment of the prospects for joint development of the South China Sea seems to ignore this point.[94] The costs to China of the concessions that

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[87] The World Bank, *Energy and Development. The Bank's Perspective.*
[88] The World Bank, *Annual Report 1998. Project Summaries Electric Power and Other Energy*, 1998, <http://www.worldbank.org/html/extpb/annrep98/sum3.html>.
[89] The World Bank, *Annual Report 1998. Project Summaries.*
[90] The World Bank, *Annual Report 1999. Project Summaries Electric Power and Other Energy*, 1999, <http://www.worldbank.org/html/extpb/annrep/sum3.html>.
[91] The World Bank, *Completed Guarantee Operations in Power Sector*, July 25 1999, <http://www.worldbank.org/html/fpd/energy/subenergy/guarantees.html>.
[92] May, p.34.
[93] Leifer, *The ASEAN Regional Forum*, pp.57-8.
[94] Ba, pp.121-167.

it would have to make in order for joint development between governments to occur go beyond the territory disputes. China's play for influence in the area and its aspirations of regional power would be affected by any such moves. As Yergin et al note, Southeast Asian countries have not taken on cooperative measures with China over the Sea as such an action would 'constitute tacit acceptance of China's historically based claims to the region.'[95]

Existing political tensions within the region complicate the implementation of cooperative measures. North Korea's self-imposed exile has made it difficult to generate truly regional dialogues. Tensions with Japan, South Korea, the United States, and China in some areas has meant that the inclusion of North Korea in regional arrangements has been politically difficult and mostly impossible. This has energy implications when gas and oil pipeline plans traverse near to or indeed over North Korean territory. Détente between North Korea and other Asian nations will be required before such projects take place.[96] Relations between China and Taiwan also complicate cooperation. During the Gulf War China offered Taiwan cheap crude oil to make up for the disruptions but was refused due to Taiwanese policy of having no contact with Beijing.[97]

For cooperation to be feasible common goals and interests must exist between the parties involved. Yergin et al note that the security of energy flows through the South China Sea, the increased reliance upon the Middle East and the desire to develop regional energy reserves provide enough mutuality of interest to make cooperation feasible.[98] This is also true for economic cooperation, where the goals of economic growth and rising standards of living are shared amongst nations at varying stages of economic development. However, these commonalties often exist at a broad level, and at more detailed points the interests of nations may not be so compatible.

It is debatable whether Asia can be effectively regionalised. Palmer argues that the five characteristics of a region are geographical proximity, social and cultural homogeneity, shared political attitudes and behaviour, and political interdependence in the form of shared institutional membership and economic interdependence.[99] It cannot be said that within Asia there exists social and cultural homogeneity or shared political

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[95] Yergin et al, 'Fuelling Asia's Recovery', p.47.
[96] Valencia, 'Energy and Insecurity', p.87
[97] Paik, *Gas and Oil*, p.54.
[98] Yergin et al, 'Fuelling Asia's Recovery', pp.47-8.
[99] Palmer, p.7.

attitudes and behaviour, especially not to the level of western regions such as Europe or North America. The differences in levels of GDP per capita, the varying forms of political economy, and the broad mix of culture and religious beliefs deny cooperative measures within Asia the common base that many of them rely on to be effective. Desmond Ball states that '[t]he Asia/Pacific is too large and too disparate-in national capabilities, threat perceptions and security interests-to be addressed as a single entity.'[100] No nation has totally free trade policies and agreements such as GATT have had to make concessions on principles in order to achieve workability.[101] The concessions that would have to be made to accommodate the developing nations of Asia and their belief in state guidance may water these institutions down to the point of ineffectuality.

Multilateral cooperation can provide a number of benefits in dealing with the implications of rising energy demand. Regional nuclear cooperation is the most likely to be implemented. The IAEA already encompasses Asian countries with diverse economic and social situations, from Myanmar through to Japan and South Korea.[102] This ability to develop a common interest amongst a diverse range of countries means that cooperation on nuclear issues has an advantage. Other energy security cooperation will be hampered by the diversity of national interests within the region. Economic agencies such as the ADB and World Bank will remain important for the development of energy projects throughout the region, although it is unlikely that regional participation in other economic cooperation institutions such as APEC and the WTO will be driven by energy and security concerns. This participation will take place as part of the wider move for economic prosperity. Regional security cooperation holds the most promise for dealing with the challenges of increasing energy demand. Existing frameworks such as ASEAN and ARF could effectively generate dialogue and cooperation over maritime issues. Unfortunately, security cooperation is hampered by the region's diversity and the uncertain strategic environment.

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[100] Ball, *Building Blocks for Regional Security*, p.27.
[101] Gilpin, pp.190-1.
[102] IAEA, *Member States of the IAEA*.

Conclusion.

Energy is the basis of modern post-industrial society and has implications for national, regional, and international security. Access to sufficient amounts of energy resources has been a key element in the economic well-being of countries since the industrial revolution. Winston Churchill's decision to power the Royal Navy with oil rather than coal linked the military security of a nation to the question of energy supply security. Half a century later, two oil crises emphasised the impact that energy issues can have upon the economic security of modern countries, and propelled the concept of energy security to the forefront of national policy.

Energy will retain the ability to impact upon security well into the twenty first century. The Middle East remains home to the majority of the world's hydrocarbon reserves and remains one of the world's most unstable regions. Environmental issues, linked in a number of ways to the production and consumption of energy, have gained prominence on an international scale. As more nations aspire to OECD standards of development and modernisation, world energy markets will tighten as more countries compete for supply. The security of energy transport, whether by pipeline or by tanker, becomes more complicated as the number of participants increases and as the market becomes more globalised.

Nowhere is this more applicable than in Asia. Japan, acutely deficient in energy resources and thus dependant on imported energy, has always been aware of energy and security issues since industrialisation. Economic growth throughout the region means that these issues will become of concern to other Asian nations. Asia will recover from the financial crisis of 1997/98, and will resume its push for higher living standards and further modernisation. With economic growth will come increased demand for energy at varying degrees. South Korea, with energy intensive industries and a growing transport sector, faces the prospect of having to meet the increasing energy demand with either hydrocarbon imports or nuclear power generation. China, although it has been relatively successful at decoupling energy demand growth from economic growth, will soon be the world's largest consumer of energy. Japan's high level of development means that it will not experience a large jump in energy demand, but will face the problem of finding enough energy within an increasingly crowded market.

Asia does not possess the energy reserves required to meet the rise in energy demand. 'Increased energy consumption will inevitably clash with the limited regional

supplies, particularly of oil.'[1] Oil imports into the region will increase even as countries work to reduce oil's share of total energy consumed. China has recently become a net importer of oil and Malaysia will follow as economic growth returns. Indonesia, the only Asian member of OPEC, faces declining production. Gas will become an important substitute for oil in areas such as power generation and urban heating, and nuclear power will be increasingly utilised to supply the region's growing demand for electricity. The growth in use of coal, driven by China's utilisation of its huge reserves, will be second only to that of electricity within the region. Even North Korea and its policy of energy self-sufficiency will face the need to import energy as reserves of coal, nuclear power and hydroelectricity fall short of being able to supply the increasing demand.

The scope of the energy problem facing Asia encompasses a wide range of security concerns. As Kent Calder notes, 'Asia's emerging energy problems cut subtly across the conventional boundary between economics and security.'[2] Supplying the increase in energy demand will generate questions not only in terms of development strategies and macroeconomic policies, but also for international relations within the region and raise implications for regional security. Security of sea lanes of communication will become even more important as increased amounts of energy is transported through areas such as the South China Sea and the Malacca or Lombok Straits. Geopolitical concerns will also become prominent as the need to import hydrocarbon resources draws Asian countries into greater contact with the Middle East and the Former Soviet Union.

Environmental issues have hampered the development of hydroelectric projects and have necessitated participation by Asian countries in global forums on issues such as carbon emissions. Oil spills and the transport and disposal of nuclear waste add to the list of environmental issues raised. The building of hydroelectric dams along trans-national rivers such as the Mekong has caused tension among countries for whom the river is of economical importance. Even gas, the preferred fuel of choice for the future, presents problems for security. The development of trans-national pipelines will require cooperation between countries that presently have little contact. Natural gas development plans have the possibility of becoming part of wider political tensions and introduce the prospect of regional competition for investment funds.

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[1] Yergin et al, 'Fuelling Asia's Recovery', p.36.
[2] Calder, 'Asia's Empty Tank', p.55.

Three methods are currently being utilised by Asian nations to deal with the challenges of increased energy demand; government measures, market mechanisms, and multilateral cooperative efforts between governments. The three solutions are being utilised to different degrees by Asian countries.

Government intervention in the energy sector is driven primarily by the concern that the alternatives do not take into consideration national interests such as energy security and social factors. The government is able to influence a wide range of issues through a number of mechanisms. Energy policy initiatives can effectively promote energy security issues such as efficiency and conservation whilst diplomatic, political and military avenues can influence wider security issues. Government control of energy companies, however, often leads to economic inefficiencies and an industry that finds it hard to attract investment.

Few Asian nations now maintain total state dominance over the energy sector, but as Yergin et al note, '[t]he temptation toward government control over resources remains strong.'[3] Throughout Asia the government is adjusting to a role of regulator rather than controller. Market forces are being allowed to operate as far as they serve national interests and goals. Asian governments understand the benefits that the market can have for energy and security but also recognise that a number of the challenges faced can only be dealt with through government measures. The government remains the provider of supply security in Asia, as well as the developer of energy security and environmental regulations beyond what the market can provide. Issues such as closer relations with the Middle East and Former Soviet Union or regional maritime issues cannot be reduced to simple economic transactions. For Asian countries energy markets will remain politicised.

Market mechanisms are increasingly being utilised within the energy sector in Asia. Competition can be introduced through liberalisation of the energy sector resulting in efficiency benefits and an increased ability to attract foreign investment. Pricing domestic energy at the international market rate can also result in efficiency and conservation gains, especially for those countries whose domestic prices are well below the international price. Relying on the market to supply energy is seen as a way to depoliticise the matter of energy security. Reducing energy transactions to the forces of supply and demand and to the workings of financial markets could remove international

[3] Yergin et al, 'Fuelling Asia's Recovery', p.49.

tensions over the supply of energy. From the evidence, however, it must be concluded that the market is being used primarily as a way to provide the region with energy infrastructure and technology rather than as an answer to the energy and security challenge. Governments cannot afford the investment and recognise that the market is the quickest and most efficient way to develop capacity, thus avoiding the economic damage from shortfalls in supply of energy resources such as electricity. Energy and security concerns do benefit from market mechanisms but are not the driving force behind the move towards the market within Asia.

Multilateral cooperation between Asian governments could produce positive results across the whole range of problems. By working on issues of common interest mutual benefits can be achieved in terms of energy cooperation, especially for nuclear safety, energy security policy coordination, and regional security issues such as sea lane security and maritime territorial disputes. Adherence to the norms, rules and regulations of international bodies such as the WTO can give Asian countries access to resources and funds that could be utilised for energy infrastructure and resource development. Calls for a nuclear safety body have already emerged from within the region and will become more prominent as nuclear power generation gains a greater share of Asia's total energy supply. A regional environmental body is also needed as a complement to the international agencies already being utilised by Asian countries.

Whilst a number of authors look towards the formation of an Asian energy forum or Asian IEA, Asian countries have been slow to move towards such an idea. Despite the wide range of benefits, extensive multilateral cooperation on energy and security issues has not developed. Asia's diversity and disparity has made cooperation difficult. As Valencia notes, Asia is 'a region whose...disputes have never been enhanced by multilateral cooperation and where security has always been defined by military might.'[4] The adoption of multilateral cooperation is thus less noticeable than government or market mechanisms but will become a necessity in the future if regional energy security is desired.

The concept of energy security for Asian nations has not changed as drastically a some scholars would have it. Mechanisms for dealing with the first energy crises are still being utilised within Asia. Liberalisation is the only new addition to the concept of energy security in Asia and this is being utilised to facilitate investment rather than

[4] Valencia, 'Energy and Insecurity', p.102.

energy security. Globalisation and the increased modernisation of Asian nations have meant that the market has become a more prominent factor in energy security. This is noticeable in the number of foreign firms now operating throughout the Asian energy sector. Government measures are still important in ensuring energy security. However, Asian governments are now assuming a stance more in line with the American government's move to greater reliance on market factors after the first energy crises. Whilst the means of achieving energy security have shifted slightly, energy security still remains focussed on the secure supply of energy and the protection of the economy from possible shocks and disruptions of this supply.

As long as energy markets and the issue of energy security remains politicised there needs to be a realisation by Asian governments that energy issues can affect a wide range of security and strategy issues. Responses to the challenges need to be included in a number of government policy initiatives. Energy security measures cannot effectively cover the wide range of challenges. Reducing consumption through conservation and efficiency may reduce the degree of dependence but will not remove maritime, geopolitical and environmental challenges and issues. Other energy security measures such as stockpiling and policy coordination will lessen the effects of a price shock upon an economy but will not take away the need to assure the stability of energy markets. What is needed is the understanding within other policy areas of just how energy issues can effect them, and what can be done to deal with the challenges not only through energy policy but also in terms of foreign, environmental and economic policy.

Additional study could help this understanding. Publication of Asian countries' energy policies in a transparent and clear manner would aid analysts in assessing the challenges and how they are being dealt with. Presently the IEA provides this service for South Korea and Japan, but extending it other Asian nations would enable greater depth in other studies. Whilst a lot of emphasis has been placed on the benefits of liberalisation, there are few studies available on the way that governments can adjust to this change, and none focus on Asia. Further study into how other areas of government policy can effectively deal with facets of the energy and security challenge facing Asia would also be of great value. Finally, an expansion of Keun Wook Paik's *Gas and Oil in Northeast Asia: Policies, Projects and Prospects* to include all of Asia and focus on the change in geopolitical relations as a result of the increased usage of natural gas would be an important study of an emerging trend.

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