Managing Regional Energy Vulnerabilities in East Asia

This book examines East Asia's inter-state collaborative energy projects to address energy vulnerability. It focuses on projects that have demonstrated effectiveness in addressing vulnerabilities faced by the ten states of the Association of Southeast Asian Nations and China, Japan, and South Korea in north-east Asia.

The book includes case studies on uncertainties in external sources of oil and gas supply, maritime piracy, continuation of energy poverty, and geographical barriers to cross-border electricity interconnection, while expert contributors highlight how collaborative energy projects have been more successful than the traditional state rivalry in energy-related issues. It develops the framework of energy vulnerability, avoiding the usual securitization approaches and instead examining non-traditional security conceptualizations, in studying energy policies to examine how issue-specific cooperation efforts between states arise and develop. Using East Asia as a starting point, contributors introduce a framework that advances the study of international energy cooperation.

Managing Regional Energy Vulnerabilities in East Asia will be of interest to students and scholars of Asian studies, sociology, development studies, international political economy – particularly the political economy of East Asia – energy and development studies, regional and global governance of energy, and environmental economics.

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Contents

Figures

Tables

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The project was first conceived in the summer of 2009, followed by a few months of consultation about specific topics and the search for participants. The formal project inception took place in June 2010, when invited authors presented their first drafts and received comments and suggestions from fellow paper writers and a larger group of experts. The papers were then revised, and another round of review and commentary was undertaken at a follow-up workshop in December 2010. The versions presented here contain updates thereafter.

From the very beginning, the organizers of the research project have been committed to making a contribution to International Studies analyses on the complex topic of energy and security in East Asia through coming to better grips with the dynamics on the ground. This approach is necessary because, more often than not, at least in the English language literature, the search for energy resources is seen as a driving force of insecurity, both between states in the region and on the global scene.

Uncertainty and competition, whether or not geostrategically inspired, are a fact of life. For international security studies analyses to make a positive contribution to sustaining the no-war momentum in the region, it is beneficial to take stock of how practitioners are managing the various dimensions of vulnerability that come from the aggregate shortage of supply from within the region and how they are minimizing the environmental and human consequences that come along with the use of fossil energy. Description is valuable – small case studies can help fill up blind spots behind theory-driven scholarship. The title of the research project, Managing Regional Energy Vulnerabilities in East Asia, which is also that of the book, grew out of this line of thinking.

I am first and foremost thankful to each contributing writer. For the overwhelming majority of them, writing for the sake of informing those of us in International Studies is beyond their daily routine. I am convinced that their

contributions will go a long way towards refining scholarly analyses of energy security in East Asia and beyond.

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dedication to professionalism are essential to the final quality of the work. Alexander Quayle and Heidi Bagtazo did every bit of the editing with good care.

My mother would most certainly reward me with an approving smile upon seeing a copy of the book, although she was never lucky enough to learn to read and write, even in Chinese, had she survived her struggle with years of illness a couple of months ago. Dawen is just beginning to recognize a few words and phrases in English, and his mother's full-time care of him (and me) played no small part in making this book possible. This book is dedicated to them.

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Abbreviations

ACE:	ASEAN Centre for Energy
ADB:	Asian Development Bank
ADBI:	Asian Development Bank Institute
ADNOC:	Abu Dhabi National Oil Company
AFOC:	ASEAN Forum on Coal
AG:	Arab Gulf
AGHAM:	Advocates of Science and Technology for the People
AIF:	Asian Infrastructure Fund
AIMS:	ASEAN Interconnection Master Plan Study
AL:	Arab Light
AMEM:	ASEAN Ministers on Energy Meeting
AMEM+3:	ASEAN Plus Three Ministers on Energy Meeting
AP:	advanced planning
APEC:	Asia-Pacific Economic Cooperation
APERC:	Asia Pacific Energy Research Centre
API:	American Petroleum Institute
API:	measurement of a crude oil's specific gravity, devised by the American Petroleum Institute
APP:	Asia-Pacific Partnership on Clean Development and Climate
APT:	ASEAN Plus Three
ASCI:	Argus Sour Crude Index
ASCOPE:	ASEAN Council on Petroleum
ASEAN:	Association of Southeast Asian Nations
ASEAN+6:	Association of Southeast Asian Nations Plus Six
ASF:	Asian Shipowners' Forum
BAKORKAMLA:	the Badan Koordinasi Keamanan Laut Republik Indonesia, the Indonesian Maritime Security Coordinating Board
BASARNAS	Badan SAR (search and rescue) Nasional, Indonesia's national search-and-rescue agency
BAU:	business as usual
bbl:	barrel

b/d:	barrels per day
bpd:	barrels per day
B/L:	bill of lading
BIMCO:	Baltic and International Maritime Council
BMP:	Best Management Practices
BNPP:	Bataan Nuclear Power Plant
BOT:	Build—Operate—Transfer
BTC:	Baku–Tbilisi–Ceyhan oil pipeline
BWave:	Brent Weighted Average
C2:	Command and Control Centre
CAT	1–3: Category 1–3 (seriousness of incident)
CCGT:	combined cycle gas turbine
CCS:	carbon capture and storage
CCT:	clean coal technology
CDM:	Clean Development Mechanism
CNIS:	China National Institute of Standardization
CO_2:	carbon dioxide
COP:	Conference of the Parties
CORE:	Council on Renewable Energy in the Mekong Region
CSO:	civil society organization
DCoC:	Djibouti Code of Conduct
DME:	Dubai Mercantile Exchange
DOJ:	Department of Justice
DPJ:	Democratic Party of Japan
EAC:	East Asian Community
EAI:	East Asian Institute
EAS:	East Asia Summit
EASG:	East Asia Study Group
EBRD:	European Bank for Reconstruction and Development
EE:	energy exchange
EEC:	energy efficiency and conservation
EIA:	Energy Information Administration
EITI:	Extractive Industries Transparency Initiative
EPF:	Subregional Electric Power Forum
ERC:	Energy Regulatory Commission
ERI:	Energy Research Institute, NDRC, China
ERIA:	Economic Research Institute for ASEAN and East Asia
ESCO:	energy service company
ESPO:	Eastern Siberia–Pacific Ocean (pipeline)
ETS:	Emissions Trading System
EUR:	Europe
FDI:	foreign direct investment
FE:	Far East
FOB:	free on board
FSU:	Former Soviet Union

GDP:	gross domestic product
GHG:	greenhouse gas
GMS:	Greater Mekong Subregion
GPW:	gross product worth
Gt:	gigaton
$GtCO_2$:	gigaton carbon dioxide
$GtCO_2e$:	gigaton of carbon dioxide equivalent
GUEU:	Georgia–Ukraine–European Union
gWh:	gigawatt hours
HAPUA:	Heads of ASEAN Power Utilities/Authorities
HVAC:	high-voltage alternating current
IAEA:	International Atomic Energy Agency
ICE:	Intercontinental Exchange
ICS:	International Chamber of Shipping
IEA:	International Energy Agency
IEEJ:	Institute of Energy Economics, Japan
IFC:	International Finance Corporation
IFN:	Information Network System
IGA:	Inter-Governmental Agreement on Regional Power Trade in the GMS
IIRSA:	Initiative for the Integration of the Regional Infrastructure of South America
IMO:	International Maritime Organization
IPI:	Iran–Pakistan–India gas pipeline
IPP:	independent power producers
ISC:	ReCAAP Information Sharing Centre
ISIS:	ASEAN Institute of Strategic and International Studies
ISIS:	Malaysia Institute of Strategic and International Studies
JASE-World:	Japanese Business Alliance for Smart Energy Worldwide
JBF:	Japan Business Federation, or Keidanren
JBIC:	Japan Bank for International Cooperation
JCC:	Japan Customs-cleared Crude
JI:	Joint Implementation
JICA:	Japan International Cooperation Agency
JODI:	Joint Oil Data Initiative
JOGMEC:	Japan Oil, Gas and Metals National Corporation
Kcal:	kilocalorie
KEEI:	Korea Energy Economics Institute
KISEAS:	Korean Institute of Southeast Asian Studies
kl:	kilolitre(s)
kV:	kilovolt(s)
kWh:	kilowatt hour(s)
LA:	Latin and Central America
LDP:	Liberal Democratic Party
LNG:	liquefied natural gas

MARISX:	Maritime Information-sharing Exercise
MERALCO:	Manila Electric Company
METI:	Ministry of Economy, Trade and Industry, Japan
MISIS:	Myanmar Institute of Strategic and International Studies
mmbd:	million barrels per day
MMEA:	Malaysian Maritime Enforcement Agency
MMtoe:	million tonne oil equivalent
MoU:	memorandum of understanding
MRCC:	Maritime Rescue Coordination Centre
MSC: IMO	Maritime Safety Committee
MSTF-IFC:	Maritime Security Task Force – Information Fusion Centre
MTPA:	million ton(s) per annum
MW:	megawatt(s)
NAFTA:	North American Free Trade Agreement
NAPOCOR:	National Power Corporation
NAVTEX:	Navigational Telex
NDRC:	National Development and Reform Commission, China
NEAT:	Network of East Asian Think-tanks
NEDO:	New Energy and Industrial Technology Development Organization
NGO:	non-governmental organization
nm:	nautical miles
NO_x:	nitrogen oxide
NPV:	net present value
NRE:	new and renewable energies
NREB:	National Renewable Energy Board
NT2:	Nam Theun 2
NYMEX:	New York Mercantile Exchange
OECD:	Organisation for Economic Co-operation and Development
OPEC:	Organization of the Petroleum Exporting Countries
OSP:	official selling price
PAIF:	Pan-Asian Infrastructure Forum
PCG:	Philippine Coast Guard
PDR:	(Lao) People's Democratic Republic
PECC:	Pacific Economic Cooperation Council
PHP:	Philippine peso
PIW:	*Petroleum Intelligence Weekly*
POCC:	Singapore Port Operations Control Centre
PP:	power purchase
PRC:	People's Republic of China
PSALM:	Power Sector Assets and Liabilities Management
R&D:	research and development
RCC:	Rescue Coordination Centre

RE:	renewable energy
ReCAAP:	Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia
RMN:	Royal Malaysian Navy
RPTCC:	Regional Power Trade Coordinating Committee
RSIS:	S. Rajaratnam School of International Studies
RSN:	Republic of Singapore Navy
SCORE:	Sarawak Corridor of Renewable Energy
SO_2:	sulphur dioxide
SOME:	Senior Officials Meeting on Energy
SOME+3:	ASEAN Plus Three Senior Officials' Meeting on Energy
SOME+3 EPGG:	ASEAN Plus Three Senior Officials' Meeting on Energy, Energy Policy Governing Group (SOME+3 EPGG)
SOP:	Standard Operating Procedure
SO_x:	sulfur oxide
sq m:	square metre(s)
sq km:	kilometre(s)
SSAS:	Ship Security Alert System
TAGP:	Trans-ASEAN Gas Pipeline
TAPI:	Turkmenistan–Afghanistan–Pakistan–India
Tcf:	trillion cubic feet
toe:	ton(s) of oil equivalent
TRP:	Top Runner Programme
TWh:	terawatt-hour(s)
UAE:	United Arab Emirates
UC:	under construction
UNCLOS:	United Nations Convention on the Law of the Sea
UNESCAP:	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC:	United Nations Framework Convention on Climate Change
USC:	ultra-supercritical
USGC:	US Gulf Coast
WAF:	West Africa
WE:	Western Europe
WG:	Network of East Asian Think-Tanks Working Group on Energy Security Cooperation
WTI:	West Texas Intermediate
WWF:	World Wildlife Fund for Nature

1 Introduction

Zha Daojiong

In East Asia, as in the rest of the world, the pursuit of adequate energy resources to meet demand for consumption at the household and aggregate national levels has been a practical concern for over a century. A general view is that the region has been remarkably successful at tackling its need for energy, the shortage of which could have placed a ceiling on the region's development. The region's sustained economic growth through industrialization and urbanization, starting from a low base at the end of the Second World War, stands testimony to this. Asia's growth would not have been possible without technological advances in the cultivation, exploration, and utilization of various forms of energy; and energy trade among states within the region and beyond played no small part in meeting the region's consumption needs.

The East Asian region has also witnessed decades of sustained inter-state peace. It is true that the region continues to be troubled by a host of territorial disputes – both maritime and land. It is also true that disagreements over the legitimate ownership of energy deposits are a powerful factor behind the inability to resolve such disputes. Nevertheless, there has been no outbreak of inter-state war over a known deposit of hydrocarbon resources since the Second World War. The term 'energy war' is by and large metaphorical and functions (rightfully so) as a warning against its becoming a reality.

Nonetheless, in the field of East Asian international studies, energy has become increasingly securitized. There is no dearth of literature on the issue. Predictions abound of energy being a cause of deeper diplomatic unease or outright inter-state conflict. Such a state of affairs is, in part, a result of the search by the international security studies community for conceptual frameworks. Calls to redefine security began to flourish upon the end of the Cold War. Yet, the 'debate about prospects for inter-state war in Asia [which] has dominated the field of Asian security studies … has undergone remarkably little change since the end of the Cold War' (Hamilton-Hart 2009: 53). Traditional concerns continue to dominate the discourse:

> [The debate] remains concerned with what the distribution of power in the region is and what it means for war and peace; and with what

> regional institutions and diplomatic practices mitigate the role of relative power balances and alliance structures.
>
> (Hamilton-Hart 2009: 53)

Justifications for the conceptual and analytical energy-conflict nexus proceed from considerations of the global implications of geographical concentrations of known hydrocarbon resources. The fact that supplies of oil are concentrated in relatively few countries speaks volumes. Four of the five countries that hold more than 60 per cent of the world's proven oil reserves are in the Middle East (Saudi Arabia, Iran, Iraq, and Kuwait), with each having its own set of deep structural challenges when it comes to maintaining domestic stability and managing complex inter-state relationships. China is the only East Asian country among the top 20 countries with proven oil reserves (together these countries hold 95 per cent of the total proven oil reserves). It was a net oil exporter for two decades – until the 1990s – but is not expected to return to that status. The central question then arises: how should East Asian countries deal with the increasing competition among themselves for energy, the supply of which comes from just a few major sources, namely, the Middle East and, increasingly, Africa and Central Asia?

In the early 1990s, East Asia acquired added significance in the global energy equation; the region as a whole entered the heart of the drama of energy consumption, joining the USA and Western Europe which had up to that point been the central actors. Such a change conceptually changes the rules of the game. The USA went from leading the Western Pacific on energy – meeting the energy supply of its security allies and partners in the region and developing the energy industry of countries such as China which are outside its security alliance – to head-on competition for oil from the world's largest source, the Middle East (Salameh 2003).

Much of the energy security studies literature begins with conventional concerns over the geopolitical dynamics that cross-border movements of energy may trigger. The underlying logic is rather straightforward. Sufficient energy to power a country's economic growth, which in turn is required for sustaining military might and expansion, gives a potential geopolitical adversary a greater opportunity to be a formidable challenger. At some risk of simplification, the mainstream international security studies community makes a differentiation between the types of nation-states that access the same physical supply of oil and other forms of energy. Those states that are conceptualized as status quo ones within the current regional security structure are seen as benign. By contrast, those states viewed as potential challengers are subject to scrutiny over the geopolitical motivations behind their efforts to secure external energy supplies.

A case in point is the treatment of China in mainstream studies on the energy-security nexus on the regional and international scene. As the Cold War political structure was taking shape, China became an explicit object of

the US-led hub-and-spoke security order in the Western Pacific. Industry-level contacts between China and its neighbours were lost.

As the geostrategic competition between the USA and China began to subside, there arose growing research interest in making access to China's newly discovered oil and other forms of hydrocarbon resources possible (Ma 1980). In 1973, the first shipload of crude oil from China arrived on Japanese shores. China also sold crude oil and oil products, at 'friendship prices', to Thailand and the Philippines, both members of the US-led regional security structure. There was even a short-lived expectation for China to become the Saudi Arabia of the Western Pacific (Barnett 1981).

Against the background of continuing uncertainties in the world's oil markets after the Arab oil embargo of 1973, such developments should have been welcomed as contributions to development and peace in the region. However, the authors in the US-based journal *Foreign Policy* opined that 'We should welcome China's oil but recognize that, for us, enormous quantities of it may be a mixed blessing' (Park and Cohen 1975: 49). Also, with world crude oil prices dropping in the latter half of the 1990s to a level low enough to affect investment in the oil industry and thus the sustainability of production levels, the growing Chinese demand for oil ought to have been viewed with relief by the global oil industry. However, within a geopolitics-driven mode of understanding, the China factor is not seen as a positive for energy security. According to that perspective, it is not consumption per se, but *what type of country's* consumption, that truly matters.

A significant limitation of geopolitics-driven studies of energy dynamics in East Asia is that it fails to take into consideration one important dimension of the global oil and energy market. Oil crosses nation-state boundaries in two forms: physical barrels of crude and refined products; and those unseen barrels embedded in manufactured goods. In a sense, non-oil commodity trade involves the trade of oil as well, except that the directions of flows are more difficult to track and scholars often have to rely on mathematical models. One such model puts forward this estimate:

> In 2000, global trade in manufacturing goods accounted for 2.9 million barrels of oil per day, compared to 33.2 million barrels of oil per day traded directly. This calculation of oil used in industry includes oil used as a direct input in manufacturing processes. It does not account for indirect oil used, for example, by labour.
>
> (Wagner 2010: 7711)

The extent of energy embedded in products traded between nation-states is beyond the scope of consideration here. For international security studies, suffice it to point out that an awareness that energy is used in non-energy products alerts us that we need to take into consideration other reference points such as the degree to which states can affect each other's policies and practices in the area of energy utilization. One such observation is that, due

to international trade, a country's energy consumption takes place beyond its own boundaries as well. In a similar fashion, trade in non-energy products amounts to a spreading of the various costs of securing energy supply (which could include technological and monetary inputs).

Still another key point to note is that states do have the option of ameliorating increasing energy demand through promoting efficiency in energy use among all trading partners. The logic is simple. The expansion of demand in one country is what drives competition, real or perceived, for access to the same available sources of supply in the first place. As a matter of fact, patterns of intra-industry trade are well established in East Asia and gaining importance across the region (Sawyer et al. 2010; Fukao et al. 2003). These trends are indicative of increasing levels of cross-national harmonization of manufacturing standards, which is in turn conducive to the adoption of equipment and industrial processes and practices compatible with the goal of reducing the intensity of energy consumption. Multinational manufacturing corporations are important and necessary agents in moving those products between nation-states, often through vertical integration strategies that keep companies rather than governments in the driver's seat. Although international studies scholarship tends to take the nation-state as the unit of analysis, what is important to note is that an exclusive focus on state–state competition for access to oil in particular, and energy in general, can easily result in fallacious assessments about a country's or region's level of (in)security.

In short, the movement of energy across nation-state boundaries is a multifaceted web of phenomena, defying neat simplification. When assessing a nation-state's (in)security – whether in terms of questions of access to the hydrocarbon resources available or in broader terms that taken into account calculations of the overall economic power of countries active in the world energy equation – international security studies that adopt energy as a referent point need to adequately reflect the complexities rather than rely on simplistic assessments.

Based on such observations, the current study introduces the notion of energy vulnerability as an organizing theme for viewing East Asia's energy dynamics. Before we move on to highlight the areas of those vulnerabilities, a general view of regional energy cooperation is in order.

Region-wide energy cooperation in East Asia

A commonsensical observation to make is that the energy issues facing countries in East Asia are not parochial. Countries in this region are directly affected by many of the same issues facing the rest of the world. Meanwhile, countries in the region differ wildly in terms of energy endowments and levels of industrialization. Regardless of a particular country's stage of development, it is a government policy imperative to continuously search for energy supply both from within and without a country. So it is necessary to expand the scope of business opportunities and the potential for energy and energy-

related development. Last but not least, it should be noted that in East Asia there is no regional policy structure for handling world energy trade dynamics.

For East Asia, the three decades following the Second World War saw state-to-state economic (and, of course, energy) cooperation following the divisive lines of West-versus-East trade, defence ties, and political ideologies. The establishment of the Association of Southeast Asian Nations (ASEAN) in 1967 did usher in government-led cooperation in economic affairs in the Southeast Asian region. However, ASEAN, either collectively or through its individual member states, was not in a position to influence the slow course of regional energy cooperation for the entire East Asian region. China did reach out to Japan and a number of Southeast Asian markets through trade in coal and oil, but the scale was limited. China's efforts to explore oil and gas in the continental shelf areas were accompanied by disputes over territorial rights (Woodard 1980). It was only with post-war Japan's return to energy development and with the other broader economic trends emerging in Southeast Asia that the conditions emerged for the weaving of trade ties between ASEAN member states and Japan, and among the Southeast Asian economies (Zha and Hu 2006).

A meaningful attempt at creating a regional platform for fostering economic cooperation is the Pacific Basin Economic Council, launched in 1967. The grouping was merged into the Pacific Economic Cooperation Council (PECC) in 1980. A key rationale in establishing the PECC – a network of country committees (as opposed to sovereign representation) and institutions – was to bring to the same forum the interests of the USA, China, Hong Kong and Taiwan. With the signing of a friendship treaty between Beijing and Tokyo in 1979, Japan worked hard to make the creation of the PECC possible (Okita 1979).

The PECC launched a Minerals and Energy Forum in 1986. This was arguably the earliest multilateral forum to specifically address energy issues in East Asia. In the same year, China joined the grouping, as did the Soviet Union (as an observer). PECC discussions were structured to be unofficial and non-binding. Still, with China and the Soviet Union, the two countries in the region with the geological endowments to supply oil and coal to the rest of the region, both on board, one might expect that coordinated official initiatives on energy policy might emerge. However, from the start, the PECC process was too unofficial and exploratory to have much influence over government policies. According to one anecdote, in the process of negotiating China's participation, a Chinese diplomat suggested that the PECC adopt the practice of the World Energy Conference in recognizing 'Taiwan' as the official name for that territory's representation. In other words, there seemed to be some space among PECC participants from China to see energy as less sovereignty-sensitive (Woods 1990: 215), which seems to underline the unofficial tone of the country's representation. With the PECC proving to be

ineffective, geostrategic opportunities in the region opened up for the creation of the Asia-Pacific Economic Cooperation (APEC) forum in 1989.

At this juncture, it would be relevant to mention that, in the mid-1980s, the USA – an economy unrivalled in energy endowment, cross-Pacific energy trade, and equipment and business models for energy industry development in the East Asian countries – had its own package of energy policies. The USA supplied Japan with oil and coal, worked with China to increase oil output from the latter, and helped American energy companies explore Southeast Asian energy markets (Mares 1986). The US government provided funding to support the East-West Center in Honolulu, Hawaii, to systematically track energy market developments in the entire Pacific region. For many years, the East-West Center functioned as the knowledge powerhouse for the region's energy scene. While the solid chronicling of the PECC is difficult to undertake, the preceding observations on the stand-alone US energy policy of the time ought to in some way validate general observations about national preferences taking precedence in institutions designed to foster trans-governmental policy coordination.

APEC was the first government-level institution devoted to promoting cooperation in the Asia-Pacific region. It was an improvement on the PECC concept in that it envisioned participating governments translating consensus into action. Nevertheless, it was still based on an incremental and non-binding approach. In the initial Canberra Declaration in 1989, a number of small-scale and specific projects were listed as agenda items. All were issues that member governments would have had difficulty choosing not to address: investment, technology transfer, human resource development, collaborative research, energy, resources, fisheries, the environment, and tourism. The rationale was that concrete achievements on those projects would pave the way for higher-level, region-wide policy coordination.

An APEC Energy Working Group was launched in 1990. The Group's work is substantiated by four expert groups (clean fossil energy, efficiency and conservation, energy data and analysis, and new and renewable energy technologies) and two task forces (biofuels, and energy trade and investment). Clearly the focus of cooperation tilts towards management of the demand side of the energy policy equation. APEC's energy programmes, like its programmes dealing with other issues, focus on capacity building. Nonetheless, they do address the common challenge faced by APEC member countries, namely, achieving greater levels of efficiency in energy consumption, a necessary component for enhancing a country's energy security (Rudner 1995). On energy efficiency, for instance, APEC leaders agreed in their 2007 Sydney Declaration to facilitate and review progress through the voluntary APEC Energy Peer Review Mechanism and work towards achieving an APEC-wide aspirational goal of a reduction in energy intensity of at least 25 per cent by 2030 (with 2005 as the base year). Gains in energy efficiency are not evenly spread across member states, but in the overwhelming majority of the East

Asian member states, there have been measurable levels of progress made (Thomson et al. 2011).

As East Asian economies recovered from the financial crisis of 1997, government-level discussion forums for cooperation to enhance energy security among the countries of north-east and Southeast Asia became institutionalized. In 2002, ASEAN enlarged its Senior Officials Meeting on Energy (SOME, first established in 1982) to include energy ministers from China, Japan, and South Korea. In addition, energy has been a featured topic in the annual meeting of ASEAN Plus Three countries for many years, and in the China, Japan and South Korea leaders' summit since 2008. In East Asia, consultations – structured and ad hoc – among industry, technology, and policy specialists take place on a daily basis. Such consultations are complementary to, and perhaps more effective than, meetings among heads of government, although the latter category of activities is usually better known to the general public.

In this century, the habitual focus on the ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand) in research on the energy-economy dynamics within that grouping is no longer sufficient. With Vietnam, Cambodia, Laos, and Myanmar embarking on economic take-off programmes, these formerly insignificant entities in the regional economy would likely require larger amounts of energy. In addition, opportunities for bringing those countries' hydrocarbon and hydraulic energy resources to the market have opened up. It is natural, then, to include Japan, South Korea, and China, whose manufacturing enterprises have started to become more deeply involved in transforming the industrialization and urbanization processes in those countries (Thomson 2006). A platform that includes those three north-east Asian countries and all ten ASEAN countries represents a meaningful approach to dealing with the developments under way.

Still, the half-empty bottle of the record in East Asia's government-to-government cooperation in energy policy remains: there is no mechanism to collectively address uncertainties in supply on a worldwide scale. Virtually all countries in the region rely on maritime means to transport oil (and increasingly natural gas) from the Middle East, Africa, and Australia for consumption. Programmes to foster intra-regional integration of energy markets continue to face obstacles in implementation (Sovacool 2009). In short, the road to deepening cooperation remains a long one. The next section goes over some of the key areas of vulnerabilities for north-east and Southeast Asian countries.

About the volume: East Asian vulnerabilities

Vulnerability is not a novel notion in energy policy discussions. It is country- and time-specific, and arguably ideology driven as well, especially with energy policy research giving more weight to insights from economics. On the face of it, the term 'energy vulnerability' is a close twin of 'energy insecurity'. Indeed,

sources of vulnerability first and foremost arise from insufficient domestic energy supply, which leads a country to become heavily reliant on imports. Additionally, inadequate financial resources limit a country's capacity to either develop energy domestically or import it from abroad. Export of raw energy in exchange for foreign financial and technological input, in many cases with the targeted purpose of extracting more raw energy for export, hardly constitutes any amelioration of concerns over insecurity, as the world of demand is also one of competition. Last but not least, vulnerability is associated with the technological instruments adopted for movement and consumption of energy. There can be no guarantee of safety for electric power generation and transmission facilities, fuel refineries, pipelines, or nuclear power plants. In short, the uncertainties are just too numerous for any one nation-state to keep under control.

The notion of insecurity as a conceptual driver for organizing international energy policy studies has a country's independence in energy supply (hence less constraints on political diplomacy) as the key underlying rationale. The notion of vulnerability, on the other hand, admits up front that independence is not a productive conceptual justification for analysis. Countries, big or small, are all vulnerable in the world of energy. The difference is in degree and scale. As such, scholarly studies ought to proceed by realizing that uncertainty is an energy policy challenge to live with, rather than to focus on eliminating. By extension, when we make recommendations for inter-state interactions in energy matters, we must bear in mind that our mission is to make a positive contribution to managing uncertainties – through liberating the various actors from innate apprehensions about each other's ill intent.

What contribution, then, does the current volume intend to make to assessments of the management of energy vulnerabilities in East Asia? Overall, the chapters are meant to contribute to the growing interest in appraising East Asia and its role in international energy dynamics. Over the past decade, the sustained upward trend in oil prices and the persistent growth in energy demand from Asia have led to increasing interest in the study of the East Asian factor in the world of energy. Here, I draw particular attention to research interest in policy analysis rather than conventional security studies that arise from energy movements on the ground.

According to one review of literature, from 1999 through 2008, Asia features in 24 per cent of articles with a country focus published in *Energy Policy*, an English language journal founded in 1973. In contrast, the proportions are 44 per cent for Europe and 14 per cent for North America (D'Agostino et al. 2011: 513–14). This figure, though far from inclusive, since the survey does not cover literature published in other journals or in other languages, provides a useful indicator of research interest.

One possible reading of these data is that there exists de facto acknowledgement that North America as a region faces comparatively lower levels of vulnerability in the worldwide search for ways to manage energy-related uncertainties. Indeed, the establishment of the North American Free Trade

Agreement (NAFTA) area in 1993 formalized the pattern of energy interdependence among member states (Mackay and Probert 1995). To be sure, political and economic interactions among NAFTA member states go through challenges and uncertainties of their own, but the region has the luxury of a greater level of resource endowments. In fact, recent discoveries have led to the emergence of what has been termed a 'hemispheric energy policy':

> The outline of a new world oil map is emerging, and it is centered not on the Middle East but on the Western Hemisphere. The new energy axis runs from Alberta, Canada, down through North Dakota and South Texas, past a major new discovery off the coast of French Guyana to huge offshore oil deposits found near Brazil.
>
> (Yergin 2010)

In contrast, East Asia's search for a region-wide energy policy framework has to first and foremost acknowledge the aggregate shortage of supply from within the region. Kensuke Kanekiyo in 'Energy outlook of East Asia and energy policy formulation for sustainable development' (Chapter 2) provides a reminder of the overall challenge for all states: securing supply from wherever available, especially from outside the region. Japan has been and will continue to be the regional linchpin in the pursuit of efficiency in energy. Catastrophic events like the great earthquake of 2011 in north-eastern Japan have effects on the energy and manufacturing industries most directly through the industry ties centred around Japanese firms in the East Asian region, before they reach across the Pacific and to other parts of the world.

It is, nevertheless, meaningful to note that pragmatism has driven Japan's search for energy supplies from its East Asian neighbours, China included. Kanekiyo's recounting of major Japanese energy cooperation programmes offers a valuable balance to the mainstream discussion (in international studies) predicated on rivalry among the East Asian states. His likening of interstate energy policy thinking as 'oriental medication – a combination of various medicines that will eventually produce slow but steady effects' is highly recommended for international observers of East Asian energy dynamics; it would hopefully encourage them to retool their paths of inquiry.

Being on the receiving end of the global oil and gas trade, East Asia has had to grapple with a deficit in negotiating power when dealing with Middle East suppliers. For over a decade, observers in Northeast Asia have noted the existence of what has become known as an Asian Premium: Arab Gulf producers had charged Asian customers an average of US $1 per barrel of oil more for term crude compared with Western buyers. A number of organized industry discussions on this issue took place, but apparently to little avail (Lee 2004).

Tilak K. Doshi and Adi Imsirovic, both with extensive experience in oil trade between the Middle East and East Asia, offer their own assessments in

'The "Asian Premium" in crude oil markets: Fact or fiction?' (Chapter 3). They posit that the Asian Premium issue has been exaggerated.

In 'Oil price volatility: A threat to sustainable development in East Asia' (Chapter 4), Kensuke Kanekiyo and Yoshikazu Kobayashi, also long-time practitioners in the oil trade, examine the Asian Premium and note that the phenomenon is perhaps less serious today. The debate about the East Asian Premium is not settled and perhaps will not be for some time to come. It is noteworthy that Kanekiyo and Kobayashi propose that the increase in the Russian contribution to north-east Asian energy imports could be employed as a meaningful market force to help hedge against the perceived Middle Eastern discrimination in pricing. This option carries its own set of uncertainties and is likely not within reach in the foreseeable future.

What is truly interesting is that even from the point of view of Japan, a geostrategic ally of the USA, a drastically significant increase in movement of fossil fuel energy from the Americas to Asia is thus far beyond conceptual reach. How North America and East Asia relate to each other down the road warrants continuous tracking and analysis.

Lee Yin Mui in 'Enhancing regional cooperation in fighting piracy and robbery against ships in Asia' (Chapter 5) offers by far the single most comprehensive introduction to date of the way in which East Asian states have managed to establish a treaty-based mechanism to address the challenge of piracy and robbery against ships moving back and forth through the Straits of Malacca and Singapore. With India's participation, the maritime waters covered have widened to include the entire geographical stretch. Piracy against ships, oil tankers included, is a complicated issue. The shipping insurance industry, much of which is headquartered in Europe, stands to profit from the identification and enhanced assessments of threat. International security studies as a profession often takes note of reports on piracy incidents, using them as a means to gauge the region's energy security dynamics. The cottage industry studying piracy in Southeast Asia (from the Indian Ocean, through to the waterways of Indonesia, Malaysia, and Singapore, and all the way up the South China Sea) has grown into a topic area of its own and requires no footnoting.

Lee's chapter informs us that the multitude of stakeholders have come together to assemble the legal, diplomatic, and human resources needed to collectively tackle the malaise, beginning with a careful tracking of ships in distress. One of the insights gained from Lee's detailed description is that non-state actors are at the forefront in getting a handle on wrongdoers. Furthermore, capacity building of local maritime law enforcement bodies offers a good deal of promise in trying to keep the problem in check. In short, this chapter offers a concrete example of how desecuritization can be achieved.

Lye Liang Fook in 'NEAT Working Group on Energy Security Cooperation' (Chapter 6) shares with us his insights on Track-II energy policy dialogues under the ASEAN Plus Three framework. Theoretically, Track-II discussions are less bound by protocol and hence can be expected to be more

productive in confidence building. Through Lye's profiling of energy policy discussions under the government-anointed Network of East Asian Think-tanks (NEAT), we gain useful insights into the connections between proposals made at the informal level and those pronouncements made at the official level of energy policy consultations.

NEAT is meant to be a gathering of idea-gatherers from participating countries. As Lye informs us, the quality of contributions from participating member institutions varies. While this is to be expected, their participation in NEAT does affirm that, in the East Asian region, there is a shared recognition that having professionals touch base with each other on a regular basis has a value of its own. In the discourse, it has been more common for efforts like NEAT to receive at most a one-phrase passing mention – in part because Track-II dialogue venues among the East Asian countries are so numerous and also because, admittedly, energy cooperation necessarily requires engineers and traders to make projects happen. In this volume, however, we find it meaningful to give efforts such as NEAT full play, even if they do at the very end come to be seen as yet another 'Asian way' exercise.

Benjamin K. Sovacool in 'Is bigger always better? The challenges facing transnational Asian energy megaprojects' (Chapter 7) offers a critical investigation of a number of transnational Asian energy infrastructure projects and, based on extensive field research, sheds light on the dilemmas associated with large, land-based energy transportation projects and the socio-cultural and environmental impacts. This chapter challenges researchers to look at transnational energy projects from within rather than through the usual lens of goodwill, or lack of such, between nation-states. Sovacool looks at pipeline projects in Central Asia as well as Southeast Asia, in the process driving home the message that energy-related social and environmental challenges are universal.

The pursuit of energy supplies often favours large-scale, long-distance projects. To energy companies, scale matters. This is also true in thinking about meeting the energy needs of urban centres in any nation-state, large and small. Sovacool updates us about the tension between supply security and human security. Although there can be no one-size-fits-all remedy, attention to impacts on the ground is always worthwhile.

Youngho Chang and Yao Lixia in 'Energy and GMS: Cooperation, competition and development' (Chapter 8) provide an overview of the development of indigenous energy resources in the Greater Mekong Subregion (GMS) from an economics perspective. Energy poverty continues to permeate states in the region. The chapter provides a useful counterpoint to the prevailing negativism in international commentary on the pursuit of hydropower and electricity interconnectivity in the GMS.

The development of hydropower in the Mekong River basin has become a highly contested issue. The situation is in part related to developments in North America and Western Europe. There, decommissioning and demolition of dysfunctional dams, and resistance to the construction of new ones, has

been a noticeable power-industry norm. The arguments of anti-dam activists who take issue with the GMS dams could in some measure be attributed to good faith, since it is human nature to call against the repetition of past mistakes. Dams – especially large, tall ones that block the main through-flow – do have an impact on the ecology of rivers. Further, the affected areas are often underdeveloped, with residents dependent on access to rivers for their livelihoods – a dam could potentially limit or block such access. Also, inter-ethnic differences and even conflicts increase the possibility that well-meant energy and development projects could become new sources of conflict. While it is recognized that dam projects have significant effects, it is difficult to come up with meaningful alternatives to hydropower in those areas.

Kevin Punzalan in 'Energy security in the Philippines: Challenges and opportunities' (Chapter 9) offers a view of the energy security situation in the Philippines. The Philippines is unique among ASEAN nations in that, geographically, it is set somewhat apart from the other ASEAN nations. This implies that the Philippines is likely to derive few if any benefits from the laws of economic gravity as it pertains to energy, the various schemes promoting interconnectivity among ASEAN countries notwithstanding. It is therefore useful to have a fairly comprehensive introduction to the particularities of the energy security challenges faced by that country.

Concluding words

Energy as a topic fascinates international studies researchers with an interest in East Asia. The areas of vulnerabilities identified in this volume are meant to be neither systematic nor exhaustive. Indeed, it is impossible to be systematic. What we do aim to do is to make a concerted effort to present perspectives from practitioners in energy trade and policy while keeping academic observations to a bare minimum. Each chapter stands alone in its own right in covering a specific issue area. Collectively, the chapters remind us that the vulnerabilities are manageable, contrary to the more common inclination to see these challenges as sources of insecurity.

The volume makes no claims about breakthroughs in theory making or theory testing. On the specific issue areas covered, this volume invites readers and researchers to see the forest, not just the trees. For academic researchers, the volume is meant to further enrich their background understanding of energy dynamics on the ground in East Asia, which is critically important for making sense of headline-making events. For practitioners, we hope that the chapters are in-depth enough for them to draw meaningful lessons and parallels in making policy choices when challenges of the same nature arise again.

This volume has its limitations in terms of topics covered and author line-up due to the practicalities of managing a research team. Nevertheless, together, they do offer new insights that serve to enrich the collective understanding of the region's energy security challenges. Interested readers are

encouraged to make good use of the data and perspectives presented here before expanding their inquiry into more individually meaningful paths.

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2 Energy outlook of East Asia and energy policy formulation for sustainable development

Kanekiyo Kensuke

Introduction

With world energy demand forecast to increase significantly in the coming decades, particularly in Asia, securing stable energy supply and minimizing the impacts on the environment are the major challenges as countries pursue sustainable development. More fundamentally, as the Great East Japan Earthquake and the ensuing tsunamis that hit Japan in March 2011 reminded us, safe and reliable energy supply is the foundation of modern society. The International Energy Agency (IEA) suggests that 'the future of human prosperity hinges on finding a way of supplying the world's growing energy needs in a way that does not irreparably harm the environment' (IEA 2008: 51). To cope with the challenges, what are the major policy options available to countries? This chapter explores the significance of this question for the emerging economies of East Asia (including Southeast Asia) by examining Japan's approach to energy security over the last few decades.

Global implications of Asia's energy trends

Since the turn of the century, Asia has been driving the world economy. Among the emerging countries, China and India, with their large populations, are the main engines of growth, with countries in Southeast Asia also expanding steadily. Being the fundamental element of modern life and industry, energy consumption has inevitably increased (Table 2.1).

In the past two decades, energy consumption in Asia (excluding Japan) has more than doubled (Figure 2.1). In 2009, China became the single largest energy-consuming country in the world. Southeast Asia's energy market is as large as that of India or Japan and is growing fast. The only Asian country experiencing a decline is Japan, its consumption having peaked in 2006.

Projections of the number of motor vehicles over the coming decades illustrate this trend. In 2009, car ownership per 1,000 people was 47.2 units in China and merely 16.6 units in India, while it was 793 units in North

Table 2.1 World energy consumption

	Consumption			*2010 consumption relative to:*	
Energy, total	*1990 MMtoe*	*2000 MMtoe*	*2010 MMtoe*	*1990 %*	*2000 %*
Japan	432	514	501	116	97
Korea	90	189	255	283	135
China	692	1,054	2,458	355	233
India	181	296	524	290	177
Southeast Asia	203	328	497	245	151
Others	84	145	202	240	140
Asia (excluding Middle East)	1,682	2,526	4,437	264	176
USA	1,968	2,314	2,286	116	99
European Union	1,648	1,720	1,733	105	101
Others	2,809	2,823	3,547	126	126
World	8,109	9,382	12,002	148	128
Oil					
Japan	246	255	202	82	79
Korea	50	103	106	213	102
China	119	234	445	373	190
India	58	106	155	268	146
Southeast Asia	111	184	240	217	130
Others	41	65	72	176	111
Asia (excluding Middle East)	624	947	1,218	195	129
USA	772	884	850	110	96
European Union	664	699	662	100	95
Others	1,088	1,041	1,297	119	125
World	3,149	3,572	4,028	128	113

Source: BP 2011
Note: MMtoe – million tonne oil equivalent

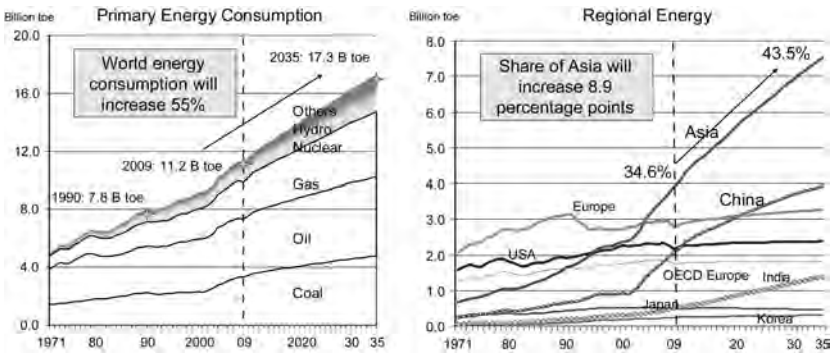

Figure 2.1 World energy outlook, 1971–2035
Source: IEEJ 2011a
Note: Btoe – billion tonnes oil equivalent

America and 579 units in Japan. The *IEEJ Asia/World Energy Outlook 2011* projects increases over the next decades to relatively modest levels, by developed country standards, of 228 units in China and 92 units in India, respectively in 2035 (IEEJ 2011a). Globally, there will be 1.9 billion motor vehicles in 2035, up from 1 billion in 2009, with 40 per cent of that increase coming from Asia. The number of motor vehicles in Asia (excluding Japan) will increase from 144 million units (2009) to 612 million (2035) – in China, the number is projected to increase from 63 million to 315 million; in India, from 19 million to 145 million; and in Southeast Asia, from 31 million to 91 million. Despite the proactive development of hybrid vehicles and non-petrol vehicles, most of the additional vehicles will run on oil. This base trend will continue to steadily push up world oil demand (Table 2.2).

World energy consumption will increase 55 per cent, from 11.2 billion tons of oil equivalent (toe) in 2009 to 17.3 billion toe in 2035 for the business as usual (BAU) scenario (Figure 2.1). Energy demand in East Asia is forecast to grow faster than other regions, while the advanced countries will experience only a modest increase. As a result, Asia's share of global energy consumption will rise significantly, from 34.6 per cent to 43.5 per cent in the next two decades (Figure 2.1).

China, India and the member states of the Association of Southeast Asian Nations (ASEAN) will grow fast and significantly increase their energy consumption. As shown in Figure 2.1, energy consumption in China (including

Table 2.2 Energy outlook of Asia

	Energy Demand			*Compared with 2009*	
	2009	*2020*	*2035*	*2020*	*2035*
	MMtoe	*MMtoe*	*MMtoe*	*%*	*%*
China	2,057	3,047	3,897	*148*	*189*
India	512	866	1,428	*169*	*279*
Japan	472	499	451	*106*	*95*
Korea	229	274	297	*120*	*130*
ASEAN 7	391	590	997	*151*	*255*
Other Asia	217	317	474	*146*	*219*
East Asia	3,877	5,592	7,544	*144*	*195*
World	11,206	14,126	17,338	*126*	*155*
ASEAN 7					
Singapore	18	24	28	*130*	*151*
Brunei	3	3	4	*114*	*136*
Indonesia	149	222	399	*148*	*267*
Malaysia	64	103	138	*161*	*216*
Philippines	32	50	91	*156*	*285*
Thailand	85	118	182	*139*	*214*
Vietnam	39	74	154	*191*	*397*

Source: IEEJ 2011a
Notes: MMtoe – million tonne oil equivalent

Hong Kong) is projected to almost double from 2009 (2.06 billion toe) to 2035 (3.9 billion toe). China's energy consumption exceeded that of the Organisation for Economic Co-operation and Development (OECD) Europe in 2008 and the USA in 2009, and will catch up with the entire European continent around 2020. The increase in energy demand in India may stay relatively moderate for the time being, though it will see even faster growth than China over the long run. On the other hand, energy demand will remain modest in Japan and Korea, as their economies have reached maturity. Their combined share of energy consumption in eastern Asia will significantly decrease, from 18 per cent in 2009 to 9.9 per cent in 2035.

The world will continue to be heavily dependent on fossil fuels in the coming decades (see Figure 2.1) despite proactive efforts to promote renewable energy. The various fossil fuels will eventually play differentiated roles: oil will be used mainly for transport, and natural gas and coal for heat and power. Among fossil fuels, natural gas appears to be the most favourable option from the point of view of its environmental impacts – it is clean and its carbon content is low. Also, natural gas can be easily applied to sophisticated high-efficiency power generation technologies, combined cycle gas turbines (CCGTs) being an example of this.[1] However, due to barriers in terms of resource distribution, available technologies, funds for development and the time needed for construction of natural gas infrastructure, there is a ceiling to the amount of natural gas to be utilized. Consequently, it is inevitable that countries would turn to other sources, including coal, to meet the balance of their energy requirements. For some countries, the quantity of coal required would be substantial; thus it would be important to consider its clean and smart use.

The threat of supply uncertainties

The significant growth in the demand for energy in Asia means that the region, like the rest of the world, faces twofold energy-related risks. The first issue is the threat to the adequate and secure supply of energy (in particular, oil) at affordable prices. Volatility in the price of energy magnifies uncertainties in supply, making it more difficult to plan for the future (discussed further in Kanekiyo and Kobayashi, this volume). The shift in commodity flows due to the rapid rise in demand from China and India, the major emerging countries, will also be a problem. For instance, the two countries will likely increase their coal imports significantly, changing the pattern of the flow of coal in the Asia-Pacific basin, and increasing supply uncertainties, which could have a detrimental effect on neighbouring countries that are also dependent on imported coal. It needs to be recognized that, as most Asian countries secure their energy needs through purchasing oil, gas and coal from the international market, they would face increasing price volatility as a result of growing market uncertainties. To cope with this, there is a need to

strengthen security measures such as oil stockpiling and emergency response systems.

Threat of global warming

Environmental harm is another real threat. Growing energy consumption would lead to increased greenhouse gas (GHG) emissions, and thus regional pollution and global climate change. Today, it is widely understood that economic development would be far from sustainable under the BAU scenario, where no additional policy action would be taken to counter global warming. Balanced against this, however, is the reality that developing countries need to focus on economic growth in order to provide their people (who comprise more than 80 per cent of the world's population) with a comfortable standard of living. That means that not only has energy demand increased in Asia over the past decades, but it will continue to do so for the foreseeable future.

There has been a substantial increase of carbon dioxide (CO_2) emissions, in particular in emerging countries (Figure 2.2). Global CO_2 emissions as a major source of GHG are forecast to increase from 28 gigatons of carbon dioxide ($GtCO_2$) in 2009 to 41.6 $GtCO_2$ in 2035 (IEEJ 2011a). Asia's share will increase from 41.9 per cent to 49.7 per cent over the same period.

As China is the world's largest coal-producing and -consuming country, it has caught up with developed countries much earlier in terms of CO_2 emissions, even though its per capita energy consumption is lower than that of the developed countries. China's GHG emissions made a big jump around the year 2000 and exceeded that of North America in 2008 (Figure 2.2; estimated from IEA 2011b, 2011c). Although China's growth will slow down as a result of efforts to increase energy efficiency, it may overtake the entire European continent in 2011. As its per capita income and energy consumption is still

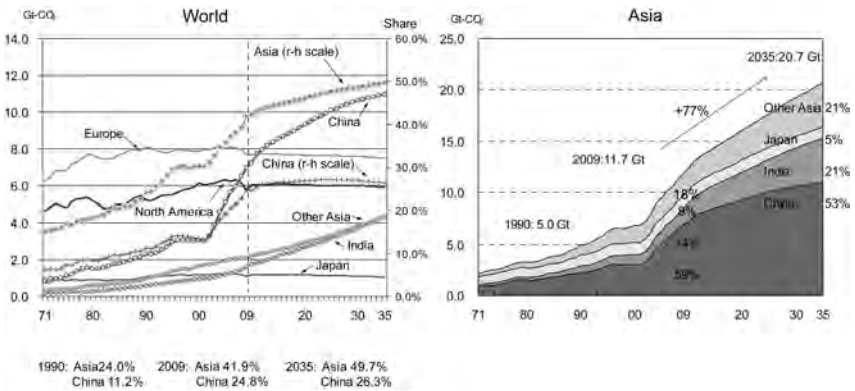

Figure 2.2 Outlook for CO_2 emissions
Source: IEEJ 2011a
Note: $GtCO_2$ – gigaton carbon dioxide

low, China's energy consumption will continue to increase. Its GHG emissions will also increase, from 6.9 $GtCO_2$ in 2009 to 11.0 $GtCO_2$ in 2035, pushing up the global share from 24.8 per cent in 2009 to 26.3 per cent in 2035.Tcf

India is also a coal-consuming country, and its GHG emissions will increase even faster than China's. India's GHG emissions will increase from 1.6 $GtCO_2$ in 2009 to 4.4 $GtCO_2$ in 2035, substantially pushing up the global share from 5.8 per cent to 10.5 per cent (Figure 2.2).

Global warming has a long-term, cumulative effect and affects the future generations of developed and developing countries equally. Therefore, it is a serious issue even for smaller countries. Global warming is, however, difficult to tackle, because it does not, for the most part, impose great suffering on the present generation, while the measures for countering global warming are largely indirect in nature.

Having said that, there is greater potential for emissions reduction in developing countries as the energy facilities in those countries are still largely low in terms of efficiency (see for example, IEEJ 2010b). Rather than controlling any individual economy, it may be more effective to promote international cooperation, persuading high-emission countries to take effective actions. International cooperative systems such as the Emissions Trading System (ETS), the Clean Development Mechanism (CDM) and the Joint Implementation (JI) scheme allow for easier, wider and more effective translation of emissions reductions goals into action.

Asia's regional energy issues

In addition to global concerns related to energy security and global warming, there are also energy issues facing Asia specifically. To consider these issues, it is first necessary to review Asia's energy mix (Table 2.3).

Fossil fuels: the supply-demand balance

Coal dominates in the two mega energy-consuming countries, China and India, as they are endowed with abundant coal reserves. China is the world's largest coal producer and consumer. By contrast, oil makes up the greatest portion of energy consumption in most other Asian countries, where it is mainly used for transportation, with a substantial quantity also used in the industrial and household sectors. These countries do not have rich coal reserves and rely on energy imports. For these countries, oil is the most convenient resource to use in driving industrialization and modernization.

Natural gas was introduced recently and is mainly used for power generation and household use. In Southeast Asia, natural gas comprises a large share of energy for power generation and household use. Its share in China and India is still low, but natural gas consumption in these countries is increasing fast.

Table 2.3 Energy structure of Asia, 2009

	Primary energy supply (MMtoe)							*Consumption ratio*					
	Oil	*Gas*	*Coal*	*Nuclear*	*Hydro*	*NRE*	*Total*	*Oil* %	*Gas* %	*Coal* %	*Nuclear* %	*Hydro* %	*NRE* %
Japan	202	85	124	66	19	5	501	**40.2**	12.6	23.5	12.6	4.4	5.4
Korea	106	39	76	33	1	0	255	**41.4**	15.1	29.8	13.1	0.3	0.2
China	445	102	1,720	17	163	12	2,458	18.1	4.1	**70.0**	0.7	6.6	0.5
Taiwan	46	13	40	9	1	1	110	**41.8**	11.5	36.5	8.5	0.8	0.9
North-east Asia	798	238	1,960	126	184	19	3,324	24.0	7.2	**59.0**	3.8	5.5	0.6
Indonesia	60	36	39	-	3	2	140	**42.6**	25.9	28.1	-	1.8	1.5
Malaysia	25	32	3	-	2	0	63	40.2	**51.1**	5.3	-	3.4	0.0
Philippines	13	3	8	-	2	2	28	**47.3**	10.1	28.0	-	6.4	8.2
Singapore	62	8	-	-	-	-	70	**89.2**	10.8	-	-	-	-
Thailand	50	41	15	-	1	1	108	**46.5**	37.6	13.8	-	1.1	1.0
ASEAN 5	210	119	65	0	8		408	**51.5**	29.2	16.0	-	1.9	1.3
Others	14	5	19	0	7	0	45	30.3	10.8	**42.4**	-	16.5	0.0
Southeast Asia	224	124	84	0	15	5	453	**49.5**	27.4	18.6	0.0	3.3	1.2
India	155	56	278	5	25	5	524	29.7	10.6	**52.9**	1.0	4.8	1.0
Total East Asia	1,203	471	2,327	132	231	29	4,393	27.4	10.7	**53.0**	3.0	5.3	0.7
World	4,028	2,858	3,556	626	776	159	12,002	33.6	23.8	29.6	5.2	6.5	1.3

Source: BP 2011
Notes: The energy resource with the highest share in each country is indicated in bold
'Others' refers to Brunei, Cambodia, Laos, Myanmar and Vietnam
MMtoe – million tonne oil equivalent
NRE – new and renewable energies

Historically, China and Southeast Asia used to be energy suppliers to other Asian nations, but their positions with respect to fossil fuel exports have evolved differently.

Japan and South Korea are fully dependent on imports for oil. China and Indonesia used to be the main exporters of low sulfur crude oils. However, China became a net oil importer in 1993 and Indonesia in 2004 (BP 2011). Their domestic oil consumption is growing fast, while production is levelling off. Although Malaysia and Vietnam are still net oil exporters, their production surplus for export will deplete unless there are major oil discoveries. East Asia, together with the USA and Europe, is among the top three major oil importing markets in the world, and the region is expected to import even more oil in the future (Figure 2.3).

The supply-demand balance for natural gas is slightly different from oil (Figure 2.4). Japan and South Korea are almost wholly dependent on the import of liquefied natural gas (LNG), while the Southeast Asian states of Indonesia, Malaysia and Brunei are major suppliers. Natural gas consumption has been increasing in Southeast Asia, but these states have to date managed to remain natural gas exporters.

In the middle of the 2000s, India and China began to import LNG. In Indonesia, with increasing energy demand, there are plans to divert natural gas from export to domestic use. For this purpose, the construction of several LNG-receiving terminals is planned in Java and Sumatra. Other Asian countries such as Singapore, Thailand and the Philippines are also planning to import LNG.

At the global level, however, the natural gas balance is relatively loose at present because of huge increases in supply. Due to growing unconventional gas production such as tight sand gas, shale gas and coalbed methane, many LNG import projects have been cancelled in the USA. Net imports of natural gas into the USA are forecast to decrease from 12.6 per cent in 2009 to

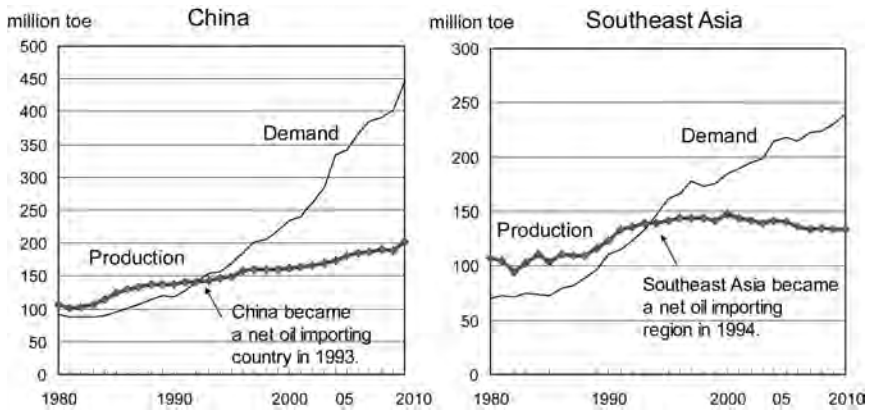

Figure 2.3 Energy structure of Asia
Source: BP 2011

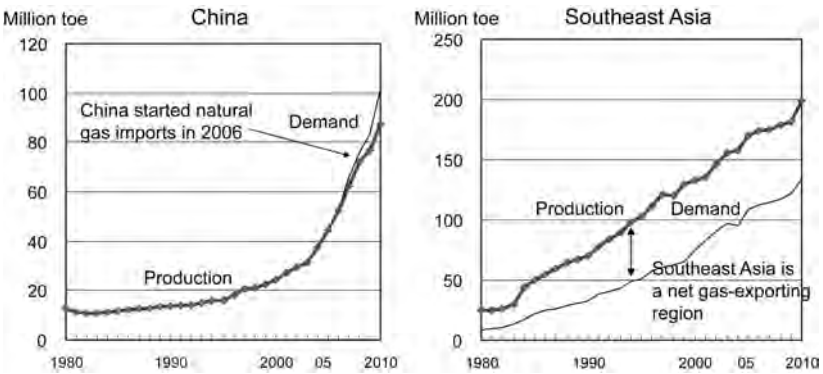

Figure 2.4 Natural gas balance of East Asia
Source: BP 2011; IEA 2011a

0.7 per cent in 2035 (US EIA 2011).[2] Qatar is building LNG facilities with a huge production capacity of 77 million tons per annum (MTPA). Many other large LNG projects are coming up in Australia, Africa and Latin America. Thus, it was expected that a 20–30 MTPA supply surplus would appear in the global LNG market. However, because of the Great East Japan Earthquake in March 2011, this surplus was mostly absorbed by the sudden increase of LNG consumption to make up for the reduced electricity supply from nuclear power stations. Despite the unexpected development, if investments are implemented as scheduled, LNG supply will be relatively adequate for some time (Hashimoto and Koyama 2012).

A big wild card is China's natural gas potential. China began importing LNG in 2006 and is constructing a number of LNG terminals along its coastal provinces. China is also promoting piped natural gas imports from Central Asia and Russia. With these LNG and piped natural gas initiatives, there is potential for significant increases in supply of natural gas to China. The domestic production of gas, including the production of unconventional gas such as coalbed methane and shale gas, could also increase. On the demand side, the potential for growth in natural gas consumption is also high, once regulations allow for its use for power generation and industrial fuel.

India is another influential player. It began importing LNG in 2004. Its natural gas consumption will increase steadily along with robust economic growth. At the same time, large gas fields are being discovered in the coastal areas and this will boost domestic production. For the time being, ample supply will be available from the huge Qatar LNG complex, while it remains highly questionable if Iranian gas would become available, via LNG or pipeline. Uncertainties remain high in both supply and demand aspects in China and India. Nevertheless, the natural gas balance is expected to be relatively stable for Asia for a decade or two.

The Asian coal flow is currently changing rapidly. Japan and Korea are dependent almost fully on imports. China is the world's largest coal producer

and has increased coal production substantially since 2000 to fuel its rapid economic growth (Figure 2.5). China became a net coal importer in 2009, and may expand imports further in pace with its economic growth. Already, China is expanding its coal imports in its southern provinces, since coal produced domestically has to be railed and shipped a long distance to reach those areas, while imported coal can be easily delivered by ocean-going bulk carriers. India is another element. As its domestic reserves are of low quality and concentrated in its north-eastern provinces, India has increased its coal imports from Australia and Indonesia (Figure 2.5).

In Southeast Asia, on the other hand, Indonesia and Vietnam are increasing coal exports. In particular, Indonesia has become the world's biggest steam-coal exporter. Australia, the traditional coal exporter for the Asia-Pacific region, is also expanding its production and export capacity.

All in all, the Asian coal supply situation is expected to remain at a comfortable level as the increase in import requirements will not outpace the development of coal mines and export infrastructure in Australia and Indonesia. However, there is some possibility that China's and India's big appetites may eat up the modest export flux expected in the Asia-Pacific basin market.

To sum it up, the most serious energy issue for Asia is the security of oil imports. The supply-demand balance of natural gas and coal are expected to remain relatively comfortable. However, considering the huge increase in demand for energy to fuel the economic growth of the emerging countries, close and frequent exchange of information is necessary among producers and consumers.

Nuclear energy after the 2011 Great East Japan Earthquake

On 11 March 2011, a great earthquake hit the north-eastern coast of Japan, triggering a huge tsunami. The impact of these two natural disasters

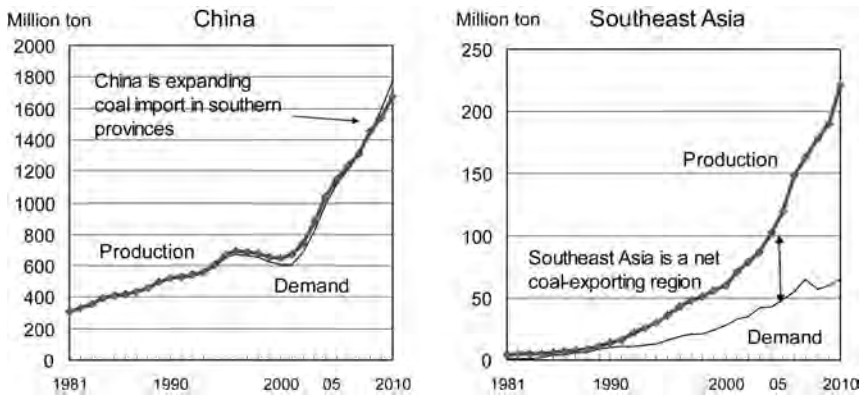

Figure 2.5 Coal balance of East Asia
Source: BP 2011; IEA 2011a

destroyed energy facilities on an unprecedented scale. Energy systems over a vast area were shut down, including 14 nuclear power plants at four stations, 14 thermal power stations, six refineries and many other energy facilities amounting to almost one-third of the Japanese energy supply capacity. Four nuclear plants at Fukushima Daiichi, six thermal power stations, three refineries and 25 oil depots were seriously damaged. Some 150 oil-tank trucks were washed away and 40 per cent of the 1,700 gasoline stations in the region were disabled by the tsunami. Electricity and city gas supply were cut, affecting over 5 million people. Operable gasoline stations continued services, but they ran out of stock within 3–4 days, at a time when northern Japan was still experiencing low temperatures, with occasional snow.

By mobilizing every resource available, the supply of oil products was mostly restored by the end of two weeks, while electricity and city gas took a month or more. It was a harsh lesson for Japan. The country was reminded of the principle that the energy delivery system should be built to withstand disasters. It was also recognized that, as oil is handy for delivery and suitable for multiple-purpose uses, it should be reinstated in Japan's disaster response plan.

In addition to the immediate damage, the disaster led to a serious review of Japan's electricity supply system. The 'nuclear safety myth' completely collapsed in the face of the serious accident at the Fukushima Daiichi nuclear power station and the resultant release of radioactive matter. The accident brought to the fore serious concerns over nuclear safety that could not be easily dismissed. In the aftermath of the accident, nuclear plants that had been shut down for regular inspection were not able to obtain the agreement of local governments to resume operation. Of the 54 nuclear power plants installed in Japan, less than 10 were operating as of December 2011. If these plants did not resume operations, they would become inoperable by the summer of 2012, a dilemma, as nuclear power was supplying a quarter of Japan's electricity demand, and one-third of the requirements of the 10 major power companies (Figure 2.6).

The loss of nuclear power supply caused serious problems. First, it led to a significant shortage in the nationwide electricity supply. All thermal plants were mobilized to make up the deficit, which inevitably led to sudden and huge increases in fossil fuel procurement. According to the Institute of Energy Economics, Japan (IEEJ), LNG purchases increased by approximately 14 million tons in 2011 from the previous year. The increase for oil was 4 million tons. Coal imports remained at almost the same level, as several coal thermal plants were seriously damaged. As a result, spot prices of LNG and low-sulfur fuel oil in the Asian market jumped and continued to stay there. Thus, all energy-importing counties in Asia were affected. At the time of writing (December 2011), the prospect for nuclear power plant resumption was uncertain, and the oil and gas market was expected to be volatile for some time.

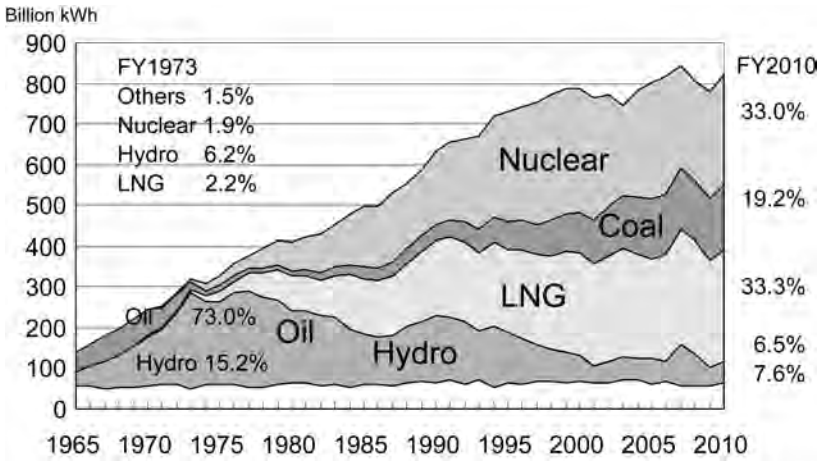

Figure 2.6 Japan's power supply by source
Source: Compiled by the Institute of Energy Economics, Japan (IEEJ) from Federation of Electric Power Companies, Handbook of Electric Power Industry, published annually
Note: kWh – kilowatt hour

The 2011 earthquake thus triggered the greatest energy crisis for Japan since the oil crisis of the 1970s, and reminded countries of the fundamental fact that a safe and reliable energy supply system is needed. Globally, energy supply disruption has occurred numerous times – caused by natural disasters as well as human error. Examples include the damage caused by hurricanes Ivan and Katrina, which affected oil and gas supply in the deep south of the USA, and the blackouts caused by the failure of the electricity market system in California or the lack of investments in New York and in vast areas of China. To ensure energy security, the first priority must thus be given to the establishment of a safe and reliable energy supply system – a basic principle which is often not given attention, or is set aside in favour of other priorities.

The Fukushima nuclear power plant accident also generated severe criticism of nuclear energy, invoking the big question: Could nuclear power be used as a major energy source in the long run? The accident forced the evacuation of more than 100,000 people from their homes (that was in addition to those directly hit by the earthquake and tsunamis). Although the Japanese government declared in December 2011 that the ill-fated plants had been brought to a 'cold stop' and the situation was under control, vast areas of land remain to be decontaminated before people can go home. Such an operation would be lengthy and expensive. Also, it is estimated that the decommissioning of the nuclear plants would take 40 years or more, as the condition of the plants would have to be determined, and the technical procedures for doing so safely would have to be developed step by step.

According to Japan's 2010 Basic Energy Plan (this revision is also known as the Strategic Energy Plan of Japan), the country had planned to increase nuclear energy use to more than 50 per cent of its electricity mix. However, the serious accident at the Fukushima Daiichi nuclear power plant raised serious questions as to whether nuclear energy can maintain its position as one of the fundamental pillars of the country's energy mix. Under the circumstance, the Japanese government is reviewing the Basic Energy Plan.

Traditional energy security measures

Let us review here the traditional measures to cope with energy security issues based on Japan's experiences. When the oil crisis hit in the 1970s, oil-importing countries rushed to implement measures to cope with the situation, such as controlling domestic oil consumption and promoting oil security policies such as stockpiling and the development of alternative energies. The OECD, a grouping comprising advanced countries, created the IEA in 1974 to deal specifically with energy issues.

Japan also implemented various policies to address the situation. On the supply side, there were three direct policies: (1) to create oil stockpiles (Figure 2.7); (2) to decrease the dependence on oil imports from the Middle East; and (3) to decrease oil dependence. On the demand side, Japan aimed to reform itself into a resource-saving society, enhancing energy efficiency and restructuring its industry to become less energy-intensive.

Creating an oil stockpile

Facing the first oil crisis of 1973, Japan implemented an oil stockpiling policy in line with the guideline laid down by the IEA. Japan's stockpile had reached a level equivalent to the 90 days' oil consumption when the second oil crisis occurred in 1978. The effect of the stockpile was apparent: it kept people calm and staved off market confusion, despite the fact that the oil price increased significantly more than the first crisis of 1973. However, stockpiling only addresses short-term supply disturbance, and the cost is not low. Also, enhancing inventories alone would not help address long-term energy security risks. Thus, Japan turned also to the diversification of sources of supply.

Reducing dependence on Middle East oil

Japan successfully diversified its oil sources and reduced its dependence on the Middle East in the 1970s (Figure 2.8). Crude oil imports from other countries – such as Indonesia, China and Mexico – increased considerably. However, this favourable development lasted less than two decades. The new sources of supply began experiencing rising demand for oil in their own countries. That trend, coupled with the stagnant oil prices during the post-crisis era, which discouraged the development of high-cost oil fields,

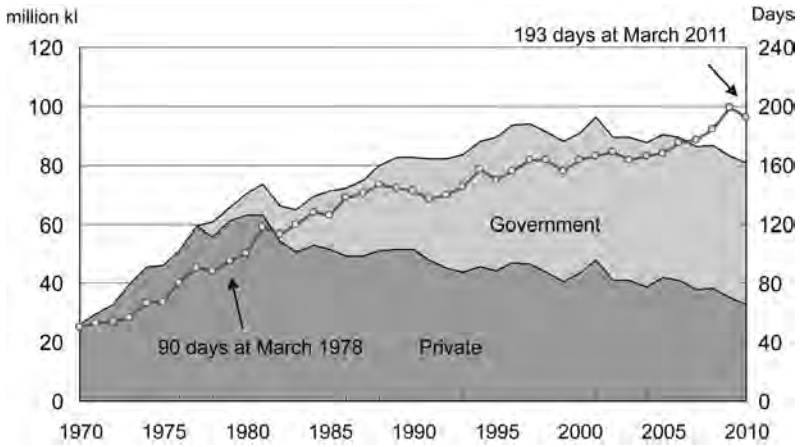

Figure 2.7 Japan's oil stockpiling
Source: Ministry of Economy, Trade and Industry, Japan (METI) Yearbook of Mineral Resources and Petroleum Products Statistics, also its monthly reports; Petroleum Association of Japan (PAJ), Monthly Report of Petroleum Data. Online. Available at: <www.paj.gr.jp/statis/>
Note: kl – kilolitre

contributed to these countries gradually phasing out exports to the international market. Consequently, Japan's dependence on the Middle East increased again in the mid-1980s, reaching almost 90 per cent today (Figure 2.8).

It would be difficult to reduce the country's dependence on the Middle East unless other export-oriented sources with relatively small domestic demand and abundant reserves emerge. Russia is a candidate – it has developed oil-exporting facilities in its eastern provinces (see Kanekiyo and Kobayashi, this volume: Figure 4.6). While Russia is not expected to threaten the dominant

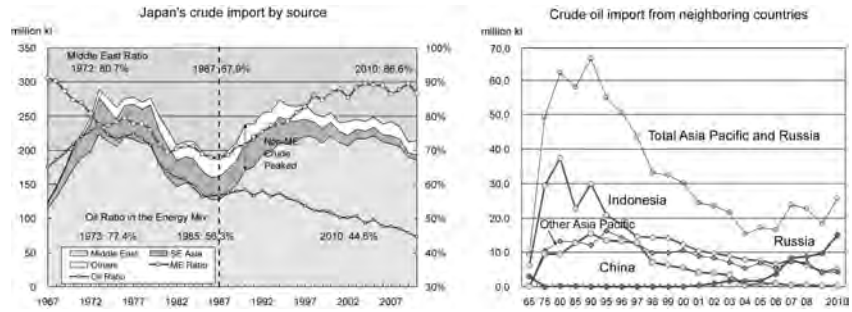

Figure 2.8 Japan s oil import by source
Source: Ministry of Economy, Trade and Industry, Japan (METI) Yearbook of Mineral Resources and Petroleum Products Statistics, and also its monthly reports; Ministry of Finance, Japan Trade Statistics, published monthly and annually
Note: kl – kilolitre

position of the Middle East, the supply from the country has nevertheless had significant impact in terms of increasing market competition in Asia (see Kanekiyo and Kobayashi, this volume).

Reducing dependence on oil

The strategy of diversifying sources of oil supply certainly has a role to play in enhancing energy security in Japan. However, the country also faces exposure to global forces in the oil market, in particular, the significant increase in demand from emerging countries, the effect of which is amplified by speculative investors in the market. Against this backdrop, it would be more practical to diversify energy sources by increasing the use of alternative energies. As shown in Figure 2.9, Japan, faced with the oil crisis of the 1970s, increased the use of alternative energies such as natural gas, coal, nuclear energy and renewables. As a result, its oil dependence decreased from a peak of 77.4 per cent in 1973 to 44.6 per cent in 2010. Oil consumption in absolute quantity has also decreased from its peak (though it did show a slight increase during the period of low oil prices, from mid-1980s through to the early 2000s).

The strategic focus on reducing oil dependence was given even greater impetus by the need to combat global warming and create a low-carbon society. As noted earlier, Japan had intended to increase nuclear energy use under its 2010 Basic Energy Plan, which would have helped Japan move in

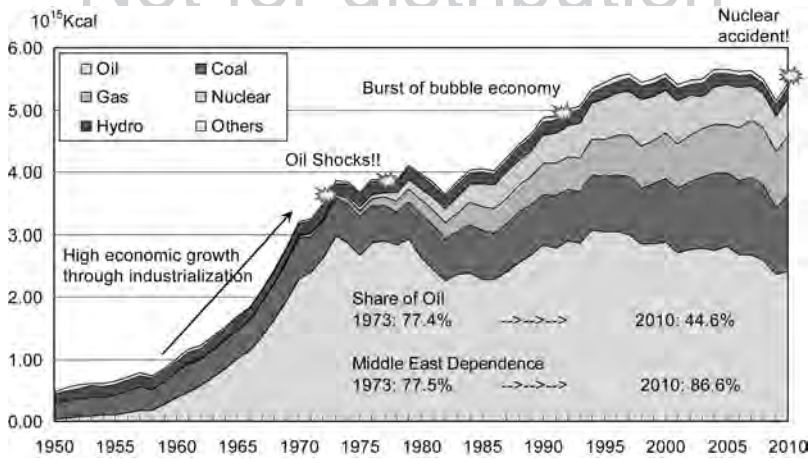

Figure 2.9 Total primary energy supply of Japan
Source: Ministry of Economy, Trade and Industry, Japan (METI) 'Comprehensive energy statistics (Energy balance table)', published annually. Online. Available at: <www.meti.go.jp/english/press/2011/0426_02.html>; IEEJ 2011c
Note: Kcal – kilocalorie

the right direction in terms of climate change goals. However, the country will have to revisit that plan in view of the Fukushima accident.

Enhancing energy efficiency

On the demand side, Japan successfully implemented comprehensive policies to curb rising energy consumption in the 1970s. Energy consumption had been increasing in the 1960s as the country industrialized. However, following the 1970s' oil shock, the country instituted aggressive energy efficiency and conservation (EEC) policies, which slowed down the growth in energy consumption – from an annual 12.2 per cent during the 1960s to almost zero for the 10 years after the oil crisis of 1973.

Japan's EEC policy was aimed, first, at changing the country's industrial structure, from one reliant on heavy/big industries to one focused on light/small ones; and second, at improving the energy efficiency of each industry. As shown in Figure 2.10, extensive EEC efforts lowered Japan's energy intensity significantly – until the mid-1980s. However, when oil prices decreased, and remained low, people loosened their belts. A consumption boom arose in Japan and the 'Cima effect' dominated for almost a decade (the Nissan Cima was a large, luxury car which appeared in the market, taking advantage of people's vigorous appetite as they enjoyed the bubble economy).

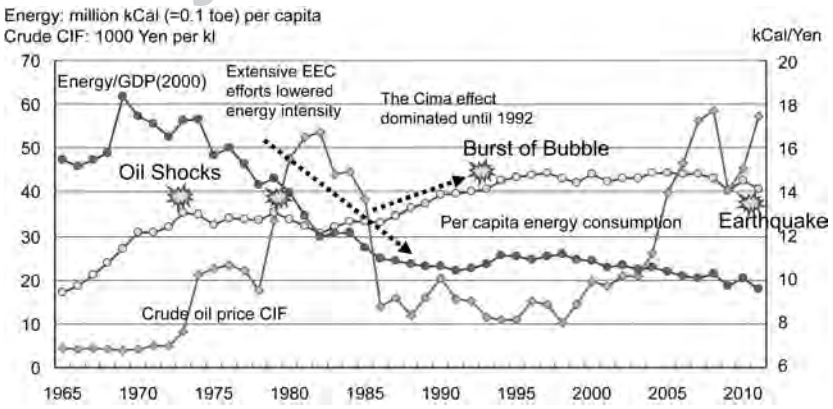

Figure 2.10 Changes in energy efficiency of Japan
Source: Compiled from Ministry of Finance, Japan Trade Statistics, published monthly and annually; Ministry of Economy, Trade and Industry, Japan (METI) 'Comprehensive energy statistics (Energy balance table)', published annually. Online. Available at: <www.meti.go.jp/english/press/2011/0426_02.html>; and IEEJ 2011c
Notes: Figures for 2011 represent forecasts The 'Cima effect' refers to the excessive consumption during Japan s bubble years symbolized by a luxury car, the Nissan Cima, which was marketed in JapanKcal – kilocalorie; toe – ton oil equivalent; CIF – cost, insurance and freight; kl – kilolitre; EEC – energy efficiency and conservation

Per capita energy consumption increased more than 40 per cent from its bottom in 1981 as a result of a rise in incomes (income effect) during the post-oil shock era (Figure 2.10). It was only when Japan's bubble economy burst in 1992 and the Japanese economy was trapped in a prolonged stag-deflation that both per capita energy consumption and energy intensity per gross domestic product (GDP) levelled off.

After 2000, increasing concern over global warming, and another oil price shock in 2008, heightened awareness of energy security issues. In 2010, Japan's government announced an ambitious energy and environment policy designed to create a low-carbon society. While the policy was still being deliberated, the Great East Japan Earthquake hit. The resultant disruption and shortage of energy supply caused drastic changes in peoples' mindsets; energy conservation has become the fashion of the day. While the magnitude cannot yet be ascertained, Japan's per capita energy consumption and energy intensity will certainly drop significantly in the coming decades.

The most significant policy options for EEC are energy subsidies and taxes. These have direct effects on consumption. Energy taxes are also often used to finance energy and environmental policies. Energy subsidies are widely applied globally and tend to be financed directly from government budgets or indirectly through cross-subsidies at public or private energy companies via energy price/tariff regulations. In developing countries, subsidies are used to assure a minimum supply of energy to the poor at affordable prices or the cheap supply of feedstock for essential industries such as fertilizer production. It is often difficult to graduate from this type of policy even after an economy has reached a stage where most people can afford to purchase the energy source of their choice, or industries have become sufficiently competitive. Subsidies, either applied on goods or through the control of energy prices, that do not differentiate between the poorest and the richest, have significant regressive effects and encourage wasteful use of energy. China experienced a big jump in electricity demand by energy-intensive industries in the early 2000s because its electricity tariff structure encouraged power consumption. In 2009, Japan's government implemented a weekend highway toll discount financed by the national budget, which pushed up highway traffic by 30 per cent in rural areas and 10 per cent in metropolitan areas during weekends (IEEJ 2009: 8). Thus, in designing EEC policies, existing subsidies and taxes should be revisited and carefully restructured.

Japan's energy strategy

New National Energy Strategy 2006

Against the backdrop of rising concerns over energy security and the global environment, the Japanese government (under the Liberal Democratic Party, or LDP) held deliberations on a New National Energy Strategy. The

intention was to develop a comprehensive toolbox of policies or approaches to current energy issues. The report of the discussions was released in 2006.

The New National Energy Strategy report outlined several objectives: to establish trustworthy energy security for the national economy; to resolve energy and environment issues to provide a basis for sustainable development; and to contribute to global efforts to overcome energy issues (METI 2006). To achieve those objectives, the report recommended that Japan develop the world's most advanced energy structure, accelerate its diplomatic efforts on energy and environment protection and strengthen its emergency response capability. The report set several numerical targets for 2030:

- Improve energy efficiency by over 30 per cent through the Energy Conservation Frontrunner Plan.
- Reduce oil dependence to below 40 per cent.
- Reduce the mineral oil components in next-generation transport fuel to less than 80 per cent.
- Aim for 30–40 per cent or more of power generation from nuclear-based power.
- Raise the equity oil ratio to 40 per cent through comprehensive supply security.

The report also suggested increasing Asian energy cooperation, encouraging innovation on new and renewable energy, developing a super-long-term route map for energy technology development and encouraging coordination among administrative and institutional mechanisms.

Strategic Energy Plan of Japan 2010

In September 2009, Japanese Prime Minister Yukio Hatoyama said in a speech at the United Nations Summit Meeting on Climate Change that Japan would aim to cut GHG emissions by 25 per cent from 1990 levels by 2020. Following this declaration, Japan's Basic Energy Plan was revised in June 2010 under the Democratic Party of Japan (DPJ) administration (METI 2010). It set significantly more ambitious goals for countering global warming (IEEJ 2010a), including the following numerical targets:

- Raise the energy independence ratio from the current 38 per cent to around 70 per cent by 2030.
- Raise the zero-emission power source ratio from the present 34 per cent to 70 per cent.
- Cut energy-related CO_2 emissions by 30 per cent from 1990 levels by 2030.[3]
- Set the CO_2 emissions per GDP, or CO_2 intensity, at 1 ton per real GDP of 1 million yen in 2030, which will be less than half the figure of 2.2 tons for 2007.

To achieve these goals, a variety of policies, legislation, institutions and programmes would need to be developed to promote and regulate energy-related activities.

CO_2 emissions in 2030 will amount to 1.32 billion tons in the BAU case. The target set by the 2010 Plan (Figure 2.11) is to reduce CO_2 emissions by 600 million tons per year, on the basis that this is achievable if a variety of measures are effectively and adequately pushed forward. However, many questions have been raised as to whether the goal is too ambitious or truly beneficial for the nation and economy.

Amid the nationwide deliberation on how the proposed goal should be achieved, the Great East Japan Earthquake hit. The accident at the Fukushima Daiichi nuclear power station struck a deadly blow to the 'nuclear safety myth' (that nuclear plants are absolutely safe). It highlighted the fact that implementing an ambitious strategy that gives a central role to nuclear energy in the pursuit of a low-carbon society could result in substantial setbacks.

In addition to concerns over nuclear energy, several global events and developments may change the energy landscape significantly, among them, the Arab Spring demonstrations in the Middle East and North Africa, the increasing attention given to shale gas as an energy source and the moratoria on its drilling, the Climategate scandal and the slow development of the UN global warming negotiations. Due to these concerns, a paradigm shift is appearing that will affect energy policy formulation significantly, the

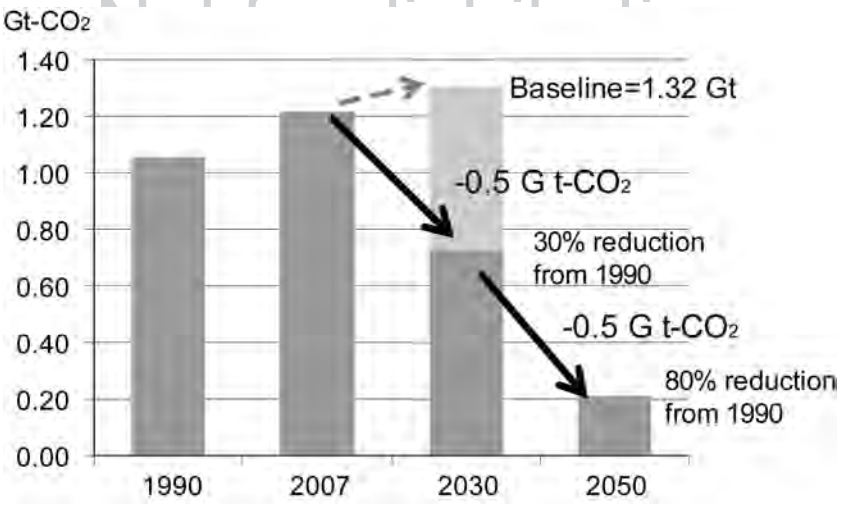

Figure 2.11 Target of the New Basic Energy Plan
Source: Ministry of Economy, Trade and Industry, Japan (METI) 'Comprehensive energy statistics (Energy balance table)', published annually. Online. Available at: <www.meti.go.jp/english/press/2011/0426_02.html>
Note: $GtCO_2$ – gigaton carbon dioxide

magnitude of which may be compared to that experienced at the time of the 1970s' oil crisis.

In Japan, another review of the Basic Energy Plan began in October 2011 (IEEJ 2011b). With the severe criticisms of nuclear energy, the range of policy options has substantially narrowed. How can Japan simultaneously achieve energy security and environmental protection, given a significant reduction in the use of low-carbon nuclear power? There is no magic wand in this case. Every conceivable policy option should be revisited and carefully examined to see if it is practicable and acceptable. Japan's energy strategy would have to be restructured to facilitate Japan's path towards sustainable energy. A substantial part of the plan may have to be based on technologies and systems yet to be explored and developed.

Japan's efforts to overcome the challenges brought about by the reduction in nuclear energy use may take time, but the author hopes that its actions will be rewarded eventually. For example, despite the fact that Japan is said to be the most advanced country in terms of energy efficiency, in the face of the Fukushima accident, the Japanese were successful in reducing electricity consumption even further – by 18 per cent year-on-year in eastern Japan during the summer of 2011. This gives us great hope. Even in Japan, the penetration rate of available best technologies is estimated to be around 10 per cent or so, and these technologies generally provide a 20–30 per cent increase in efficiency compared with the average for the existing stock of energy equipment and apparatus. Technologies under development, as well as possible breakthroughs, are expected to significantly increase the efficiencies that could be achieved. At the same time, it is important for the country to reform its socio-economic structure – towards a less energy-intensive system. Japanese society should place energy and environment as important elements of its development strategy and take policy actions with clearly recognized social goals. As Japan moves forward, regional and international cooperation is also an important linchpin of its strategy. In the next sections, cooperation with China and other countries are discussed.

Japan-China energy cooperation

Various efforts were made to reinforce energy security following the oil crisis of the 1970s. International cooperation was promoted as an effective measure in this regard. In the earlier years, resource-oriented cooperation was the focus. Today, we are entering a new era of energy cooperation brought about by a shift in energy concerns as the world pays more attention to global warming. The history of Japan-China energy cooperation is illustrative of this change in emphasis.

Energy cooperation began with the normalization of the Japan-China bilateral relationship in September 1972. Japan's Prime Minister Tanaka Kakuei visited China and signed the Treaty of Peace and Friendship with Chinese Premier Zhou Enlai.

Japan began importing Daqing crude oil in 1973, a development that was deemed as a powerful accelerator to Japan's drive to diversify its oil supply sources. Export facilities at Dalian were poor, and Daqing is a high-pour-point crude oil which is difficult to handle. Nevertheless, pushed by the oil crisis in October of that year as well as the intensifying environmental regulations on sulfur oxide (SO_x) emissions, the Daqing crude oil soon became an important source of low-sulfur crude oils for Japan (Figure 2.12). For China, Daqing represented the injection of a huge amount of foreign currency, which it needed to develop its economy. Because of the turmoil in China after the Tiananmen incident, a Long Term Trade Agreement was signed only in 1978.

This traditional-style cooperation based on energy export and import lasted almost three decades, ending in the early 2000s when China became an oil importing country. Coincidentally, that type of cooperation ended just as the bilateral relationship between the regimes of China's Jiang Zemin and Japan's Junichiro Koizumi deteriorated. Although energy dialogues were still held occasionally, energy cooperation came to a standstill.

It was only in the autumn of 2005 that a new initiative arose to renormalize the relationship. After intensive dialogue, Japan's Minister of Economy, Trade and Industry Toshihiro Nikai and China's Ambassador to Japan Wang Yi agreed that EEC is a most suitable subject for bilateral cooperation.

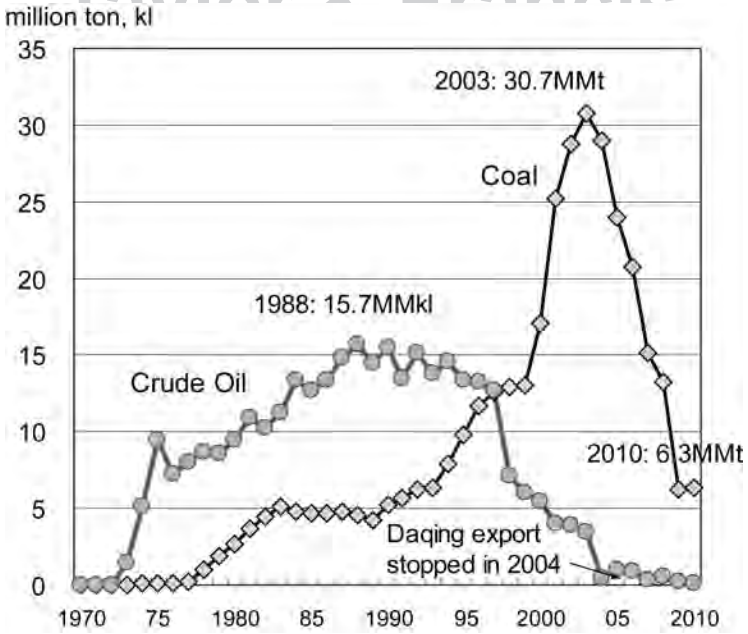

Figure 2.12 Japan-China energy cooperation
Source: Ministry of Finance, Japan Trade Statistics, published monthly and annually
Notes: MMt – million ton; MMkl – million kilolitre

The first core activity of this cooperation initiative is the Japan-China Energy Conservation Forum. This was a turning point for the renewal of Japan-China energy cooperation activities. The Japan-China Energy Conservation Forum held its first annual meeting in Tokyo in May 2006. Since then, activities under the Forum have expanded through the efforts of the public and private sectors in the two countries.

Another core activity under the bilateral cooperation initiative is the ministerial-level Energy Ministers Policy Dialogue, which held its inaugural meeting at the same time as Chinese Premier Wen Jiabao's visit to Tokyo in April 2007. The third activity is the Japan-China Energy Conservation and Environmental Business Promotion Model Project, which involves developing model projects for demonstration. Another activity, the Japan-China Consultation Centre for EEC and Environment provides support for the development of businesses to implement energy conservation. The fifth core activity, the Framework for Developing Human Resources for Energy Management, focuses on capacity building.

Despite the tense political relations between the two countries' administrations at the time of the formation of the Japan-China Energy Conservation Forum, it has increased its activities year to year, both in terms of breadth and depth. In November 2011, the sixth Japan-China Energy Conservation Forum was held in Beijing. Over 1,000 participants attended the Forum, 500 from each of the two countries. Among them were Li Keqiang, Vice-Premier of China's State Council; Zhang Ping, Vice Chairman of the China's National Development and Reform Commission (NDRC); and Yukio Edano, Japan's Minister of Economy, Trade and Industry. Zhang and Edano signed a memorandum in which both countries agreed to the objective of building a less resource- and energy-intensive socio-economic system by enhancing energy conservation and promoting renewable energies.

At the 2011 Forum, a record 51 cooperation projects were signed (METI 2011). They ranged from industrial energy conservation to environmental protection, such as sludge treatment, water treatment/production/recycling, as well as an increasing number of smart grid and smart community projects. The IEEJ and the Energy Research Institute (ERI) of China's NDRC signed an agreement for a joint study on a top runner system for promoting energy savings (the two institutions had earlier worked together on a three-year joint study on energy conservation legislation).

The spectrum of Japan-China business-based cooperation on energy conservation and the environment is also steadily expanding. At working sessions during the 2011 Forum, experts from the two countries made presentations and exchanged views on energy conservation and the environment in seven individual fields. Prior to the meeting, Japanese delegates had gone on six tours to visit organizations and companies in nine of China's provinces and cities for business-matching and business-to-business exchange in the energy conservation and environmental sectors.

New era of energy cooperation

As noted above, Japanese policy on energy security cooperation has been changing in line with the increasing concerns over the global environment and, in this connection, Japan is focusing on cooperation in the area of implementing and supporting new technologies and renewable energies, a strategy that is thought to be able to pay substantial dividends. IEEJ projections, for example, show that a substantial reduction in GHG emissions will be achievable if the best available and near-commercial technologies are applied together with carbon capture and storage (CCS) (Figure 2.13). Under the Advanced Technology Scenario, GHG emissions in 2035 will be lowered to 28.6 gigatons of carbon dioxide equivalent ($GtCO_2e$) from 42.7 $GtCO_2e$ in the BAU Case. The greatest contributor to emissions reduction is EEC, and this is followed by non-fossil fuels. Recognizing this, Japan gives priority to EEC and renewable energies in its energy cooperation programme.

On the demand side, the main solutions are the introduction of new technologies for energy use such as heat pump systems and hybrid vehicles as well as the orientation of entrepreneurs and consumers toward low-carbon behaviours. Supply-demand collaboration, such as a smart grid system for better, greater use of renewable energies, has also come under consideration. On the supply side, the main solutions are efficient fossil fuel use in power generation and industry, clean coal technologies (CCTs), switching to low-carbon fuels and increasing the supply of zero-emission fuels such as nuclear, hydro- and

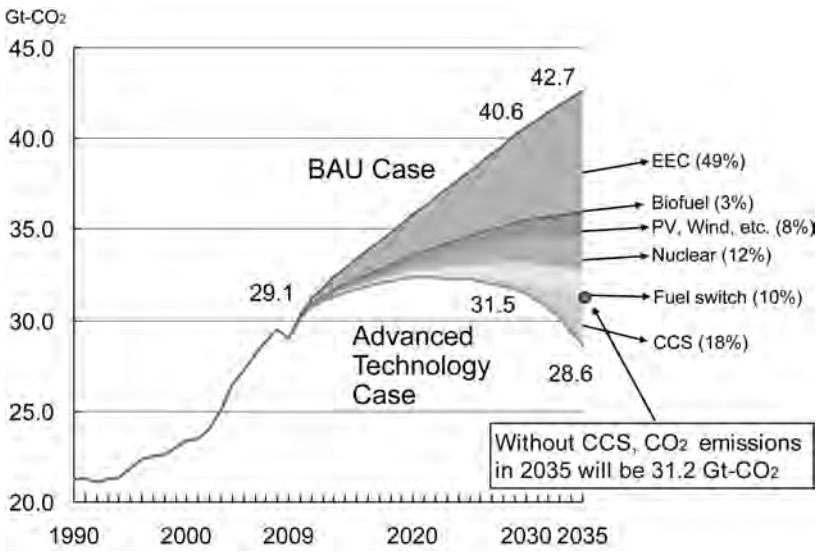

Figure 2.13 CO_2 emissions reduction by source
Source: IEEJ 2011a
Notes: $GtCO_2$ – gigaton carbon dioxide; EEC – energy efficiency and conservation; PV – photovoltaics; CCS – carbon capture and storage

renewable energies. However, without proactive introduction of CCS, GHG emissions will remain at 31.2 gigatons (Gt), which is higher than the 2009 level.

Thus, EEC cooperation programmes are structured to transfer Japan's strengths in two categories: (1) a socio-economic system for the introduction of technologies and products; and (2) demonstration of EEC projects. Category 1 programmes include the development of laws, institutions and social programmes to allow easier and proactive introduction of efficient products and technologies. Category 2 programmes include the development of model projects in counterpart countries. Since EEC businesses have multiple aspects spreading over the manufacturing, construction and residential sectors, these programmes also consider EEC for inter-sectoral or multi-purpose products (including home appliances) and technologies.

To enhance awareness, Japan proactively supports social structure development through initiatives such as arranging joint forums with its counterparts and mobilizing public and private sector collaboration. Following the success of cooperation between Japan and China on EEC, the Japanese Business Alliance for Smart Energy Worldwide (JASE-World) was established in 2008. The aim of this consortium of public and private institutions is to create a system to advance energy-saving technologies, products and social structures, and to propagate energy-saving businesses all over the world. The above activities have three aspects, namely, frameworks for international cooperation, a menu of EEC programmes and support for structuring institutions.

Frameworks for international cooperation

Japan's EEC cooperation is promoted under various international frameworks:

- bilateral cooperation mainly with China, India and other Asian countries;
- multilateral cooperation such as through the activities of the United Nations, the Asia-Pacific Economic Cooperation (APEC), ASEAN +3/+6, G8+3 and the East Asia Summit. These activities also include joint research via the Asia Pacific Energy Research Centre (APERC), Joint Oil Data Initiative (JODI), ASEAN Centre for Energy (ACE), Economic Research Institute for ASEAN and East Asia (ERIA), etc.;
- international public and private cooperation activities, typically through the Asia-Pacific Partnership on Clean Development and Climate (APP).

Menu of EEC programmes

Japan's EEC programmes span five main areas: (1) energy use: energy manager system / energy management standard; (2) appliances: energy efficiency standard and labelling system; (3) facilities: model projects for commercial

application; (4) matching of technologies and business partners; and (5) public/private joint forum: formulation of action plans and policies.

Energy manager systems are programmes designed for the collection of accurate records and plans related to the energy consumption of end users, in order to directly come to grips with the energy-consuming performance of users. Table 2.4 provides an overview of Japan's efforts to cooperate with other Asian countries on the development of energy manager systems. The data and information obtained through such systems will be utilized in formulating other policies such as CDM and ETS.

The Top Runner Programme (TRP) is one of Japan's most successful programmes for promoting energy efficiency standards and labelling. This programme was set out at the 1998 review of the Energy Conservation Law and has produced significant improvements in energy efficiency. At present, there

Table 2.4 Japanese cooperation initiatives in energy manager systems

Country	*Forms of Japanese cooperation*
China	• Cooperation framework for developing human resources for energy management.
India	• Supporting the development of legislation of the Energy Conservation Law (including energy manager system). • Providing training and expert dispatch programmes with the Bureau of Energy Efficiency (BEE) and the Petroleum Conservation Research Association (PCRA, an energy efficiency and conservation (EEC) promoting body under the Ministry of Petroleum and Natural Gas).
Indonesia	• Providing support for the drafting of the EEC Master Plan – since 2007. • Supporting the development of legislation of the Indonesian energy conservation law (including the energy manager system). • Carrying out training and expert dispatch programmes for a pilot plan to introduce an energy manager system into the East Java State – since 2006.
Vietnam	• Dispatching experts to the Ministry of Trade and Industry on a long-term basis to develop legislation of the energy conservation law since 2007. • Providing training programmes for government officers. • Implementing a support programme for the drafting of the EEC Master Plan (which includes an energy manager system) – since 2008.
Malaysia	• For the legislation of the Energy Conservation Law (including the energy manager system). • Providing training and expert dispatch programmes for the Ministry of Energy, Water and Communication as well as Pusat Tenaga Malaysia (PTM, or Malaysia Energy Centre, a body for EEC activities) since 2004.
Thailand	• Implementing training and expert dispatch programmes (2002–05) • Providing materials for establishment of an Energy Manager Training Centre for the training of energy management officers (2002–05) • The above programmes led to the amendment of the Energy Conservation Law in 2007.

Source: Compiled by the Institute of Energy Economics, Japan (IEEJ)
Note: The above information is based on the activities of Japan's Ministry of the Economy, Trade and Industry (METI)

are 21 items designated for further efficiency improvement under the programme.

Another type of programme, model projects for commercial application, aims to demonstrate commercial applications of Japanese EEC technologies with a view to verifying the high efficiency of commercial-class plants in countries where such technologies are yet to be introduced. Japan implemented 42 programmes in eight countries mainly in Asia from 1993 through to 2008. By 2007, those programmes had implemented about 130 model projects, including about 50 units of waste heat recovery systems for cement factories and about 30 units of similar systems for steel mills in China. Energy service company (ESCO) systems are also being extensively developed.

In terms of the match-making of technologies and partners, JASE-World deploys Asia-wide activities proactively in close cooperation with the Japan Business Federation (JBF) or Keidanren. The JBF compiled *The 600 Cases for CO_2 Emissions Reduction* in 2004 as a guidebook of Japanese experiences and inventions. This guide has been revised, with the number of cases expanded to 900 (JBF 2007).

Public and private forums are also being held – with China, India, ASEAN and others – to support the promotion of private activities to develop EEC businesses. Notable under this category are the Japan-China Energy Conservation Forum (discussed earlier) and the Asia ESCO Conference held in 2005 and 2007.

Structuring institutions

Japan provides support for structuring institutions through (1) training programmes in Japan; (2) expert dispatch programmes; and (3) joint studies, joint research and development (R&D) and other collaboration projects.

Capacity-building training in Japan

Under this programme, policymakers are invited to attend training courses held over one or two weeks in Japan. These courses cover various aspects of EEC, including legislation, institutions (tax and subsidy systems, etc.), promotion methods, EEC technologies and energy management systems. Site visits are also included. Between 2004 and 2008, about 900 participants were trained under the programme. In 2009, this initiative was expanded, with the goal of inviting 2,000 participants over a span of three years. Courses on renewable energies were also added. In 2009, there were 450 participants on EEC programmes and 150 participants on renewable energy programmes.

Expert dispatch programmes

Another form of support provided by Japan is the dispatch of experts to various countries, either on a long-term or a short-term basis. Under the

long-term dispatch programmes, experts are sent to support the drafting of energy conservation plans (EEC targets, EEC action plans, etc.) and the development of structuring institutions and systems. For example, experts were dispatched to Vietnam to assist with the drafting of the Energy Conservation Law which was enacted in 2010. Short-term dispatch programmes could include energy management training at factories. About 400 experts participated in short-term programmes between 2004 through 2008. In 2009, this programme was further expanded, with 80 experts dispatched on EEC programmes and 30 experts on renewable energy programmes.

Joint projects

In addition to training and transfer of expertise, Japan also participates in joint studies and R& d as well as other collaboration projects with various countries. An example is a technical cooperation initiative with the China National Institute of Standardization (CNIS) under a public-private collaboration arrangement. The project focuses on measuring the energy efficiency of air-conditioners using two advanced high-efficiency technologies from Japan, namely, heat pumps and inverters. Also, the IEEJ and the ERI of China's NDRC have conducted a joint study on EEC that covers laws, institutions and policies; energy efficiency measures by sector; achievements, issues and recommendations; local activities, etc. They have now extended their cooperation with an agreement on a joint study on a top runner system, as mentioned in the earlier section on Japan-China energy cooperation.

The implementation of cooperation programmes requires substantial budget and manpower. Various ministries, subordinate organizations, business associations, academies and institutions, consultants and private firms would have to be involved. In Japan, the main ministries engaged in such efforts are the Ministry of Foreign Affairs, the Ministry of Economy, Trade and Industry (METI) and the Ministry of the Environment. Among government arms are the Japan International Cooperation Agency (JICA), the New Energy and Industrial Technology Development Organization (NEDO), the Japan Oil, Gas and Metals National Corporation (JOGMEC) and the Japan Bank for International Cooperation (JBIC). The JBF and its member associations and firms also pursue voluntary programmes in the private sector. Cooperation projects are implemented by consultants, academies, research institutes and private firms under contract with the aforementioned organizations.

Several problems have been observed in past EEC cooperation projects with Asian developing countries. First, developing countries had institutional problems such as the lack of responsible office(s), limited budgets and small incentives for EEC. Another issue was that, at the business level, there was a lack of awareness on EEC when considering the expansion of production and marketing capacity. Subsidies on energy or regulated, low prices could be used to mitigate this. Funding issues are another challenge, particularly the high initial investment cost of applying Japanese high-quality but expensive

equipment and technologies vis-à-vis the proper treatment of intellectual property. Developing countries also lacked experts with sufficient knowledge and experience in both the public and the private sectors. These aspects and local specificities would need to be carefully considered to improve future cooperation programmes.

Conclusion: energy policies for sustainable development

Energy policies must be aligned with other national policies to realize sustainable development. It is widely agreed that this would require the harmonization of three often conflicting elements, namely, economic growth, energy security and environment protection, or the 3Es.

The policy formulation process

The process of formulating an energy policy starts with a grand design which articulates the goals of society with regard to its future. The next step is to identify the development pathway to fulfil that design. Finally, appropriate policies must be selected at various points along the pathway. A low-carbon society appears to be the best solution to address the growing concerns over global warming. To achieve this, each state must establish a grand design of its future with clear (numerical, if applicable) goals. Then, some practicable development pathways should be identified for deliberation, with due consideration given to each state's own resources (physical, human, financial, cultural and intellectual), capability and geopolitical circumstances. Such discussions should coalesce into a long-term energy plan. Finally, appropriate energy policies should be selected and enforced in accordance with the energy plan.

In formulating energy policies, a state would have to take several important elements under consideration – safety, security, stability and sustainability. A state must ensure that any energy supply system that is developed is safe and reliable. In discussions of energy and environmental issues on a global scale, safety had previously been considered a given. However, the Fukushima Daiichi accident served as a reminder that the issue of safety is fundamental and that there must be specific focus given to the issue when formulating energy policies. Another major consideration for a state would be the security of its energy supply, particularly its import sources and issues of supply routes. Also important is the development of the energy market. The market has to, as far as is possible, facilitate stable prices. Finally, a state has to develop policies to manage the environmental burden caused by energy consumption.

The policy toolbox

In the foregoing sections, the policy toolbox for energy and the environment was examined with reference to the past and current experiences of Japan and Asia. These policy actions may be classified into two groups; those to initiate socio-economic reform and those to enhance technical improvements.

Socio-economic reform

The main policy actions needed to advance socio-economic reforms are as follows:

- Set out a long-term national energy plan, which includes a grand design for the future and identifies the pathway to reach there.
- Establish an implementing body – one that operates at central as well as local government levels – responsible for the formulation and implementation of the national energy plan.
- Set out preferential policies to direct society and industry toward a low-carbon society. Options include incentives, subsidies and taxes.
- Set forth legislative institutions, laws and implementing rules and/or legislation for fair and transparent enforcement and administration.
- Implement public relations activities to enhance people's awareness of and actions to support the above policies.

Technical improvements

The policy actions to encourage and promote technical improvements could be summarized as follows:

- Promote R&D for technology improvements and innovations based on a long-term technology development map.
- Set out an information and coordination centre as a focal point for the match-making of technologies, businesses and academies. This would facilitate efforts to find the exact technologies and counterparts needed.
- Set out quality or performance standards for products and goals for technology development.
- Provide a budget for the support of sub-commercial or pre-commercial projects. This could include funds for loans to encourage such projects.
- Enhance technology transfer and capacity building.
- In selection of policies, international cooperation is essential for industrialized countries such as Japan and Singapore, whose economies are already at a mature stage and domestic mitigation potential is limited. They should allocate resources and funds more for regional and global cooperation.

Major issues going forward

The 2011 accident at the Fukushima Daiichi nuclear power station raised significant questions about nuclear safety and invoked harsh criticisms against use of nuclear power. However, we are required to accommodate the world's strong appetite for energy while simultaneously combating global warming. To what extent can we use fossil fuels? Do we have the luxury of totally abandoning nuclear energy? Can we let our economy depend heavily on renewable energy, which is known to be intermittent in nature? How can we use nuclear energy safely? We need to make responsible decisions on these issues based on realistic assessments and views.

The Fukushima Daiichi accident has led to a major shift in Japan's energy policy. The country needs to revisit its energy strategy and examine its policies more carefully on the dimensions of practicability, economic feasibility and effects, in order to plot a logical, realistic pathway that takes into account the fact that the range of policy options has narrowed in the aftermath of the Fukushima Daiichi accident.

Another concern is the difficulty in achieving international accord on severe control on energy use to mitigate global warming (Kanekiyo 2010). Progress at the meetings of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) has been slow. A unanimous, top-down agreement by all 192 members seems impossible, given their different backgrounds and national interests. Voices of the minority should be respected, while the opinions of the majority must be adopted and brought into action. The urgency of the matter means that the present institutional impasse must not be allowed to be a barrier to necessary action. World leaders should make a move to set out a practicable target and to initiate proactive actions as responsible citizens of the earth. In addition to mitigation, adaptation measures must be considered more seriously also.

In countering energy and environmental problems, an ambitious target does not necessarily give us an answer, while there is no single perfect and decisive measure. We need to structure and mobilize every conceivable means as applicable, setting up appropriate rules and regulations, supporting subcommercial but necessary projects and creating fair and equitable markets. This may resemble oriental medication; a combination of various medicines will eventually produce slow but steady effects.

Notes

1 For example, the most advanced CCGT plant has achieved electricity generation efficiency of 59 per cent (Group 1 units of Tokyo Electric's Kawasaki Power Station), while the most advanced ultra-supercritical (USC) plant using coal has achieved 43 per cent (No. 2 unit of J-Power's Isogo Power Station).

2 According to the US EIA's *Annual Energy Outlook 2011*, US natural gas imports will decrease from 0.41 trillion cubic feet (Tcf), or 8 million tons (actual 0.45 Tcf or 8.6 million tons) in 2009 to 0.14 Tcf, or 2.7 million tons, in 2035. The US EIA had

forecast in its *2004 Annual Energy Outlook* that US net gas imports would amount to 28 per cent of the total natural gas supply by 2025 because of stagnant domestic production.

3 This amounts to a 40 per cent reduction from the 2007 level of 1.22 billion tons. It means that, if the target for 2050 is set at 80 per cent of 1990 levels, about half of the targeted reductions will have been realized by 2030.

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3 The 'Asian premium' in crude oil markets: fact or fiction?

Tilak K. Doshi and Adi Imsirovic

Introduction

There is a widely held perception that Asian customers have been paying a premium for Middle East crude oil, relative to their counterparts in the USA and Europe. This has led to calls for intervention among some observers of the Asian crude oil market in order to mitigate the so-called 'Asian premium'. More recently, it has been argued that the premium has been reversed because Asia has emerged as the dominant consuming region, forcing the Middle East oil producers to reduce their crude oil prices relative to the other oil-consuming regions of Europe and the USA.

In this chapter, we seek to investigate the basis of arguments that assert the existence of the Asian premium. We analyze the regional market structure and Saudi formula prices for crude oil sales to understand whether the analysis supporting the argument for the existence of an Asian premium is tenable. We conclude that the existence of an Asian premium is misconstrued, and that regional price differentials of Middle East crude exports are a function of market structure and formula-based regional crude oil price setting by key Middle East exporters, in particular Saudi Arabia.

Section 1 lays out the substantive claims of the existing literature on the Asian premium. We explain formula-based pricing in Section 2. In Section 3, we examine the structural characteristics of the crude oil market. We argue that market structure plays a role in perceived distortions in regional crude oil price differentials. We then provide counter-arguments to the claims regarding the existence of the Asian premium, in Section 4. In Section 5 we calculate the free on board (FOB) price differentials for Arab Light[1] crude oil exported to the USA, Europe and Asia for the period 2007–09 to assess recent claims of the 'reversal' of the Asian premium. Lastly, we summarize our conclusions in Section 6.

1. The Asian premium

It has been commonly believed that Asia pays higher prices for crude oil exported from the Middle East relative to its counterparts in Europe and the

USA. This price differential is referred to as the 'Asian premium'. There have been several papers by government-funded research institutions in the key north-east Asian crude oil-importing countries – Japan, South Korea and China[2] – and by US academics[3] analyzing this issue, which have estimated the magnitude and variation of the so-called premium.

The Institute of Energy Economics, Japan (IEEJ) reported that 'crude oil prices for Asia have remained higher than those of European and US markets by $1.00 – $1.50/bbl [per barrel] throughout the 1990s' (Ogawa 2003: 1).[4] In another paper by the IEEJ, the Asia crude oil premium to Europe was estimated to have averaged $0.94/bbl over the period January 1991 to June 2002 (Ogawa 2002b: 2). More recently, an article in the *Wall Street Journal* indicated that the Asian premium was, on average, 'about $1.20 a barrel since 1988', without attributing sources (Chiu and Pleven 2010: 1). Utilizing data from the *Petroleum Intelligence Weekly* (*PIW*, a leading industry journal) for the period 1990–97, Soligo and Jaffe (2000: 122) found that Saudi FOB prices for crude oil destined for Asian markets have been, on average, $0.83 higher per barrel than for Western Europe, and $0.93 higher than for the USA. In another paper, Soligo and Jaffe (2004: 3) calculate the Asia–Europe differential for Saudi Arab Light FOB sales to average $0.90/bbl over 1988–2002, increasing to $1.48/bbl over 1997–2002. In another careful study, covering January 1992 to November 1996, the Asia-destined loadings for Saudi Arab Light realized prices were found to be, on average, $1.00 to $1.20/bbl higher than for European loadings (Horsnell 1997: 305). These quantitative estimates are broadly consistent with the Asian premium being estimated to have averaged in the range of $1.00 to $1.50/bbl over the 1990s and the early part of the 2000s.

Several north-east Asian government-funded research institutions have cited far-reaching implications of the higher crude oil prices facing Asia. The IEEJ believes that refiners in Asia are already disadvantaged, given poor Asian refining margins. It calculates that higher crude oil prices have caused refining margins to become negative, at around minus $1/bbl, since 1999; the IEEJ estimates that the Asian premium imposes an additional burden of $4–8 billion annually (Ogawa 2002b: 3). Furthermore, many claim that higher crude oil prices also lead to higher prices for other energy commodities, such as liquefied natural gas (LNG) and coal, which are linked to oil prices.[5] Similarly, the Korea Energy Economics Institute (KEEI) points out that extra costs adversely affect economic and industrial activity and can lead to the deterioration of the competitiveness of Asian economies. The KEEI estimates that the Asian premium burdens the Korean economy by as much as $0.8–0.9 billion a year (Lee 2003, 9).

Proposals have been offered by East Asian oil market observers for the consideration of Middle East exporters. These have included adopting Brent crude as the reference price for Asian sales, rather than the Oman/Dubai average, the current reference; charging Asian customers an average of their US and European prices; and allowing spot trading of Arab Light, thereby

making this effectively the marker crude for Middle East grades in Asia. One of the more controversial 'solutions' to the Asian premium issue has been talk of a 'combined challenge' by China, Japan and South Korea to Middle Eastern oil producers, by leveraging joint purchases of crude oil for collective bargaining power (Teo 2004). To date, nothing has come of this initiative, although Teo (ibid.) did report that 'China, Japan and Korea are together searching for ways to eliminate the [Asian] premium through an ad hoc body known as the "Committee on Northeast Asian Co-operative Initiative"'.

2. The Saudi formula-based pricing mechanism

In 1973/74, the Organization of the Petroleum Exporting Countries (OPEC) inherited from the oil companies collectively known as the Seven Sisters[6] a pricing regime that effectively administered the price of oil by fiat. Prior to 1974, the Seven Sisters fixed a 'posted price'[7]which was used to compute royalties and the income tax paid to producing countries. When OPEC countries nationalized their upstream hydrocarbon assets, effectively the administered price was the price at which oil was sold and bought in arms-length transactions from the exporting countries.

The administered (or fixed) price system collapsed in 1985 (Mabro 2000: 1). In the years leading up to that time, there had been disarray in the OPEC ranks over the pricing policy, including the fundamental long-term pricing strategy. This was particularly obvious during the 1980 conference in Algiers. At that time, OPEC official prices were falling out of line with competing freely traded crudes in the Atlantic Basin spot markets. The problem arose from the difficulty encountered by OPEC in defending a given price in the face of strong competition from emerging, and rapidly growing, non-OPEC sources. At a time of stagnant world demand, increasing non-OPEC supplies resulted in the emergence of considerable surplus capacity within the OPEC region. This induced intra-OPEC competition, which led several OPEC member countries to discount their prices in order to protect their export volumes. By adhering to the official pricing system, which most of OPEC was abandoning, Saudi Arabia was forced to reduce output and take on the role of a swing producer. Between 1980 and 1986, the country suffered a continuous decline in the volume of its exports, from about 10 million barrels per day (mmbd) to under 3 mmbd. By the mid-1980s, the OPEC-administered price system, which had been in operation since 1974, became unsustainable because it was resulting in huge losses for Saudi Arabian export revenues (Mabro 2005: 7).

For a relatively short but dramatic period in 1986, 'netback pricing' replaced administered prices. Under netback arrangements, the price of crude oil was referenced to the value of refined petroleum products derived from the given crude. In effect, netbacks guaranteed a refinery margin that, during the periods of excess refining capacity that prevailed at the time, resulted in falling product prices. In turn, this led to a collapse of crude oil prices. The

effects were catastrophic for crude oil exporters. At one point, oil prices, previously priced at $24–26/bbl, fell to $8–10/bbl.

The ensuing price recovery followed an OPEC meeting in November 1986. This meeting was significant, as it changed the overall strategy from charging official administered prices to managing OPEC supply through the quota system, in order to stabilize the price around a target level of $18/bbl. Given that neither the administered OPEC prices nor netback prices were acceptable any longer, a system of market-related formula-based prices was gradually adopted. This involved setting official monthly discounts (or premiums) relative to the other marker or reference grades, such as Brent or West Texas Intermediate (WTI).

We focus on the formula-based pricing mechanism used by Saudi Arabia's national oil company, Saudi Aramco, whose pricing system is loosely tracked by most exporters in the Middle East.[8] Saudi Aramco's sales to international buyers are made under long-term contracts, usually 'evergreen' contracts, renewable annually. The pricing formula generally has four components: point of sale, a market-related base price, an adjustment factor reflecting both crude oil quality and point of sale, and a timing mechanism that stipulates when the value of the formula is to be calculated (*PIW* 2009: 4). The base price is calculated by taking the daily average for the market prices of a particular widely traded reference crude oil. The FOB price for European destinations is tied to Brent Weighted Average (BWave)[9] data for Brent crude oil for the 10 days around the delivery of the cargo, about 40 days after loading at Ras Tanura, a port in eastern Saudi Arabia.[10] For the USA, the FOB price is linked to WTI crude oil for the 10 days around delivery, about 50 days after loading at Ras Tanura. For buyers in Asia, crude oil prices are linked to the average spot prices of Oman and Dubai crude oils during the month in which the crude is loaded at Ras Tanura for the Asian market. The base price is then adjusted by adding or subtracting an 'offset' or 'adjustment' factor. This takes into account the point of sale (to adjust for the freight costs) and the quality differential between the Saudi and reference crudes.

Crude oils differ from one another in chemical and physical properties, which play an important part in their refining and subsequent value as refined petroleum products. The two most important characteristics of crude oils are specific gravity, measured in 'degrees API' (a scale devised by the American Petroleum Institute) and percentage of sulphur content by weight. Lighter crudes (those with higher API) produce a large number of lighter products – such as gasoline – with higher market values. So, other qualities being equal, lighter crude grades are expected to sell at a premium over heavier crude grades. High sulphur content has an adverse effect on the value of crude oil, because it leads to higher operating costs for refineries due to special processing (such as oxidative desulphurization technology) and maintenance requirements. In addition, in many countries new environmental legislation mandates lower sulphur content for gasoline and diesel. Therefore, high-sulphur ('sour') crude is expected to sell at a discount relative to low-sulphur

('sweet') crude of the same API. The quality differential is essentially the difference between the gross product worth (GPW) of the Saudi crude and the reference crude. GPW is calculated by multiplying the refined product yield of each barrel under a given refinery process configuration with the price of the resulting refined products in the spot market.

The official selling price (OSP) for any particular Middle East export crude oil is simply the sum of the reference crude price and the announced monthly offset for given regional destinations, as explained above. For Atlantic markets, the reference crude's WTI[11] and BWave are traded in highly liquid markets with prices set competitively, both in physical barrel trades as well as in the organized futures markets of New York and London. In contrast, Asia has no well-established futures markets for crude oil. In the absence of an established crude oil futures market, during the 1980s the Dubai blend forward market[12] for crude was successfully developed. This was able to take place because the new market fulfilled a number of conditions: its relatively large production volumes were not dominated by term contracts; it was not marketed by a government monopoly, but rather by a number of equity producers; and there were no resale restrictions. Price quotes for Dubai crude traded in the forward market were based on assessments of previous deals as well as on bids and offers by energy-pricing agencies such as Argus and Platts.

However, as Dubai crude production went into decline during the early 1990s, there was a corresponding fall in liquidity in outright deals that provided absolute price signals. As a result, the Dubai market no longer served as an indicator of absolute prices; instead, it became a relative price market, where its price was set relative to Brent and the time structure of Dubai prices. The markets for Brent–Dubai spreads and Dubai inter-month spreads are well established, and Platts's assessed Oman–Dubai prices became the basis for pricing Middle East crude exports on term contracts to Asia.[13] There has been extensive commentary in the industry media regarding the imperfections of the Platts Oman–Dubai price quotation. The fact remains, however, that the world's largest flow of crude oil – that is, the flow from the Middle East to Asia, amounting to some 15 mmbd – is largely priced on the basis of this agency's assessments. That assessment, based on the Platts 'partials assessment methodology', allows for delivery of crude from Oman and the Upper Zakum field (in the Persian Gulf) in lieu of Dubai, and remains the reference quotation for Middle East term contracts.[14]

The Dubai Mercantile Exchange (DME) launched its Oman futures contract in June 2007, and since then has established itself as the key arena for physical Oman crude oil delivery. In the third quarter of 2010, the exchange delivered 41.4 million barrels of Oman crude oil, an 82 per cent increase on the same period the previous year (DME 2010). However, its average daily volumes, typically below 3,000 lots (3 million barrels), pale in comparison, for example, to the 150,000 lots (150 million barrels) normally traded in the front month Brent contract every day. The emergence of the DME Oman futures contract as a viable instrument for establishing a reference price for Middle

East crude oil exports to Asia is uncertain. To date, the Saudi, Kuwaiti, Iranian and other Middle East OSPs for Asia-destined crude oil sales are based on Platts's assessments, and there is no indication that this will change anytime soon. No official announcements have been made by the region's national oil companies or their governing ministries regarding adopting the Oman futures contract as their pricing basis.[15]

3. Structural characteristics of the market

To help identify key patterns of the global oil trade, Figure 3.1 gives the estimated major inter-regional oil trade movements for 2009.[16] By far the largest single flow of crude oil trade is from the Middle East (the Arab Gulf or AG) to the Far East (FE), amounting to around 14.5 mmbd. This reflects the large base of demand in Asia (around 25 mmbd) and the limited intra-regional supplies available, from countries such as Australia, Indonesia, Malaysia, Brunei and Vietnam. The only other significant inter-regional flow of crude into the Far East is from West Africa (WAF), approximating some 0.9 mmbd. Part of the West African crude traded into the Far East is base-load, but the total quantum fluctuates depending on the Brent–Dubai differential (since West African crude is priced offBrent). More recent estimates suggest that West African imports into Asia increased by over 60 per cent, to some 1.75 mmbd, during the first quarter of 2010 (Chiu and Pleven 2010: 1).

The North American market (including the USA and Canada) not only produces significant proportions of its own crude requirements, but also has access to short- and long-haul crudes from Latin and Central America (LA, 3.8 mmbd coming into the North American market), Europe (EUR,

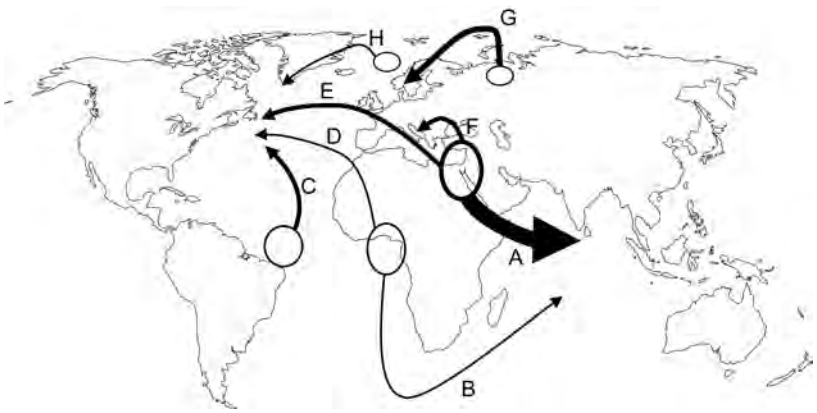

Figure 3.1 Major crude oil flows 2009 (mmbd)
Source: BP Statistical Review of World Energy (2010)
Note: A: AG = > FE, 14.5; B: WAF = > FE, 0.9; C: LA = > USA, 3.8; D: WAF = > USA, 2.3; E: AG = > USA, 1.9; F: AG = > EUR, 2.3; G: FSU = > EUR, 7.5; H: EUR = > USA 0.8

0.8 mmbd), WAF (2.3 mmbd) and the AG (1.9 mmbd). In addition, Europe is a large recipient of Former Soviet Union crude (FSU, 7.5 mmbd), apart from being a significant exporter of crude to other regions – though this figure is going down as crude oil production in the North Sea declines. Urals and North Sea crudes occasionally flow into the Far East, when the economics of inter-regional arbitrage allow. As noted earlier, West African crude also flows into the Far East, volumes of which increase as the arbitrage window allows. However, the base-load of crude supply for the Far East remains the Middle East.

A substantial portion of the incremental non-OPEC supply is located in short-haul Europe/Mediterranean (North Sea/Russia/Caspian) and US Gulf Coast (Latin America/deepwater Gulf of Mexico) regions. Most of the incremental global demand, meanwhile, is in the Far East. West Africa is a source of swing crude exports, flowing east or west (the Atlantic markets) as arbitrage economics dictate.[17] Thus, the pattern of global oil demand has a key asymmetric attribute: while the major portion of global incremental demand in the past two decades has come from the Far East, the majority of non-OPEC incremental crude supply has been focused on the Atlantic market (Horsnell 1997: 279–85).

To the extent that arbitrage makes it viable, North Sea, Russian, but particularly West African crudes flow into the Far East. The claim that lack of competition in Asia's crude oil market results in higher prices in Asia is thus an artefact of the pattern of global crude flows, which in turn is a function of geographic resource endowments, demand sources and transport costs. Thus, it seems apparent that higher crude oil prices in Asia, relative to the USA and Europe, in part reflect a market that has access to few alternative sources of crude oil. As shown in Figure 3.2, crude oil supplies into Asia predominantly flow from the Middle East, with West African and FSU crudes constituting supplies at the margin.

The different characteristics of oil markets between the Atlantic (USA and Europe) and Asia are summarized in Table 3.1. The willingness to pay by buyers in Asia reflects the concerns in these markets with security of supply. Term contracts constitute a predominant source of crude oil for Asian buyers, and regional crude markets have limited spot cargoes. This allows for far less supply-and-demand flexibility than can be observed in the Atlantic markets. In contrast, oil refiners in Europe and the USA require crude oil supplies from the Middle East to be competitive with available short-haul crude supplies in actively traded spot markets. Quite naturally, to remain competitive, Atlantic Basin refiners will be unwilling to pay higher prices for crude supplied under term contracts. In other words, Middle East crude exported to Atlantic markets under term contracts needs to have the characteristics of a spot market in order to remain competitive. Indeed, one may argue that this is not a premium charged to Asian customers as much as a discount that Middle East exporters need to bear in order to maintain market share in European and North American markets.[18]

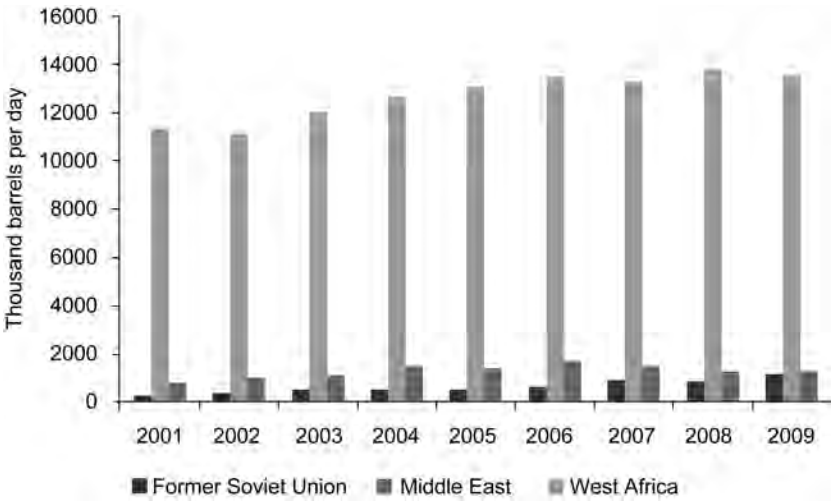

Figure 3.2 Crude oil supplies into Asia from the Middle East, the Former Soviet Union and West Africa

While the liberalized markets of Europe and North America required refiners to actively manage risk in their crude oil-loading schedules, the more regulated oil markets of Asia made supply security a dominant concern for Asian refiners in their purchasing and loading programmes. In economic terms, then, the markets in the Atlantic and Pacific Basins differed in the

Table 3.1 Structural differences between the Asian and Atlantic (US and European) markets

Atlantic Markets	*Asian Markets*
Spot crude competes actively with term crudes from the Arabian Gulf.	Far less spot-traded crude competing with term contracts.
Buyers highly conscious of short-term trading and business risks; risk management critical to refiner's loading programme.	Buyers highly conscious of long-term supply security risk; term supply management dominates refiner's loading programme.
Key refining regions (US Gulf Coast, Rotterdam) can access multiplicity of short- and long-haul crudes in effective competition.	Total region massively short of net crude, with heavy dependence on Middle East crude.
Supply and demand flexible and competitive among many alternative grades (demand is more 'price elastic').	Less flexible supply-and-demand responses in crude markets, less alternative grades, fewer short-haul sources (demand is less 'price elastic').

Source: Platts; authors' calculations

price elasticities of demand – i.e. customers in the two regions differed in their willingness to pay for crude oil.

4. Does Saudi Arabia act as a price discriminator?

Among the various reasons given by researchers in the north-east Asian institutes for the existence of the Asian premium are Dubai illiquidity, unresponsive adjustment factors, lack of competition and rigid supply rules.

Dubai illiquidity

The progressive reduction in Dubai crude oil exports, from its peak of over 400,000 barrels per day (b/d) in the early 1990s, has long been noted. Figure 3.3 shows the fall-off in volumes by the mid-2000s, and industry estimates of current production range from 50,000 to 70,000 b/d. Since the 1990s, limited and falling volumes of Dubai crude production have led to reports of 'manipulation' and calls for an alternative marker. In 2001, in response to media reports of 'market squeezes' (i.e. cornering a particular market), Platts introduced a new price assessment for Dubai crude that allowed sellers to opt for Oman deliverability in lieu of Dubai on contract execution. This expanded the pool of cargoes significantly (from about five to six a month of Dubai to at least 30 to 35 of Dubai and Oman together). This made it difficult for any single player in the market to 'squeeze' Dubai.

In 2006, Platts further revised its Far East benchmark assessment by allowing alternative deliveries of Upper Zakum crude into the Oman-Dubai pool. This was done to counter the drop in Dubai production, which exposed it to the pricing plays (where market players take large position in the forward and paper markets, allowing them to control the physical supply of the crude stream) that proliferated in the 1990s and early 2000s. These changes to the Platts price assessment methodology seem to have resolved the problem, at

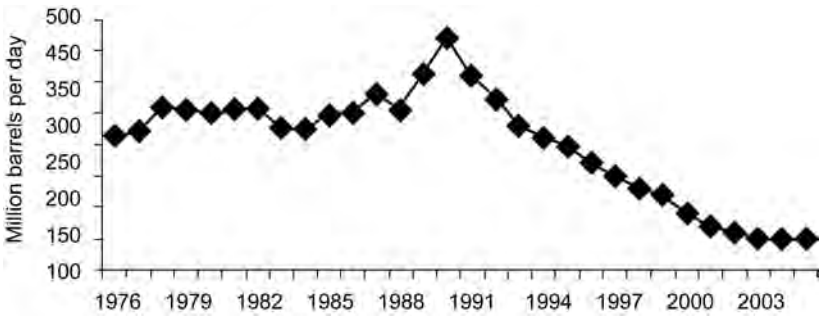

Figure 3.3 Dubai crude oil production
Source: Authors; industry sources

least for the present. Few observers would currently argue that the Asian premium is driven by a paucity of Dubai cargoes.[19]

Unresponsive adjustment factors

In assessing the impact of Saudi Arabia's monthly offsets and whether they are responsive in any precise use of the term, the first thing to note is the insignificant size of these offsets relative to the price of crude oil. Between January 2007 and December 2009, when the Platts Oman/Dubai average quote was $74.65/bbl, the average value of the Arab Light offset was $0.70/bbl, about 0.7 per cent of the Oman/Dubai price (see Appendix 1). When absolute prices of Oman/Dubai have been $20–$26/bbl, as they were for much of the 1990s and 2000s, average Arab Light offsets would have been closer to $0.15–$0.25/bbl.

As explained in Section 2, this chapter, on formula pricing, the offset needs to adjust Arab Light (and other Arabian crude oil grades') values for two factors: refining value and freight cost, relative to the reference Oman/Dubai barrel. If freight values are held constant, then the Arab Light offsets are primarily reactive to changes in refining values of Arab Light relative to Oman/Dubai. Naturally, the monthly setting of Saudi Aramco OSP is a widely watched variable among crude customers' pricing departments, as well as the global industry media. Any competent analyst could set up models of refining values and track freight markets to investigate whether there is any systematic tendency for monthly movements of Saudi offsets to overstate improvements in Arab Light refining value relative to the Oman/Dubai barrel and to understate adverse movements for Arab Light relative refining value. It is therefore difficult to argue that Saudi Aramco marketing and planning departments would intentionally bias their in-house measures of refining values and freight market conditions in order to systematically overcharge its Asian customers. To date, there is no empirical analysis that establishes such a charge.[20]

While the Saudi monthly offset changes may sometimes have overshot in favour of the seller, it would be difficult to maintain that, on the whole, these offset changes support systematic overpricing by $1.00 to $2.00/bbl, as claimed by the East Asian analysts. According to empirical analysis conducted by Horsnell (1997: 303), changes in Arab Light offsets were 'reactive to observed market conditions, with the results implying that $0.75 out of every $1 monthly change in refinery value differentials are reflected in the adjustment terms'.

Lack of competition and rigid supply rules

Soligo and Jaffe (2000; 2004) explain the existence of the premium through a model of constrained price discrimination. They argue that Saudi Aramco's abilities to restrict and monitor the destination of its oil sales, and to charge a

price according to the destination, are prerequisites for the existence of the premium. At the margin, the price differential between Asia and the US or European markets is limited by the difference between the freight costs of transporting West African crude oil cargoes to Asia and to the Atlantic markets. The constrained optimization model presented by Soligo and Jaffe (ibid.) shows how region-specific prices can be set by the seller in order to allocate crude oil exports to maximize global revenues, so long as the regions cannot freely trade that commodity with one another. This is a straightforward exposition of the micro-economics model of price discrimination, with segmented markets exhibiting different own-price elasticities of demand.[21]

These models, however, cannot explain why it is that these markets can remain segmented, without resorting to a depiction of the Saudi role as a form of unilateralism practiced by a price discriminator. Here we come to the essence of the argument asserting the existence of the Asian premium: an imposition is made by the large oil producers in the Arabian Gulf to segment otherwise globally fungible markets. Soligo and Jaffe's (ibid.) positive analysis of the Saudi pricing policy based on a price discrimination model might be read as implying that the Arabian Gulf exporters are not behaving as they 'ought' to as non-discriminating – read, 'responsible' – exporters.

As mentioned in the section on formula pricing, the failure of the administered pricing system of the 1980s made it imperative that Gulf OPEC countries switch over to selling crude oil to end users through term contracts that used reference crude oil prices in each of the major consuming regions (Asia, Europe and the USA). This was because the central imperative for the Saudi crude oil pricing policy, in the aftermath of the 1985/86 price collapse, was (and is) a 'market responsiveness with a low profile',[22] an attempt to avoid being a price leader. Saudi crude exports – and, by extension, Gulf OPEC crude exports – had to be price responsive to growing non-OPEC crude oil supplies in the 1980s and 1990s, such that there did not emerge a two-tier pricing regime as it did under the administered price system.

Saudi crude prices had to be market determined, not market determining, and this could only be achieved by fixing a relationship with regional reference crude oils whose prices are discovered in large, liquid markets. As remarked by Ali Naimi, the Saudi Minister of Petroleum and Mineral Resources, 'The fact is that within the existing complex market framework, with its wide diversity of players, no one can claim to have a Midas touch. We aim at a reference price, leaving markets to determine actual prices through their own dynamics' (Taipei Times 2001).

If Saudi policy were to allow for resale of crudes by its customers, this would immediately lead to further transactions downstream. Crude oil could be redirected to higher-priced markets from lower-priced markets so long as inter-regional price differentials were higher than freight costs. In turn, this would lead to an absolute price discovery, and, once again, such independent price signals would lead to the creation of a global absolute spot price for Arabian crudes. In terms of physical flows, this situation would lead to Saudi

Aramco crude exports 'sloshing' from one region to another,[23] depending on inter-regional price differentials relative to freight costs. For extended periods, Saudi exports would likely be fully concentrated in the closest and highest-valued market, the East of Suez. While oil-exporting countries could 'globalize' their prices by ending end-user and resale restrictions on their crude oil exports, this would entail, in effect, a regression to a situation approximating the pre-1985 administered pricing system and discarding the current formula-based market-responsive pricing system.

As the world's largest crude oil exporter, Saudi Aramco has a marketing strategy based on maintaining 'significant' market share in key consuming regions around the world. The very size of Saudi Aramco's annual crude oil sales programme necessitates a global presence. As with any global corporate actor with a significant export stake in the world market for any particular commodity or class of commodities, its legitimate concern would be to seek a share in all large markets and not to allow a total concentration of sales into one region. This makes sense to the extent that different markets do not have perfectly correlated refined oil product markets and business cycles. Given the scale of Saudi Arabia's role as crude oil producer and exporter, it would quite naturally be a strategic imperative for Saudi Aramco to be a large and preferred long-term supplier of crude oil to the major consuming regions of North America, Europe and the Far East. To achieve this risk-optimizing marketing strategy, a necessary corollary of Saudi oil policy would be to disable the customer's right to 'onward sell' its allotment of crude oil, and thereby create independent selling price signals.[24]

In this context, it is a question not of an Asian premium but of European and US 'discounts'. These discounts were a burden that Arabian Gulf producers – Saudi Arabia in particular – had to bear, given the imperative to maintain market share in Pacific Basin markets in the face of competing non-OPEC short-haul crudes. Put this way, it is entirely possible that the Saudi marketing strategy in fact reduced the potential net present value (NPV) of its hydrocarbon assets by having to discount the price of its crude bound for the Pacific Basin, in order to achieve some reduction in risk across a geographical portfolio of markets. This implied maintaining a higher share of Atlantic Basin markets than would otherwise be the case under unconstrained revenue maximization. One could argue that Saudi pricing policy reduced the NPV of its oil assets, in order to prudently reduce its market risk across regional markets. To achieve its role as a supplier of choice for crude oils around the world, Saudi policy endeavoured to avoid putting all or most of its barrels in one region. In so doing, it acted as would be required of any global risk-optimizing enterprise.

5. FOB price differentials 2007–09: reversal of the Asian premium?

In a new twist to the debate over the Asian premium, a 2010 article in the *Wall Street Journal* asserted that the 'rising power of Asian oil consumers is

increasingly helping them buy oil more cheaply than their counterparts in the West, a reversal of the historical pattern' (Chiu and Pleven 2010: 1).[25] According to the *PIW*, as quoted by Chiu and Pleven, Saudi Arabia sold Arab Light crude to Asia for about $6.40 less per barrel than it charged European buyers in March 2010. Tom Wallin, president of *PIW*, opined that 'an Asian discount is looking more likely to be the new normal' (ibid.). More dramatically, the global oil director at Platts, John Kingston, stated that 'It's a game changer … the balance of power in pricing is drifting to Eastern markets' (ibid.).

In our analysis, we focus on the biggest player in the Middle East, Saudi Arabia, and its national oil company, Saudi Aramco. We estimate the differentials in Arab Light OSPs, which are loaded on FOB terms at Ras Tanura port and destined for three major regions – the USA, Western Europe (WE) and the Far East from January 2007 to December 2009. For Asia, the monthly OSP is generated by adding the announced Asia offset for the month of loading to the reference crude price (the monthly average of Oman and Dubai price, as reported by Platts) for that same month of loading. For the US market, the buyer is charged the 10-day average of reference crude price (the front month WTI price settled at the New York Mercantile Exchange, the NYMEX) taken 50 days after loading at Ras Tanura, adjusted by the announced US offset for the same month of loading. Similar to the USA, the buyer in the Western Europe market is charged the reference crude price (BWave)[26] averaged over 10 days, adjusted by the announced Saudi Aramco offset for Arab Light for European sales. This 10-day average price is taken 40 days after loading at Ras Tanura. The offset will be negative if Arab Light crude is at a discount to the reference crude and will be positive if Arab Light is at a premium.

For all three regions, we used the daily price data for 2007, 2008 and 2009.[27] We chose two dates for the loading or bill of lading[28] (B/L) day. The first loading day chosen was the middle of each month, the 15th. Then we assumed that the oil to be delivered to all three markets was loaded on this same date, in order to clearly compare prices of the same barrels for the three different regions. Once we worked out the time series and obtained results, we chose another, arbitrary date (the fifth day of each month of loading) and calculated another set of prices. This was done to test for the sensitivity of our results to the choice of B/L date. Before we start a discussion of the results, it is worth examining the general trends in the price of oil over the period under consideration. Figure 3.4 shows the movement of the OSPs.

Three distinctive trends are immediately noticeable. First, there is an uptrend from January 2007 to July 2008 prior to the financial crises, reaching almost $140/bbl on a monthly average basis; second, the collapse of the prices, from $140/bbl to below $40/bbl following the financial crises that began in the third quarter of 2008; and third, a recovery and uptrend from the end of 2008 and early 2009. Table 3.2 summarizes our results for Asia/Europe

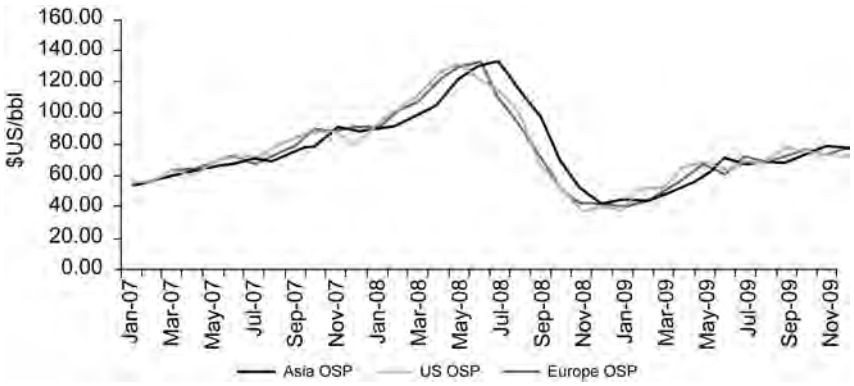

Figure 3.4 Arab Light OSPs by major region
Source: Authors; Platts

differentials for two assumed B/L dates, and compares them with the *PIW* estimates presented in the *Wall Street Journal* article.

As can be seen, the price differentials between Asia and Europe are large and highly volatile. In 2007, Asia experienced a large 'discount' relative to Europe, ranging from $2.00/bbl to $3.57/bbl. Then, in 2008, Asia experienced a very large premium compared to Europe, ranging from $4.59/bbl to $7.00/bbl. In 2009, the premium reversed again, and Arab Light sold to Asian buyers was at a discount to Europe, this time ranging from $0.04/bbl to $0.50/bbl. Over the three years studied, Asia paid a small overall premium of $0.19 relative to Europe.

Figure 3.5 shows that the OSP differential between Asia and the USA for Arab Light ranges from negative $20/bbl to over $30/bbl over 2007–09. In 2007, we estimate that Asia paid on average $2.00/bbl less for its FOB purchases of Arab Light crude, while it paid about $4.70/bbl more in 2008 (when the differential spiked, starting in March) and $1.90/bbl less in 2009.

Similarly, Figure 3.6 shows that the OSP differential for FOB Arab Light between Asia and Europe also ranges from a negative ($15/bbl) to a positive ($25/bbl) number. On average, Asia paid $2.24/bbl less in 2007, $4.60/bbl more in 2008 and $0.04/bbl less in 2009. Therefore, akin to the Asia–USA differentials, annual averages for OSP differentials between Asia and Europe are also volatile.

Table 3.2 Asia–Europe FOB price differentials for Arab Light

Year	*B/L (5th)*	*B/L (15th)*	*PIW*
2007	-2.24	-3.57	-2.00
2008	4.59	5.06	7.00
2009	-0.04	-0.91	-0.50

Source: Platts; authors' calculations

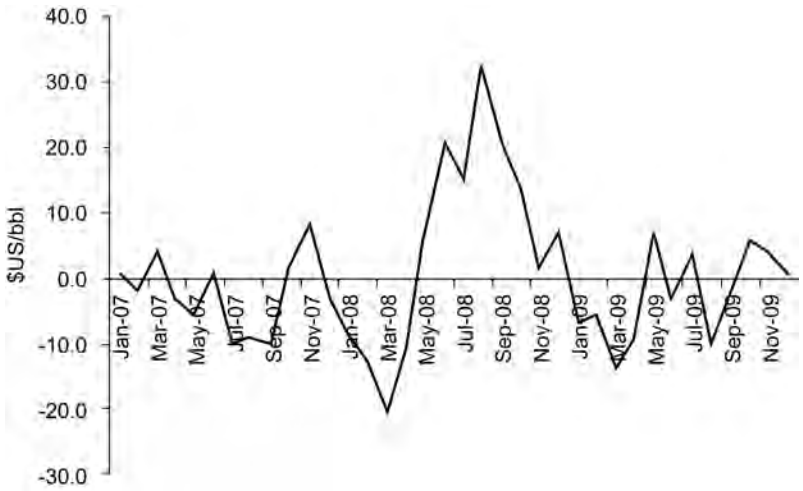

Figure 3.5 AsiaUS Arab Light FOB price differential
Source: Authors; Platts

We then measured the FOB differentials for Arab Light sold in the three markets utilizing the arbitrary loading date, the 5th of the month. This advanced the pricing for crude destined for both Europe and the USA by 20 days, from the 15th to the 5th of the next month. Note that Asian pricing always remains the same with regard to the loading date, since, for Asian sales, the pricing period is the average of the month of loading, irrespective of the actual B/L date. Figure 3.7 gives a plot of the change in the Asia offsets,

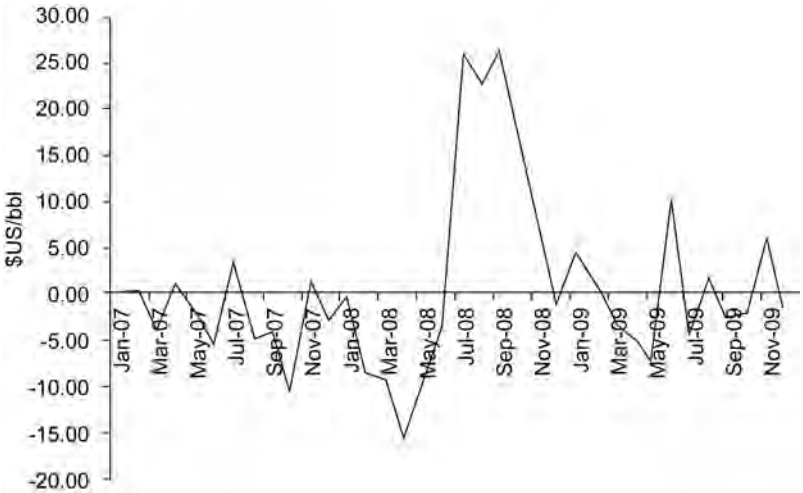

Figure 3.6 AsiaEurope Arab Light FOB price differential
Source: Authors; Platts

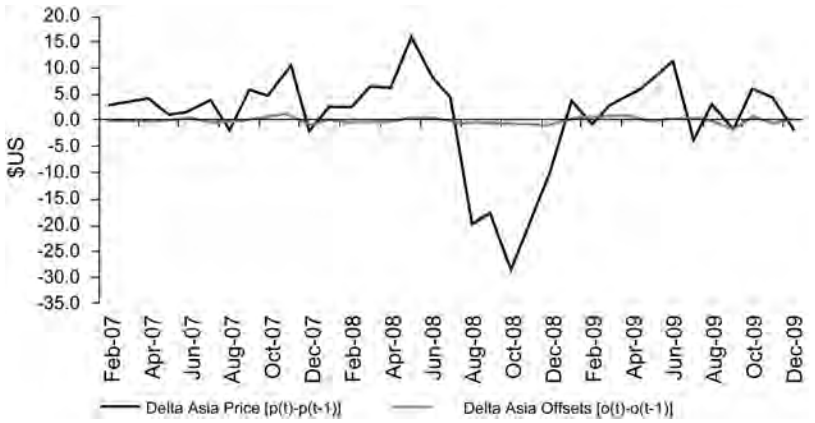

Figure 3.7 Change in the price of the Asia OSPs and Asia offsets ($/bbl)
Source: Authors; Platts

along with a plot of the change in the Asia OSP. During 2007–09, the change in Asia offsets is insignificant compared to the change in Asia OSPs – the magnitude of the change in the Asia offsets is very small compared to the magnitude of the change in the Asia OSPs.

As can be seen in Figure 3.8, the Asian Arab Light OSPs go to a discount of between $10 and $20/bbl to European Arab Light OSPs in March–May 2008, as BWave trends up sharply from $90/bbl to $140/bbl. When BWave trends upward, pricing on a 10-day average 40 days forward will be higher than pricing the Oman/Dubai average monthly price for the month of loading for Asian sales. In other words, in a rising market for BWave reference crude,

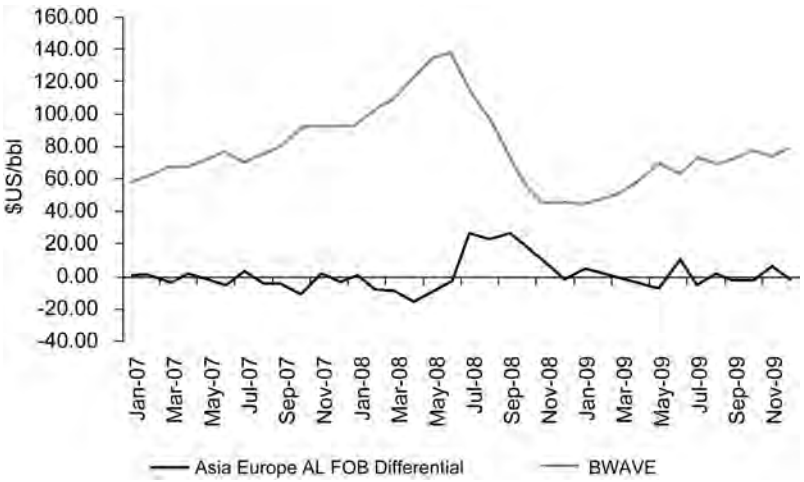

Figure 3.8 AsiaEurope Arab Light FOB differential and BWave
Source: Authors; Platts

one expects crude oil arriving in Europe some 40 days after loading at Ras Tanura to be priced higher than that loaded for the Far East, which is priced on the average of the month of loading. When BWave falls off steeply from the $140/bbl peak to around $40, beginning around June/July 2008, we see the Asian OSP quickly becoming a premium over the European OSP of up to $20/bbl (around July to September 2008). A similar relationship exists between Asian OSP and US OSP, as shown in Figure 3.9. In short, whether Asian customers were paying a premium or enjoying discounts (relative to their counterparts in the Pacific Basin) over the three years under study seems to be determined by whether absolute reference crude prices in the US or European markets were on an uptrend or a downtrend.

Saudi Aramco aspires to be a major and preferred long-term supplier of crude oil to each of the major consuming regions of North America, Europe and the Far East. Nevertheless, its crude exports to Asia have grown significantly as a proportion of total crude exports between 1995 and 2008, from less than 50 per cent to over 60 per cent (see Figure 3.10). This is not unexpected, given that Asia constitutes a natural market for Middle East oil, both geographically and logistically.

There have been important developments that have expanded the crude oil diet for many Asian customers, introducing newer crude oil grades from non-traditional sources. The Saudi crude oil share of the key China and India markets declined from 2009 to 2010, while those of West and Central Africa and Latin America increased in both countries (Hua and Tan 2010: 6). Arabian Gulf crudes accounted for nearly 45 per cent of China's crude oil imports during the first seven months of 2010, compared to 52 per cent in the year-ago period, during the first seven months of 2009. During the same time

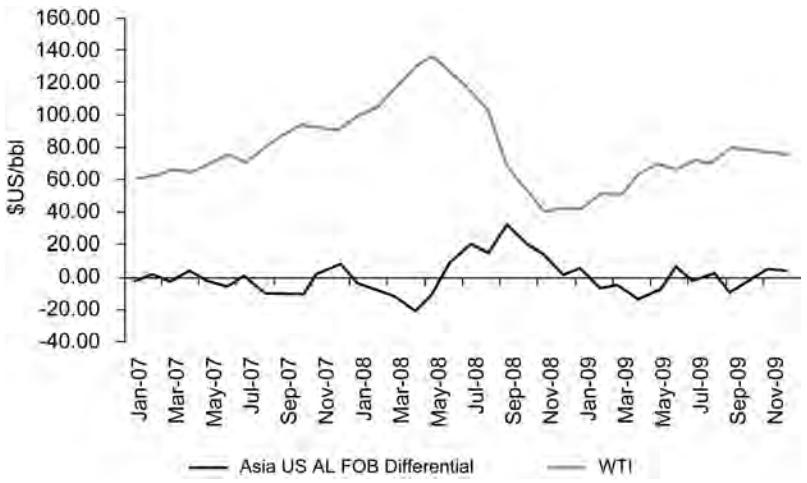

Figure 3.9 Asia-US Arab Light FOB differential and WTI
Source: Authors; Platts

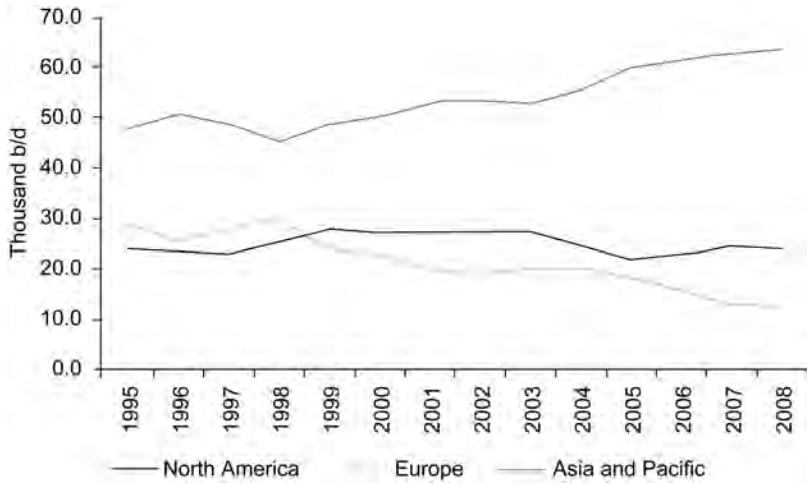

Figure 3.10 Saudi Arabia s crude oil exports by destination
Source: Authors; UN Comtrade Database

frame, West African and Latin American market shares increased. In India, the crude oil purchasing decisions by Reliance, India's largest private sector refiner, in favour of Latin and African sources reduced the Middle East share of the country's crude oil imports in the first months of 2010, relative to the previous year's comparable period (Verma 2010: 9).

Another recent development is the completion of the first phase of the Eastern Siberia–Pacific Ocean (ESPO) pipeline, in 2009. ESPO crude (32.6 API and about 1 per cent sulphur) is not overly dissimilar from Omani crude (33.3 API and 1.06 per cent sulphur). ESPO crude is almost exclusively sold on tender basis by the main producers, Rosneft, Surgutneftegaz OAO, TNK-BP and Gazprom. The sales are priced with reference to Platts's Oman or Dubai average monthly quotations. According to reports, ESPO has quickly gained a foothold at the expense of Middle Eastern grades, buoyed by shorter transit times and lower freight rates to north-east Asia, as well as reduced restrictions on usage than Middle Eastern crudes (Hall 2011).

In the context of the analysis presented in this section, the claim in the *Wall Street Journal* article that 'the rising power of Asian oil consumers is increasingly helping them buy oil more cheaply than their counterparts in the West, a reversal of the historical pattern' seems rather inapt. Oil prices – i.e. Arabian Gulf OSPs – are not 'bargained' between Arabian Gulf producers and Asian buyers, and have precious little to do with 'the rising power of Asian consumers' as such. These prices are set by relatively mechanical formulas, which add the reference crude prices to announced monthly regional offsets. To the extent that added supplies of ESPO, African and Latin American crude oils put pressure on Arabian Gulf supplies into Asia at the margin,

this would indeed support lower crude oil acquisition costs for Asian customers.

6. Conclusion

Since 1986, Saudi prices are set only in relation to reference or marker crude prices, never independently signalling absolute price levels. Saudi Aramco – and, by extension, the other Arabian Gulf national oil companies that essentially follow its lead – is more appropriately seen as a 'price take' in international markets for crude oil, in that Arabian Gulf crude oil prices are market determined.[29] This conclusion fits well with what observers know about the overall Saudi exporting strategy. Saudi Arabia is a producer with vast oil reserves, and its strategic interest in maintaining a significant market share in all the consuming regions for the (temporal) long haul, until its oil supplies run out, is clear.

Notions about the Asian premium reflect a normative slant taken, inadvertently or otherwise, in presenting observations of inter-regional price differentials for Arabian crudes. Those who call for the lifting of resale and end-user restrictions on Arabian crude oil term contracts, or for the auctioning of Arabian crude oil to assist in the discovery of absolute price signals, betray an ignorance of how real crude oil markets work.

Appendix 1

Table A1 Asia offsets as a percentage of the Oman/Dubai reference prices

Month	*Platts Oman/Dubai (US $/bbl)*	*Asia offsets*	*Offsets as % of the Oman/Dubai price*
Jan 07	52.25	0.15	0.29
Feb 07	55.23	0.05	0.09
Mar 07	58.83	0.25	0.42
Apr 07	63.70	0.15	0.24
May 07	64.69	0.15	0.23
Jun 07	65.94	0.55	0.83
Jul 07	69.78	0.55	0.79
Aug 07	67.83	0.55	0.81
Sep 07	73.46	0.75	1.02
Oct 07	77.19	1.35	1.75
Nov 07	86.97	2.35	2.70
Dec 07	86.01	1.35	1.57
Jan 08	87.96	1.75	1.99
Feb 08	90.35	1.55	1.72
Mar 08	97.31	1.25	1.28
Apr 08	103.75	1.05	1.01
May 08	119.65	1.45	1.21
Jun 08	128.07	1.85	1.44
Jul 08	132.04	2.05	1.55
Aug 08	113.09	1.35	1.19
Sep 08	96.02	0.70	0.73
Oct 08	67.69	0.00	0.00
Nov 08	49.94	-0.65	-1.30
Dec 08	40.76	-1.25	-3.07
Jan 09	44.29	-0.85	-1.92
Feb 09	43.31	-0.45	-1.04
Mar 09	45.71	0.25	0.55
Apr 09	50.13	0.90	1.80
May 09	57.84	0.80	1.38
Jun 09	69.44	1.00	1.44
Jul 09	64.95	1.40	2.16
Aug 09	68.05	1.50	2.20
Sep 09	67.90	-0.25	-0.37
Oct 09	73.24	0.60	0.82
Nov 09	77.80	0.15	0.19
Dec 09	75.45	0.50	0.66

Source: Platts; authors' calculations

Appendix 2

Table A2: Bill of lading (B/L) is the 15th of the month

Month	*Asia OSP*	*US OSP*	*Euro OSP*	*Asian premium to the USA*	*Asian premium to Europe*
Jan 07	52.40	54.491	54.596	-$2.10	-$2.20
Feb 07	55.28	56.310	59.153	-$1.03	-$3.88
Mar 07	59.08	57.337	62.638	$1.74	-$3.56
Apr 07	63.85	60.953	64.592	$2.90	-$0.74
May 07	64.84	70.309	67.092	-$5.47	-$2.26
Jun 07	66.49	70.988	71.896	-$4.50	-$5.41
Jul 07	70.33	72.547	66.725	-$2.22	$3.60
Aug 07	68.38	77.839	75.138	-$9.46	-$6.75
Sep 07	74.21	88.673	83.273	-$14.46	-$9.06
Oct 07	78.54	83.786	90.686	-$5.25	-$12.15
Nov 07	89.32	89.008	89.841	$0.31	-$0.52
Dec 07	87.32	78.926	87.273	$8.40	$0.05
Jan 08	89.71	97.321	95.506	-$7.61	-$5.80
Feb 08	91.90	101.976	98.517	-$10.07	-$6.62
Mar 08	98.56	113.505	112.708	-$14.95	-$14.15
Apr 08	104.80	126.237	126.501	-$21.43	-$21.70
May 08	121.10	136.430	133.251	-$15.33	-$12.15
Jun 08	129.92	114.144	121.498	$15.78	$8.42
Jul 08	134.09	107.327	109.167	$26.76	$24.92
Aug 08	114.44	87.969	94.656	$26.47	$19.79
Sep 08	96.72	61.339	60.294	$35.38	$36.42
Oct 08	67.69	42.738	46.775	$24.95	$20.91
Nov 08	49.29	40.885	36.944	$8.41	$12.35
Dec 08	39.51	39.299	41.158	$0.21	-$1.65
Jan 09	43.44	41.297	36.975	$2.14	$6.46
Feb 09	42.86	50.872	45.837	-$8.02	-$2.98
Mar 09	45.96	57.272	46.601	-$11.32	-$0.65
Apr 09	51.03	72.196	59.164	-$21.17	-$8.13
May 09	58.64	63.841	65.396	-$5.20	-$6.76
Jun 09	70.44	68.126	65.627	$2.31	$4.81
Jul 09	66.35	67.760	70.839	-$1.41	-$4.49
Aug 09	69.55	66.471	66.320	$3.08	$3.23
Sep 09	67.65	78.402	75.268	-$10.75	-$7.62
Oct 09	73.84	72.903	75.999	$0.94	-$2.16
Nov 09	77.95	77.046	74.506	$0.90	$3.44
Dec 09	75.95	70.553	72.022	$5.40	$3.93

Source: Platts; authors' calculations

Appendix 3

Table A3: Bill of lading (B/L) is the 5th of the month

Date	*US OSP*	*Europe OSP*	*Asian premium to the USA*	*Asian premium to Europe*
Jan 07	54.99	52.17	-2.60	0.22
Feb 07	54.37	55.04	0.90	0.23
Mar 07	61.00	62.86	-1.92	-3.78
Apr 07	59.58	62.50	4.27	1.35
May 07	68.07	66.62	-3.23	-1.78
Jun 07	72.09	72.08	-5.60	-5.60
Jul 07	69.20	66.80	1.12	3.53
Aug 07	78.10	73.28	-9.72	-4.90
Sep 07	82.95	78.19	-8.74	-3.98
Oct 07	88.57	89.53	-10.03	-10.99
Nov 07	86.43	87.59	2.89	1.72
Dec 07	78.93	90.31	8.43	-2.95
Jan 08	92.76	89.79	-3.05	-0.08
Feb 08	100.55	100.44	-8.65	-8.54
Mar 08	111.20	107.70	-12.65	-9.14
Apr 08	125.63	120.37	-20.82	-15.57
May 08	131.62	130.26	-10.52	-9.16
Jun 08	121.03	133.05	8.89	-3.13
Jul 08	112.96	108.02	21.14	26.07
Aug 08	100.09	91.84	14.36	22.60
Sep 08	64.04	70.12	32.68	26.6
Oct 08	47.75	49.64	19.94	18.05
Nov 08	35.57	40.36	13.72	8.93
Dec 08	38.37	41.06	1.14	-1.55
Jan 09	36.15	38.57	7.29	4.87
Feb 09	49.87	41.02	-7.02	1.84
Mar 09	51.17	48.58	-5.21	-2.62
Apr 09	65.01	55.57	-13.98	-4.54
May 09	67.73	66.19	-9.09	-7.54
Jun 09	63.25	59.92	7.19	10.52
Jul 09	69.86	71.18	-3.51	-4.83
Aug 09	65.52	67.69	4.04	1.86
Sep 09	78.37	70.40	-10.72	-2.75
Oct 09	75.10	75.91	-1.25	-2.07
Nov 09	72.16	71.64	5.79	6.31
Dec 09	71.87	77.48	4.08	-1.53

Source: Platts; authors' calculations

Appendix 4

Econometric tests for causality

In this appendix, we test the hypothesis that there exists a causal relationship between the adjustment factors and the price differential, i.e. whether the adjustment factors are the cause and the price differentials are the effect. We use a simple test of causality proposed by Sims (1972). The intuition behind the test is as follows: if the adjustment factors cause the price differential, it must mean that future values of the adjustment factor would not have any effect on the current price differential (as the cause should precede the effect). If this is not true, then we would be remiss in making the claim that the adjustment factors cause the price differential.

Accordingly, we ran the following regression:

$$Y_t = \alpha+\beta_{t-1}X_{t-1}+ \beta_tX_t+ \beta_{t+1}X_{t+1}+u_t$$

For our case, X represents the Saudi monthly adjustment factor for Asia-bound crude, and Y represents the price differential between Arab Light FOB crude for delivery to Asia and the USA or Europe. We then test the null hypothesis that $\beta_{t+1} = 0$. If X is to 'Granger-cause' Y,[30] then the coefficient of the lead term, β_{t+1}, must be statistically equal to zero. We find that, when we regress the price differential on the adjustment factor, the null hypothesis is rejected (see Tables 3.3 and 3.4 below). This means that causality does not run from the adjustment factor to the price differentials for FOB-priced Arab

Table 3.3 Regression of the Asia–Europe Arab Light FOB price differential on the adjustment factor for Asia-bound crude

Dependent variable: price differential Europe–Asia

Method: least squares
Date: 4 September 2010; time: 9.22 am
Sample (adjusted): 235
Included observations: 34 after adjusting endpoints

Variable	*Coefficient*	*Std error*	*t-statistic*	*Prob.*
C	2.360739	2.068010	1.141551	0.2627
Adjustment factor ({minus}1)	3.910083	2.780538	1.406233	0.1699
Adjustment factor	3.593386	3.606695	0.996310	0.3271
Adjustment factor (1)	-9.447022	2.782326	-3.395368	0.0019
R-squared	0.327688	Mean dependent var.		0.852353
Adjusted R-squared	0.260457	SD dependent var.		10.01486
SE of regression	8.612451	Akaike info. criterion		7.254426
Sum squared resid.	2225.229	Schwarz criterion		7.433998
Log. likelihood	-119.3252	F-statistic		4.874044
Durbin-Watson stat.	1.094883	Prob. (F-statistic)		0.007048

Source: Platts; authors' calculations

Table 3.4 Regression of the Asia–US Arab Light FOB price differential on the adjustment factor for Asia-bound crude

Dependent variable: price differential US–Asia

Method: least squares
Date: 04 September 2010; time: 9.23 am
Sample (adjusted): 2 35
Included observations: 34 after adjusting endpoints

Variable	*Coefficient*	*Std error*	*t-statistic*	*Prob.*
C	1.776658	2.315243	0.767374	0.4489
Adjustment factor ({minus}1)	4.507220	3.112955	1.447891	0.1580
Adjustment factor	4.446161	4.037881	1.101113	0.2796
Adjustment factor (1)	-10.91271	3.114957	-3.503325	0.0015
R-squared	0.340371	Mean dependent var.		0.237647
Adjusted R-squared	0.274409	SD dependent var.		11.31943
SE of regression	9.642080	Akaike info. criterion		7.480282
Sum squared resid.	2789.091	Schwarz criterion		7.659854
Log. likelihood	-123.1648	F-statistic		5.160047
Durbin-Watson stat.	1.156157	Prob. (F-statistic)		0.005381

Source: Authors

Light crude at Ras Tanura. We also tested the hypothesis that the monthly change in the adjustment factors (from one month to the next) causes the change in the price differential (from one month to the next). We found that there was no causal relationship between them.

Notes

1 Arab Light is the largest stream of Saudi crude oil exports; the others are Arab Heavy, Arab Medium, Arab Extra Light and Arab Super Light (this last stream exported only to the Far East).
2 Gong and Shan (2003), Koyama (2003), Lee (2003), Moon and Lee (2003), Ogawa (2002a; 2003), (Ogawa *et al*. 2000).
3 Soligo and Jaffe (2000; 2004).
4 All dollar figures in this chapter are US $.
5 LNG and coal sold in Asia are typically indexed to crude oil prices, such as the Japan Customs-cleared Crude (JCC) index. The JCC price is the average price of customs-cleared crude oil imports into Japan as reported in customs statistics. It is often referred to as the Japanese Crude Cocktail price.
6 The term refers to the seven oil companies that formed the Consortium for Iran and dominated the global petroleum industry from the mid-1940s to the 1970s. The group comprised Standard Oil of New Jersey and Standard Oil Company of New York (now ExxonMobil); Standard Oil of California, Gulf Oil and Texaco (now Chevron); Royal Dutch Shell; and Anglo-Persian Oil Company (now BP). See Sampson (1975).
7 A posted price is a price that a seller or a buyer makes public in some conventional way to give notice that she or he is prepared to accept or to offer a certain sum for a barrel of crude oil or a tonne of petroleum products. In the past, US refiners used to post, at the gate of their plant, the price at which they were prepared to buy a barrel of crude oil on a given day. See Mabro (2005).

8 Kuwait, Iran, Qatar and Abu Dhabi are among the other large oil producers using some form of formula prices for long-term contracts. Among the few Gulf crudes sold on the 'spot' market (i.e. not based on term contracts with end-user and re-sale restrictions) are Oman and Dubai.
9 A weighted index of Intercontinental Exchange (ICE) Brent crude oil futures contracts traded on any given day on the exchange.
10 Ras Tanura is a city in the Eastern Province of Saudi Arabia, located on the peninsula extending into the Persian Gulf.
11 Saudi Aramco switched over to the Argus Sour Crude Index (ASCI) for its crude oil sales in the USA in 2010. The ASCI represents the daily value of US Gulf Coast medium sour crude, based on physical spot market transactions. The ASCI price is the volume-weighted average of all deals done in three grades of sour crude traded in the US Gulf Coast, namely, Mars, Poseidon and Southern Green Canyon. Saudi Aramco switched over from Platts WTI assessments to ASCI because WTI prices would often get 'decoupled' from relative values in global crude oil markets (as measured by the WTI–Brent differential, for example) whenever storage facilities at Cushing, Oklahoma, become a binding constraint. See, for instance, Fusaro (2009): 'The long term WTI Cushing Cushion pricing problem has resurfaced. This occurs when US midcontinent crude oil markets detach from international oil markets … . Rising crude oil stocks, which are stored in tanks at Cushing, are oversupplied depressing WTI prices in both the physical and paper markets.'
12 The 'forward market' refers to deals made for crude oil sales with delivery commitments in the future.
13 The role of Dubai and Oman as reference crude oils for Saudi crude oil export pricing is discussed in Section 4 (this chapter).
14 The 'partials' methodology is described on the Platts website; see Platts (2012).
15 For a careful assessment of the DME Oman futures contract and its outlook, see Fattouh (2008).
16 The figures include some refined product flows as well, but the broad magnitudes for crude flows are reasonably approximated by Figure 3.1.
17 West African producers are the closest potential suppliers to the Asia market, in the sense that they are in a position to shift sales from other markets to Asia (Soligo and Jaffe 2000). Essentially, when crude oil prices in the Far East are high enough relative to the European or North American regions, traders will redirect West African crude oil flows into Asia.
18 See for instance Horsnell (1997: 305), who argues that growth of non-OPEC short-haul crude supplies in the 1990s in Europe and the USA was 'forcing' discounts on Middle East oil exporters for them to remain competitive.
19 See, for instance, APS Review Oil Market Trends (2007).
20 The most careful study of Saudi pricing policy is Horsnell (1997). None of the econometric tests in his wide-ranging work support the 'intentionality' argument. In Appendix 4, we present econometric test results that show that Saudi monthly offsets do not 'cause' inter-regional crude oil price differentials.
21 See, for instance, Tisdell (1972).
22 We are in debt to Horsnell (1997: 295), who uses this apt and concise phrase to describe Saudi oil policy.
23 Among economists, such extreme 'sloshing' would be described as 'corner solutions', where market share trade-offs would not be movements along a smooth market share curve but rather a non-contiguous movement from one end of the curve, crossing one axis, to the other end, crossing the other perpendicular axis.
24 One way of putting this in more intuitive terms is the following thought experiment: a Japan-incorporated Toyota Corporation tells independent wholesale and resale car dealers around the world that they have been appointed to sell Toyota

cars in their domestic markets (where such independent dealers are domiciled). Independent car dealers would therefore be forbidden from holding auctions to sell Toyota cars in non-domestic markets. This would be a requirement if the corporation wanted to set the effective price for Toyota car buyers around the world and not have independent dealers setting absolute price signals for sales on a global basis.

25 See also an earlier article along the same lines, Demongeot (2009).

26 This new BWave price linkage was first adopted by Saudi Arabia in July 2000, followed by Kuwait and, six months later, by Iran for oil pricing in its term contract sales to Europe. It replaced the traditional dated Brent benchmark after extensive reports of price manipulation and market 'squeezes'.

27 In 2010, Saudi Aramco changed the methodology for the USA and started using Argus Sour Crude Index. For this reason, we excluded data from 2010 except when it was used to price crude loaded at the end of 2009. (Note that Europe- and USA-delivered crude oil cargoes arrive 40 and 50 days after date of loading at Ras Tanura, respectively.)

28 A document issued by a carrier to a shipper, acknowledging that specified goods have been received on board as cargo for conveyance to a named place for delivery to the consignee, who is usually identified.

29 Note that this is quite different from the argument often made that OPEC as a group sets global crude oil prices by imposing production quotas on its members. This 'OPEC as cartel' argument is not the subject of this paper.

30 Econometricians typically use 'Granger causality' in empirical analysis. It is a term for a specific notion of causality in time-series analysis. A variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than it can be predicted using the history of Y alone.

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4 Oil price volatility: A threat to sustainable development in East Asia

Kanekiyo Kensuke and Kobayashi Yoshikazu

Introduction

The volatility of oil prices has increased significantly in recent years, bringing substantial uncertainties in terms of long-term planning and hindering proper socio-economic development. This chapter analyses the important issues in oil pricing in Asia, known as the Asian premium and the light–heavy spread, and reviews various activities aimed at solving the price problems. Establishing a stable marker crude for the Asian market is the key, and the chapter explores ways to achieve this.

Oil price destabilization and sustainable development

The impact of the 1970s' oil shock was so great that advanced countries, who were the major oil consumers then, rushed to promote energy efficiency and develop alternative fuels. Subsequently, prices declined, and the crude oil price remained in the range of US $15–25 per barrel for two decades. In the early 2000s, when emerging countries such as China and India began to rapidly increase their oil imports, the price of crude oil again began to rise. The growth of speculative fund activities exacerbated the situation – until the market finally burst in 2008. As shown in Figure 4.1, oil price instability has increased significantly after the turn of the century.

The destabilization of the crude oil price threatens sustainable development (Kobayashi 2010). Excessively high oil prices have various negative impacts. First, as petroleum products are fundamental to a range of economic activities, high oil prices would depress the economy. Second, rising energy costs result in more national wealth being transferred to oil-producing countries, thus widening the global imbalance. The growing imbalance in turn causes a rapid increase in capital inflow into the US market, triggering risk-tolerant investments by financial institutions, and amplifying market volatility. Third, high prices encourage resource nationalism, which prejudices the sound development of the global energy sector. When oil prices rise, oil-producing countries find it easier to earn export revenue. This leads to a tendency to impose harsh conditions on oil companies. The result is that, contrary to the

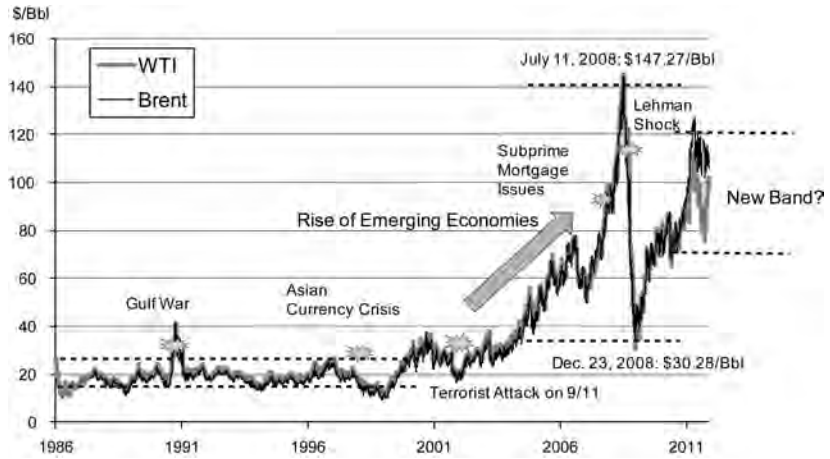

Figure 4.1 Destabilization of oil price: WTI futures at the New York Mercantile Exchange (NYMEX)
Source: US Energy Information Administration (US EIA), 'Spot prices – petroleum and other liquids'. Online. Available at: <www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm>
Notes: Prices are in US $ WTI – West Texas Intermediate; Bbl – barrels of oil

economic theory that higher oil prices lead to higher investments, oil price increases may in fact lead to an investment slump in the oil industry. Fourth, oil-producing countries may experience the so-called 'resource curse'. The huge inflow of foreign currency from oil exports results in a country's national currency appreciating significantly against foreign currencies. This makes it more difficult for the country to develop modern industries that are competitive, and this would affect in particular the manufacturing sector. The economy may therefore become a monoculture economy overly reliant on energy exports, and any fluctuation in the international resource price would have a large effect. The difficulties in managing the national economy when oil prices – and therefore the country's export earnings – fluctuate could hamper the country's economic development. An excessively high oil price is thus not beneficial – for oil-producing as well as oil-consuming countries.

An excessively low oil price is also harmful. First, it will destabilize oil-producing countries, politically and economically. Oil export earnings are an important source of revenue for many oil-producing countries, providing them with the means to govern their countries and implement various policies that benefit their people. Simultaneously, oil-consuming countries suffer from stagnant demand for their manufacturing goods due to lower demand from oil-producing countries. Second, low prices reduce the motivation to conserve fossil fuel consumption, develop alternative energies, improve energy efficiencies and counter global warming. Third, investments for upstream exploration and development will shrink when prices are excessively low. In the long run, necessary investment will be deferred and R& d will slow down.

As a result, the increase in production that is necessary to sustain global development will not occur.

To sum it up, excessive fluctuation of the crude oil price, whether it tends to the high or the low, is harmful to stable global development. In addition to price fluctuation, the Asian premium and the light–heavy spread of crude oil prices are issues to be noted in discussing international oil pricing and these are addressed below.

Asian premium

The Asian premium is a discriminatory phenomenon. Middle East crude oils supplied to Asia are priced substantially higher (at free on board (FOB) basis, when shipped from the same port in the Middle East) than those bound for the West, namely, the USA and Europe. Asia, which imports more than 13 million barrels per day (bpd) of oil from the Middle East today, may be paying an additional US $5 billion a year.[1]

This phenomenon appeared around 1992, and was brought to public attention in the 1990s (Ogawa *et al*. 1996). Researchers began focusing on the issue more frequently and seriously after the turn of this century (Ogawa *et al*. 2000; Fesharaki and Vahidy 2001). Yoshiki Ogawa of the Institute of Energy Economics, Japan (IEEJ), the earliest to analyze the phenomenon, argues that:

> Formula prices of Arabian Light crude for the Asian market have been higher than those for European/US markets by US$1.0–1.5 per barrel over the period of ten years or so in and after 1992 … . This premium is not a temporary one – seen on the basis of yearly averages – and should be taken up as an important problem as it has an adverse impact on the economic competitiveness of the countries involved. On the other hand, the formula prices of Arabian Light crude for the European market had been almost identical with those of the U.S. market through the end of 1999. … Oil imports by Asian countries as a whole totaled 15 million bpd in 2000. Assuming that crude oil prices for the Asian market are higher than those for other markets by $1–1.5 per barrel, this means that there was an (additional) income transfer totaling $5.5–8.2 billion from oil-consuming countries to oil-producing countries. It should be noted that Asian oil-consuming countries have shouldered the burden of such a high extra cost as shown above the past decade or so.
>
> (Ogawa 2002: 2; see Figure 4.2)

The Asian premium was an average of US $1.42 per barrel for the past 10 years (January 2001–December 2010) as shown in Figure 4.3. In recent years, in particular since 2007, the premium has experienced greater fluctuations, increasing the region's vulnerability in relation to oil supply.

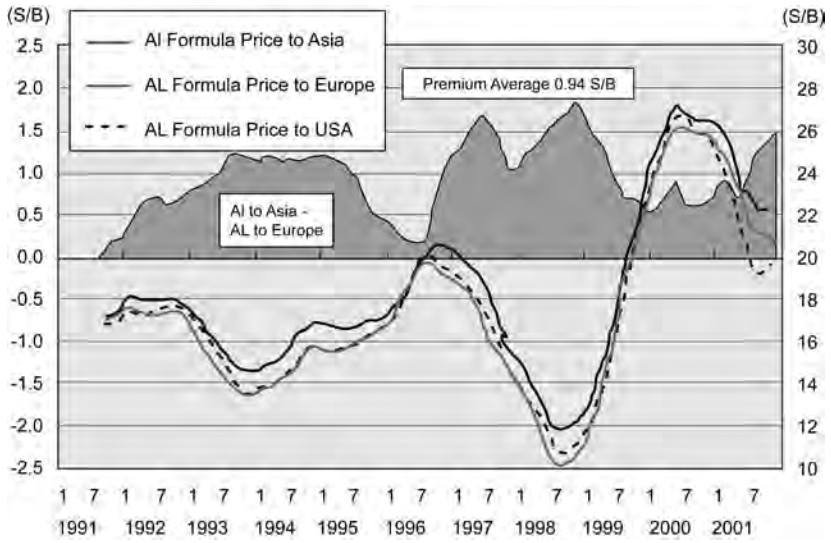

Figure 4.2 Changes in formula prices of Arabian Light crude and the Asian premium
Source: Ogawa 2002
Notes: Prices are in US $; FOB basis at the time of shipment, 12-month moving averageAL – Arabian Light; B – barrel; FOB – free on board

There are several factors and explanations behind this 'biased' pricing, including the Middle East exporters' policy of restricting the resale of their exports and their willingness to accept a discount in return for a share of the US and European markets. The main reason for the Asian premium, however, is that Asian oil customers did not have any recourse to alternative supply sources with sufficient volume to compete with Middle East sources at a time when Asian crude oil imports were expanding significantly. Asian oil buyers were thus forced to accept the terms and prices specified by Middle East suppliers.

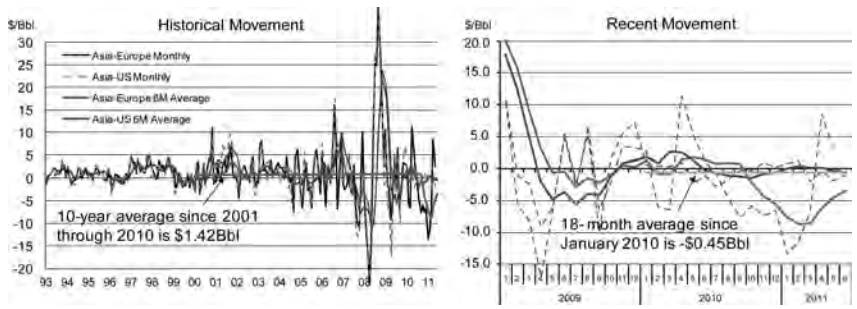

Figure 4.3 Asian premium
Source: Compiled by the Institute of Energy Economics, Japan (IEEJ) from estimates provided in the Petroleum Intelligence Weekly (PIW)

Following the extreme price volatility of 2007 and 2008, the premium has sharply decreased (since mid-2009), and has even become negative (-US $0.45 per barrel of oil for the 18 months from January 2010). This may reflect a slackening of demand in the world oil market, or, as discussed later, it could be a consequence of the recent emergence of Russian crude export from the Pacific ports. However, once the supply of Russian crude oil reaches saturation point, its influence on the Asian oil market may wither away. With Asian oil demand forecast to grow steadily (as discussed in Kanekiyo, this volume), the Asian premium may reappear in the future.

Light–heavy spread

A similar trend can be observed in the light–heavy crude oil price spread for the past decades. Figure 4.4 shows the historical changes of the price differential between Arabian Light (API gravity[2] 33) and Arabian Heavy (API gravity 27). Around 2004, the differential began to exceed the technical cost of compensating for the quality differential, which is estimated to be US $2–4 per barrel, and this has added another element of volatility to the market.

Reflecting an upsurge of world petroleum demand, particularly for lighter products, the differential expanded hand in hand with oil prices. The timing of the increase coincided with a significant rise in China's oil imports. The sharp growth of speculative funds amplified the violent oil price fluctuations, a situation which continued until the Lehman shock of 2008, when both oil prices and quality differentials plunged.

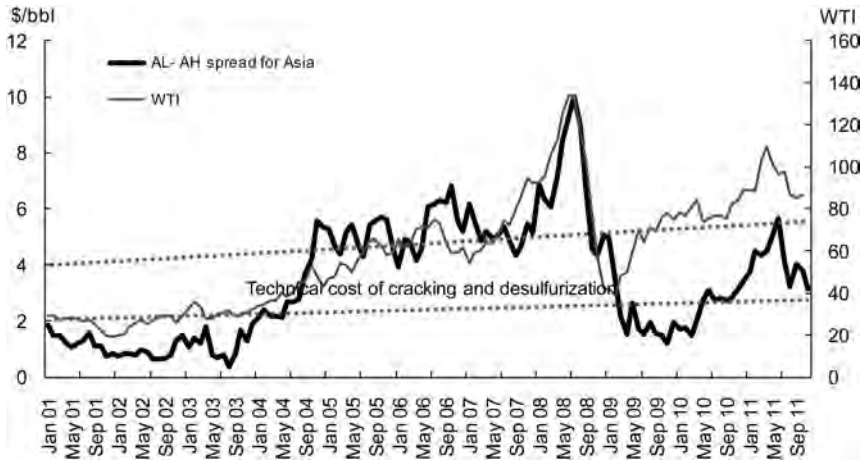

Figure 4.4 Light–heavy spread (Arab Light minus Arab Heavy)
Source: Compiled by Institute of Energy Economics, Japan (IEEJ) based on estimates by Middle East Economic Survey (MEES), weekly.
Notes: WTI – West Texas Intermediate; AL – Arab Light; AH – Arab Heavy

Since 2009, the differential has been relatively low compared to the oil price changes. This is reflective of the appearance of surplus in refining capacities, in particular, the upgrading of capacity to treat heavier crude oils as oil demand declined due to the economic downturn. When the overall operation rate of a refinery is low because of slow demand, secondary plants will have idle capacities to process more heavy feedstock in proportion to the crude oil input. Such a surplus may disappear as oil demand regains its momentum. In fact, oil demand started picking up again during the winter of 2010. Thus, the development of refining capacity, especially sophisticated plants to produce lighter transportation fuels, is an important element of oil security policy.

In the Asian oil market, it is believed that the average crude oil quality will become heavier in future. Several major heavy-grade development projects are underway in Saudi Arabia (Manifa), Oman (Mukhaizna) and Bahrain (Awali). In addition, there are plans to develop the heavy-grade deposits in the Kuwait–Saudi Arabia Neutral Zone (Wafra) and Iraq (Zubair and West Qurna). Given these developments, Asian refiners have invested in upgrading capacities in recent years. Nevertheless, the light–heavy differential looks to be creeping upwards, reflecting the fundamental trend of crude oil supply becoming heavier.

Producer-consumer dialogue

Issues related to oil price volatility, including the findings on the Asian premium, have been discussed by oil producers and consumers. The IEEJ has held annual meetings with the Organization of the Petroleum Exporting Countries (OPEC) to exchange information and views, focusing in particular on security and oil pricing. The IEEJ raised the issue of the Asian premium when the phenomenon became apparent through various analyses. Meetings from 2001 through to 2003 were specifically dedicated to discussing the issue (on these meetings, see Koyama 2001, 2002, 2003). Through these efforts, both parties came to share the view that extreme price volatility is not beneficial, not just for oil-consuming countries, but also for oil-producing countries.

The issue of price volatility, which encompasses concerns regarding the Asian premium, was an important agenda item at the Asian Energy Ministers' Roundtable in New Delhi in January 2005, which was attended by oil/energy ministers from 12 Asian countries including Saudi Arabia and Japan. The participants shared the view that there was a need to ensure stable supply and demand of oil in Asia, and to consider the issue of the Asian premium (Kanekiyo 2005). The Roundtable was the first time the ministers of oil-producing and -consuming countries in Asia spoke in concert on the fundamental principle of achieving security, stability and sustainability of oil supply and demand.

The above principle gained renewed attention in the face of the great oil price fluctuation of 2008–09 which was triggered by intense speculative fund

activities and the Lehman shock. Today, the leaders of oil-producing and oil-consuming countries speak of a fair price, or a desirable price band that will enhance the predictability of future oil prices, which is needed for setting out reliable long-term development plans (Kobayashi 2010). It is, however, not easy to agree on a fair price, or a price band, as background conditions are diverse even among oil-producing countries. They differ in terms of financial position, size of population, their economies' dependence on oil exports, etc. In addition, the dynamic forces in the international market are not easy to politically redirect. Nevertheless, through these dialogues, oil producers and consumers have come to share an awareness of the problems arising from a volatile crude oil market, which sets the stage for them to take common steps toward the stabilization of oil prices.

Regional dialogue in north-east Asia

Efforts in facilitating dialogue among regional consumers have also been seen. Asian oil markets, which are diverse in terms of backgrounds and characteristics, used to be relatively independent of each other, and it could be observed that the oil-consuming countries were increasingly competing with each other to secure oil supply. Before 2000, however, there was no institution where they could get together to discuss issues such as the increasing competition and the concern over security of oil supply.

In 2001, several oil companies and energy research institutes in Japan and China established the Sino-Japan Petroleum Forum, with the aim of sharing information and discussing strategies for cooperation, thus strengthening the position of oil-consuming countries. The Forum met in Dalian in September that year. With the participation of Korea in 2003, the meeting was renamed the Northeast Asia Petroleum Forum. The Forum is held every two years, with the meetings rotating among the three countries. The research institutes of these countries, namely, the IEEJ, the Korea Energy Economics Institute (KEEI) and the Petroleum Economics Commission of the Chinese Petroleum Society serve as the secretariat of the Forum. Participants include top management from the oil industries of the three countries, who meet to discuss market trends and exchange views on the strategic development of the regional oil industry. In addition, Russian experts have been invited to join the discussion. The last Forum was held in October 2011 in Seoul, with the next scheduled for June 2013.

This Forum has significantly improved understanding in north-east Asia on the issues and prospects facing the oil industry, as a result of wide-ranging discussions encompassing areas such as the energy/oil/gas outlook, country reports of oil and gas industry activities, views on the Asian premium and other pricing issues, upstream and downstream developments, energy efficiency and conservation, global and regional environmental issues and policies, and the promotion of renewable energies. Over the 10 years of its existence, the Forum has provided a platform for oil-consuming countries to

speak with one voice and has thus increased the impact of their views on energy suppliers.

Russian oil exports

Recently, a new phenomenon has emerged in the Asian oil market. There has been a substantial increase of oil exports from the Pacific coast ports of Russia. As shown in Figure 4.5, Japan's crude oil imports from eastern Russia are increasing fast. Russia's share of Japan's total crude import has increased from 4.4 per cent in 2009 to 7.1 per cent in 2010. Major grades are Vityaz from Sakhalin-2, Sokol from Sakhalin-1 and the Siberian (or ESPO) blend transported via the East Siberian–Pacific Ocean (ESPO) pipeline, all of which started production in the past five years (Figure 4.6).[3] The Nakhodka blend, a mixture of topped crude mainly composed of east Siberian crude oils railed to the coastal refinery, has gained share in recent years. The export of the ESPO pipeline crude oil began at the end of 2009 and amounts to 15 million tons per annum. This has significantly pushed up Russian crude oil export to Asia in 2010.

Once the section between Skovorodino and Kozmino is completed (scheduled for 2014, but with early completion likely), the ESPO pipeline will bring

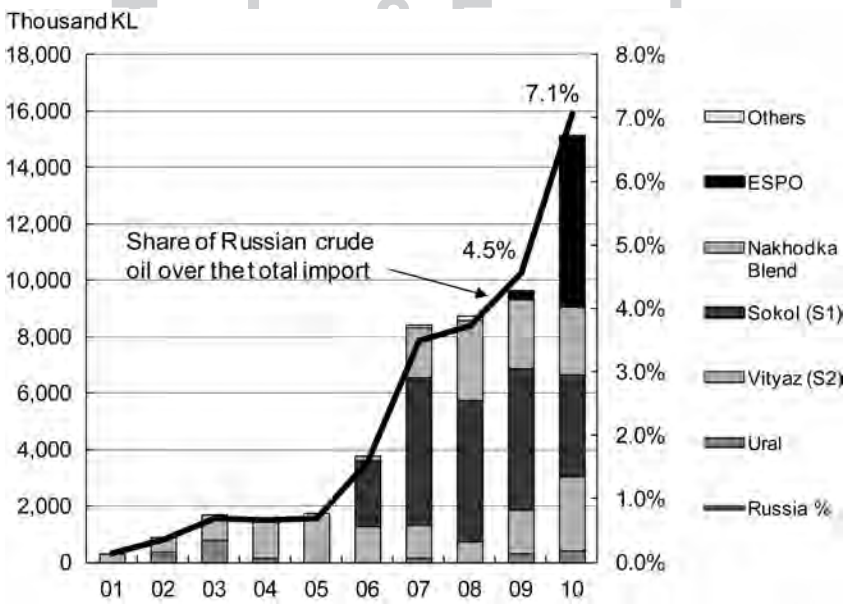

Figure 4.5 Japan's Russian crude oil import, by grade
Source: Petroleum Association of Japan (PAJ), Monthly Report of Petroleum Data. Online. Available at: <www.paj.gr.jp/statis/>
Note: The table shows imports of various grades from Russia as a percentage of Japan s total crude oil import

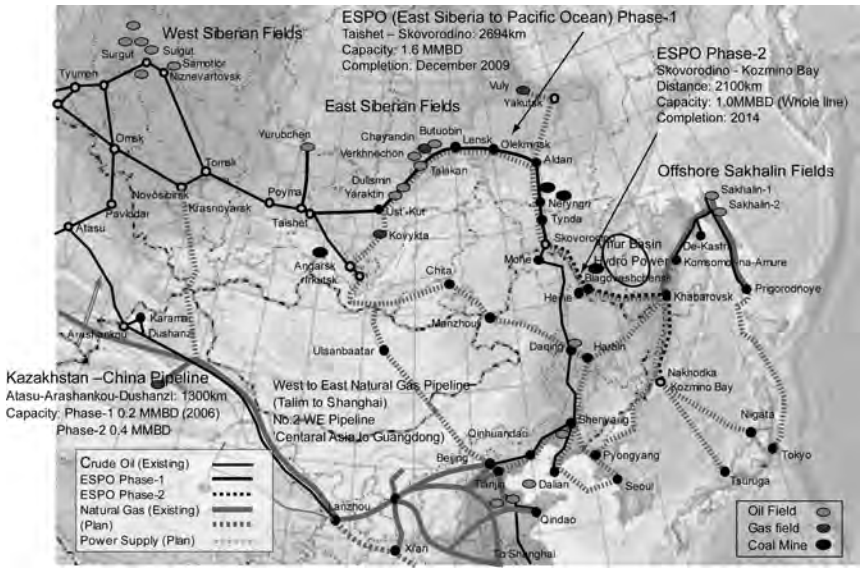

Figure 4.6 Oil and gas export system in eastern Russia
Source: Updated from Kanekiyo (2008)

up to 50 million tons per year of Siberian crude oils to Kozmino. This is in addition to the 30 million tons piped to China from a line branching off from Skovorodino that began regular operation on 1 January 2011. In future, Russia will be exporting 100 million tons per year or 2 million bpd of crude oil from its eastern provinces including Sakhalin, while north-east Asia's crude oil import was 538 million tons in 2010. This will not only meet China's oil import needs, but will also have a substantial impact on the crude oil market in north-east Asia (Figure 4.7).

China has been importing about 10 to 15 million tons per year of Russian Siberian crude oils via the Siberian railway linking both countries. The actual transaction quantity has declined after peaking in 2006. Then, in February 2009, China and Russia made a loan-for-oil deal where China will import 15 million tons per year of crude oil from Russia. This arrangement will be maintained for at least the next two decades. China also has another agreement to import an additional 30 million tons of Russian crude oil. This oil is scheduled to be imported via the ESPO pipeline which connects Russia with the north-eastern provinces of China. The coastal provinces of China will also benefit from the marine export of Russian crude oils from Kozmino, De-Kastri and Prigorodnoye.

As shown in Figure 4.7, north-east Asia's import of crude oil from Russia has increased tremendously in recent years, rising from a mere 5.4 million kilolitres (kl), or 1.2 per cent of the total import in 2001, to 41 million kl, or 6.5 per cent, in 2010. The ESPO pipeline, which could be completed earlier than expected, that is, at the end of 2012, will further push up imports.

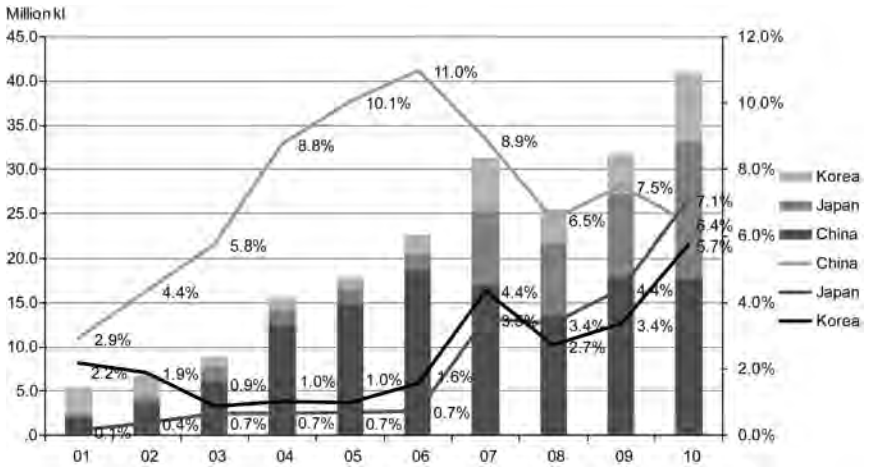

Figure 4.7 North-east Asia's import of Russian crude oil
Source: National statistics on imports of each country, compiled by the Institute of Energy Economics, Japan (IEEJ) from the following: Xinhua News Agency, China Oil, Gas & Petrochemicals, biweekly; The General Administration of Customs of People s Republic of China, China Customs Statistics, published monthly and annually; Ministry of Finance, Japan Trade Statistics, published monthly and annually; IEEJ 2011; Korea Energy Economics Institute, Korea Energy Review Monthly; Korea International Trade Association, Korea Trade Statistics. Online. Available at: <http://global.kita.net/>

Impact on the Asian premium

Although Russia is obviously not able to overtake the dominant position of the Middle East suppliers in the Asian market, Asian oil importers could have an effective countermove against the Middle East suppliers once the supply of 2 million bpd of ESPO and Sakhalin grades to Asia comes on stream. In fact, Middle East suppliers have begun to address the emergence of this new competitor in the Asian market. Saudi Aramco has secured a crude oil storage facility in Okinawa, the southern territory of Japan, and Abu Dhabi National Oil Company (ADNOC) of the United Arab Emirates (UAE) is looking for a similar opportunity. These Middle East oil exporters recognize that they need to have a supply base in the Asian market so as to make up for their geographical disadvantage against Russian suppliers and to quickly respond to any sudden increase in regional oil demand. Competition among oil suppliers has already begun in Asia, and such a competitive environment will certainly redress the 'biased' pricing imposed by Middle East suppliers on Asian oil importers.

Impact on the light–heavy crude oil price spread

The emergence of Russian oil supply will also have an impact on the light–heavy crude oil price spread. The Sakhalin and ESPO grades are in general light (in terms of gravity) and sweet (in terms of sulphur percentage) as shown in Figure 4.8. Currently, the ESPO blend is mainly composed of crude oils from the Vankor, Talakan and Verphnechon fields, with Vankor currently the dominant element of the blend. As the development of other East Siberian fields advances, the proportion of the Vankor grade with its relatively heavy and sour quality will fall, and the ESPO's quality will improve. The expected change to a lighter and sweeter quality is a perfect match to the future oil product demand structure in Asia. It is anticipated that there will be an increase in demand for lighter oil products such as motor gasoline and diesel oil due to a rapid rise in the number of motor vehicles. The incremental supply of Russian light crude oils will also ease the circumstances influencing the light–heavy crude oil price spread.

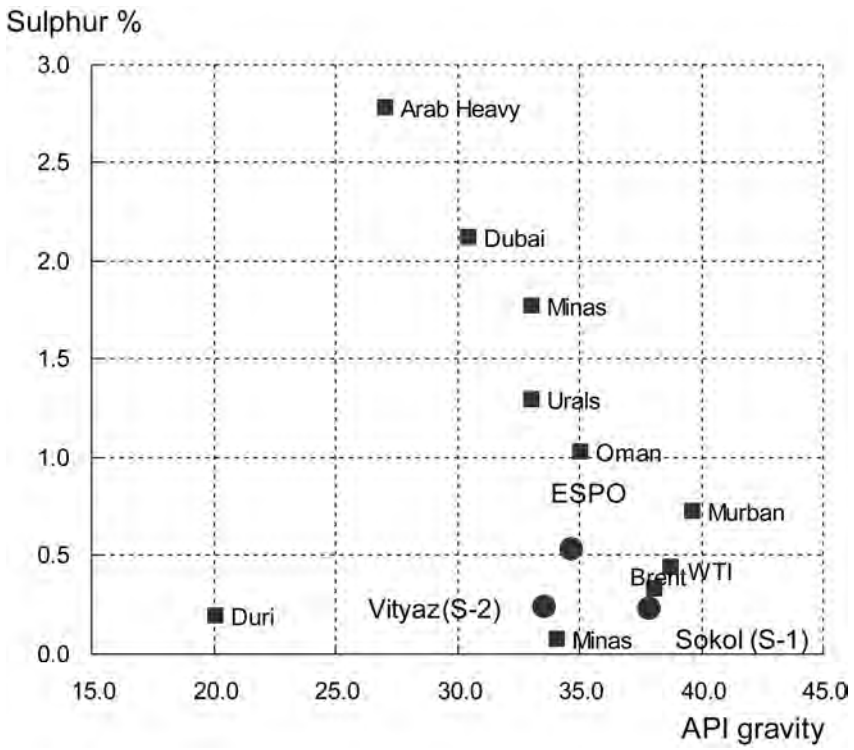

Figure 4.8 Qualities of various crude oils
Source: Compiled by the Institute of Energy Economics, Japan (IEEJ) with information from Japanese oil companies and Petroleum Intelligence Weekly

New Asian marker crude

In addition to its potential influence on the Asian premium and the light–heavy crude oil price spread, the increase in Russian crude oil supply could have a third impact: Russian crude oil has the potential to become a new regional marker grade. The current oil pricing systems in the Asia-Pacific are rather patchy. Also, through the aforementioned meetings between the IEEJ and OPEC, the fragile nature of the pricing system for the Middle East crude oils bound for Asia was identified. However, the two parties were not able to find a decisive cure. Some oil producers determine their selling price retroactively based on the price assessments by certain news publishers, while Oman sets its selling price *a priori* by referencing the futures price traded at the Dubai Mercantile Exchange (DME) as shown in Table 4.1. It has been argued that the current pricing system in the Asian market is opaque, unlike those in the US and European markets, where crude oil prices are set through open market transactions.

In principle, the market function plays the most important role in the price formation of a certain commodity; vice versa, the market system should be designed to fully utilize the market mechanism. Ideally, oil prices should mirror the fundamental supply and demand trends, which are in principle reflected in spot prices.

The present pricing system of the Middle East crude oils is as summarized in Table 4.1. The Middle East supplies crude oil to all major oil markets in the West and East, but Middle East countries such as Saudi Arabia and Iran prohibit the resale of their crude oils. Accordingly, spot transactions are not conducted for these sources. Thus, their prices do not adequately reflect market supply–demand despite their extremely large volumes. If a certain amount of these countries' crude oil is traded in the spot market, it will significantly enhance market transparency and produce a strong and reliable

Table 4.1 Pricing system for Middle Eastern crude oils

	Saudi Arabia / Kuwait / Iran	*Oman*	*Abu Dhabi*
Indexed crude oil	Platts Oman/Dubai	DME Oman (pre-shipment pricing)	Not indexed to any oil Absolute value (post-shipment pricing)
Index-based pricing	Pre-shipment pricing	–	Post-shipment pricing
Spot transaction	None (resale prohibited)	DME –individually negotiated (resale allowed)	Official selling price (OSP) +/-α Major-purchased oil may be resold

Source: Kobayashi 2010
Notes: DME – Dubai Mercantile Exchange; OSP – Official selling price

price signal that more precisely follows fundamental market supply–demand trends.

Under the circumstances, there are several possible measures for stabilizing crude oil price. These could be categorized as follows: (1) short-term measures that are relatively easy to implement or have already been implemented; and (2) long-term measures that are important and essential but require more time before realization. These measures are summarized in Table 4.2.

At present, Asia lacks a proper market signal for crude oil pricing. However, once the Russian ESPO pipeline moves into full-scale operation, it is highly possible that the ESPO blend – backed by a combined volume of crude oil supply from eastern Russia that will eventually amount to 2 million bpd – will become the new marker crude oil for Asia. Realizing this is of course no easy task, but such a development could drastically change the current pricing system into a more open and transparent one. It will surely enhance market stability in that the fundamental principles (of the supply/demand balance in the market as the basis for price determination) are duly taken account.

Three conditions will be needed for the Russian ESPO blend to become a marker crude. First, the volume of ESPO crude oil supply needs to become large enough to ensure that a sufficient amount is available for spot trading. Currently, most ESPO oil comes from Vankor, but additional new production from other East Siberian fields will be critically important for additional physical supply.

Second, the ESPO blend will have to be traded in a highly liquid market with a number of active participants to determine the price at which both buyers and sellers find comfortable. Limited liquidity may lead to price

Table 4.2 Measures for oil price stabilization

	Dialogue and information	*Supply–demand flexibility*	*Market systems*
Short-term measures	• Balanced provision of information • Development of statistics • Dialogue between oil producing and consuming countries	• Establishment of oil stockpiles in emerging countries • Maintenance of spare production capacity • Review of operation policy of stockpiles	• Ensure diversity of market participants
Long-term measures	• Dialogue between oil-producing and -consuming countries on future outlook and policies	• Increase flexibility in demand by consuming countries • Abolish subsidies in emerging countries	• Increase transparency of market transactions • Increase spot transactions

Source: Kobayashi 2010

manipulation by certain parties and this will undermine the grade's credibility as a marker crude oil.

The third condition, which is somewhat related to the second, is the diversity of sellers. At present, Rosneft is a dominant seller of the ESPO blend, with more than half of the tendered cargoes so far sold by the company. In order to ensure that the market functions in an objective manner, a large number of sellers should be present in the market. If players other than Rosneft come in to undertake additional exploration and development in East Siberia, that will contribute to diversity, which will enhance market transparency and objectiveness.

It is of course hard to achieve these conditions in the immediate future. Yet, it is highly possible that the ESPO blend export could eventually help to solve some of the issues facing the Asian oil market that have been discussed earlier. It is also expected that the export of the ESPO blend could progress in a manner that enhances the transparency and liquidity of the Asian crude oil market.

Asia needs to establish a more reliable and stable pricing mechanism for its crude oil procurement. Russian crude oil export to East Asia can play an important role in this respect. It could also be instrumental in establishing a fair and equitable crude oil pricing system in the Asian market. At the same time, close and frank communication with the countries of the Middle East, the major suppliers of crude oil, should be strengthened. Dialogues between producers and consumers would not necessarily solve all the issues, but they could at least enhance the sharing of views and create a platform for joint efforts to counter common problems.

Notes

1 Asian countries imported 14.28 million bpd of oil from the Middle East according to the *BP Statistical Review of World Energy 2011*. Suppose that the Asian premium is US $1 per barrel, the annual excess payment amounts to US $5.21 billion.
2 Developed by the American Petroleum Institute (API), the API gravity is an index that shows the specific gravity of oil and is calculated as: API gravity = 141.5/ Specific Gravity at $60/60^0$F - 131.5. It is 10 when the gravity is 1.0 (same with water) and increases as the gravity becomes lighter.
3 Oil production at Sakhalin-2 started in 1997, but only for the summer season via a temporary facility. Export via the permanent facility in Prigorodnoye started in February 2009.

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5 Enhancing regional cooperation in fighting piracy and robbery against ships in Asia

Lee Yin Mui

Introduction

About 30 per cent of world trade, including energy supplies, passes through Asian waters annually. This figure is likely to grow exponentially, given the increasing rate of energy consumption by fast-growing Asian countries. At present, the logistics systems supporting the sea transport of energy supplies are calibrated very finely, and substantial costs are incurred to ensure a smooth and uninterrupted flow of maritime traffic. Threats to the physical security of the maritime logistics supply chain are likely to have an adverse effect on the growth and economy of energy-consuming states, whose energy supplies are mostly delivered by sea.

Among others, threats to energy security include transnational crime. The consequences of this trend significantly impacts upon both crime-affected countries as well as their neighbours across the region. In addition to both conventional and non-conventional threats, rampant incidents of piracy and armed robbery against ships[1] are likely to upset the equilibrium of the energy supply chain. The Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) is the first government-to-government multilateral initiative of its kind in Asia. The ReCAAP is mandated to combat piracy and armed robbery against ships in Asia and contributes towards the physical safety of energy-carrying vessels in Asian waters.

Birth of the ReCAAP agreement

In the early 1990s, there was a general surge in the number of incidents of piracy and armed robbery against ships in the Straits of Malacca and Singapore and in some parts of Asian waters. At the time, the concern was mainly focused on safety to navigation, as crew members were often tied up or locked in their cabins, leaving the ship underway without proper watch-keepers on duty. This trend threatened the maritime security of coastal states and traffic flowing through the waters, and led to an increase in operating costs due to higher insurance premiums, which correspond with the risk of being attacked.

The situation worsened during the later half of the 1990s with the emergence of 'phantom' ships. Here, crew members were abandoned on isolated islands, in lifeboats or simply thrown overboard; the ships were taken over by a fresh set of crew with new identity, and the cargo onboard was eventually sold. The loss of lives and the trauma experienced by seafarers in such situations was unacceptable to the maritime community and governments. Eventually, calls by governments in the region to cooperate to combat the growing trend of maritime crime moved high on the agenda at ministerial-level meetings and regional forums. Indeed, the growing trend during the late 1990s and early 2000s was so alarming that the Straits of Malacca were categorized as a war zone in 2005, listed under the Joint War Committee,[2] until August 2006.

In November 1999, the then Prime Minister of Japan Keizo Obuchi mooted the need for a regional agreement to address these growing threats at sea. In March 2000, a regional conference titled Combating Piracy and Armed Robbery against Ships (commonly referred to as the Asia Anti-Piracy Challenge 2000 Conference) was held in Tokyo, where law-enforcement agencies and maritime industries came together to jointly address these concerns. The conference resulted in the promulgation of two documents, the 'Tokyo Appeal' and the 'Model Action Plan', which together called for affected Asian governments to cooperate and share information, and to take appropriate measures to suppress and combat piracy and armed robbery against ships in Asia.

Following the conference, Asian governments and law-enforcement agencies held several meetings to draft the framework for a regional agreement. The ReCAAP Agreement was finalized on 11 November 2004 by 16 countries, collectively known as the Association of Southeast Asian Nations Plus Six (ASEAN+6), which comprises Bangladesh, Brunei, Cambodia, China, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, the Philippines, Singapore, Sri Lanka, Thailand and Vietnam. All but Malaysia and Indonesia signed and ratified the ReCAAP.

The ReCAAP is the first regional government-to-government agreement to promote and enhance regional cooperation in combating piracy and armed robbery against ships in Asia. Its three central pillars are information sharing, capacity building and cooperative arrangements, with the key principal consideration of respecting the sovereignty of each contracting party. The agreement entered into force on 4 September 2006 and, to date, 17 states have become contracting parties. These include three non-Asian countries committed to protecting the interests of the maritime community in Asian waters – Norway, the Netherlands and Denmark, who signed and ratified the ReCAAP on 29 August 2009, 3 July 2010 and 20 November 2010, respectively. The participation of these three countries further reaffirms the need for multilateral efforts in addressing the international issues of piracy and sea robbery and their associated challenges.

Mechanism and roles of the ReCAAP ISC

Article 18 (5) of the ReCAAP Agreement allows for accession by any state interested in joining. To do so, the state notifies the depository of the agreement, who is the Government of Singapore. In the absence of a written objection by a contracting party within 90 days of the receipt of the depository's notification, the state may deposit an instrument of accession with the depository. It would then become a party to the agreement 60 days later. For any state that expresses an interest in acceding to the ReCAAP, it is the responsibility of the ReCAAP Information Sharing Centre (ISC) – the nerve centre for the ReCAAP system – to convey to the interested state the following (among others): an affirmation that the target area of interest is the Asian region, and a request to the state to furnish information on its areas of interest and potential areas of contribution to the ReCAAP ISC, such as capacity building.

Each ReCAAP contracting party nominates a representative, known as a governor, who sits on the ReCAAP ISC Governing Council to provide guidance on the day-to-day running of the ISC. The governors of the ReCAAP ISC Governing Council meet at least once a year. In addition to the annual ReCAAP ISC Governing Council Meeting, a Special Governing Council Meeting may be convened as deemed necessary by the chairperson of the Governing Council. The chairperson is elected from among the governors for a period of two years; the Council's decisions are based on consensus among all governors.

The ReCAAP ISC was established and officially launched in Singapore on 29 November 2006 by Raymond Lim, then Minister for Transport and Second Minister for Foreign Affairs for the Government of Singapore. The ReCAAP ISC was formally accorded the status of an international organization on 30 January 2007, based on the operating principles of effectiveness, transparency and respect for countries' sovereignty. As the ReCAAP system's central hub, the ISC is linked to all contracting parties through a network of ReCAAP focal points (explained in detail below). The ReCAAP ISC is headed by an executive director appointed by the Governing Council. The centre is staffed by 14 personnel, consisting of both local staff from Singapore and foreign secondees from China, India, Japan, Korea, and the Philippines.[3] The executive director is responsible for the administrative, operational and financial matters of the ReCAAP ISC in accordance with the policies (and any other matters) as determined by the Governing Council and the provisions of the ReCAAP Agreement.

Although the scope of maritime security includes a broad spectrum of issues, the ReCAAP ISC is presently mandated to focus on combating piracy and armed robbery against ships in Asia. The vision of the ISC is to be the information hub for combating piracy and armed robbery against ships in Asia. To achieve this, the ISC focuses on enhancing regional cooperation

through information sharing, capacity building and cooperative arrangements. Overall, the roles of the ReCAAP ISC are:

- to serve as a platform for information exchange with the ReCAAP focal points via the Information Network System (IFN);
- to facilitate communication and information exchange among participating governments, in order to improve incident response by the contracting parties;
- to analyse and provide accurate statistics of piracy and armed robbery incidents in Asia, in order to foster better understanding of the situation;
- to facilitate capacity-building efforts that help to improve the capabilities of member countries and their focal points in combating piracy and armed robbery in the region; and
- to cooperate with organizations and likeminded parties on joint exercises, information sharing, capacity building programmes or other forms of cooperation/collaboration, as appropriate and as agreed upon among the contracting parties.

Under the provisions of the ReCAAP Agreement, the ReCAAP ISC is currently receiving voluntary contributions from the host state (Singapore) and some of the contracting parties (at present, China, Japan, Korea, India, Denmark, the Netherlands and Norway). In addition, the ISC is open to receive funding from any international organization or other entity, in accordance with relevant criteria adopted by the ReCAAP ISC Governing Council, as well as any other contributions as may be agreed upon by the Governing Council.

The ReCAAP focal point concept

At the operational level, each ReCAAP contracting party designates a focal point to be a point of contact for the ReCAAP ISC. Because China operates under a 'one country, two systems' structure, while the Beijing Maritime Rescue Coordination Centre (MRCC) is the country's focal point, China also designates Hong Kong as a contact point (the only such designation). Among the ReCAAP focal points are navies, marine police departments, coast guards, port authorities, MRCCs and shipping and marine departments. The roles of the ReCAAP focal points and contact point are as follows: to manage piracy and armed robbery incidents within ReCAAP's territorial waters and jurisdiction; to act as points of information exchange among the ReCAAP focal points and with the ReCAAP ISC; to facilitate each country's law enforcement investigations; and to coordinate surveillance and enforcement for piracy and armed robbery with neighbouring focal points.)

Exchange of information among the ReCAAP focal points and the ReCAAP ISC are conducted via the secure, Internet-based IFN. Through this network, focal points are constantly linked to each other and to the ISC, to

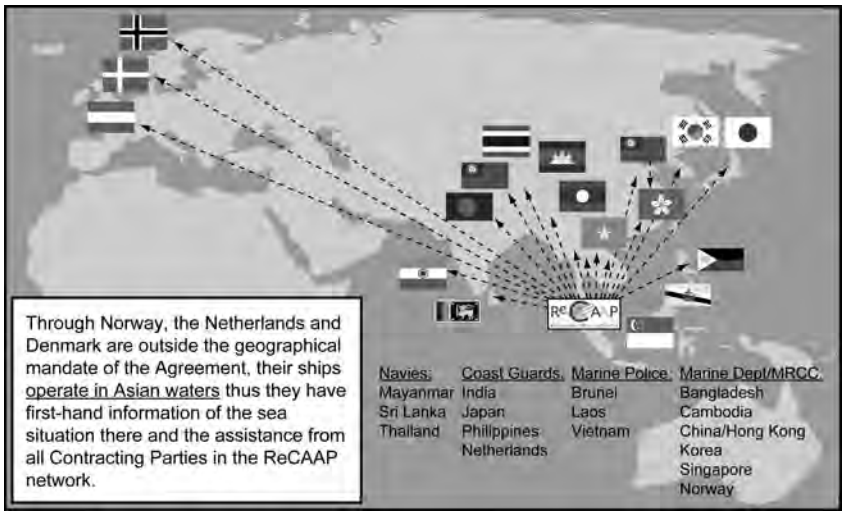

Figure 5.1 Network of the ReCAAP focal points and contact point
Source: ReCAAP ISC

facilitate appropriate responses to incidents of piracy or armed robbery that have been reported to the focal points and to relevant agencies. An agency receiving the report of an incident will manage the incident in accordance with its national policies and response procedures and provide assistance to the victim ship where possible. The focal point is required to submit an Incident Report and to follow up with reports (via an Amplifying Report) based on its investigation findings, to be sent to the ISC and to all ReCAAP focal points.

ReCAAP ISC analysis and other activities

The ReCAAP ISC collects, collates and analyses information received from reliable sources. In its analysis, the ISC defines *piracy*, in accordance with Part VII, Article 100 of the United Nations Convention on the Law of the Sea (UNCLOS), as any of the following:

a. any illegal act of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed:
   (1) on the high seas, against another ship, or against persons or property on board such ship;
   (2) against a ship, persons or property in a place outside the jurisdiction of any State;
b. any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;

c. any act of inciting or of intentionally facilitating an act described in subparagraph a or b.

(UNCLOS 1994)

Armed robbery against ships is defined, in accordance with the Code of Practice for the Investigation of Crimes of Piracy and Armed Robbery against Ships of the IMO Assembly Resolution A.1025 (26), as any of the following acts:

a. any illegal act of violence or detention, or any act of depredation, or threat thereof, other than an act of 'piracy', committed for private ends and directed against a ship, or against persons or property on board such ship, within a State's internal waters, archipelagic waters and territorial sea;
b. any act of inciting or of intentionally facilitating an act described above.

(IMO 2010)

To assess the severity of each incident, the ReCAAP ISC adopts a matrix-based assessment tool that focuses on two key aspects of an incident, comprising the violence factor and the economic factor:

a. **Violence Factor**. This factor refers to the intensity of violence described in an incident, and the three indicators used to determine this are:
   (1) *Type of weapons used*. Incidents of pirates/robbers who board a ship with no visible weapons are generally deemed as less violent compared to those equipped with hand guns, knives, machetes, or other dangerous weapons. In cases where more sophisticated weapons are used, such incidents would be considered more violent.
   (2) *Treatment of the crew*. Incidents where pirates/robbers kill or kidnap crew are deemed to be more violent compared to petty thieves who flee upon being noticed. Other cases could include threatening crew members, assault, or serious injury.
   (3) *Number of pirates/robbers engaged in an attack*. As a rule, an incident where a larger number of pirates/robbers were involved would be considered more significant as having a large capacity (as well as probability) for use of force. A larger number of pirates/robbers may also indicate the involvement of gangs or organized syndicates rather than petty and opportunistic pirates who generally operate in small groups.
b. **Economic Factor**. This factor takes into consideration the type of the property taken from the ship. Cases of theft of cash or personal effects are generally less significant incidents compared to cases where the entire ship is hijacked either for the cargo onboard or theft of the vessel.

Using these indicators, the ReCAAP ISC classifies each incident of piracy or robbery at sea into one of three categories of significance. Category 1 (CAT 1) means the incident is 'very significant', while CAT 2 and CAT 3

refer to incidents of 'moderate' or 'less' significance, respectively. Examples of CAT 1 incidents are those involving more than seven pirates/robbers at a time, pirates/robbers armed with firearms, the death or serious injury of crew, ships being hijacked or going missing, the theft of cash or property, etc. CAT 3 incidents, on the other hand, are petty theft-type situations, in which robbers board a ship while at anchor/berth to steal ship stores, mooring ropes, spare engine equipment and other items onboard ships.

CAT 2 incidents fall in the middle, normally involving pirates/robbers who have threatened crew or held them hostage to demand cash, valuables or personal belongings. The assailants may or may not be armed with firearms, but are relatively more aggressive than the robbers involved in CAT 3 incidents. A large number of CAT 2 incidents have also involved the theft of cash and personal belongings – mobile phones, laptop computers, cameras, navigational equipment and other computer peripherals that can be easily sold for cash.

By differentiating the severity of each incident according to its significance level, the ReCAAP ISC provides a qualitative analysis of these incidents. This allows the relevant authorities to optimize their resources while dealing with situations within their jurisdictions and under their national policies. The ReCAAP ISC has also shared its analysis on trends and patterns at conferences and forums, as well as through publications, particularly its Monthly, Quarterly and Annual Reports, as well as *ad hoc* Incident Alerts and Special Reports. These documents are disseminated to the ReCAAP focal points, contact point, stakeholders, members of the shipping community and like-minded organizations and individuals. The reports are also posted on the ReCAAP website at <www.recaap.org>.

Capacity building

To support information sharing and confidence building and to enhance the capability of the ReCAAP focal points, the ReCAAP ISC conducts regular capacity-building activities. These include operational visits, workshops, exercises and technical assistance programmes that share best practices. Key annual programmes carried out by the ReCAAP ISC are the ReCAAP Focal Point Senior Officers' Meeting and the Capacity Building Workshop. Other capacity building activities include educational and training-related activities, team building, bonding sessions, exchanges and visits.

The ReCAAP Focal Point Senior Officers' Meeting is an annual meeting of all senior officers of the ReCAAP focal points/contact point, with the following objectives:

- to enhance the capabilities of the ReCAAP focal points/contact point and their respective law enforcement agencies by promoting dialogue and sharing of knowledge on recent incidents of piracy and armed robbery;

- to promote networking and strengthen mutual understanding in order to improve the working rapport among the ISC, focal points/contact point and the maritime industry; and
- to share experiences and challenges faced by the focal points/contact point.

Between 2008 and 2010, the ISC conducted three ReCAAP Focal Point Senior Officers' Meetings, in Singapore (2008 and 2009) and Phuket, Thailand (2010).

Also on an annual basis, IFN operators from each of the ReCAAP focal points/contact point meet to share best practices and experiences via a scenario-based exercise at Capacity Building Workshops. At these events, representatives from the maritime industries have also been invited to share their challenges and views. The objectives of the workshops are the following: to improve the efficiency of the ReCAAP focal points/contact point in submitting Incident Reports and Amplifying Reports via the IFN; to enhance operational cooperation among focal points/contact point, as well as between focal points/contact point and the ISC; and to facilitate networking among the ISC, focal points/contact point, maritime industries and respective government agencies. Four Capacity Building Workshops have been conducted by the ReCAAP ISC, held in Singapore (2007), Hong Kong (2008), the Philippines (2009) and Singapore (2010).

Other capacity-building activities included exercises conducted by the ISC, the focal points and the contact point. Information-sharing exercises via the IFN are also held on a quarterly basis among the focal points/contact point. These scenario-based exercises are aimed at harnessing the operators' skills in submitting Incident Reports via the IFN, and providing additional training and familiarization opportunities for new operators.

The ReCAAP ISC also participates in joint exercises organized by other law enforcement agencies. Two of these have been the Maritime Information-Sharing Exercise (MARISX), conducted by the Republic of Singapore Navy (RSN) at the Changi Command and Control (C2) Centre in May 2009 and September 2010. The MARISX involved hands-on participation through real-time collection and evaluation of information using the information-sharing portal developed by the Maritime Security Task Force – Information Fusion Centre (MSTF-IFC) of the Changi C2 Centre.

Cooperative arrangements

The ReCAAP ISC has worked with partner organizations on mutually beneficial terms as well as with those who are not members of the ReCAAP Agreement but who wish to collaborate on its programmes. Such cooperative agreements have paved the way for greater growth and progress in combating piracy and armed robbery incidents in the region. To date, the ReCAAP ISC has signed cooperative agreements with the IMO on 4 December 2007. A Standard Operating Procedure (SOP) was signed between the ISC and the

MSTF-IFC on 17 December 2009. In addition, memoranda of understanding (MoUs) were signed with two shipping associations, the Baltic and International Maritime Council (BIMCO) on 29 April 2010 and the Asian Shipowners' Forum (ASF) on 27 August 2010.

Engagement with the maritime community

The IMO Maritime Safety Committee (MSC), at its 86th session (27 May–5 June 2009), reviewed and revised two internal circulars. MSC/Circ.622/Rev.1 was on 'Recommendations to governments for preventing and suppressing piracy and armed robbery against ships', and MSC/Circ.623/Rev.3 was on 'Guidance to ship owners, ship operators, ship masters and crew on preventing and suppressing acts of piracy and armed robbery against ships'. These two circulars were subsequently replaced by MSC/Circ.1333 and MSC/Circ.1334, respectively, in which the ISC is recognized as one of the agencies engaged in preventing and suppressing piracy and armed robbery against ships in Asia.

The circulars include a flow diagram on the procedures for reporting incidents of piracy and armed robbery against ships in Asia (Figure 5.2). The reporting procedures stipulate that shipmasters are to report all incidents of piracy and armed robbery against ships to the Rescue Coordination Centres (RCCs) of the coastal states immediately, while ship owners and ship

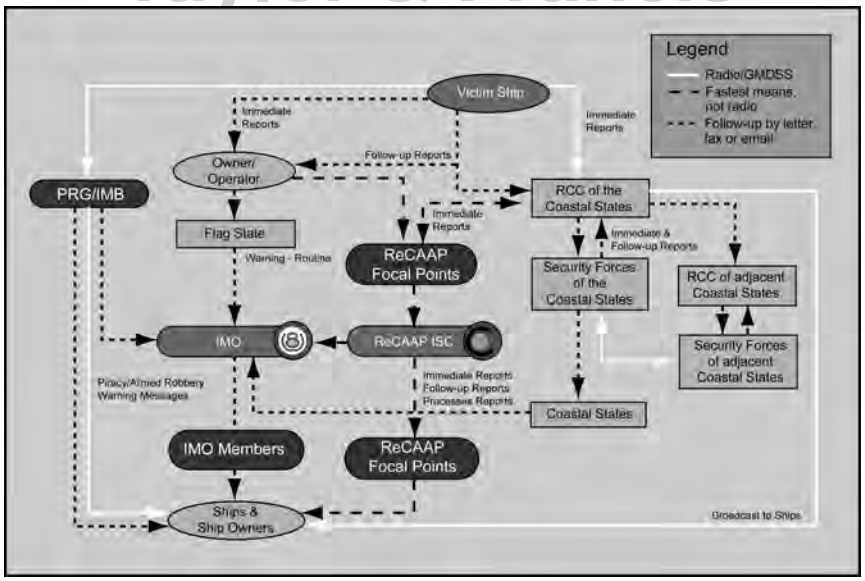

Figure 5.2 Flow diagram for reporting incidents in Asia
Source: ReCAAP ISC
Note: GMDSS – Global Maritime Distress and Safety System; PRC – Piracy Reporting Centre; IMB – International Maritime Bureau

operators are to report such incidents to the ReCAAP focal points. Some of the ReCAAP focal points are the RCCs of the ReCAAP contracting parties. Multi-channel reporting and timeliness of reports enable the ISC to issue alerts warning seafarers and the maritime community about unfolding incidents. This process also provides inputs from alternate sources, which facilitates data verification, information collation and comprehensive analysis in deriving trends and patterns, and production of value-added reports that can be shared with shipmasters, ship owners, ship operators and the maritime community at large.

The ReCAAP ISC reaches out to the maritime community through various avenues. Among other international and regional conferences, the ISC organizes two annual events, the Nautical Forum and the Piracy and Sea Robbery Conference, both of which share best practices and offer advice and recommendations for government agencies, shipping companies and crew at sea. The objectives of the two events have been to address the evolving piracy and armed robbery situation and to assist seafarers in preparing for potential attacks at sea. In particular, the ISC emphasizes timely reporting of incidents and shared social responsibility between seafarers and governments in combating piracy and armed robbery against ships, as no single agency can manage this responsibility alone.

The Nautical Forum has been held every year in Singapore since 2009; the inaugural meeting included some 140 participants. The objectives of the forum are the following:

- to provide updates on the patterns and trends of piracy and armed robbery against ships in Asia, based on the Annual Report published by the Research Department of the ReCAAP ISC;
- to enhance cooperation between the ISC and local stakeholders, including the ReCAAP focal point (Singapore), shipping companies and likeminded organizations and individuals;
- to provide a platform for shipping companies to better understand the working mechanism of the ISC and the ReCAAP focal points/contact point;
- to reiterate the endorsed reporting procedures in accordance with the IMO MSC's Circulars 1333 and 1334; and
- to gather feedback from the shipping industry on reports and analysis by the ISC.

The annual Piracy and Sea Robbery Conference is organized to offer perspectives from a range of stakeholders, including governments, international organizations, shipping associations, ship owners and operators, maritime industries, seafarers and likeminded individuals. The discussions during the conference are meant to provide common understanding among all so as to foster closer cooperation among these entities in addressing the challenges of combating piracy and sea robbery. A wide spectrum of issues have been

highlighted and discussed during the conferences, including trends and assessments of piracy and sea robbery in Asia; perspectives on piracy and sea robbery shared by regional authorities and the shipping and maritime industries; and the operational experiences of the multinational task force deployed off the coast of Somalia and in the Gulf of Aden.

The inaugural Piracy and Sea Robbery Conference, attended by 130 participants, was jointly organized by the ReCAAP ISC, the Roundtable Group of International Shipping Associations (comprising BIMCO, International Chamber of Shipping [ICS], INTERCARGO and INTERTANKO) and the S. Rajaratnam School of International Studies (RSIS). The following year, 170 participants attended the conference, which was jointly organized by the ISC and BIMCO. That year's events included the signing of an MoU between the ISC and BIMCO.

Through the Nautical Forums and the Piracy and Sea Robbery Conferences, the ReCAAP ISC has emphasized the following key messages to the maritime community: immediate reporting of incidents, thus enabling law enforcement to channel resources to assist the victim ship; the issuance of warnings to fellow seafarers on the increase in piracy and sea robbery activities in specific locations; and reminding crew to be vigilant and adopt Best Management Practices (BMP).

Situation update of piracy and armed robbery against ships in Asia, January–September 2010[4]

A total of 118 incidents were reported during January–September 2010, of which 97 were actual and 21 were attempted incidents (see Figure 5.3). This was a 60 per cent increase compared to the same period in 2009, when

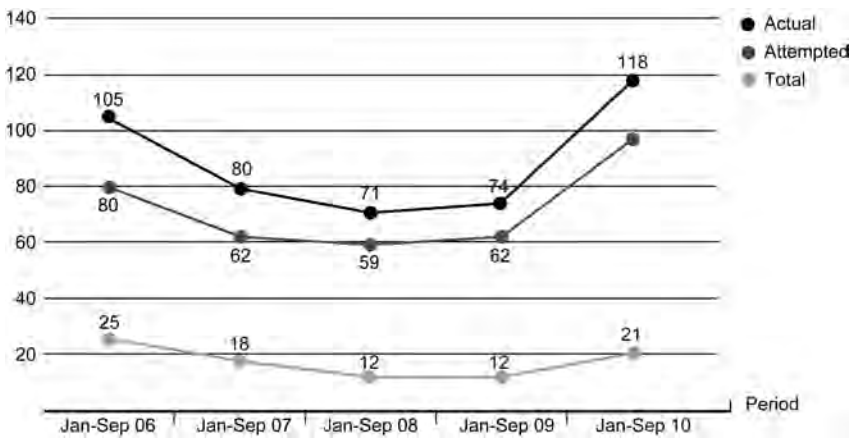

Figure 5.3 Number of incidents of piracy and robbery reported (January–September 2006–10)
Source: ReCAAP ISC

74 incidents were reported, of which 62 were actual and 12 were attempted incidents.

Analysis of incidents between January and September 2010 indicates that the actual incidents during that period were relatively more violent compared to the same periods in 2006–09. About one-third of the incidents (32 of 97) involved crew being threatened and held hostage. Most of the actual incidents were CAT 2 incidents involving ships that were underway in Indonesia (off Pulau Mangkai, Pulau Anambas, Pulau Natuna and Pulau Subi Besar) and in the South China Sea. CAT 3 incidents tended to involve ships at anchor/berth at ports and anchorages in Bangladesh, Indonesia and Vietnam (see Figure 5.4).

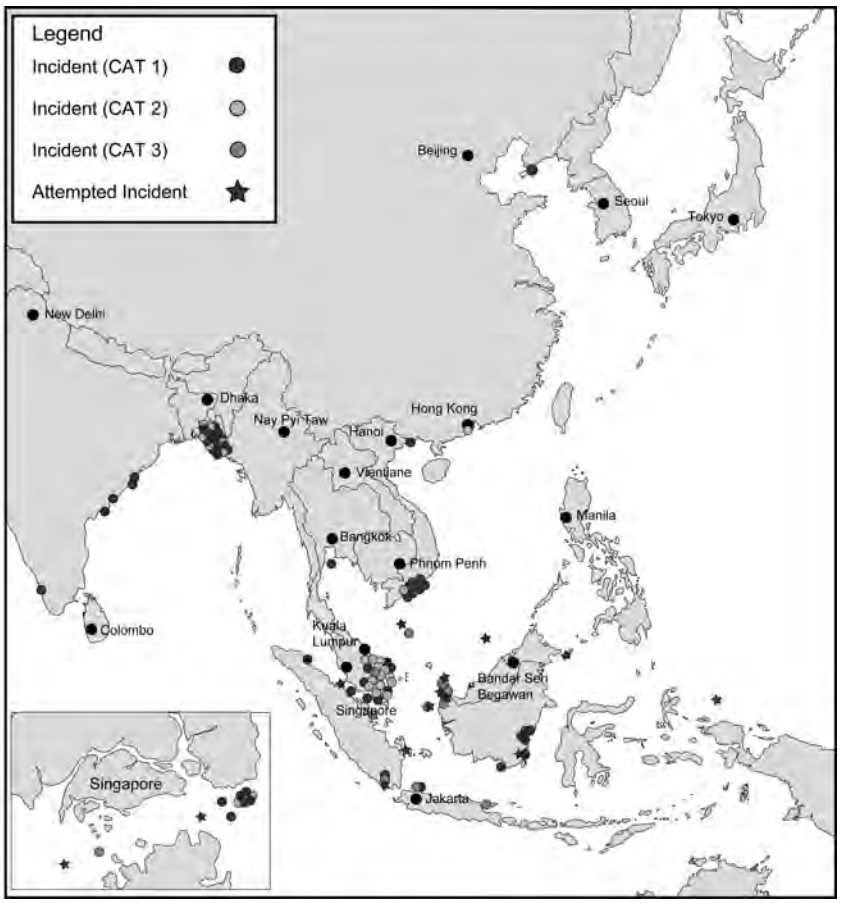

Figure 5.4 Approximate location of incidents of piracy and robbery, January–September 2010

Source: ReCAAP ISC

The number of CAT 1 incidents has remained fairly consistent throughout the period of January–September of 2006–10. Of the three CAT 1 incidents reported during January–September 2010, all were hijacking incidents involving tugboats. Two of these tugboats, the *Asta* and the *Atlantic 3*, were subsequently found in the Philippines, and their crew members were rescued by the Malaysian and Vietnamese authorities, respectively. In the case of the *Asta*, the Philippine National Police arrested the pirates, who were charged with kidnapping with serious illegal detention and piracy. The *Asta* was released to its owner and arrived in Singapore in August 2010, while the *Atlantic 3* also returned to its owner and arrived in Miri, Sarawak, East Malaysia, in February 2011.

As for the hijacking of the third tugboat, the *PU 2007*, the quick response from the regional authorities and the presence of other law enforcement agencies in the area were believed to have been important factors in compelling the pirates to abandon the tugboat and escape. These hijacking incidents demonstrated the potential for information sharing, timely reporting of incidents by ship owners to the ReCAAP ISC and ReCAAP focal points/contact point, as well as inter-agency cooperation and responses by the authorities in locating the vessels and rescuing the crew.

This period also saw the highest number of incidents involving the use of knives or machetes by pirates/robbers, as well as assailants operating in groups of more than seven individuals. About half of the incidents involved pirates/robbers armed with knives/machetes and 18 per cent (17 of 97 incidents) armed with guns; in addition, some 23 per cent (22 of 97 actual incidents) involved groups of more than seven pirates/robbers.

There was a surge in the number of incidents reported in Indonesia (off Pulau Mangkai, Pulau Anambas, Pulau Natuna and Pulau Subi Besar) during January–September 2010. The number of incidents involving ships while underway in this area more than doubled over the same period in 2009. Most were CAT 2 incidents involving pirates/robbers usually armed with knives, although five incidents reported that the pirates/robbers were armed with guns as well. During these incidents, the pirates/robbers threatened crew members, tied them up and forced them to surrender cash and properties. They typically fled after taking the crew's cash and valuables.

The ReCAAP ISC notes that all 17 incidents reported in January–September 2010 occurred during hours of darkness (between 7 pm and 5 am), with the exception of an incident involving fishing vessels *Lian Man Tsai* and *Man Yi Feng*, which occurred at 5.01 pm. Most of the incidents occurred on consecutive days and are believed to have involved the same group of pirates/robbers. The sighting of a mother boat[5] was also reported by the crew aboard *Yangtze Spring* on 30 August 2010. Although not conclusive, the ReCAAP ISC assessed that the following factors could have contributed towards the increase in the number of incidents in the South China Sea:

- insufficient surveillance in the waters and vicinity of the South China Sea;

- stringent enforcement in other areas that used to be operating grounds for pirates/robbers, thus forcing the latter to look for alternate areas;
- an increase in awareness in the shipping fraternity towards the reporting of incidents, leading to more incidents being reported to authorities compared to previous years;
- taking advantage of the traditional practice of barter trade between fishermen and crew, the robbers disguised themselves as fishermen, and were thus able to attain proximity to the vessel or to distract the crew to allow for boarding opportunities; and
- as the world economy improved, the shipping trade also recovered, leading to higher traffic density and more opportunities for attacks by pirates/robbers.

Case studies of two hijacking incidents, involving the *Asta* and the *Atlantic 3*, seek to highlight the cooperation and coordination mechanism among the ReCAAP ISC, the ReCAAP focal points, the shipping community and regional partner organizations. The collaboration and information sharing between government agencies within the respective countries were instrumental in the recovery of the tugboats, the rescue of the crew and, in the case of *Asta*, the arrest of the robbers.

The hijack of tugboat Asta *on 6 February 2010*

On 5 February 2010, a Singapore-registered tugboat, the *Asta*, with 12 crew members onboard and towing a barge named *Callista*, departed Singapore bound for Cambodia. The *Asta* and *Callista* were scheduled to arrive in Cambodia on 9 February. At about 1.30 in the morning on 6 February, the ship agent reported that they had lost communications with the *Asta* off Pulau Tioman, Malaysia. The tugboat had reportedly deviated from its planned course and was tracked heading north-easterly in the South China Sea.

The ship agent suspected that the *Asta* had been hijacked and reported the incident to the Singapore Port Operations Control Centre (POCC), which in turn immediately issued a broadcast to all vessels to report the sightings of *Asta* and *Callista*. The POCC, which is also the ReCAAP focal point for Singapore, notified the MRCCs of Indonesia (Badan SAR Nasional, BASARNAS, the national search-and-rescue agency), Malaysia (Putra Jaya), Vietnam (Hanoi), Thailand (Bangkok) and the Philippines (Manila). The maritime authorities in the region and all ReCAAP focal points were immediately alerted about the missing vessels. In particular, the maritime authorities of Brunei, Indonesia, Malaysia, the Philippines and Thailand, as well as the shipping community in general, were alerted to be on the lookout for the tugboat and barge, which were likely to be quickly repainted and renamed.

On 10 February, a passing ship reported a sighting of the *Asta* but without the *Callista*. Five sightings of the *Callista* were subsequently received from passing ships during 12–17 February (see Figure 5.5 for locations).

On 17 February, the Malaysian Maritime Enforcement Agency (MMEA) informed the ReCAAP ISC that a Royal Malaysian Navy (RMN) vessel had spotted a life raft off the Adraiser Reef (in Malaysian waters) and rescued 11 individuals, believed to be the crew of the *Asta*. The ISC forwarded the *Asta* crew list to the MMEA for verification, through which the chief engineer of the *Asta* was found to be still missing.

Preliminary information gathered from the rescued crew was reported by the MMEA to the ISC. According to the crew, at around 1.15 am on 6 February, eight robbers dressed in dark clothes had boarded the *Asta*, about 3 nautical miles (nm) south-east of Pulau Tioman. The robbers had approached the *Asta* in a white fibreglass boat about 5 m long and 2.5 m wide, equipped with an outboard motor of about 80 horsepower. The robbers then blindfolded the crew members and locked them in the cabins of the shipmaster and chief engineer. On 10 February at about 9 pm, the crew was set adrift in an inflatable life raft. The crew revealed that only one robber was armed with a rifle and the rest of them were armed with *parangs* (long knives). It was also reported that the tugboat was carrying only SG$600, held by the second mate.

On 18 February at about 1.10 pm, the *Callista* was located on the eastern side of Pulau Tioman. A tugboat from the same company was despatched to recover the barge. On 25 February, the Philippine Coast Guard (PCG), which is also the ReCAAP focal point for the Philippines, informed the ISC that the

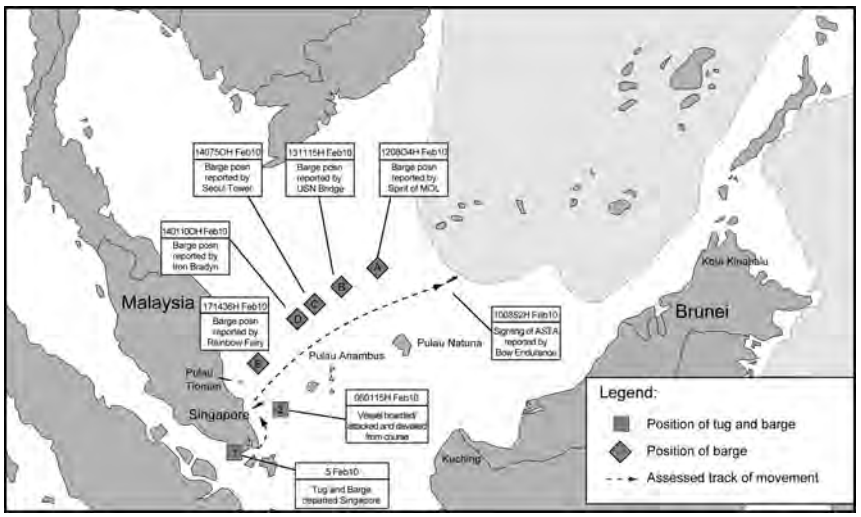

Figure 5.5 Map showing the location of sightings of Asta and Callista
Source: ReCAAP ISC

Asta (now renamed *Roxy-I*) had been positively identified through its IMO number in the area of Dinagat Island, Surigao City, in the Philippines. The PCG despatched a patrol craft to the area and took custody of the tugboat on 26 February.

The PCG informed the ReCAAP ISC that the chief engineer, who had been held hostage by the robbers throughout the incident, had managed to escape and reported to the local police. The seven robbers, all Indonesians, were arrested. On 5 August, the 11th Judicial Court of the Philippines issued a court order releasing the *Asta* to its rightful owner, subject to the condition that the tugboat would be made available if its presence were deemed necessary for the prosecution of the cases filed against the seven robbers. The *Asta* arrived in Singapore on 13 August 2010.

While the *Asta* was returned to its rightful owner, the saga of the Indonesian pirates/robbers was far from over. In a press statement carried by the *Philippine Daily Inquirer* on 30 August 2010, the chief city prosecutor requested the office of the chief state prosecutor of the Department of Justice (DOJ) to take cognizance of the case. The city prosecutor did not have the wherewithal to successfully prosecute the case, considering that it involved nationals and authorities from the Philippines, Indonesia and Malaysia. The chief city prosecutor added, 'The nature of the case requires the resources and intervention of the national government. It requires the intervention of the Department of Foreign Affairs to make the proper representations in those countries to get their interest in the prosecution of the case' (Zonio 2010: 1).

The hijack of tugboat Atlantic 3 *on 27 April 2010*

On 27 April 2010 at about 11.30 am, a Malaysia-registered tugboat, the *Atlantic 3*, towing barge *Atlantic 5*, departed Tanjung Ayam, Johor, Malaysia, for Kintap, South Kalimantan, Indonesia, after replenishment of fresh water. At about 5.26 pm, the shipping company lost contact with the *Atlantic 3*. The last known position of the tugboat and barge was approximately 11 nm east of Pulau Bintan, Indonesia. The vessels had been scheduled to transit through Pulau Bintan sometime between midnight and the morning of 27–28 April. The shipping company reported the incident to the Singapore POCC and the ReCAAP ISC on 29 April. The POCC also initiated a broadcast about the missing boats on Navigational Telex (NAVTEX) and asked vessels in the area to report any sightings to the POCC and MRCC Putra Jaya. The ISC also alerted the maritime authorities in the region, including the Malaysian and Indonesian authorities and the PCG.

On 3 May, a Vietnamese vessel, the *MV Truong Sa 06*, while returning from the Spratly Islands to Vietnam, spotted a life raft carrying the abandoned crew of the *Atlantic 3*. The crew members were rescued and brought to Vung Tau Anchorage, Vietnam, on 8 May. The crew members were in a state of fatigue but, overall, they were reported to be doing well. Interviews with the crew revealed that seven robbers, armed with knives and possibly a gun,

had boarded the tugboat. Upon boarding, the robbers had switched off the lights, tied up the crew members and confined them to the mess room. The shipmaster explained that he had had no chance to activate the Ship Security Alert System (SSAS) after the robbers boarded the tugboat. Between 1 and 2 am on 2 May, the robbers brought the crew members, two by two, out from the mess room and demanded their money. After handing over whatever they had, the crew members were forced to board the life raft. Subsequently, the *Atlantic 3* sailed north-easterly towards the Philippines.

The ReCAAP ISC then informed the MMEA, the Badan Koordinasi Keamanan Laut Republik Indonesia (BAKORKAMLA, the Indonesian Maritime Security Coordinating Board), the ReCAAP focal points in the region (particularly in the Philippines and Brunei) and the MSTF-IFC about the last known position of the *Atlantic 3* and its assessed direction. On 17 May, the PCG unit in General Santos City, the Philippines, received information that a tugboat named the *Marlin VIII* and a barge (the *Marlin IX*), matching the description of the *Atlantic 3* and *Atlantic 5*, were en route from Surigao Province to Davao City (both in the Philippines) for dry docking (see Figure 5.6).

On 19 May, the PCG reported to the ReCAAP ISC that the two vessels had entered Sarangani Bay, Sarangani Province, the Philippines, that

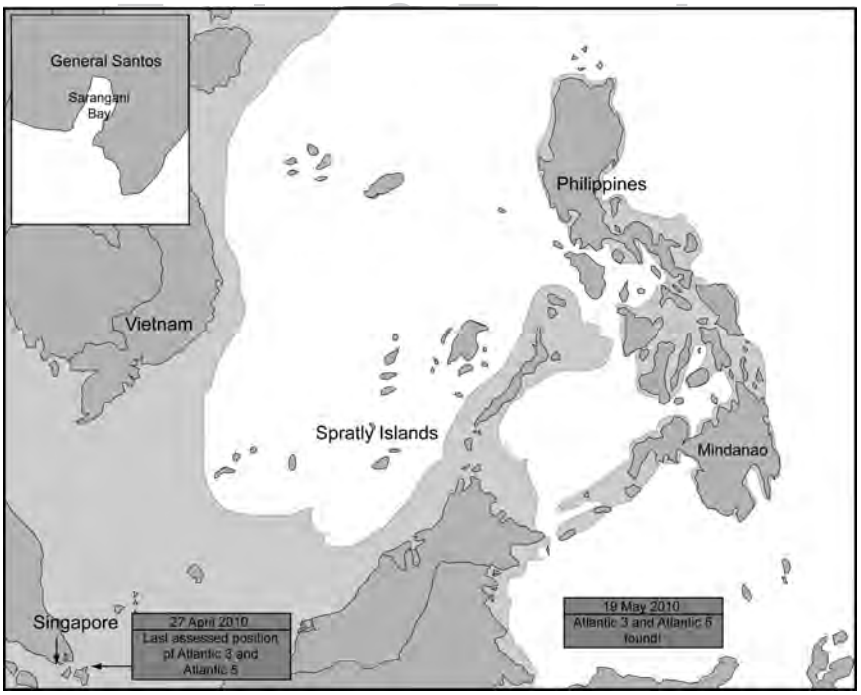

Figure 5.6 Approximate locations of Atlantic 3 and Atlantic 5
Source: ReCAAP ISC

morning. The PCG personnel from the station at General Santos City boarded and inspected the vessels at about noon, and confirmed the vessels to be the *Atlantic 3* and *Atlantic 5*. The authorities then arrested individuals who were using gas torches to cut away the names of the tugboat and barge.

The PCG took the vessels into custody and conducted an investigation of the incident. It revealed that the *Atlantic 3* and *Atlantic 5* were being manned by five Indonesian and two Filipino nationals when the vessels arrived at General Santos City. Upon docking, the five Indonesian nationals hurriedly left the vessels. During inspection by the PCG, the crew was unable to present any vessel documents. Upon closer inspection, the Coast Guard personnel found some documents belonging to the *Atlantic 3* and *Atlantic 5* in a trash bin in the pilot house. The crew members were subsequently taken into custody.

Besides the documents in the trash bin, the Coast Guard also found that the IMO number in the pilot house of *Atlantic 3* had been painted over with the words 'Safety First'. The words 'Marlin VIII' and 'Marlin IX' had been painted over the embossed 'Atlantic 3' and 'Atlantic 5', respectively. And the words 'Atlantic 3' on the lifejackets and life buoys had been replaced with 'Marlin VIII'.

Further investigation indicated that the vessels had been registered in Honduras under the name *Marlin VIII* and *Marlin IX*, and that a businessman residing in General Santos City had allegedly bought the tugboat and barge. The businessman even produced a Builder's Certificate for the tugboat, issued by the Singapore-based President Marine Pte Ltd, which showed that the tug had been built in Singapore. The ReCAAP ISC attempted to verify the businessman's claim with the general manager of President Marine, who confirmed that his company had neither built a tugboat named *Marlin VIII* nor issued the certificate.

On 9 July 2010, on orders from the City Prosecutor's Office in General Santos City, the PCG released the Filipino crew of the *Atlantic 3*, in accordance with the dismissal of charges filed against them, as there was insufficient evidence to show that they were involved in the hijacking of the vessels.

Emulation of the ReCAAP model

The ReCAAP ISC advocates situation awareness through information sharing among shipping companies, the ReCAAP focal points/contact point and the ISC. The increase in reporting channels (via shipping companies and seafarers) in providing timely information has enabled the ISC to issue Incident Alerts to warn other ships operating in the vicinity and to inform law enforcement agencies, through the focal points, about the incident. Multi-source reporting enables the ISC to better classify incidents according to its classification system, which in turn provides a qualitative analysis of the situation.

The ReCAAP ISC strongly urges shipmasters to report immediately all incidents of piracy and armed robbery against ships to the coastal states'

RCCs. The report should include a description of the type of craft used by the pirates/robbers, the direction the craft was heading, the presence of a mother ship (if any), the number of pirates/robbers involved, their physical appearance and language spoken. While the shipmaster reports the incident to the RCC, ship owners and operators are encouraged to report the incidents to the ReCAAP focal points.

Realizing the potential of a coordinated effort, the states of the region have resorted to coordinated patrols. Such efforts by Indonesia, Malaysia, Singapore and Thailand have contributed to a decrease in the number of incidents in the Straits of Malacca and Singapore. While there was an increase in the overall number of incidents during January–September 2010 compared to the same period during the previous four years, there has been a decrease in the number of incidents in the Straits of Malacca and Singapore. Only two actual incidents were reported in the Straits of Malacca and Singapore during January–September 2010, compared to five incidents reported there during the same period in 2009.

In view of the escalation of the piracy situation off the coast of Somalia and in the Gulf of Aden, the ReCAAP's model of information sharing and governmental cooperation has been widely regarded as the anti-piracy model to be emulated in the Horn of Africa. Through the IMO, the experience of setting up the ReCAAP ISC has been shared, and inputs have also been provided on the drafting of the Djibouti Code of Conduct (DCoC),[6] which was based on the ReCAAP model. Apart from the initial development of the DCoC at Tanzania (2008) and the high-level meeting at Djibouti (2009), the ReCAAP ISC also organized a familiarization programme for some of the DCoC states in November 2009 and participated in expert meetings on the DCoC's development in Tokyo in 2009 and 2010. These programmes were aimed at shortening the learning curve for the DCoC countries towards setting up an information-sharing system.

Conclusion

The ReCAAP ISC is now a step closer in terms of enhancing regional cooperation. The organization will continue to build on its strength through exchange of analysis and information and through various capacity-building programmes. The hard work put in by all agencies is encouraging, testament to the effort to steer the ReCAAP ISC concept to realization. The incidents involving the hijacking of tugboats and their successful recoveries have been underpinned by the commitment and determination of the ReCAAP contracting parties and partner organizations. These efforts include merchant fleets reporting sightings of victim vessels, law enforcement agencies' investigations, multi-channel reporting and timely exchange of information.

Cooperation and encouragement from the shipping industry and international organizations like the IMO have been crucial to the ReCAAP ISC's progress. With its international partners, the ISC will continue to seek avenues

to address the maritime challenges ahead and to assist likeminded agencies and organizations in their quest to suppress piracy and armed robbery at sea. The success of the ReCAAP ISC in Asia showcases the ReCAAP framework, which has now been adopted as a model for regional anti-piracy cooperation in the formulation of the DCoC. Moving forward, the ISC will continue to cooperate and collaborate with government agencies, ship owners, ship operators and seafarers in ensuring timely reporting and alerting of incidents of piracy and robbery at sea, prompt responses by authorities, and effective robbery and piracy countermeasures by shipmasters and crew.

Notes

1 This definition of piracy is according to Part VII, Article 100 of the United Nations Convention on the Law of the Sea (UNCLOS); additional details are included in this report. Armed robbery against ships is defined in accordance with the Code of Practice for the Investigation of Crimes of Piracy and Armed Robbery against ships of the International Maritime Organization (IMO) Assembly Resolution A.1025 (26); additional details are also included in this report.
2 The Joint War Committee, comprising underwriting representatives from Lloyd's, had declared the Straits of Malacca a 'high-risk zone' and added it to its list of areas that are at risk of war, strikes, terrorism and related perils. This resulted in the imposition of higher insurance premiums (as much as 30 per cent) for ships transiting through the area. Under the protest of the littoral state governments and the decreasing number of incidents, believed to be a result of actions carried out by the littoral states, the Joint War Committee removed the Straits of Malacca from the list.
3 A secondee from Thailand joined the ReCAAP ISC team with effect from July 2011.
4 For the latest data on incidents of piracy and armed robbery against ships for 2011, please see ReCAAP ISC (2011).
5 A mother ship is a vessel that is used by the pirates to carry smaller vessels onboard, to be launched when out in the sea to attack commercial vessels. Usually commercial ships, mother ships are normally vessels that had been hijacked by the pirates.
6 The Djibouti Meeting adopted the Code of Conduct concerning the Repression of Piracy and Armed Robbery against Ships in the Western Indian Ocean and the Gulf of Aden, which was signed on 29 January 2009 by the representatives of Djibouti, Ethiopia, Kenya, Madagascar, the Maldives, the Seychelles, Somalia, Tanzania and Yemen. Known as the Djibouti Code of Conduct, a total of 18 out of 21 eligible countries had signed the memorandum of understanding, including Comoros, Egypt, Eritrea, Jordan, Mauritius, Oman, Saudi Arabia, Sudan and the United Arab Emirates.

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6 NEAT Working Group on Energy Security Cooperation

Lye Liang Fook

Introduction

Governments around the world normally pay special attention to energy or energy-related issues, as these have a direct bearing on the economic or security well-being of a particular country. In Asia, an obsession with energy issues, either in terms of energy mix, energy sources or energy supply routes, is even more pronounced, as the majority of countries in the region are rapidly developing. On top of this is the rise of India and China, two of the world's most populous countries, which will exert an even more voracious demand for energy, particularly fossil fuels, to meet their rapid economic development.

Already, the International Energy Agency (IEA) has estimated that global oil demand in 2011 will rise by a daily 1.3 million barrels, or 1.6 per cent, to an average of 87.8 million barrels a day. Of this consumption volume, the IEA estimates that non–Organisation for Economic Co-operation and Development (OECD) countries in Asia (such as China and India), the Middle East and Latin America 'will continue to command the lion's share of oil demand growth in 2011' (Indian Express 2010: 1–2). In particular, China has surpassed the USA to become the world's biggest energy consumer. According to Fatih Birol, chief economist at the IEA, China consumed 2.252 billion tons of oil equivalent in 2009, about 4 per cent more than the USA, which burned through 2.170 billion tons of oil equivalent (Swartz and Oster 2010: 1).[1]

Given the growing importance of energy and energy-related issues in a dynamic and fast growing Asia, it is not unusual to find countries actively pursuing strategies either nationally or in collaboration with other countries or organizations to secure their long-term energy needs. Indeed, in East Asia, there are a number of formal organizations or institutions at the formal or Track One level dedicated to pursuing energy cooperation.[2] These groupings can be broadly classified into three main levels: formal cooperation at the ASEAN level,[3] the ASEAN Plus level,[4] and at the Plus Three level (referring specifically to China, Japan and South Korea).[5]

However, very little attention has focused on cooperation among the regional countries at the informal or Track Two level. This paper intends to fill this void by highlighting the efforts of a Track Two body known as the Network of East Asian Think-Tanks (NEAT), sanctioned by the ASEAN Plus Three leaders to enhance cooperation among these 13 countries. In particular, the paper will focus on the efforts of the NEAT Working Group on Energy Security Cooperation (referred to throughout as the WG), which met over a three-year period from 2005 to 2007 to brainstorm and create recommendations related to energy and energy-related issues for the consideration of Track One officials.

This paper is divided into four main sections. The first section will provide background to the formation of NEAT and in particular the WG; the rationale behind this latter body and the composition of its members will be explored. The second section will examine some of the key recommendations of the WG. In 2005, at its inaugural meeting, the WG focused primarily on the energy outlook among the ASEAN Plus Three countries and to some extent on East Asian cooperation in energy conservation, as this was the inaugural session. In 2006, the WG explored the topic of energy efficiency and energy conservation. In 2007, it looked at energy diversification.

The third section of this paper will highlight the positive contributions made by the WG. It will focus on the extent to which the WG's recommendations were fed into the Track One process and whether Track One entities took account of these recommendations. It bears mentioning that the importance of energy security cooperation was reflected in the Second Joint Statement on East Asia Cooperation and its attendant ASEAN Plus Three Cooperation Work Plan (2007–17). It is the contention of this paper that the possible actions outlined in the Work Plan reflected to some extent the contribution of the WG. The third section of this paper will also briefly touch on the strengths and limitations of the WG. Finally, the concluding section will summarize the findings of this paper.

This paper was prepared at the request of the S. Rajaratnam School of International Studies (RSIS) at the Nanyang Technological University of Singapore. The RSIS was interested to find out what the Track Two process – or, more specifically, the NEAT – was doing to facilitate energy cooperation at the regional level. It is the intention of this paper to shed some light on this dimension. An elaboration of the WG is timely, as its work shows how Track Two representatives can work to complement the efforts of Track One bodies in this area. To do so, the Track Two representatives will need to be familiar with the issues and preoccupations as well as the current status of energy cooperation at the Track One level. At the same time, the Track Two representatives will need to be bold enough to offer recommendations that constantly stretch or push the existing boundaries of cooperation at the Track One level. To some extent, the WG has been able to achieve this, even though it convened for a relatively brief period of three years.

Neat and the Neat WG on Energy Security Cooperation

The Network of East Asian Think-Tanks (NEAT)

The formation of the NEAT was among 17 short-term measures (i.e. those subject to immediate implementation) endorsed by the East Asia Study Group (EASG) in 2002 to foster cooperation among the ASEAN Plus Three countries.[6] Comprising Track One officials, the EASG met several times from March 2001 to October 2002. In its final report, submitted to the ASEAN Plus Three leaders in November 2002, the EASG argued that building a network of think tanks would 'facilitate cooperation in decision-making processes and coordination of policies in the East Asian region'. More specifically, through the network, the allied think tanks of East Asia can do the following (East Asia Study Group 2002: 1–65):

- accelerate exchanges of views on issues important to peace and security in the region;
- effectively analyse common problems faced by East Asian countries, and draw up harmonized solutions;
- exchange best practices in addressing problems in policymaking and implementation; and
- jointly explore long-term issues of strategic importance to the region.

This report also suggested that it would be relatively easy to establish a network of East Asian think tanks because ASEAN already has related experience in building the ASEAN Institute of Strategic and International Studies (ISIS) and extending it through its network of institutions in northeast Asian countries. The EASG believed that once a network of East Asian think tanks was established, this set-up would make a 'great contribution to promoting political cooperation and deepening cooperative relationships among the East Asian countries' (ibid.).

The series of measures recommended by the EASG was subsequently endorsed by the leaders of ASEAN, China, Japan and South Korea at the sixth ASEAN Plus Three Summit in Phnom Penh in November 2002.[7] This provided the green light for the formation of the NEAT. In terms of membership, the NEAT would comprise think tanks designated by the ASEAN Plus Three governments. Each government would designate a think tank, also known as a country coordinator, to be its country's primary contact point to liaise with and tap the relevant expertise of other think tanks and research institutions in the same country. Together, the 13 country coordinators would pursue activities to promote East Asian cooperation.

The 13 founding country coordinators of NEAT (in alphabetical order by country) are as follows:

- Brunei: Brunei Darussalam Institute of Policy and Strategic Studies, Ministry of Foreign Affairs
- Cambodia: General Department of ASEAN, Ministry of Foreign Affairs and International Cooperation
- China: Center for East Asian Studies, China Foreign Affairs University
- Indonesia: Center for East Asian Cooperation Studies, University of Indonesia
- Japan: Japan Forum on International Relations, Inc.
- Korea: Korean Institute of Southeast Asian Studies (KISEAS)
- Lao People's Democratic Republic (PDR): Institute of Foreign Affairs, Ministry of Foreign Affairs
- Malaysia: Institute of Strategic and International Studies (ISIS)
- Myanmar: Myanmar Institute of Strategic and International Studies (MISIS)
- The Philippines: Philippine Institute for Development Studies
- Singapore: East Asian Institute, National University of Singapore
- Thailand: Institute of East Asian Studies, Thammasat University
- Vietnam: Institute for International Relations (now Diplomatic Academy of Vietnam), Ministry of Foreign Affairs.

From these organizations, three broad groups of representation can be discerned. The first consists of seemingly autonomous think tanks or academic institutions such as those from Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore and Thailand. The second group comprises institutions that have some form of affiliation to or come under the aegis of Track One, such as those from Brunei, China, Lao PDR, Myanmar and Vietnam. The third group is made up specifically of Track One bodies such as those from Cambodia. Whatever the nature of the representation, each country coordinator has its own internal channels of communication with the relevant Track One bodies, which are less apparent to the outside audience. By extension, the frequency and depth of such interactions would understandably vary among different country coordinators.

NEAT WG on Energy Security Cooperation

According to the Basic Rules of the NEAT, the purpose of the network is to 'support, promote and develop the ideas of East Asian cooperation and regionalism'. One of the key functions of NEAT is thus to propose recommendations to the governments in the 10 ASEAN countries plus China, Japan and South Korea through policy-oriented studies, conferences, workshops and publications. To come up with practical recommendations, the NEAT country coordinators, either individually or jointly, can propose the formation of relevant working groups to conduct studies and research into areas of common interest or common concern to the 13 countries. The country coordinator that proposes a working group will also usually sponsor

it.[8] Before a working group can be formed, it must be approved by all the NEAT country coordinators.

There is no fixed duration for how long a working group will be convened. This timeframe depends on a number of factors, including the complexity of the topic or theme to be examined and the availability of relevant expertise, as well as funding. So far, the following working groups have been convened and have concluded their findings:

- Overall Architecture of Community Building in East Asia (led by Japan, 2005–07)
- Trade–Foreign Direct Investment–Technology Linkages in East Asia (led by NEAT Japan, 2006)
- Intra-regional Exchange Rate Stability and Prevention of Financial Crisis in East Asia (led by NEAT Japan, 2006–07)
- Concepts, Ideas and Empowering Guidelines for East Asia (led by NEAT Malaysia, 2005)
- Regional Cooperation Framework for Migration Labor (led by NEAT Malaysia and NEAT Philippines, 2006–08)
- **Energy Security Cooperation in East Asia (led by NEAT Singapore, 2005–07)**[9]
- East Asian Environmental Cooperation (led by NEAT Singapore and NEAT Japan, 2008–09)
- Special Working Group on the Future Direction of NEAT (led by NEAT Thailand, 2008)
- East Asia's Evolving Regional Architecture (led by NEAT Thailand, 2010).

The following working groups are continuing their work at the time of writing:

- East Asian Financial Cooperation (led by NEAT China, started 2005)
- East Asian Investment Cooperation (led by NEAT China, 2005)
- Enhancement of Cultural Exchange in East Asia (led by NEAT Korea, 2007)
- East Asian Food Security (led by NEAT Japan, 2009)
- Water Resource Management (led by NEAT Singapore, 2010).

Of particular interest here is the Working Group on Energy Security Cooperation, which NEAT Singapore proposed and sponsored over a period of three years, from 2005 to 2007. NEAT Singapore first proposed this WG in 2004 and received the endorsement of the NEAT country coordinators for its formation. In explaining the need for this WG, NEAT Singapore highlighted that the sharp hike in oil prices and their continued volatility brought to the fore the urgent need for a fresh look at the emerging energy situation in East Asia and how it may serve as a focus for greater regional cooperation.[10]

NEAT Singapore further argued that East Asian leaders had started to view an East Asian Community (EAC) as an achievable long-term goal following the successful conclusion of the Eighth ASEAN Plus Three Summit in Vientiane and the Second East Asian Forum in Kuala Lumpur, both in 2004.[11] Towards the goal of an EAC, NEAT Singapore suggested that a serious study be made of concrete energy security cooperation issues and problems specifically geared to the East Asian region. In the long run, a more integrated East Asian energy network will not only significantly boost intra-regional security but also contribute to greater regional economic integration, thereby bringing the region closer to the goal of an EAC.

In terms of the participants in the WG, each NEAT country coordinator nominated an expert from the relevant research institutions in its country. Almost all participants were from the Track Two level, either from autonomous think tanks or academic institutions or from research institutions affiliated with Track One entities. The rest (usually referring to NEAT Cambodia and sometimes NEAT Lao PDR) would generally send representatives from Track One, either from the ministry or bureau level, as they lack the relevant expertise within the Track Two entities. More importantly, a principle practiced by the WG, similar to other NEAT working groups, was that all participants spoke in their personal capacities. This process is meant to facilitate free and frank discussions.

Over the course of three years, from 2005 to 2007, the WG submitted a total of three annual reports, with relevant recommendations, for the consideration of the NEAT country coordinators. Other NEAT working groups also followed this practice of submitting a report after each meeting, in which any suggestions or recommendations made are not attributed to any NEAT country coordinator but are regarded as arising from the deliberations of the experts in the working group as a whole. Once the report of the WG (as with other working group reports) was approved, the NEAT country coordinators submitted a consolidated report containing a set of approved recommendations for the consideration of the Track One process at the level of senior officials. After deliberation, the senior officials bring the consolidated report to the attention of the ASEAN Plus Three leaders when they meet towards the end of every year (see Figure 6.1 for the Work Flow Process).

A point worth highlighting here is that the idea to form the WG originated from the East Asian Institute (EAI) of the National University of Singapore, the country coordinator for NEAT Singapore. It did not originate from the Track One level within Singapore. As the designated country coordinator, the EAI has the responsibility to offer ideas or proposals that are both in line with Singapore's interest and are of common concern with the other East Asian countries.

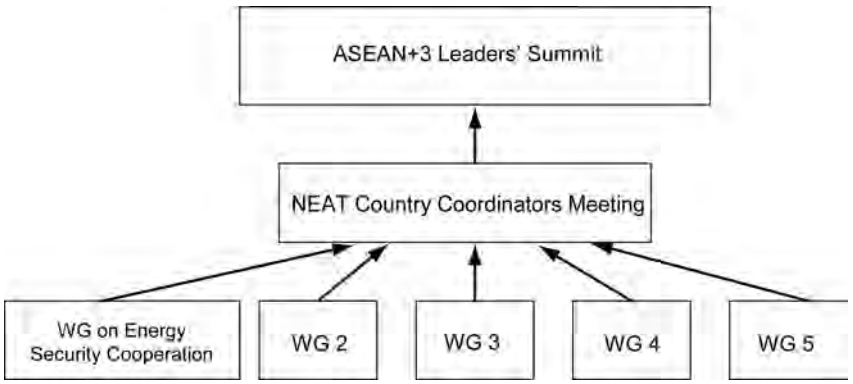

Figure 6.1 Work flow process for the NEAT working groups
Source: Author

Key recommendations of the WG on Energy Security Cooperation

The WG focused on different themes for each of the three years of its existence, to ensure more comprehensive coverage of energy and energy-related issues. The WG defined 'energy security' as the process by which the ASEAN Plus Three countries, either nationally or in collaboration with each other, meet their energy needs at a reasonable cost in a sustainable manner. This definition is not merely confined to ensuring access to physical supply of oil but encompasses much broader aspects as well, such as pursuing energy conservation, energy efficiency and energy diversification.

In 2005, during what was known as Phase I, the WG focused on broader topics, such as the energy outlook in the region and, to some extent, on East Asian cooperation in energy conservation, as this was the inaugural session. In 2006, or Phase II, the WG examined demand-side issues, particularly energy efficiency and energy conservation. In 2007, or Phase III, the WG looked at the other side of the equation – the supply side – and delved into energy diversification. This section will highlight the key recommendations that were submitted to the Track One process in each of the three years.

Phase I

In 2005, the WG focused on the energy outlook in the region and East Asian cooperation in energy conservation. The WG came up with three broad recommendations, calling on the ASEAN Plus Three governments to engage in the following (Working Group on Energy Security Cooperation n.d.):

Institutionalize a regional energy cooperation framework

The WG observed that energy policy and oil diplomacy tended to be driven by economic nationalism. To create synergies based on commonalities and

complementarities, the East Asian countries should therefore institutionalize energy policy cooperation within a regional framework. This would provide a platform for accommodating different policy objectives, create a more conducive environment for free exchange of ideas, seek common ground for coordination and cooperation, and provide comprehensive 'win-win' solutions to energy security in the region. Five major components were identified as integral to realizing this regional energy cooperation framework:

- Respecting and complying with international law

East Asian countries are urged to:

- comply fully with international law, particularly the 1982 United Nations Convention on the Law of the Sea;
- harmonize their respective domestic laws and regulations with contemporary international law as far as possible; and
- [for Asian coastal states that have yet to participate,] join the 1988 Convention on the Suppression of Unlawful Acts against the Safety of Maritime Navigation.
- Coordinating oil stockpiling in East Asian countries

East Asian countries should consider:

- coordinating their efforts in building up sizeable oil stockpiles that are consistent with the needs of individual countries;
- sharing experiences and know-how in building up oil stockpiles; and
- expanding regional swap mechanism to meet sudden and temporary energy shortfalls.
- Promoting transnational energy projects

Notwithstanding the sensitive issue of sovereignty, East Asian countries are encouraged to actively work out modalities of joint oil exploration even in disputed territories and other territorial waters for mutual benefit. Other cross-border cooperation such as pipelines for oil/natural gas should also be explored.

- Improving the quality of energy data and statistical information

East Asian countries are urged to establish an effective regional energy information system and statistical clearing house. Information on regional energy demand, supply, trade and storage may help East Asian countries reasonably and accurately achieve their own energy policy objectives.

- Stepping-up coordinating efforts on energy maritime security

East Asian countries are urged to:

- develop a regional sea-lane security scheme in accordance with international maritime laws and agreement of littoral states to ensure smooth shipment of oil in the region;
- assist littoral states in ensuring maritime safety in the Straits of Malacca by providing material and technical aid and training, as well as timely and critical information; and
- engage in contingency planning to multilaterally address potential environmental disaster in the event of oil spillage from tankers.

Develop a market for conventional energy

East Asia should promote more transparent market practices and make the Asian energy market more responsive to market forces. East Asian countries are encouraged to do the following:

- develop Asian oil markets to ease speculative oil price fluctuation and remove impediments to trade and investment for energy sectors;
- develop Asian natural gas markets to reduce these countries' dependence on oil and oil-fired subsidiaries; and
- establish an East Asian Energy Consortium (comprising both East Asian state authorities and private-public ventures) to explore cooperation in energy development in the region and beyond, and to conduct energy-related dialogues with extra-regional groupings to promote understanding and build rapport for future cooperation.

Promoting energy conservation and alternatives

Besides securing and diversifying energy supply, East Asian countries should collaborate to improve existing energy use and explore alternative forms of energy, especially renewable resources. East Asian countries should freely share their expertise and individual experiences in energy conservation. In this context, the East Asian countries are urged to do the following:

- improve energy efficiency and conservation by promoting effective policies on these issues and sharing experiences and know-how with technologically advanced countries;
- promote cleaner use of coal; and
- promote renewable energy by engaging in feasibility studies of energy sources including solar, wind, hydro, geothermal and biomass.

Phase II

In 2006, the WG examined energy and energy-related issues from the demand side. In particular, it concentrated on energy efficiency and energy conservation, while also discussing the maritime dimension of energy security. On the first two topics, its key recommendations included the following:

- The countries of East Asia should set national targets of energy efficiency with a view to catching up with the world's best standards in the long run. Governments should also expand existing energy conservation efforts, including energy audits and inspections, minimum energy consumption efficiency standards, energy efficiency demonstrations, public education on energy efficiency, energy-efficiency labelling programmes and international technical exchange.
- East Asian states should pay attention to energy-saving activities by introducing (mandatory or voluntary) energy efficiency standards for common household products such as air conditioners, heaters, cooking appliances, water heaters and other electrical appliances.
- Governments should promote energy conservation efforts in the consumption of oil (especially gasoline and diesel) in the transport sector and develop policies that ensure that the increasing numbers of vehicles on the roads use fuel as efficiently as possible. Manufacturing industries should also adopt more efficient methods of production by using less energy per unit of output.
- Countries in the region should hold regular energy conservation campaigns that educate people about the relative quantities of energy they use and waste in the home and at work each day and instil in them the imperative of practicing energy-conserving behaviour at all times.

On maritime energy security, the WG made the following recommendations:

- The more-developed East Asian countries should consider providing material or technical assistance to the less-developed littoral states. Besides providing patrol boats and training ships, these countries could help such states build a surveillance radar network to cover the Straits of Malacca.
- East Asian countries should participate and cooperate actively in the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships (ReCAAP). There should also be multilateral exercises to build capacity to handle environmental disasters caused by oil spills from tankers, tugs and barges in the Straits of Malacca and to provide humanitarian assistance through search and rescue operations. These initiatives can be regarded as confidence-building measures, as they aim to boost mutual trust and confidence, reduce suspicion and develop a spirit of cooperation among countries.

- Countries in the region should build on the June 2006 proposal by Malaysia for a Southeast Asian Disaster Relief Centre to provide humanitarian assistance and to handle environmental disasters. This proposal can be expanded to cover the Straits of Malacca and potential maritime disasters with the participation of the ASEAN Plus Three countries.
- The more-developed countries are encouraged to transfer energy conservation technology and know-how to less-developed members, and the latter should institute the necessary policies and regulatory framework to make full use of these transfers. Thus, the ASEAN Plus Three countries can share all their energy-efficiency experience for mutual benefit and enhance trust within the EAC.

Phase III

In 2007, the WG examined the supply side of the energy equation, focusing on energy diversification in terms of the energy mix and sources of energy supply. The WG observed that most of the ASEAN Plus Three countries are heavily dependent on one or two dominant sources of energy supply. Energy diversification is therefore a key strategy for the individual countries to enhance their overall energy security. The WG made the following key recommendations to the ASEAN Plus Three governments:

- Explore all possible avenues relating to energy cooperation, especially in the areas of energy conservation and diversification.
- Facilitate the sharing of information, technology and know-how on the use of both fossil and non-fossil fuels. In particular, the more advanced ASEAN Plus Three countries should consider sharing energy-saving technologies with others.
- There is growing and urgent need to explore viable alternatives, particularly renewable sources of energy such as safe nuclear energy, clean coal, solar energy and bio-fuels. The ASEAN Plus Three countries should also consider undertaking research in appropriate technology for renewable energy sources.
- Hasten the development of the Trans-ASEAN Gas Pipeline (TAGP) as an alternative energy source and reduce the heavy reliance on oil in the transportation sector.
- Remove impediments to cross-border investments for energy diversification projects and devise a conducive set of policies and incentives to achieve a more viable energy mix.
- The ASEAN Centre for Energy (ACE) should explore expanding its scope of activities to cover all ASEAN Plus Three countries. In particular, the centre should pay more attention and channel more resources to energy conservation and diversification efforts.

Outcomes of the recommendations

The recommendations made by the WG, together with the recommendations made by other NEAT working groups, were submitted to the Track One process for consideration every year. The submission of these recommendations represents only one part of the story. The other part, perhaps even more important, is to what extent these recommendations were adopted by Track One bodies.

Two possible methods will be used here to attempt to evaluate the usefulness of the recommendations made by the WG. The first method is to examine the official statements made by Track One bodies in response to these recommendations. The purpose is to show to what extent the work of the NEAT is being recognized at the Track One level. The second is to examine the Second Joint Statement on East Asia Cooperation, issued in November 2007, particularly its attendant Work Plan, to see whether any of the NEAT recommendations were incorporated. The Work Plan contains priority activities and flagship projects to further enhance ASEAN Plus Three cooperation over the decade of 2007–17.[12] These activities and projects would shed further light as to whether and to what extent the WG's recommendations have been incorporated at the Track One level.

Official statements

Under the first method, the ASEAN Plus Three official statements issued in 2005 (one statement)[13] and 2007 (two statements) will be examined.[14]

Ninth ASEAN Plus Three Summit, Kuala Lumpur, 12 December 2005

The NEAT submitted a joint report incorporating the recommendations of the WG (as well as those of the other working groups) to the Track One process after NEAT's August 2005 meeting. At the Ninth ASEAN Plus Three Summit, held in Kuala Lumpur in December 2005, paragraph 5 of the chairperson's statement recorded that the leaders '*noted* the policy recommendations of the 3rd Meeting of the Network of East Asia Think-Tanks (NEAT) entitled "Towards an East Asia Community" in August 2005 in Tokyo' (ASEAN Secretariat 2005: 1).

In paragraph 13 of the same statement, the leaders 'reaffirmed the urgent need to address energy security issues'. They noted that 'policy dialogues' as well as the 'search for alternative or renewable sources of energy such as hydro power, solar and bio-fuel from palm oil, sugar cane and even coconut could be cooperative initiatives' to further explore. They also mentioned the need to 'exchange best practices and technologies on energy efficiency and conservation', and 'tasked' the 'Ministers and Senior Officials to study cooperation in this sector' (ibid.).

Tenth ASEAN Plus Three Summit, Cebu, 14 January 2007

At the Tenth ASEAN Plus Three Summit held in Cebu, the Philippines, in January 2007, paragraph 15 of the chairperson's statement '*noted* the Memorandum No. 3 on Policy Recommendations on Strengthening the Pillars of East Asian Community Building, prepared by the Network of East Asian Think-Tanks (NEAT), which may form part of the stocktaking of APT [ASEAN Plus Three] cooperation' (ASEAN Secretariat 2007a: 1). In paragraph 11, the leaders 'reaffirmed the urgent need to address energy security and to strengthen existing cooperation on alternative or renewable sources of energy' (ibid.).

Eleventh ASEAN Plus Three Summit, Singapore, 20 November 2007

At the Eleventh ASEAN Plus Three Summit, held in Singapore in November 2007, paragraph 12 of the chairperson's statement '*noted* the policy recommendations of the 5th Meeting of Network of East Asia Think Tank in August 2007 entitled "Memorandum No. 4 – Policy Recommendations of East Asia Cooperation: Towards Sustainable Development and Prosperity" in August 2007 in Singapore' (ASEAN Secretariat 2007b: 1). In paragraph 8, the leaders stated that they were 'gratified by recent developments in APT energy cooperation' (ibid.).

Analysis of the Chairperson's statements

It is obvious from these three statements that the ASEAN Plus Three leaders recognized the work of the NEAT and, specifically, of the WG. In each of these three statements, the leaders 'noted' the recommendations made by the various NEAT working groups. Further, at the Tenth ASEAN Plus Three Summit, the leaders stated that the NEAT recommendations could form part of the stocktaking of ASEAN Plus Three cooperation. This is another indication that the recommendations of the NEAT, including those of the WG, were identified as a possible source of input in helping the Track One officials take stock of the cooperation thus far and, more importantly, in drafting the Second Joint Statement on East Asia Cooperation and its Work Plan, which was subsequently signed at the Eleventh ASEAN Plus Three Summit.

It is worth highlighting that 2007 was an important year in ASEAN Plus Three relations, as it marked the tenth anniversary of cooperation since the leaders of the 13 countries met informally at their first summit in 1997. Their relations were further institutionalized in 1999, when the leaders issued the Joint Statement on East Asia Cooperation, during their meeting in Manila. In this first joint statement, however, there was no mention of cooperation in energy or energy-related issues (ASEAN Secretariat 1999: 1). In contrast, in the Second Joint Statement on East Asia Cooperation and its attendant Work Plan, in 2007, energy cooperation among the ASEAN Plus Three countries

was specifically highlighted. (More of the Second Joint Statement and its Work Plan will be discussed in the next two sections.)

It is difficult, however, to discern how significant a role the WG played in each of the three years in contributing to the strong emphasis by the ASEAN Plus Three leaders to the urgent need to address energy security and to strengthen existing cooperation on renewable energy sources. This is due to the fact that, in tandem with the efforts of the WG, there was (and remains) a more formal, direct process. Moreover, the formal process started earlier than the WG, which only submitted its first findings in 2005. In particular, the ASEAN Plus Three Senior Officials' Meeting on Energy (SOME+3), established in 2002, has met annually to explore energy cooperation. Building on this framework, the ASEAN Plus Three countries convened the first SOME +3 Energy Policy Governing Group (SOME+3 EPGG) in 2003, providing overall policy direction and programme management to facilitate ASEAN Plus Three energy cooperation. Going further, the ASEAN Plus Three countries elevated their cooperation to a higher level by convening the first ASEAN Plus Three Ministers on Energy Meeting (AMEM+3) in 2004, which has also met annually. In addition, the ASEAN Plus Three countries hold regular forums in five agreed-upon areas: oil stockpiling, oil market, natural gas, renewable energy and energy security.[15]

Second Joint Statement on East Asia Cooperation and its Work Plan

Energy cooperation was highlighted as an important area of ASEAN Plus Three cooperation in the Second Joint Statement on East Asia Cooperation and its attendant Work Plan. The Second Joint Statement noted that the ASEAN Plus Three countries would 'put particular emphasis on improving energy efficiency, diversification of energy supply and development of new and renewable sources of energy' (ASEAN Secretariat 2007c: 1). To implement energy cooperation among the ASEAN Plus Three countries over the following 10 years (2007 to 2017), the Work Plan devotes an entire section calling for specific actions to be carried out in this area (ASEAN Secretariat 2007d: 10–11):

- Pursue energy security, sustainable development and economic growth in an integrated approach taking into account specific and diverse national circumstances.
- Promote energy diversification through information exchanges and researches on alternative, new and renewable energy development such as solar, wind, sea tides and waves, hydro, geothermal, clean coal technology, biofuels, biomass, gas and marsh gas, and others, taking into consideration each country's specific national circumstances; and for those Member countries that choose to do so, the use of civilian nuclear energy, while giving careful and due regards to the security, environmental, health and internationally recognized safety standards of the energy source.

- Promote energy conservation and energy efficiency as well as the use of clean and environment-friendly technologies such as new vehicle technologies.
- Endeavour to create a more favourable market environment with a view to creating an efficient energy market, facilitating regional energy production and trade, and promoting investment in energy infrastructure and facilities.
- Improve energy efficiency, where possible, in all sectors, such as the industrial, transport, residential/commercial and power sectors, through setting individual goals and formulating action plans.
- Enhance cooperation on emergency preparedness by making full use of the ASEAN Plus Three Energy Security Communication System.
- Promote greater cooperation and market transparency, including through the Joint Oil Data Initiative, and intensify the exchange of energy data, where possible, and the sharing of national energy policies on a voluntary basis.
- Explore means of supporting the national rural electrification programmes of concerned ASEAN member countries.
- Support the work of the ASEAN Centre for Energy.
- Consider specific projects and proposals on energy issues raised within various regional processes such as the East Asia Summit (EAS) and Asia-Pacific Economic Cooperation (APEC).
- Promote dialogue with Middle East oil- and gas-producing countries to enhance mutual understanding and cooperation between oil-producing and oil-consuming countries.
- Promote cooperation for diversification of energy transportation routes to enhance energy security.

Analysis of the Second Joint Statement on East Asia Cooperation and its Work Plan

There are some similarities between the ASEAN Plus Three Cooperation Work Plan on energy and the recommendations made by the WG. In particular in the area of energy diversification, in 2005 and 2007 the WG had called on ASEAN Plus Three countries to explore viable alternatives, particularly renewable sources of energy. It also called for research in appropriate technologies for renewable sources of energy. These points are reflected in paragraph (b) of the Work Plan.

Furthermore, in 2007 the WG had called on the ASEAN Plus Three countries to remove impediments to cross-border investments for energy diversification projects. In 2005, the WG had made a similar call for the promotion of transnational energy projects. This recommendation is partly reflected in paragraph (j) of the Work Plan, which calls for ASEAN Plus Three countries to consider specific projects and proposals on energy issues raised within various regional processes. Also in 2007, the WG had proposed that the ACE expand its scope of activities to cover all the ASEAN Plus

Three countries. This is somewhat similar to paragraph (i) of the Work Plan, which calls on the ASEAN Plus Three countries to support the work of the ACE.

In 2006, the WG had recommended that the ASEAN Plus Three countries focus their energy conservation efforts on reducing the consumption of oil (especially gasoline and diesel) in the transport sector, as well as develop policies to ensure that vehicles on the road use fuel as efficiently as possible. This recommendation is reflected in paragraph (c) of the Work Plan, which seeks to promote energy conservation and energy efficiency as well as the use of clean and environment-friendly technologies, such as new vehicle technologies.

In 2005, the WG had called for the creation of an East Asian Energy Consortium to explore cooperation in energy development in the region and beyond, and to conduct energy-related dialogues with extra-regional groupings to promote understanding and build rapport for future cooperation. In the Work Plan, there is no call for the creation of such a consortium, but paragraph (k) does call for dialogue with Middle East oil- and gas-producing countries to enhance mutual understanding and cooperation between oil-producing and oil-consuming countries.

From these examples, it would seem reasonable to conclude that the recommendations of the WG formed a source of input for the ASEAN Plus Three officials in their drafting of the Work Plan. However, it is difficult to assess how significant a role the WG played in this effort given that, as mentioned earlier, there are other, more official and direct, channels looking at the topic of energy cooperation. Moreover, the WG is not a permanent body dedicated to pursuing energy cooperation among the ASEAN Plus Three countries.

It should also be pointed out that some other recommendations of the WG were not incorporated into the Work Plan. Most notably, in 2005 the WG had called for the establishment of a regional energy cooperation framework that could serve as a platform for accommodating different policy objectives. This could have facilitated a freer exchange of ideas, experiences and know-how and functioned as a means to coordinate emergency response measures, should they be warranted. Quite expectedly, this call did not come to fruition. This can largely be attributed to the fact that countries in the region still consider their national interests as paramount and are wary of setting up a body beyond the state level that could impinge on such interests. Moreover, the energy sector is a highly sensitive sector in most ASEAN Plus Three countries and the preference of most countries is therefore to build on existing efforts of collaboration rather than to come up with new bodies.

Nevertheless, the WG did play a useful role in creating what it thought were relevant and useful proposals for the consideration of Track One bodies. In this sense, the participants of the WG, which largely comprised Track Two representatives, ought to be commended for coming up with not only practical but at times somewhat ambitious proposals, in an attempt to push the

envelope. This was the advantage that the WG enjoyed: although the WG formed part of the officially sanctioned NEAT process, it also had the autonomy to offer recommendations for the consideration of Track One officials. The onus was on the latter to take up or reject these proposals, after taking into account current realities.

A possible area of improvement in forming future NEAT working groups could be to try to strengthen the two-way communication between Track One and Track Two bodies. After the WG submitted its recommendations, its work appears to have been deemed finished. Yet, in fact, this represents only half of the work done. More importantly, it would be extremely useful for Track One (or relevant sectoral) bodies to provide feedback either to the NEAT or to its respective working groups on the outcomes of the recommendations made. Preferably, there would be a means or some form of mechanism set up to let the working groups know whether their recommendations were useful, whether any recommendations deserved to be further looked into, and whether there were related areas that could be further examined. The lack of such a mechanism often left the WG with some doubts on how effective it had been in carrying out its work.

Conclusion

Over a three-year period, from 2005 to 2007, the WG submitted three separate sets of recommendations for the consideration of Track One bodies. According to the chairperson's statements that were issued at the end of every ASEAN Plus Three Summit, the work of the NEAT has been recognized. At the Tenth ASEAN Plus Three Summit in early 2007, in particular, the leaders stated that the recommendations of the NEAT could form part of the stocktaking of the ASEAN Plus Three cooperation.

Upon analyzing the possible courses of action for energy cooperation as outlined in the ASEAN Plus Three Cooperation Work Plan (2007–17), it was found that there were some similarities between these actions and the recommendations made by the WG. To some extent, these similarities show that Track One bodies did use the WG's recommendations as a source of input in drafting the energy portion of the Work Plan.

However, it would be prudent to set in context the role played by the WG. This is primarily because the WG is a Track Two body contending with several formal ASEAN Plus Three bodies that are also exploring ways and means by which to enhance energy cooperation. These formal bodies provide a more direct input into the decision-making process on energy cooperation within Track One systems. Hence, while it is clear that the WG did play a part in this entire process, it is difficult to discern its exact contribution.

Notes

1 Fatih Birol reportedly attributed China's emergence as the world's largest energy consumer to its 'outstanding economic expansion', which he considered to be 'very normal'. See Zhang (2010); International Energy Agency (2009).
2 'East Asia' here refers essentially to the 10 ASEAN countries plus China, Japan and South Korea.
3 At the ASEAN level, the highest level body dealing with energy and energy-related issues is the ASEAN Ministers on Energy Meeting (AMEM). Other more specialized bodies include the ASEAN Council on Petroleum (ASCOPE), Heads of ASEAN Power Utilities/Authorities (HAPUA), ASEAN Forum on Coal (AFOC) and four sub-sector networks dealing with energy efficiency and conservation, renewable energy, regional energy policy and planning, and nuclear energy safety. There is also the ASEAN Centre for Energy (ACE), which initiates, coordinates and facilitates joint and collective activities on energy among ASEAN countries.
4 For example, the ASEAN Plus Three has adopted a 10-year Cooperation Work Plan (2007–17) that has a section on energy cooperation. There are also the SOME +3 and AMEM+3, which cover five areas: energy security, oil market, oil stockpiling, renewable energy and energy efficiency and conservation, and natural gas and business dialogue. In addition, ASEAN and Japan have worked closely in two main areas, energy supply and security planning, and in the promotion of energy efficiency and conservation. Beyond ASEAN Plus Three, there is also the East Asian Summit Energy Ministers Meeting (encompassing the 10 ASEAN countries, China, Japan, South Korea, India, Australia and New Zealand) to foster energy cooperation at a broader level.
5 At the Plus Three level, China, Japan and South Korea issued the first declaration on tripartite cooperation in 2003, which includes a commitment to work together to 'strengthen regional and global energy security'. At their trilateral summit in Jeju (South Korea) in May 2010, the leaders of the three countries agreed to set up a permanent secretariat to further institutionalize tripartite cooperation.
6 President Kim Dae-jung of South Korea proposed the establishment of the EASG, and this idea was endorsed by the leaders of ASEAN, China, Japan and South Korea in November 2000.
7 In the Press Statement by the Chairman of the Sixth ASEAN Plus Three Summit, it was stated that the EASG 'identified 17 concrete short-term measures and nine medium-to-long-term measures to move East Asian cooperation significantly forward'. See ASEAN Secretariat (2002).
8 The sponsor of a working group will normally cover the air ticket, accommodation and selected meals for one participant from each of the 13 countries. The country coordinator that proposes a working group may also invite other country coordinators to be co-sponsors.
9 This WG is in bold because it is the focus of this paper.
10 By September 2004, the price of a barrel of crude hit a record US $50 a barrel, marking a 50 per cent jump in crude prices since the start of 2004. See CNN Money (2004).
11 At the ASEAN Plus Three Summit in Vientiane in November 2004, the 13 leaders 'agreed that the establishment of an East Asian Community is a long-term objective'. The leaders further 'reaffirmed the role of ASEAN+3 process as the main vehicle for the eventual establishment of an East Asian Community. China, Japan, and the Republic of Korea reiterated their support for ASEAN's role as the major driving force in East Asia cooperation'. See ASEAN Secretariat (2004).
12 In the Second Joint Statement on East Asia Cooperation, it was stated that the relevant ASEAN sectoral bodies shall implement the Work Plan and incorporate it in their respective programmes and plans of action. Progress in the implementation

of the Work Plan would be monitored by the ASEAN Plus Three directors-general and reported to the annual ASEAN Plus Three Ministerial Meeting and ASEAN Plus Three Summit. The Work Plan would be subject to a mid-term review and might be revised for purposes of greater efficiency or to more effectively accomplish the purposes of the Joint Statement. See ASEAN Secretariat (2007c).

13 The Ninth ASEAN Plus Three Summit was held in Kuala Lumpur, Malaysia, on 12 December 2005.

14 The Tenth ASEAN Plus Three Summit was originally scheduled to be held in Cebu, the Philippines, in December 2006. However, the summit was postponed due to the possible dangers posed by Typhoon Utor. The Tenth ASEAN Plus Three Summit was eventually held in Cebu on 14 January 2007. See Presidential Communications Operations Office (2006). The Eleventh ASEAN Plus Three Summit was held in Singapore on 20 November 2007. Hence, there were two ASEAN Plus Three Summits held in 2007.

15 Further information on these bodies can be found at the ASEAN Secretariat website. Online. Available at: <www.aseanenergy.org/energy_organisations/some_-gov/some-reports.html> (accessed 3 November 2010).

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7 Is bigger always better? The challenges facing transnational Asian energy megaprojects

Benjamin K. Sovacool

Introduction

Though the national economies in Asia depend upon a mix of energy sources, ranging from coal in China, to hydroelectricity in the Mekong Delta, to geothermal reserves in the Philippines, the prospect of transnational cooperation on energy infrastructure is intriguing. The Association of Southeast Asian Nations (ASEAN) regularly touts the promise of building a Trans-ASEAN Gas Pipeline (TAGP) and an ASEAN Power Grid, giving assurances that doing so would facilitate the flow of energy services throughout the region and deepen economic ties among member states. In South Asia, we hear analysts and pundits repeatedly discuss plans for an Iran–Pakistan–India (IPI) gas pipeline as well as a Turkmenistan–Afghanistan–Pakistan–India (TAPI) gas pipeline. Across the continent in north-east Asia, South Korea and Japan continue to talk about a regional electricity grid; plans for a trans-Siberian oil pipeline, stretching from Lake Baikal in Russia to the Sea of Japan, are underway; and Mongolia, China and South Korea are ruminating about the possibility of erecting a massive concentrated solar power facility in the Gobi Desert.

These types of engagements are often lauded for offering greater opportunities for cross-border investment, the sharing of best practices and improved resource efficiency. With truly massive growth in energy demand expected between 2008 and 2035 – the latest International Energy Agency (IEA) projections anticipate the need for more than US $1 trillion of investments in new energy infrastructure (IEA 2010: 3–4) – transnational energy projects are also seen as a useful tool for building large amounts of much-needed energy capacity, all in one go. Even the Asian Development Bank (ADB) suggests that Asia alone will need to invest a staggering US $290 billion in regional energy infrastructure between 2010 and 2020, in addition to US $8 trillion in overall national infrastructure (ADBI 2009: 2). Others have argued that large-scale transnational energy projects can enable countries to stockpile resources and avoid duplication; allow them to link infrastructure in ways that distribute costs, create synergies and improve market efficiencies; and engender a shared sense of vulnerability to the risk of accidents and disruptions, which

can promote 'coordination and cooperation' (Jaffe 2001: 491–503). One recent study even went so far as to argue that 'a shared need for [energy] resource commerce can be a means of fostering cooperation between states', and that in some cases 'pipelines become conduits of peace-building' (Ali 2010: 12).

This chapter questions the conventional logic that large, capital-intensive, multi-billion-dollar energy megaprojects (of either a national or transnational nature) are most effective in enhancing economic, social and environmental welfare. It argues that, due to their scale, size and complexity, such projects face a collection of largely unavoidable inefficiencies that far outweigh those confronting energy infrastructures at smaller scales within national borders. The article begins by justifying the selection of three case studies – the Baku–Tbilisi–Ceyhan oil pipeline in the Caspian Sea, the TAGP in Southeast Asia, and the Sarawak Corridor of Renewable Energy in Borneo – and summarizing its methods of data collection, primarily research interviews and site visits. It then suggests that each of these projects is prone to a common set of obstacles, before offering lessons for energy development and policy.

Research and conceptual methods

A useful starting point is to view energy infrastructure not merely as physical objects – 'hardware' such as pipes, compressor stations, dams and electricity transmission lines – but as part of a socio-technical system (Hughes 1983: 2–12). Such thinking posits that large-scale technologies weave together technical artefacts, organizations, institutional rule systems and structures, and cultural values (Hughes 1987: 51–82). Viewed as an artefact, a telephone is a box in a room; viewed as a system, it is part of a network of cables, exchanges, corporations, satellites and global telecommunication links. Viewed as an artefact, a car is just a clunky box with an engine and wheels; but as a system, it includes roads, traffic signals, fuel stations and refineries, the maintenance industry, registration offices, insurance companies, and police and legal networks. Viewed as an artefact, a pipeline is just a physical conduit for oil or gas; but as a system, it includes pumping stations, operators, knowledge, financing institutions, investors, land, import and export terminals, oil refineries, natural gas sweetening facilities and energy traders. The implication here is that each system succeeds and expands, or stalls or fails, because of a confluence of technical, economic, political and socio-cultural factors. To focus on one of these attributes in isolation is like watching a movie with the sound turned off: it's missing a key part of the story.

Systems theory tells us that the barriers facing any energy system would tend to be social as well as technical, or socio-technical, but it does not tell us which case studies of large Asian energy megaprojects to select. For this study, the author relied on four criteria: capital intensity, geographic scale, technological diversity and recency. To be capital intensive, a project had to cost at least US $1 billion. By geographic scale, it had to involve at least three

or more countries. For technological diversity, the author was looking for cases from different energy sectors – ideally, oil, gas and electricity. And, for recency, it had to have been primarily constructed within the past 10 years or be currently under construction. Sticking with these criteria, the author selected the Baku–Tbilisi–Ceyhan (BTC) oil pipeline, exporting petroleum from the Caspian Sea near Azerbaijan and then traversing parts of Georgia and Turkey; parts of the TAGP Network, connecting the gas reserves of Indonesia, Myanmar and Thailand with each other and Singapore; and the Sarawak Corridor of Renewable Energy (SCORE), intended to connect East Malaysia's hydroelectric resources with electricity markets in Brunei and Indonesia.

The author selected each case because they are among the largest in the world, are recent, involve multiple stakeholders and cross international borders, aspects summarized in Table 7.1. The BTC, for instance, required US $4.6 billion of investment and involved a 1,760 km pipeline route that criss-crosses 17,700 parcels of land and moves through a collective population of more than 1 million people living within its corridor. Operating according to a master plan envisioned by ASEAN, the TAGP is even more expansive, including a network of 10 cross-border pipelines worth US $14.2 billion in investment and transporting 3,095 million cubic feet of natural gas per day along 3,952 km of pipe in 2008.[1] SCORE is bigger yet and would involve building at least 12 hydroelectric dams constituting 20,000 megawatts (MW) of installed capacity connected to industrial facilities along the coast of West Malaysia. It would stretch some 320 km from Tanjung Manis to Samalaju, covering an area of 70,709 sq km, more than half the size of the state of Sarawak, and would require US $105 billion worth of investment by 2030. Ultimately, SCORE is intended to export hydroelectricity to Brunei, Sabah (Malaysia) and Kalimantan (Indonesia) to create a regional electricity grid.

To collect data on these cases, the author relied on 213 research interviews at 87 institutions in 17 countries conducted over the course of August 2007 to July 2010. Participants were selected to represent upper-level management positions in their respective institutions, and institutions were selected to include a sample of different stakeholders involved in each case study. A semi-structured format was utilized that enabled the author to ask a standardized set of questions but also allowed the conversational flow of the interview to follow new topics or return to incompletely answered questions. Standard questions included the following: What were the most significant drivers behind each case study? What were some of the most meaningful challenges encountered? What lessons do such projects offer for political science, public policy and energy studies? Some of these interviews were conducted with a digital audio recorder, for the sake of record keeping. When participants elected not to have the conversation recorded, notes were carefully taken and cross-checked at a later date. Participants were guaranteed confidentiality and anonymity to ensure candour and to respect the wishes of those not wishing to be identified. The data used from these interviews in this article are thus

Table 7.1 Summary details for the BTC pipeline, TAGP Network and SCORE

Case study	*Fuel*	*Length/area*	*Location*	*Volume/size*	*Cost (US $)*	*Majority shareholder/ operators*	*Major financiers*	*Status*
BTC pipeline	Oil	1,760 km	Azerbaijan, Georgia, Turkey	1 million barrels of oil per day	$4. 6 billion	BP, Chevron, State Oil Company of the Azerbaijan Republic, Inpex, Statoil Hydro	International Finance Corporation, European Bank for Reconstruction and Development, export credit agencies of seven countries, and a syndicate of 15 commercial banks	Completed and operational
TAGP*	Natural gas	3,952 km	Indonesia, Malaysia, Singapore, Thailand	3. 1 billion cubic feet	$14. 2 billion	PETRONAS, PERTAMINA, TotalElf, Chevron, PTT, Premier Oil, Myanma Oil and Gas Enterprise, Nippon Oil and SembGas	ADB, Japanese Bank for International Cooperation, consortium of private banks	About half completed as of 2009
SCORE	Hydro-electricity	70,709 sq km	Brunei, Malaysia, Indonesia	20,000 MW	$105 billion	Regional Corridor Development Authority, Sime Darby, Sino Hydro, Three Gorges Corporation	Ministry of Finance (Malaysia), State Government of Sarawak	One dam (Bakun) almost complete, one (Murum) under construction, 10 more in planning stages

Source: Author
Note: * as of 2009

presented as anonymous. However, details of all institutions interviewed are presented in the Appendix.

The interview method does mean that respondents could 'strategically manipulate' answers to sway the outcomes of the study in their favour. To further ensure accuracy and validity, data from the interviews were triangulated with each other and then supplemented with field visits. For the pipelines, the author travelled to Azerbaijan, Georgia, Indonesia, Japan, Malaysia, the Philippines, Singapore, Thailand, Turkey, Russia, Ukraine and the USA (home to parts of the BTC, areas of the TAGP or the headquarters of key stakeholders). Site visits were also taken to oil refineries, drilling fields and terminals in Baku, Sumgayit and Surakhani, Azerbaijan; the BTC pipeline corridor in Tbilisi and Tabatskuri, Georgia; and the import terminal into Thailand at Ratchaburi, for the Yetagun and Yedana natural gas pipelines from Myanmar.

To explore the perspectives of those involved with building and operating parts of SCORE, the author visited one operating dam, Batang Ai, as well as two under construction, Bakun and Murum. To get input directly from communities in these areas, the author spoke with community leaders, tribal elders and ordinary villagers from longhouses in Asap, Bakun, Upper Bakun, Danang, Murum and Lubok Antu, including Uma Badeng, Long Lawen, Long Wat, Nepi Pasir, Rumah Kelap and Uma Daro. These villages included settlements of the Bukitan, Iban, Kayan, Kenyah and Penan tribes. The author was lucky to have simultaneous translation into all local languages for the entirety of each visit. Interestingly, while the respondents were asked to elucidate both advantages and disadvantages towards each case study, most identified only disadvantages.

Systems theory predicts that each energy project would have a series of interrelated economic, political, socio-cultural and environmental problems. The next three sections explore these types of factors for each case study.

Baku–Tbilisi–Ceyhan (BTC) pipeline

Economic challenges

Project sponsors assured the governments of Azerbaijan, Georgia and Turkey that the BTC would cost US $2.1 billion, but its actual price ballooned to more than twice this figure. Many of the contractors hired by the BTC Pipeline Company did not understand the requirements for social and environmental impact assessments, leading to delays in assessing rights of way and construction. The oil companies hired the cheapest contractors for pump stations and pipeline components in an effort to keep costs low, but these contractors had no experience with health, safety and environment issues. The Azerbaijani government stipulated that 90 per cent of the workers for the Azerbaijan part of the project had to be hired locally. While this was a benefit

for local populations, it also necessitated extra training and, at times, resulted in inappropriately implemented social and environmental safeguards.

Furthermore, BP (the oil and gas company formerly known as British Petroleum) and others put pressure on the contractors to get the job done as quickly as possible. In part, this was because the Production Sharing Agreement was set to expire in 2023, meaning that every day of delay cost these companies potential revenue from oil; further, the price of oil was threatening to drop from US $40 per barrel, meaning that there was an incentive to complete the project before oil prices bottomed out. As a result, some contractors cut corners and made mistakes that ended up causing greater delays when they had to be corrected. Others set their bids too low and ended up going bankrupt or withdrawing from the project, further adding to delays. Weather also played a part, with one respondent estimating that unexpected snowstorms accounted for 90 days of delay at an extra cost of US $270 million. Finally, once construction began, contractors encountered more archaeological sites and unexploded ordinance along the pipeline route than anticipated.

These delays meant that the pipeline ended up costing more than each of the earlier proposed alternatives. A new pipeline to Novorossiysk would have cost only US $2.5 billion; one to Supsa, US $1.8 billion; one to the Persian Gulf through Iran, US $1 billion (Rasizade 2000: 138–47). Some oil companies within the consortium even fought against the BTC route, suggesting that a cheaper and more secure alternative would be to diversify exports by sending oil simultaneously from Baku to Supsa, north through Novorossiysk and south to Iran; but that plan was fiercely resisted by Turkey and the USA. Three members of the consortium – Lukoil of Russia, ExxonMobil of the USA and Pennzoil of the USA – were so certain the BTC would not be profitable that they withdrew from the project. Therefore, the BTC pipeline cost billions of dollars more than proposed alternatives, and required hundreds of millions of dollars of additional subsidies from each of the host governments to complete construction.

Political challenges

The oil revenues now flowing to Azerbaijan from the BTC empower a state known for its corruption and elitism, highly centralized patronage networks and suppression of dissent. Compared to its neighbours, Azerbaijan does not have an independent media, detains political prisoners and fixes elections. Freedom House, a US watchdog, characterizes the Azerbaijani government as an authoritarian regime that is mostly 'not free', and Transparency International ranks Azerbaijan as one of the worst of 160 surveyed countries in terms of prevalence of corruption.

While the purported benefit of the state's oil fund – established in 1999 and worth about US $1 billion per year – is to protect 'future generations', in reality only two of the fund's past seven expenditures were arguably for public

benefit: US $327.1 million spent on the construction of roads and bridges, and US $45.6 million spent on construction of a trash incinerator power plant (Agayev 2008: 10–11). The rest have all been personal projects for President Ilham Aliyev, including US $127 million for the reconstruction of the Presidential Apparatus (the complex that includes the president's office), US $45.6 million for the refurbishment of the Presidential Palace, US $120 million for the construction of the Heydar Aliyev Railway Station (named after the president's father, to be built over the existing railway station), and US $168.9 million for the construction of statues and complexes of or named after Heydar Aliyev. One non-governmental organization (NGO) respondent joked that, once the oil companies deposit revenues into national Azerbaijani accounts, it 'simply enters a black hole'.

The revenues from the oil fund also concentrate political power in the Office of the President, undermining the democratic role of the Parliament. As one example, members of Parliament submitted 150 requests to fund their own projects from the oil fund in 2008, but only two were approved. Indeed, one independent study in 2008 estimated that the oil fund, far from enabling industrial diversification and reducing dependency on imported commodities, has strengthened presidential control over the disbursement of funds and enabled the presidential family to accumulate vast sums of personal wealth (Kalyuzhnova and Nygaard 2008: 1829–42).

Socio-cultural challenges

What BP and the BTC Pipeline Company termed 'consultation' with villagers amounted to officials from these corporations giving lengthy presentations and instructions, followed with two-minute question-and-answer sessions, restricted further by some villages being permitted to ask only one question. Resettlement action plans were supposed to be in place 60 days before construction in each village, so that people would be informed about land acquisition and resettlement; but, in practice, some villagers were never notified at all. The result was that many Azerbaijanis and Georgians protested against the project by lying down in front of bulldozers and filing complaints and lawsuits. Indeed, when the author visited one rural village near the pipeline corridor in Georgia, residents thought he worked for the BTC Pipeline Company and immediately surrounded him to lodge complaints. The BTC was further resisted by some elements of international civil society. A global network of concerned NGOs, including Greenpeace and the World Wide Fund for Nature, contributed funding to the Baku-Ceyhan Campaign, which wrote letters to the World Bank's president and other core personnel, and organized protests at overseas offices of both the World Bank and BP. One official involved with the BTC project told the author that more than 900 complaints against oil companies in Azerbaijan were filed in 2007, along with 37 lawsuits.

While the World Bank's policy on involuntary resettlement calls for compensation of at least US $4.30 per sq m of land, those in Turkey received less than US $1, those in Azerbaijan less than US $1.50 and those in Georgia about US $3. In Turkey, the average price paid for land was between US $0.56 and US $0.80 per sq m, and included nothing for cracked houses, ruined fields or damaged roads. When Azerbaijani and Georgian villagers took their case to the local courts, the judges refused to hear them. When they took a complaint to the European Bank for Reconstruction and Development (EBRD)'s Independent Resource Mechanism, a supposedly neutral arbitrator of disputes, the judges quickly ruled in favour of the EBRD and gave the villagers nothing (Kochadze 2006: 22–23).

As a result, evidence suggests that the BTC has done more to harm local communities than to benefit them. Perhaps the best support for this claim comes from an extensive independent study conducted after all sections of the pipeline were built in Azerbaijan. Researchers visited 86 communities along the pipeline corridor, interviewed 3,000 people and collected 600 questionnaires (Guliyeva *et al*. 2005). They found that 76 per cent of those surveyed were unhappy with the BTC project. The report noted that 7,500 internally displaced people were still living in tents and unlikely to relocate. It estimated that 90 per cent of funds provided by the BTC Pipeline Company and others, meant for social relocation and community development, went instead to foreign NGOs. It noted that roads in the Shamkir, Goranboy, Ujar and Kurdamir regions sustained significant damage from construction but had not been repaired. It documented that at least 50 homes endured cracks and damage but received no compensation. And it found that many irrigation systems sustained damage from construction but also were never repaired.

Environmental challenges

The BTC pipeline serves as a principal source of greenhouse gas emissions. These come from a variety of sources, including power generators to run offshore and onshore equipment, compression pumps to move oil through the pipeline, compressors to inject water, process heaters for oil terminals, and fugitive emissions associated with the flaring of oil and gas. Respondents noted that over the lifetime of the BTC, more than 100 million tons of carbon dioxide (CO_2) will likely be emitted, accounting for 5 per cent of Azerbaijan's national emissions each year.

Wildlife habitats and species also remain at risk along the pipeline corridor. The BTC pipeline passes through deserts, rivers, aquifers, springs, marshlands, fault lines and seismically active areas, as well as regions with globally threatened species. It criss-crosses environmentally protected areas and reserves in Georgia and Turkey; 30 per cent of the latter's threatened vertebrate species can be found within 250 m of the pipeline corridor. The pipeline also passes through fragile Turkish wetlands protected under European Commission directives as part of various bird and wildlife sanctuaries,

including water sources that feed into the source of the Euphrates River. Furthermore, the export terminal at Ceyhan, Turkey, is home to the Yumurtalik Lagoons Nature Reserve, a critical habitat for monk seals and turtles. In Georgia, the pipeline corridor snakes through three nature reserves, the Tsalka underground water reserves and the Borjomi region, known throughout the country for its pristine environment and mineral water. A number of endemic species, including the Caucasian black goose, brown bear, wolf, lynx, red deer, chamois and hundreds of migrating birds and waterfowl, live within a few kilometres of the BTC pipeline.

Trans-Asean Gas Pipeline (TAGP) Network

Economic challenges

Natural gas pipelines, especially at the regional scale, are capital-intensive projects. Transportation and distribution already account for 41 per cent of the residential price of natural gas in the USA, where the construction of natural gas pipelines can cost as much as US $420,000 per mile (Parker 2004: 66). This means that such projects tend to be prone to significant cost overruns, and that they produce fewer jobs per dollar invested than other types of industrial schemes. Generally, these costs overruns end up not being covered by the companies themselves, but rather are passed onto consumers and ratepayers through higher prices. Billions of dollars are also needed for constructing pipeline infrastructure, platforms, drills and compression equipment. Acquiring this financing is no small feat: most transnational projects require the participation of multiple firms at once, and even slight changes in feasibility, interest rates or inflation can alter the fundamental economic risk of projects. The risk of expropriation and sovereign default linger in the region as well, especially after the Asian financial crisis of the late 1990s.

Finally, natural gas pipelines must still demonstrate that they are a better alternative (i.e. can earn a greater return for investors) than many other possible investments. In this there are three points. First, pipelines must compete against other forms of natural gas delivery. While some have argued that natural gas pipelines and liquefied natural gas (LNG) infrastructure are complementary – they both create demand for natural gas – there is also the potential for competition. Noted one government official respondent within ASEAN: 'The amount of gas that will be traded regionally through pipelines will also have to compete with LNG exports to countries outside the region (e.g. Japan and Korea), or even LNG trading within the region (for remote gas fields).'

Second, natural gas as a whole must compete with other alternatives for energy supply. If shareholders desire to simply earn a profit, they may turn instead to oil, a fungible commodity for which the economics are clearer. Gas, in contrast, depends very much on sufficient load to justify pipelines, and is not attractive enough unless anchored to other large projects. As one

diplomat respondent put it, 'Oil will always find a way to the market; gas must be pulled.' If shareholders are looking to get involved in clean energy, they will likely turn to renewable forms of electricity and transportation fuel, not natural gas and its associated infrastructure. They can invest in Indonesian and Malaysian biofuel plantations, hydroelectric facilities in Viet Nam, solar panels in Singapore or wind farms in the Philippines as alternatives to natural gas.

Third, since money is fungible, pipelines must compete with all project types that could be more profitable. Gas pipelines, in other words, may fall too squarely in the middle for most investors: too dirty for advocates of clean power, not profitable enough for advocates of fossil fuels, and not exciting enough for investors outside the energy sector.

Political challenges

Perhaps the most significant political challenges relate to contests over sovereignty between Asian countries. Brunei, China, Indonesia, Malaysia, the Philippines, Taiwan, Thailand and Viet Nam continue to contest each other's claims to the natural gas reserves found in East Natuna and the Spratley Islands (Cossa and Khanna 1997). Jurisdiction over offshore pipeline segments, particularly outside territorial seas, is also contentious; despite the 'aura of close cooperation' emanating from ASEAN, there are presently a number of unresolved territorial disputes between the member states (Roberts and Cull 2003: 15–20).

Connected to these contests of sovereignty is diplomatic tension and suspicion between ASEAN members. The author was told, for example, that the Indonesians are afraid that Singapore is trying to 'buy up' Indonesia's telecommunications firms and natural resources; the Singaporeans are wary of Malaysian corruption in large infrastructure projects; the Malaysians are worried about importing natural gas from the Gulf of Thailand; the Thais are concerned about the human rights abuses allegedly occurring near Myanmarese gas pipelines; and 'everyone' has reservations about fully engaging China and Japan. One official respondent stated that, as a collective whole, ASEAN countries feel that they were taken advantage of by Western banks and investors during the Asian financial crisis, and are thus still 'afraid they are going to get screwed at everything, that everyone is out to take advantage of them – even each other'. Suspicion between TAGP proponents is deeply entrenched.

Within countries, a drive towards protectionism in the energy sector and the securing of domestic supply may also erode momentum towards creating a TAGP Network predicated on the free trade of natural gas. To meet additional expected surges in energy demand, Indonesia is defaulting on energy cargo exports to secure domestic supply, and Singapore has placed a moratorium on new gas sales for power plants on energy security grounds (Tan 2008: 18–22). Energy consultants confided to the author that the

Singaporeans secretly believe that Malaysia is selling them inferior-quality gas to keep higher-quality supply for domestic use. Clearly attitudes are shifting in Southeast Asia towards domestic control and usage of energy resources, not towards their export and trade.

Socio-cultural challenges

Numerous respondents from a variety of NGOs commented that, in order for the projects to be successful, communities must actively and meaningfully participate in discussions about where natural gas pipelines go. Yet, in some parts of Southeast Asia, such as Myanmar, no independent organization exists to face down state-owned oil and gas companies. There is no clear complaints mechanism, nor a clear definition of the delineation of roles between companies and the state.

Long-distance interstate gas pipelines cross a number of national borders and pass through sensitive environmental areas, which affect both the livelihoods of indigenous peoples and local ecosystems. Communities along the pipeline corridor may be entitled to transit fees and rights or, more seriously, may have to be temporarily relocated or permanently resettled if the pipeline goes through their area. Approaches such as 'free prior and informed consent' (a form of community consultation) and grievance mechanisms (a way for community members to engage in a dialogue with the project sponsor to quickly resolve concerns) are sorely lacking in some parts of the region, as is any type of accountability to international human rights standards.

Some oil and gas suppliers – particularly the Myanma Oil and Gas Enterprise, but also the Malaysian company PETRONAS and the Thai company PTT – have employed private security firms to protect their operations and suppress dissent, especially when operating abroad. In Indonesia and Myanmar, some firms selling gas have been accused of having denied free speech, employed torture, supported slavery and forced labour, sanctioned extrajudicial killings and ordered executions (Waskow and Welch 2005). The American oil company Unocal admitted in court to knowing that the Myanmarese military committed acts of genocide to construct a pipeline for Unocal's operation, and BP, ExxonMobil, ConocoPhillips and Shell continue to provide daily 'security briefings' for mercenaries and to supply vehicles, arms, food and medicine to soldiers and police in some of their operations in the developing world (Maassarani *et al*. 2007: 135–65; Chen 2007: 45). In this way, supporting the gas fuel chain also furtively but directly endorses human rights abuses and engenders international conflict.

Environmental challenges

Finally, the TAGP can endanger species, habitats and ecosystems through land degradation, the ever-present risk of spills and accidents, and associated greenhouse gas emissions through the natural gas fuel cycle. Drilling brings

large quantities of rock fragments, called 'cuttings', to the surface, and these are coated with drilling fluids, called 'drilling muds', which operators use to lubricate drill bits and stabilize pressure within gas wells. The quantity of toxic cuttings and muds released for each facility is gargantuan, ranging between 60,000 to 300,000 gallons per day. In addition, vast quantities of water contaminated with suspended and dissolved solids are also brought to the surface, creating what geologists refer to as 'produced water'. A typical offshore oil and gas platform releases about 400,000 gallons of produced water back into the ocean every day, potentially containing lead, zinc, mercury, benzene and toluene, making it highly toxic and often requiring operators to treat it with chemicals.

The next stage, natural gas processing, necessitates separating hydrocarbons and fluids from the gas itself. The first step involves removing condensate, oil and water before treating natural gas with amines (organic compounds) to improve quality. Natural gas is often injected with nitrogen and then 'sweetened' to remove excess hydrogen and sulphur. Fugitive emissions in natural gas-processing facilities are common, most often associated with leaks in tubing, values, connections and storage tanks (International Finance Corporation 2007: 4–5). Natural gas processing facilities commonly contaminate local groundwater sources and soils, and accidents can give rise to a variety of types and intensities of fire, depending on the quantity of gas involved.

Natural gas facilities also contribute indirectly to global warming, by emitting significant amounts of methane during the production process and transportation. Natural gas, when not separated from oil deposits, is often burned off at the well site or flared, releasing CO_2, carbon monoxide (CO), nitrogen oxide (NO_x) and sulphur dioxide (SO_2). When not flared, operators usually vent unprocessed gas directly into the atmosphere. A staggering 5 per cent of world natural gas production is lost to flaring and venting, making the gas industry responsible for roughly 10 per cent of global methane emissions (Kirchgessner *et al*. 1997: 1365–90).

Sarawak Corridor of Renewable Energy (SCORE)

Economic challenges

Respondents identified severe cost overruns as a major challenge to the SCORE project, since construction on parts of the corridor, notably Bakun and possibly Murum, have already become more expensive than planned. One respondent argued that 'by some estimates, the cost overruns associated with Bakun were a staggering 600 per cent – that dam was supposed to cost 2.5 billion ringgit but cost six times more due to delays, rising interest rates, strikes and problems with excavation'. Another remarked that 'the entire bidding process placed too much risk on the contractors and subcontractors. If we had to price all of the risks that we were being asked to take, we would never have gotten the contract and won the tender'.

Setting the power purchase agreements from the dams in SCORE could also be difficult, with many businesses 'wanting the electricity for close to free'. One participant elaborated:

> SCORE is a risky strategy, one that is very strange, trying to produce cheap energy first to attract businesses rather than having businesses already here that need energy and want to grow. The SCORE strategy is not focused and will not work on small and medium size enterprises; what it needs is energy guzzlers, things like manganese and aluminium. Sarawak is the only state in the world, to my knowledge, that uses this type of strategy.

Other participants remarked how

> Sarawak is competing with everyone to draw in industry, and the smelters and companies have all of the negotiating power … it's going to be very difficult for them to set a power purchase agreement that will bring positive returns on investment on these big dams.

A final economic challenge relates to community welfare. As one respondent put it, 'SCORE is not really intended to electrify people or the rural poor in Sarawak; it is for industry only.' Another commented that 'SCORE is supposed to be a growth engine for industry. It won't help the poor; it has no real jobs for them and no skills adoption. The amount of jobs created for locals will be practically zero.' Others stated that SCORE will have 'no positive effect on poverty alleviation' and that 'it is not really concerned with benefitting communities; it's more concerned with building infrastructure'. One even went so far as to call the project 'lousy', declaring that it was 'not doing the country any good'.

Political challenges

One major political challenge involves corruption. One respondent argued that 'SCORE is simply about the political elite in Sarawak lining their pockets'; another noted that 'the thinking behind SCORE is, The bigger the projects, the biggest the cuts and bribes you can get.' Yet another even suggested that 'the chief minister of Sarawak is so corrupt I am surprised he hasn't been assassinated yet'. The Sarawak police have been accused of 'sanctioning violence' against those that have tried to oppose the project. One participant argued:

> I and members of my community have tried to oppose SCORE and also other government linked companies from logging or building palm oil plantations on our land. But company officials have done things like hire thugs to put our village leaders into a burlap sack and drag them behind

> a car or beat them half to death. We don't oppose the government or the companies linked to it here anymore.

This corruption, perceived or real, makes communities reluctant to negotiate with the government over social issues related to SCORE, such as relocation or employment. One respondent admitted that the state government 'has a real credibility and legitimacy issue in the eyes of the international community, which can complicate everything from signing contracts and setting electricity tariffs to reaching out to communities and indigenous people'.

A related political challenge involves low political literacy and representation. As one respondent surmised, 'people are used to discontent and corruption in Sarawak – it has become normalized'. Another argued that the local groups that would most likely suffer from SCORE have been 'brainwashed' and are 'content to receive a few crumbs from the table'. As this person continued:

> The tragedy here is that the indigenous communities are all compromised, are not willing to stand up for their rights, let alone able. They can be bought off very easily, some with only a few hundred dollars. Political awareness is extremely weak; they are easily strong-armed into shutting up.

Another argued that 'the ethnic clans have problems negotiating with each other and the government. Each clan wants different things – we don't trust each other, we can agree on nothing – which makes us easy to conquer by a unified government.'

Socio-cultural challenges

The social challenges mentioned by respondents included unfair community relocation processes and threats to livelihoods. Community relocation and resettlement were discussed as constituting a 'severe' barrier. Construction of the Bakun dam alone necessitated forcibly moving about 10,000 people from the 70,000-hectare reservoir and catchment area to a 4,000-hectare sponsored resettlement site at Sungai Asap. Yet resettled life in Asap required a fundamental shift in the way of life of these communities and their attempts to maintain their traditional knowledge system. As one resettled villager lamented:

> Before we had to resettle here in Asap, our main source of protein used to be wild boar and fresh fish. Here there is no fish. The Asap River is too small and the Koyan River is too far. Wild boar is extinct in these parts as there is no more forest. It was cool there, but it is hot here. There we could sleep without fans; here we need a fan or air conditioning. We had land for farming there; here we have to walk for an hour to get to our

> farmland. There we could use the river for transport; here we have to walk or take a car. There we did not need fertilizer or pesticides; here the land is so harsh that we do. There we used to eat hornbill and what the forest provided; here we have to buy vegetables at the market, so we are no longer subsistent. We don't even have the title to this land, meaning if the government wishes to move us again, we have no choice but to go.

Our site visits also revealed that relocation and resettlement in Asap has adversely impacted community resilience and cohesion. One participant reported that since the scheme started in 1998, more than 3,000 people have migrated out of the area, 'because they cannot take it anymore', to towns such as Bintulu, Sibu, Miri and Kuching. In Long Lawen, a displaced community from the Bakun area, the numbers living there have dropped from 2,400 people and more than 300 families to 400 people and 60 relocated families; still more recently, the number of individuals has been whittled down to just 100. Another villager said the difficulties they faced in planting crops such as cocoa and pepper had become a source of tension within the community.

Downstream community livelihood could also be threatened by SCORE. About 10,000 people down the river from the Bakun dam will have their fishing and agricultural activities disrupted for the 9 to 12 months during which the reservoir impounds water; about 6,000 will be similarly affected by Murum. Rivers in Sarawak, unlike in other Malaysian states, are incredibly important to transport and community livelihoods, given the lack of rail and limited road networks there and the great distances between villages. Rivers serve as 'superhighways' from coastal areas into the interior, and the longest one, Sungai Rajang, is the one SCORE that intends to tap. The problem is that 600,000 people, or one quarter of the population of Sarawak, rely exclusively on rivers for transportation, fishing, drinking water and agriculture (Tsung-Ping *et al*. 2008). One participant worried that people will have to travel 'relatively long' distances to collect water from sources other than the river; Kapit, Song and Sibu will experience shortages of drinking water; and 16 longhouses along the river will lack domestic water for washing, bathing and cooking.

A final thematic social challenge relates to unfair compensation for those affected by the dams. One respondent called the compensation given for Bakun and SCORE-related issues 'very poor' and 'unfair', making it 'very hard for affected communities to survive'. Another exclaimed that:

> The rationale and logic behind relocation associated with SCORE is racist and defunct. It is about moving people in who don't want to be moved, dislocating them, giving them worse land that does not benefit them at all, land where they cannot even do rotational farming or hunting properly. They are given land without a lifestyle, land without opportunity.

Such loss of land, noted one respondent, is:

> very difficult to measure and fix with economic measures like price. It is hard to compensate someone for a home that has been passed down for generations, land where our ancestors are buried, or where a durian tree has been tended and cared for by generations of family members.

Environmental challenges

Deforestation and flooding were continually referenced as significant environmental impacts from SCORE. The Bakun dam, with a catchment area of 1.5 million hectares (logged) and a reservoir area of about 70,000 hectares (cleared and then submerged), will destroy 50 million cubic meters of biomass, home to six rare or endangered fish species, 32 protected bird species, six protected mammals and more than 1,600 protected plants. These include herons, eagles, woodpeckers, silvered leaf monkeys, Bornean gibbons, langurs and flying squirrels (Choy 2004; 2005a; 2005b). The Murum dam, with a reservoir area of 24,500 hectares and catchment area of 275,000 hectares, will release 3.48 million tons of carbon, displace 755 people, and threaten 300 rare and engendered species (ibid.). Other proposed dams could affect water quality and availability throughout the Gunung Mulu National Park, a UNESCO World Heritage Site that is home to what is thought to be the world's largest cave chamber.

Since Borneo is a tropical environment, the dams associated with SCORE would also emit substantial amounts of greenhouse gases. Methane emissions from rotting vegetation is one primary source, in addition to greenhouse gases released through diffusion as water is degassed through the turbines and spillways. One respondent noted, 'SCORE could have quite massive biodiversity and climate impacts. The methane generated from rotting vegetation could be equivalent to all of the emissions from Malaysia's coal fired emissions alone. We're talking about substantial climate change impacts.' Another explained that 'being a developing country, climate change and sustainability is a low priority in Malaysia. It is seen as more important to develop infrastructure, clean or not, and deal with the consequences later.'

The series of dams from SCORE could also negatively affect hydrology, water quality and river flow. Respondents mentioned that some of the water-related impacts from SCORE would include the following:

- serious deterioration of water quality in reservoirs and downstream from dams;
- significant adverse impacts on water levels and saltwater intrusion downstream;
- substantial risk of the introduction and spread of waterborne diseases; and

- a remote but tangible risk of catastrophic downstream flooding due to dam failures.

Because they act as physical barriers within a river, dams change the concentration of dissolved oxygen, nutrient loads and suspended sediments; in addition, tidal encroachment could aggravate bank erosion.

Not to be dismissed are the downstream impacts from industrialization. After all, the electricity provided by SCORE will have to go to something, and the industries that planners have been courting are some of the dirtiest forms of industry. As one respondent said:

> So far, the investment responses for SCORE have not been fantastic. So now the planners are starting to close their eyes to environmental degradation. They don't care who they attract – it could be a plant that leeches heavy metals directly into the environment, as long as they can get someone to use all of this energy.

Another clarified that 'SCORE is not really about energy, but more about promoting industrialization and attracting investment in heavy industries.' This respondent continued: 'Sarawak is not interested in processing industries such as manganese or silicon; they are interested in big industrial users. It doesn't matter which industry, as long as they are big enough to use the energy.' Another respondent went so far as to claim:

> There's really not much about SCORE that is renewable. I suspect they put the term 'renewable' in the title only so they didn't have to call it SCOE. For in this particular case, we're not talking about renewable energy that enables low carbon growth; instead, it's hydroelectricity that enables carbon-intensive and energy-guzzling growth.

Conclusions

From these case studies, three conclusions are offered: one concerning energy development assistance, one relating to the scale and complexity of large-scale energy infrastructure projects in general, and one regarding future areas of research.

Regarding energy development assistance, each project implies that efforts such as the Extractive Industries Transparency Initiative (which attempts to set global transparency standards for the oil, gas and mining sectors), environmental and social impact assessments and other voluntary codes of conduct may be necessary to ensure that pipelines and energy infrastructure do not damage their host communities. In fact, these are insufficient by themselves. The sponsors and financiers of the cases presented here perhaps embarked on projects with the best of intentions; but such efforts have done

little to offset the social, economic and environmental impacts facing communities on the ground. If the BTC is truly 'as good as it gets', as one respondent claimed, then scholars and policymakers alike may need to reconsider whether large, capital-intensive energy projects can ever be done in a way that not only minimizes damage but actually improves standards of living. A secondary lesson is that development institutions and corporations such as the World Bank, EBRD, International Finance Corporation and BP often have their own agendas, which are not always commensurate with national or community interests – in this case, BP improving its image and the banks earning revenue on their loans.

Second, concerning large-scale infrastructure projects around the world, the case studies remind us of the challenges associated with investments in large-scale energy projects. Millions of dollars' worth of materials must be purchased, hundreds of thousands of pages of assessments and documents must be approved, thousands of workers must be trained and coordinated and hundreds of villages consulted. When asked about the ultimate consequence of SCORE, one respondent commented:

> People forget that there is a price to pay for development; it never occurs in a vacuum or without consequences. Our role as policymakers and regulators here in Sarawak is not to say no to any development project – just to minimize the impacts from the development projects that occur.

In order to minimize these impacts, technical expertise must be borrowed or cultivated indigenously. Investors must be convinced to finance projects. Consistent regulatory frameworks must send a strong signal to stakeholders. Robust political leadership must occur in favour of the project. Rigorous participatory and transparency mechanisms must be in place to ensure that human rights are protected. Damage to the natural environment must be prevented or at least mitigated. Taken collectively, these projects imply that talking about regional energy cooperation and investment in Asian megaprojects is much easier than actually cultivating such trends.

Third, this study brings to light possible areas of fruitful future research. For example, exploring how transnational projects could be designed with proper safeguards, levels of transparency and improved oversight could reveal ways in which they would actually bring social and economic benefits that greatly outweigh costs. Also, to a certain degree, many of the barriers facing transnational projects, such as cost overruns, inequitable outcomes and lack of communication, affect all energy projects. Research exploring these challenges (which are uniquely amplified due to the transnational dimension of a project) and those unique to the energy dimension would be helpful.

Lastly, this study has focused exclusively on Asia, and even then its sample of just three cases has been small. Further analysis of whether problems with megaprojects can be attenuated through improved planning and control in other geographic areas, such as Africa or South America, or even types of

technology and infrastructure, such as nuclear power plants, biofuels, roads and highways, would also fill a salient research gap.

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Appendix; List of institutions interviewed

Alstom Hydro (Malaysia)
Asian Development Bank (the Philippines)
Asia-Pacific Economic Cooperation Secretariat (Singapore)
Association of Southeast Asian Nations (Indonesia)
Association of Southeast Asian Nations Centre for Energy (Indonesia)
Association of Southeast Asian Nations Council on Petroleum (Malaysia)
Bar Council of Malaysia (Malaysia)
Borneo Resources Institute Malaysia (Malaysia)
BP (United Kingdom)
BP (Azerbaijan)
BP (Georgia)
BTC Pipeline Company (Azerbaijan)
Centre for Environment, Technology and Development, Malaysia (Malaysia)
Centre for Orang Asli Concerns (Malaysia)
Department of Energy (the Philippines)
Economic Planning Unit, Prime Minister's Department (Malaysia)
Economic Research Institute for Northeast Asia (Japan)

Electricity Generating Authority of Thailand (Thailand)
Energy Charter Treaty Secretariat (Belgium)
Energy Commission of Georgia (Georgia)
Energy Commission of Malaysia (Malaysia)
Energy Market Authority (Singapore)
European Bank for Reconstruction and Development (Ukraine)
ExxonMobil Asia Pacific (Singapore)
ExxonMobil Gas and Power Marketing Company (Singapore)
Friends of the Earth (United Kingdom)
Georgian International Oil Corporation (Georgia)
Global Environment Facility (USA)
Greenpeace (Indonesia)
Georgia–Ukraine–European Union (GUEU) White Stream (Georgia)
Human Rights Commission of Malaysia (Malaysia)
Institute of South Asian Studies (Singapore)
Institute of Southeast Asian Studies (Singapore)
Institute of Strategic and International Studies (Malaysia)
International Energy Agency (France)
International Rivers (USA)
Japan Bank for International Cooperation (Japan)
Japan International Cooperation Agency (Japan)
Lao National Committee for Energy (Lao PDR)
Ministry of Energy and Mines (Lao PDR)
Ministry of Energy and Natural Resources (Indonesia)
Ministry of Energy and Natural Resources (Turkey)
Ministry of Energy, Green Technology and Water (Malaysia)
Ministry of Foreign Affairs (Turkey)
Ministry of Natural Resources and Environment (Malaysia)
Ministry of the Environment and Water Resources (Singapore)
Ministry of Trade and Industry (Singapore)
Ministry of Tourism (Malaysia)
National Economic Advisory Council (Malaysia)
Natural Resources and Environment Board, Sarawak (Malaysia)
Open Society Institute Assistance Foundation (Azerbaijan)
OSK Research (Malaysia)
Partners of Community Organisation (Malaysia)
Pendawa (Indonesia)
PERTAMINA (Indonesia)
PETRONAS (Malaysia)
PT Perusahaan Gas Negara (Indonesia)
PTT (Thailand)
Public Private Partnership Unit, Prime Minister's Department (Malaysia)
Ratchaburi Electricity Generating Holding (Thailand)
Regional Corridor Development Authority (Malaysia)
Sarawak Energy Berhad (Malaysia)

Sarawak Hidro Sdn Bhd (Malaysia)
Sarawak Iban Dayak Association (Malaysia)
Sarawak Rivers Board (Malaysia)
Sime Darby (Malaysia)
Singapore Committee for Regional Energy Cooperation (Singapore)
Singapore Institute of International Affairs (Singapore)
Snowy Mountains Engineering Corporation (Australia)
State Government of Sarawak (Malaysia)
State Oil Company of Azerbaijan Republic (Azerbaijan)
State Planning Unit, State Government of Sarawak (Malaysia)
Suara Rakyat Malaysia (SUARAM) (Malaysia)
Syarikat SESCO Berhad (Malaysia)
Tenaga Nasional Berhad (Malaysia)
The Borneo Project (Malaysia)
Third World Network (Malaysia)
Transparency International (Azerbaijan)
Transparency International (Georgia)
United Nations Development Programme Malaysia (Malaysia)
Universiti Malaysia Sarawak (Malaysia)
US Agency for International Development (USA)
US Department of Energy (USA)
Wood Mackenzie (Singapore)
World Bank Group (USA)
World Resources Institute (USA)
World Wildlife Fund Malaysia (Malaysia)

Note

1 See Sovacool (2009a, 2009b, 2010a, 2010b, 2011); Sovacool and Bulan (2011); and Carroll and Sovacool (2010).

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8 Energy and GMS: Cooperation, competition and development

Youngho Chang and Yao Lixia

Introduction

The Mekong River flows through six countries, from Yunnan (in China) to Laos, Myanmar, Thailand and Cambodia, and on to the Vietnamese coastline and into the South China Sea. These six countries form the Greater Mekong Sub-region (GMS). Despite the sub-region's rapid economic growth and abundant natural resources, about 15 million GMS inhabitants are still poor, with a daily consumption equivalent to less than US $1; some 60 per cent of the population earn less than US $2 per day (ADB 2009a: 2).

Energy is of critical importance in fuelling the region's economy and improving the quality of life of its population. Some linkages between access to energy and national development are direct. For example, energy is a fundamental input into industry and transportation, both of which are directly related to economic development and poverty reduction. Some linkages are indirect. For example, teachers and doctors are unlikely to serve in isolated areas that make it difficult to access modern energy (ADB 2009a: 3). The underlying linkage implies that energy development is essential to the development of the whole GMS.

The GMS has significant potential in terms of energy resources. The problem is that diversified energy resources are not fully or well utilized. The Asian Development Bank (ADB), as the 'honest broker', has facilitated energy market integration to make good use of the energy resources in the region. Power projects and a transmission system have been built, and energy cooperation and integration in the GMS could be said to be on a desirable path, albeit with some challenges. The main challenges are poorly coordinated energy polices and as yet inadequate regional integration, for which it has been found that infrastructure and institution building are the key responses.

This chapter reviews the energy history of the GMS, evaluates the cooperation within the sub-region, and explores both the drivers for its initial success and the implications for applying its successful experiences to a greater region, such as the countries of ASEAN and East Asia. Upon evaluating the possibilities of cooperation and identifying the drivers for

cooperation, it offers recommendations for further energy development and cooperation, including on how to build infrastructure and institutions in the GMS.

Energy situation in the GMS

Appetite for energy and 'energy poverty'

Along with fast economic growth, electricity demand in the GMS has grown rapidly since the beginning of this century, at annual rates of around 11 per cent (Economic Consulting Associates Limited 2010: 12). Table 8.1 describes the electricity demand forecast in detail. From this, it can be seen that the rapid growth of demand for electricity will continue, and thus will require a huge increase in capital investment.

Apart from significant growth in both electricity-related demand and investment needs, energy poverty still prevails in the GMS. Of the total population, more than 20 per cent have no access to electricity. The share of biomass in primary energy supply is still high, as is the indoor pollution caused by burning biomass. Each day, 4,000 deaths from indoor pollution are reported, and most of the victims are women and children (ADB 2009a: 6). Table 8.2 presents the percentage share of biomass in total primary energy supply in the GMS.

There is also wide variation and disparity in per capita energy use across the countries of the GMS. For instance, the per capita electricy use in Myanmar and Cambodia is less than 10 per cent of the GMS average, due to low electrification rates in both countries (ADB 2009a: 9). Table 8.3 presents the per capita electricity consumption in the sub-region.

Large potential for energy resources

The GMS is endowed with abundant and diverse energy resources with power-generation potential. About 30 billion tons of coal resources are estimated to exist in Yunnan, a potential generation of 125,000 megawatts (MW)

Table 8.1 Electricity demand forecast for 2020 and annual growth rates

All in MW	*Cambodia (grid)*	*China*	*Laos*	*Myanmar*	*Thailand*	*Vietnam*
Year 2020	2,401	na	2,494	na	46,481	47,607
Average annual growth in demand						
2000–07	16.5%	12.6%	13.3%	4.9%*	6.1%	12.0%
2007–20	20.9%	na	14.8%	na	5.7%	11.7%

Source: Economic Consulting Associates Limited (2010)
Note: MW – megawatts
* 2000–08, calculated using generation data
For China, growth in peak demand is for China Southern Grid as a whole

Table 8.2 Percentage share of biomass in total primary energy supply

Economy	*1990*	*Latest*
Cambodia	na	73.2
PRCGuangxiYunnan	23.2nana	13.046.714.4
Laos	93.0 (1995)	79.0
Myanmar	84.4	69.6
Thailand	33.4	16.5
Vietnam	77.7	46.7

Source: Asian Development Bank (2009a)

of electricity over 30 years. Most oil reserves in the sub-region are exploited for export. Besides traditional fossil fuel resources, the GMS has significant potential in hydropower. The Mekong River basin covers an area of over 795,000 sq km, and during the rainy season river levels can fluctuate by up to 14 m in some locations. The Mekong River's total estimated hydropower potential could be up to 285 terawatt-hours (TWh, with one TWh equal to a billion units), ranking the twelfth largest in the world (ADB 1995). The total exploitable hydropower potential in the GMS is about 248,000 MW, of which Myanmar and Yunnan have the greatest potential. Myanmar alone has a huge hydropower potential of 100,000 MW, but the country's hydro sites are generally located far from other GMS countries. Until 2007, the country's installed capacity of hydropower generation was only 21,035 MW, barely 20 per cent of potential (ADB 2008: 3). Table 8.4 presents the hydropower potential and installed capacity in the GMS.

While the GMS has large energy resource potential, these resources are typically located far from major markets of demand or are separated by national borders. In 1992, the ADB initiated a technical assistance programme to promote transnational cooperation among Cambodia, China, Laos, Myanmar, Thailand and Vietnam (Chander 2000: 3). Three years later,

Table 8.3 Per capita electric power consumption, 2005

Economy	*Kilowatt-hour (kWh)*
Cambodia	56
PRCGuangxiYunnan	1,684
	1,100
	1,252
Laos	187
Myanmar	78
Thailand	1,950
Vietnam	573
GMS average	755
World	2,701
OECD	8,795

Source: Asian Development Bank (2009a)

Table 8.4 Total exploitable hydropower potential and installed capacity in the GMS (MW)

Item	*Cambodia*	*Yunnan (China)*	*Laos*	*Myanmar*	*Thailand*	*Vietnam*	*Total*
Potential	15,000	90,000	18,000	100,000	10,000	15,000	248,000
Installed	13	11,980	663	802	3,422	4,155	21,035
Percentage of utilization	0.09%	13.31%	3.68%	0.80%	34.22%	27.7%	8.48%

Source: Asian Development Bank (2008)

an official Subregional Electric Power Forum (EPF) was established as an advisory body to the newly inaugurated annual GMS Ministerial Conference, in Yangon. From 1995 onwards, cooperation among GMS members has steadily increased. Several sub-regional hydropower projects have been developed, including the Laos-based Theun Hinboun, Houay Ho and Nam Leuk projects, which are currently exporting electricity to Thailand. The long-awaited (NT2) hydropower project, from Laos to Thailand, was commissioned in March 2010.

Energy cooperation and development in the GMS: past, current and future

Cooperation within the GMS generally can be traced back to 1957, when the Mekong Committee was established. For the most part, the committee's goals were to address the pressing issues of political instability along the river's basin, and to promote peace and prosperity through the joint use of resources available in the region (Hiroshi 2000: 103). However, cooperation was then halted for more than 30 years, due to conflict and war in the sub-region.

On the energy side, although the GMS has abundant energy resources, large-scale energy-related development and cooperation did not begin until the 1990s. Before that time, there had been no uniform strategy to develop energy resources in the GMS, with decisions over energy policies largely made by individual nations. Assisted by the ADB, the six countries through which the Mekong River flows entered into a programme of formalized cooperation. Since then, the ADB has been the broker for most cooperative initiatives, while dams and hydropower have constituted the core of the more overt resource politics (Hirsch 2001: 239).

Current status of power interconnection and energy cooperation

To enable reliable exchanges of power and fully achieve sub-regional power trading, the GMS member states have prepared a roadmap. This supplies a

plan for phased development in four stages, involving infrastructure development and institutional building. The GMS's hydropower resources are unevenly distributed within the sub-region, while most of the exploitable resources are locally concentrated. Among the GMS member states, Laos, Myanmar and Yunnan have abundant hydropower resources. The uneven hydropower resources and their geographic proximity make the GMS an ideal sub-region for power interconnection. However, this would require the member states to synchronize the operation of their national grids, and the four-stage roadmap has been set out for this purpose.

In the first stage of the plan, power trade will primarily take the form of bilateral export projects. The focus of these projects is to establish common minimum standards for bilateral agreements and national codes, so that the national grids will allow for harmonization of future regional power trade agreements. The second stage is to link the interconnectors for export projects. During this stage, trade will be possible between any members of the GMS, though available cross-border transmission capacity is limited and based on surplus capacity of project lines in exporting countries. The third stage will see interconnectors developed expressly for power trade, while a competitive power market throughout the sub-region may also be completed. During this stage, multiple buyers and sellers are allowed to take part in the cross-border power transactions. This stage will occur when all necessary transmission lines for cross-border trading have been commissioned. The fourth stage will be a situation in which an integrated competitive regional power market is created (Economic Consulting Associates Limited 2010: 2).

Infrastructure development and hydropower projects in the sub-region

The 1971 agreement under which Laos began to export power from the Nam Ngum hydropower plant to Thailand could have marked the beginning of power trading in the GMS. Yet as noted earlier, the power trade was subsequently halted due to various conflicts. Only since the early 1990s, on the backs of several memoranda of understanding, has bilateral power trading truly begun. As Laos is the sub-regional net exporter of power, existing GMS electricity trade flows primarily from Laos to Thailand and Vietnam. The sub-regional power interconnections are mainly via 110-kilovolt (kV) and 230-kV transmission lines (ADB 2008: 6). At present, the only high-voltage transnational transmission line in the GMS is a 500-kV line that runs from the NT2 hydroelectric power plant in Laos to Thailand. However, work is in progress on several additional high-voltage transmission lines among the member states (ADB 2011a).

Table 8.5 shows the major hydropower export projects in the GMS. Among these is NT2, a project whose impact will be much broader than simply providing power. First, the revenues generated by NT2 are an important contribution to the Laotian government's development and poverty reduction agenda; such a large project could encourage multinational companies to

Table 8.5 Hydropower export projects in the GMS

Hydro Project	*Year*	*Origin*	*Destination*	*Installed capacity*	*Firm capacity*
Nam Ngum 2	2008	Laos	Thailand	615 MW	415 MW
Nam Theun 2	2010	Laos	Thailand	1,088 MW	937 MW
Xe Pian–Xe Namnoy	2010	Laos	Thailand	390 MW	362 MW
Xe Khaman 1	2010	Laos	Thailand	468 MW	408 MW
Tasang	2012	Myanmar	Thailand	3,600 MW	3,000 MW
Jinghong	2013	China	Thailand	1,500 MW	863 MW
Nuozhadu	2014	China	Thailand	5,500 MW	2,393 MW
Sambor Cambodia Petroleum Exploration Co.	2019	Cambodia	Vietnam	465 MW	347 MW

invest in Laos. Indeed, since the approval of NT2, foreign direct investment (FDI) projects in hydropower have been increasing in Laos. At the same time, implementation of the NT2 revenue management plan will also catalyze governance reforms and policy initiatives, including the country's first national policy on the sustainable development of the power sector (World Bank 2007: 28).

Institutional build-up

The institutional arrangements of the GMS energy programme have evolved since it began. There are four institutions specific to the GMS power market. The first established was the EPF, inaugurated in 1995. The arrangements in the Inter-Governmental Agreement (IGA) on Regional Power Trade were officially agreed to in 2002 by the leaders of the six GMS member states. Since then, a Regional Power Trade Coordinating Committee (RPTCC) has been established, including two subgroups under it, the Focal Group and the Planning Working Group (Economic Consulting Associates Limited 2010: 3). The role of the RPTCC is to 'actively coordinate the successful implementation of regional trade and to represent the countries involved in regional power trade' (ADB n.d.: 1).

These institutional arrangements have been developing the framework for regional trade in power. Further institutional strengthening is still needed, however, in order to facilitate power trade in interconnected power systems. As shown by previous institutional experiences in the European Union, such institutional arrangements are essential to help remove barriers to power trade.

Expanded cooperation for a sub-regional power market

The development of a sub-regional power market needs the cooperation of the countries in the sub-region to upgrade the cross-border transmission system, in order to provide adequate transfer capacity and to control power flows. Throughout the confidence-building and preparation processes during the 1990s, a preliminary sub-regional power market was formed, and mechanisms for better coordination with other cooperative initiatives in the GMS were actively pursued (Yu 2003: 1228). These initiatives have focused on cross-border electricity trading and the interconnection of transmission networks to connect energy demand growth centres with rich indigenous energy resource centres.

The 15th GMS Ministerial Conference, held in 2009 in Thailand, adopted the GMS Road Map for Expanded Energy Cooperation. This is meant to expand cooperation beyond the electric power sector, improve energy security and promote environmental protection. The plan also provides a policy framework, a concrete, implementable work plan and a general timetable (ADB 2011b: 1).

Several new initiatives were endorsed at the 16th GMS Ministerial Conference, in Vietnam in 2010. These include the Core Agriculture Support Program, Phase II, which will serve to provide inputs for the development of the new long-term GMS strategic framework; the Strategic Framework for Connecting GMS Railways, which is a significant step towards an integrated GMS railway system and also does much to promote intermodal transport networks; the Program of Actions for Transport and Trade Facilitation, which is being finalized and would eventually facilitate transport and trade in the sub-region; and the Strategy and Action Plan for the Greater Mekong Subregion Southern Economic Corridor, which is meant to provide a vision and framework for developing the Southern Economic Corridor, improve coordination and mobilize resources among the countries of that area (ADB 2011c).

Harmonizing the policy framework

In order to realize the objectives proposed in the Road Map for Expanded Energy Cooperation and implement the initiatives endorsed by the latest GMS Ministerial Conference, individual national and sectoral policies in the GMS member states need to be coordinated and harmonized. The Road Map suggests several ways to achieve this: making regional cooperation into a pillar of each country's national energy strategy; making interconnection arrangements to harness the energy complementarities in the sub-region; taking advantage of regional grid infrastructure development to promote cost-effective rural electrification for poverty reduction; sharing national experiences in energy efficiency and renewable and clean coal technologies;

and developing institutional capacity to expand renewable energy projects, particularly mini-hydro.

In addition to these efforts specific to ensuring energy availability, the Road Map notes that further work needs to be put into strengthening information exchange among national and sub-regional institutions in energy policy and planning. This could be done through some kind of special institution, such as a community of practice, for sub-regional energy development. Finally, institutional and technical capacity needs to be enhanced to develop cross-border trade and energy integration beyond the power sector (ADB 2011b: 3).

A joint medium-term cooperation work plan (2010–15)

To realize the goal of expanded energy cooperation, a joint medium-term cooperation work plan was developed to implement priority sub-regional initiatives. This plan is aimed at promoting environment-friendly power trading in the GMS, to ensure that both environmental and social issues are considered at an earlier stage in the sub-region's evolving power sector plans. The work plan also focuses on improving energy efficiency by managing demand-side activities and energy conservation. The plan will further promote the development of renewable energy sources and clean fuels in the GMS, with the aim of realizing a more optimal energy mix that reduces greenhouse gas emissions in the sub-region (ADB 2011b: 4).

Under the work plan, the promotion of energy efficiency and renewable energy will increase the utilization of indigenous low-carbon resources and reduce the sub-region's dependence on imported fuels. In turn, this will help the sub-region's access to modern energy, thus reducing energy poverty and improving energy supply security. In particular, during the course of promoting energy efficiency and renewable energy, the use of cost-effective and environment-friendly local and decentralized resources – such as biomass, mini-hydro and solar – will be greatly expanded, thus improving energy security by reducing reliance on imported energy resources, especially fuels.

The role of ASEAN

The role of ASEAN in the GMS energy development process is focused on the power and oil and gas subsectors. The GMS member states will support the realization of the GMS segments of the planned ASEAN Power Grid and Trans-ASEAN Gas Pipeline (TAGP) and will promote the development of environment-friendly energy logistics and networks in the sub-region. The ASEAN Interconnection Master Plan Study (AIMS), a regional study on the ASEAN Power Grid approved in 2003, selected 11 power grid projects for implementation. Of these, five are located in the GMS. In 2007, a memorandum of understanding affirmed that the ASEAN Power Grid will enable reliable exchanges of power and develop opportunities for power trading

without negatively affecting reliability in the individual national grids (ASEAN 2003).

Table 8.6 shows the interconnection projects between ASEAN countries, the first five of which are in the GMS. These interconnections will greatly add capacity to power lines throughout the GMS and ASEAN.

Advantages of energy integration and expanded cooperation

The existing and planned cooperation on energy development in the GMS is aimed at integrating energy resources and increasing the efficiency of energy utilization. Huge advantages can accrue from energy integration in general, particularly within the GMS. Power market integration and energy cooperation in the GMS can lead to the following: comparative advantages and economies of scale, improving the environment, attracting foreign investment and enhancing economic integration, and improving international relations.

Comparative advantages and economies of scale

Since energy resources are diverse and scattered across the GMS, energy integration and trade could bring comparative advantages to the GMS countries. These comparative advantages can be realized though the use of least-cost energy resources in countries with energy surpluses; doing so

Table 8.6 Status of Southeast Asian power grid interconnection projects

Interconnection project	*Type*	*Capacity*	*Status, start*
1. Thailand–Laos	HVAC PP	2,015/1,578 MW	AP 2008/2010
2. Thailand–Myanmar	HVAC PP	1,500 MW	AP 2013
3. Thailand–Cambodia	HVAC EE	300 MW	AP 2016
4. Laos–Vietnam	HVAC PP	1,887 MW	AP 2007/2016
5. Vietnam–Cambodia	HVAC PP	80/120 MW	UC 2003/2006
6. Peninsular Malaysia–Sumatra (Indonesia)	HVAC EE	600 MW	UC 2008
7. Peninsular Malaysia–Singapore	HVAC PP	700 MW	Planned 2012
8. Sumatra (Indonesia)–Singapore	HVAC PP	600 MW	Planned 2014
9. Batam (Indonesia)–Singapore	HVAC PP	200/200/200 MW	UC 2014/15/17
10. Sabah/Sarawak (Malaysia)–Brunei Darussalam	HVAC EE	300 MW	Planned 2019
11. Sarawak (Malaysia)–W. Kalimantan (Indonesia)	HVAC EE	300 MW	Completed 2009

Source: APERC (2004)
Note: HVAC – high voltage alternating current
PP – power purchase
EE – energy exchange
AP – advanced planning
UC – under construction

reduces the importing country's costs in operation, plant investment and generating capacity. One example is Thailand's use of inexpensive hydropower imported from Laos, which replaces the development of more expensive thermal power in Thailand. Such cooperation could save cumulative costs in generation investment and operation of upwards of US $13.7 billion under a high-demand growth scenario and US $10.4 billion under a low-demand scenario (Yu, 2003: 1228). Table 8.7 presents a comparison of cost savings between self-supply and cooperation, while economies of scale are another source for these advantages.

Improving the environment

Environmental issues can also be addressed effectively by an integrated energy market. A large number of coal-fired power plants would be replaced by hydropower generation following the establishment of the sub-regional power grid, and doing so would significantly reduce air pollution. Table 8.8 shows a comparison of emissions between self-supply and cooperation.

Another environmental advantage could be found in reduced pressure on forests and lower levels of wildlife exploitation. The financial flows generated by hydropower, for instance, may also reduce a country's economic dependence on mining, logging and farming. In addition, hydropower is an alternative to fuel wood, and thus would almost certainly slow rates of deforestation (Jacobs 1996: 183).

Table 8.7 Comparison of self-supply and cooperation cases (US $ millions)

	Self-supply			*Cooperation*			*Generation*
	Capital cost	*O&M cost*	*Total cost*	*Capital cost*	*O&M cost*	*Total cost*	*Cost savings*
High demand growth							
2001–05	19,032	23,236	42,268	19,153	22,425	41,578	690
2006–10	30,264	32,253	62,517	32,065	29,546	61,611	906
2011–15	38,154	40,140	78,294	36,681	36,491	73,173	5,121
2016–20	42,696	51,593	94,289	41,982	45,364	87,346	6,943
Cumulative cost savings 13,660							
Low demand growth							
2001–05	12,228	18,056	30,284	12,315	16,915	29,230	1,054
2006–10	21,801	23,670	45,472	27,868	20,583	48,451	-2,979
2011–15	28,541	27,407	55,948	27,723	23,662	51,385	4,563
2016–20	29,020	34,488	63,508	27,833	27,941	55,774	7,734
Cumulative cost savings: 10,372							

Source: World Bank (1999)

Table 8.8 Emissions under self-supply and cooperation cases in 2020 (000 tons)

	CO_2	SO_2	NO_x	*Particulate matter*
Self-supply	432,128	840	1,379	180
Cooperation	357,385	578	1,216	148
Reduction with cooperation, relative to self-supply (%)	-17	-31	-12	-18

Source: World Bank (1999)
Notes: CO_2 – carbon dioxide; SO_2 – sulphur dioxide; NO_x– nitrogen oxide

Attracting foreign investment and enhancing economic integration

Regional power trade will encourage foreign investment. Given that foreign investment is sensitive to a country's internal political situation, if sub-regional cooperation in the power sector can create a peaceful and stable investment environment, it can undoubtedly promote investment flows within the sub-region, further enhancing economic integration. Energy integration has provided an opportunity for the GMS member states to develop a shared vision about the future development of the sub-region, which is important in securing efforts to improve economic cooperation (ADB 1999: 36). In turn, the integration of national economies will allow for an increase in investment flows throughout the GMS.

In general, economic progress of the GMS since the early 1990s has been impressive. One of the underlying causes for this economic success is strong FDI. Table 8.9 shows the increase of FDI since the early twenty-first century.

As can be seen, FDI has not been evenly distributed among the GMS member states. This spatial distribution of FDI highlights the importance of transportation and other infrastructure facilities in investment locations. Only when the relevant physical and social infrastructure is improved throughout the sub-region will FDI be developed at full scale and distributed in a more balanced way (Pham 2008: 29).

Table 8.9 Growing volume of FDI inflows into the GMS countries

FDI inflow	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Cambodia	148.5	149.4	145.1	84.0	131.4	381.2	483.2	867.3	815.2
Laos	34.0	23.9	25.4	19.5	16.9	27.7	187.4	323.5	227.8
Myanmar	208.0	192.0	191.4	291.2	251.1	235.9	427.8	257.7	714.8
Thailand	3,350.3	5,061.0	3,335.0	5,235.0	5,862.0	8,048.1	9,459.6	11,238.1	9,834.5
Vietnam	1,288.7	1,300.3	1,200.1	1,450.1	1,610.1	2,020.8	2,400.0	6,739.0	8,050.0

Source: ASEAN Statistical Yearbook 2008
Note: Data of Yunnan and Guangxi provinces, China, are not included

Improving international relations

The six countries in the GMS are geographically and economically linked by the Mekong River, and efforts towards sub-regional cooperation have been taken to exploit the hydropower and other resources along the river. These attempts at cooperation will undoubtedly help to improve political relations among the member states. An example is the agreement between Thailand and Myanmar in 1993 for economic development along their border areas. Several large dam projects have since been planned and developed to export power to Thailand (Yu 2003: 1229). In addition, Thailand and Myanmar have had no fierce conflicts since the early 1990s.

One example of efforts to enhance sub-regional cooperation is the Council on Renewable Energy in the Mekong Region (CORE). Formed in 1996, CORE is an informal track two-/three-type network for international cooperation, dedicated to promoting applications of renewable energy technology in the Mekong Region.[1] CORE activities are grounded in dialogue and capacity building among participating individuals and organizations, aimed at reducing unnecessary duplication of efforts and accelerating the diffusion of useful knowledge. CORE holds regular regional seminars and human resource development courses and undertakes research, development and transfer of technologies in order to develop and enhance renewable energy technologies in the Mekong area (Tiyapongpattana 2001: 29). These bilateral agreements and track-two activities will help to build confidence throughout the sub-region and to improve its international relations.

Challenges of energy integration and expanded cooperation

Inadequate coordination of energy policies

Currently, there is no protocol in the GMS to encourage cooperation in building and operating an integrated electricity market. There is also no clear policy by which to identify the relationship between an integrated energy market and a country's national energy development. This lack of coordinated policies for energy sector reform needs to be addressed carefully. Sub-region-wide cooperation for power trade will require energy sector reform in every GMS member state. Although the World Bank advocates the privatization and deregulation of energy sectors in the sub-region, the decision as to which policy approach is more workable depends highly on each member state's domestic situation (Yu 2003: 1230). For example, the private sector in Thailand is well developed and mature enough to dispatch financial and human resources that are necessary for energy. But, in Cambodia, the private sector does not have the ability to fund any expansion of the country's power systems, nor is privatization suitable for Cambodia at this stage (ibid.: 1231).

Another issue related to policy barriers is the social and environmental impact that large hydropower projects have incurred in the past. Social and

environmental problems are constant by-products of large hydro projects, and the countries of the GMS are no exception. Since the lives of most people of the GMS are directly dependent on water and forest resources, any intervention that threatens the integrity of these natural systems may negatively impact on social well-being (Hirsch 1996: 6). A typical problem to be addressed by coordinated policies is the discrepancy in terms of paying for social and environmental costs: the fact that some GMS countries bear more such costs while others are able to use energy resources (such as hydropower) without paying these costs (World Bank 1999: 2). All such problems need to be handled prudently through policy coordination and cooperation among GMS member states.

Inadequate regional integration

Energy development requires suitable institutions to plan, construct and distribute energy supplies. Considering the current limited physical infrastructure and institutional framework at the sub-regional level, the regional power trade market will need time to mature. Although substantial groundwork has been done to develop a regional power trade, many issues need to be addressed before actual cross-border power trading can be achieved. Both the institutional and physical infrastructure therefore needs to be developed.

Institutional support towards strengthening regional power trade will need to include further analytic work and capacity building, recognition of the important linkages between the power programme and the water resource, and facilitation of a broader dialogue with all concerned stakeholders. GMS power cooperation will also need to draw on the lessons and experience of similar projects of regional energy market development in other regions (World Bank 2007: 10). For instance, Latin America's Initiative for the Integration of the Regional Infrastructure of South America (IIRSA) is a forum for dialogue between multiple decision-making levels. In addition to promoting a platform for discussion, its achievements are mainly in coordinating with regulatory and infrastructure planning agencies and developing new instruments to improve transnational infrastructure projects.

Partially under the influence of IIRSA's work, its member countries' investment budgets are increasingly taking on a regional orientation (ADB and ADBI 2009: 131). IIRSA is thus a good example for the GMS (and for further Southeast Asian integration generally), as a forum for dialogue and cooperation. Such a platform 'can help build awareness of the benefits of regional integration and infrastructure, filter out unproductive projects, coordinate among various national and sub-national agencies, and increase stakeholders' participation' (ibid.: 133).

Evaluation of power integration in the GMS

In terms of what has been attempted thus far, power sector cooperation and power market integration in the GMS have been successful. Cooperation within the power sector has become a major example of regional collaboration for the GMS member states, while increased integration has already resulted in economic benefits for the sub-region; notably, investor confidence in undertaking power export projects has been rising in the participating countries (ADB 2009c: 22). The ADB (ibid.: 1) has done an assessment of the cooperation in two approaches, the top-down and bottom-up. The top-down approach shows that the coordination in the GMS energy sector has been good and that the value addition to the GMS energy sector has been substantial. The bottom-up approach shows that the GMS energy cooperation has been effective. Based on two hydropower projects, the Theun–Hinboun and the Nam Leuk, it could be concluded that the GMS energy sector is overall an efficient one and is likely to be sustainable.

A simulation study of hydropower development and power trade between Laos and Thailand shows that significant positive impacts have been benefiting both countries in terms of revenues, access to electricity and improvement of environmental issues. It also asserts that the increased profitability of revenue from the exploitation of hydropower resources would enhance the reliability of the power transmission system in the sub-region (Watcharejyothin & Shrestha 2009: 1783). Thailand is heavily dependent on energy imports, while Laos is rich in hydropower potential. For the Thai government, a primary strategy is to diversify its energy supply and, hence, to enhance its energy security. At the same time, Laos can earn significant revenues from power trading. Thus, it is of mutual benefit for the two countries to jointly develop and share these resources.

Through such joint resource development, both carbon dioxide (CO_2) emissions and energy costs will be reduced (ibid.: 1790). As noted earlier, the export of low-cost hydro energy from Laos can also help Thailand to avoid the operation of high-cost thermal plants, bringing down significant operation and maintenance costs for the Thai electrical system (Karki, Mann & Salehfar 2005: 506).

Lessons for Asean and East Asia

Institution building and policymaking

Effective institutions could promote and enhance cooperation among the GMS member states, in which the agricultural sector predominates and large parts of the population are dependent on local resources. Fast economic growth has already put increasing pressures on natural systems in the sub-region, but there have been difficulties in implementing measures to mitigate social and environmental issues. Enhancing the institutional and policy

frameworks of member states is urgently needed in order to ensure that the social and environmental costs in the energy systems are reasonable (ADB 2008: 7; ADB 2009c: 36).

Energy market integration also requires effective institutions to ensure more efficient cooperation. Such institutions could effectively identify sound, feasible projects to be undertaken for cooperation and market integration, and avoid choosing those that could prove problematic. This would require the involvement of civil society, private sector organizations and other representatives (UNESCAP 2008: 39). Fiscal incentives and policy frameworks will also need to be created, with an eye to promoting closer economic integration to allow for free energy trade throughout the sub-region.

The need for a leading, independent institution

Since the ADB initiated the programme to promote transnational cooperation in the GMS in 1992, the sub-region has become increasingly successful in cooperating on cross-border power trade and interconnections. The key to this progress can be attributed to effective institutional arrangements such as the EPF, tasked with identifying opportunities for power sector cooperation in the GMS. The EPF directly contributed to the signing of the IGA in 2002, an important step in the development of a sub-regional power market (ADB 2008: 8).

Hydropower development involving sub-regional transmission interconnections and power trading in the form of bilateral projects usually incur greater risks than do domestic projects. As indicated by its name, the EPF is only a forum and cannot intervene in these projects directly. The intervention of the ADB is thus both appropriate and necessary; as an 'honest broker', the ADB delivers high value in the intervention. With the EPF, the ADB has assisted in capacity building and has effectively addressed issues related to power infrastructure projects in the GMS (ADB 2008: 18).

As the driver of the GMS programme, the ADB has also played an active role in initiating the sustained high level of participation of GMS member states in relevant dialogues and meetings. As a leading and independent institution in sub-regional cooperation, the ADB fills the role of facilitator in providing neutral technical and economic advice as well as secretariat support (ADB 1999: 3). Particularly useful is the ADB's capacity to provide a comprehensive support package to prepare projects, to resolve cross-border agreements and to secure financing. For these reasons, we would expect the ADB to continue to use its expertise and experience with respect to regional energy cooperation and integration in ASEAN and in East Asia, and to enhance its roles as a facilitator and honest broker.

An economic corridor and infrastructure building

A key strategy adopted by the GMS member states to achieve the vision of a prosperous and harmonious sub-region is to increase connectivity through the sustainable development of infrastructure and transnational economic corridors (World Bank 2007: 8). Extended and enhanced infrastructure is the necessary condition for energy trade, and infrastructure investment and economic development are strongly interconnected. The improvement of infrastructure can boost a country's technological innovation and advancement and thus promote its long-term growth (Straub, Vellutini, & Walters 2008: 5).

The benefits of extended infrastructure can occur both directly and indirectly. In terms of the former, the enlargement of an infrastructure network 'expands the number of economic agents with whom direct interaction becomes possible' (ADB and ADBI 2009: 83). A case in point is road building, with the value of a road increasing as the number of businesses located along it goes up. Indirect benefits, on the other hand, occur when the enlargement of an infrastructure network 'expands the range of complementary products and services available to its members' (ibid.). For example, as the number of users of a power grid increases, it becomes increasingly profitable to sell a wider range of products that need electricity.

The benefits of regional infrastructure are often realized through cross-border economic corridors (ADB 2005: 1). It has been estimated that transport infrastructure and economic corridors have a highly beneficial effect in reducing trade costs (Fujimura & Edmonds 2006: 2; Stone & Strutt 2009: 9). Economic corridors are considered a concrete way by which to reap the network benefits of regional infrastructure. They also have the potential to extend the benefits of better transport links to remote and landlocked locations, which may have been disadvantaged by their lack of integration with better located and more prosperous areas.

Corridors are also a means by which to promote economic integration. The on-going creation of the Nanning–Singapore Economic Corridor could be a good example of how to proceed, and what the full utilization of the GMS infrastructure would bring. This corridor encompasses China, Vietnam, Laos, Cambodia, Thailand, Malaysia and Singapore. Its objective is to utilize its port and geographical advantages and to promote development through the opening up of the economies along the corridor and cooperation. The corridor will connect not only the GMS member states but also most ASEAN countries, thus making it the most important inland infrastructure of its type. Along the corridor, infrastructure construction and improvements will enhance intra-regional communication and cooperation on trade, transportation, tourism and so on. The corridor will also boost economic development and prosperity of the countries along the corridor, and even that of the surrounding countries.

The concerned countries are recommended to establish a multi-level cooperation mechanism. This may be incorporated within the ASEAN-China

Cooperation Framework, which will eventually include mechanisms on trade cooperation, international logistics cooperation, tourist cooperation and so on. Later, customs facilities in the countries along the corridor could be gradually implemented, and GMS passenger and cargo transport facilitation could be extended to the Nanning–Singapore Economic Corridor. Through the cooperation of these corridor countries, infrastructure such as roads and railways will be improved, which will facilitate transportation, industry development, and economic and trade cooperation, and accelerate the flows of people, goods and capital (Pang & Xie 2008). Specifically considering energy cooperation in the GMS, the corridor will undoubtedly facilitate energy trade and promote energy resource development.

A mechanism to realize the corridor and infrastructure building

The key to effective implementation of regional initiatives to build up both an economic corridor and cross-border energy infrastructure is sustained leadership and commitment from the ADB as well as the individual countries in the region. Ministerial meetings and sector forums have already proven their importance in gaining support for sustaining progress in the integration of both the power market and the broader economies. ASEAN has taken on a major leadership role in building infrastructure in Southeast Asia. In addition, some major Southeast Asian countries, such as Indonesia and Malaysia, are also in position to take on significant leadership roles and push for infrastructure integration as a means towards greater market and economic integration.

As infrastructure building is always a massive, capital-intensive project, some mechanism is needed to see this undertaking through. As suggested by the ADB and ADBI (2009), a Pan-Asian Infrastructure Forum (PAIF) and an Asian Infrastructure Fund (AIF) would be critical for the construction of pan-regional energy infrastructure. The PAIF could operate as an essential high-level platform to coordinate the relationships between various parties. Like the IIRSA, the role of the PAIF could, in part, consist of the following: assisting and coordinating the formulation of an Asian regional infrastructure strategy, including transport and energy policies; identifying and prioritizing regional infrastructure projects; and mitigating negative environmental and social impacts of these and related projects. Specifically for integration of the energy market, an energy sub-forum could be established within the PAIF framework to address issues of energy security.

While building infrastructure is highly costly, according to the ADB and ADBI (2009: 194) the region's problem is not lack of financing. Rather, the problem is a lack of 'bankable' projects and mature capital markets, especially bond markets. Thus, the region needs to establish a sound financing instrument, particularly for these and related infrastructure projects. The AIF, if established, could be helpful for preparing and financing bankable regional infrastructure projects. The fund could come from various sources and be

managed under appropriate governance. In addition, the AIF and the PAIF would need to work efficiently together; for instance, the AIF could finance those projects that have been identified and prioritized by the PAIF (ibid.: 195). In sum, the AIF would mobilize funding to finance 'bankable' regional infrastructure projects chosen by the coordinating body, the PAIF.

Recommendations for further energy cooperation and integration

The current cooperation surrounding the integration of the GMS energy market is to some extent successful, and the planning for extended cooperation is feasible. Further, the GMS experience can be applied to the integration of the ASEAN and East Asian energy markets, for which the following recommendations have been made.

Adopt a more holistic, integrated approach

Future development needs a more holistic and integrated approach, for which the ADB would be a useful agent. Increased emphasis should be put on policy reform and harmonization of mainstream social and environmental concerns in sub-regional projects such as power connectivity, in order to fairly allocate both the benefits and costs from energy projects among the GMS member states. The establishment of an economic corridor has manifested the GMS countries' commitment to a holistic and integrated approach to sub-regional development.

Develop and strengthen regional institutions and national capacity for cooperation

The capacity of regional bodies to take responsibility for institutional arrangements needs to be both established and strengthened. Since the GMS initiative began, in 1992, the ADB has been the primary body in promoting energy cooperation and development in the sub-region. The role of the ADB as the honest broker should be maintained. Attention must also be paid to avoiding over-institutionalizing or applying one-size-fits-all arrangements that may jeopardize sub-regional cooperation. Finally, efforts need to be developed to increase national capacity for managing the GMS energy sector and regional cooperation. To a great extent, the success of inter-governmental cooperation on energy integration and infrastructure projects rests on solid national and regional institutions and governance, which can ensure fair distribution of both the benefits and costs of integration.

Expand financing

Support needs to be mobilized from all viable sources to help bridge the financing gap in the GMS. Efforts should be made to explore innovative ways

to better engage the various agents in the GMS with the creation of the sub-region's new infrastructure projects. As previously mentioned, the AIF could be such a mechanism, vested with mobilizing financing. The ADB could also take on the role of increasing and mobilizing assistance to finance and implement sub-regional projects.

Promote greater policy dialogue

Greater policy dialogue is needed to promote regional energy cooperation and to reduce the negative externalities of energy market integration. The PAIF could provide a platform for such a policy dialogue. Energy cooperation within the GMS is a classic case of market, as opposed to institutional, integration. As connectivity among GMS countries improves and their linkages within the region as a whole are enhanced, institutional arrangements will be of mounting importance. Policy dialogue will also become increasingly critical in order to remove obstacles to further cooperation and integration (Menon 2005: 24).

Conclusion

The GMS energy programme started in the early 1990s with the power-trading agreement between Laos and Thailand. Expanded cooperation is ongoing and will be further enhanced through coordinated institutions, policies and infrastructure building; the ADB, too, will continue its role as the honest broker. The advantages of further energy market integration in the sub-region are obvious. It will help to obtain comparative advantages and economies of scale in the sub-region, foreign investment will be attracted, and the environment will be improved. To realize these benefits, however, the related challenges must be handled carefully. Energy policies are still not well coordinated in the sub-region, and regional integration is inadequate. Together, these advantages and challenges send a strong message that energy cooperation, not only in the GMS but also in ASEAN and East Asia, is both necessary and beneficial.

This paper identifies energy integration and an infrastructure network as critical elements in enhancing sub-regional economic development and growth. The recommendations focus on approaches to ensure the proper sharing of benefits and costs as well as sound financial and institutional arrangements. Following these approaches will reduce existing barriers, thus leading to the achievement of not only regional energy integration but also of economic integration, poverty mitigation and improved quality of life for the people of the sub-region.

Further research activities on GMS energy cooperation could be linked to the sub-region's integration process. Additional stakeholder dialogues are required to decide how to make the GMS energy market integration process more sustainable. Climate change and sustainability research is not well

established in the GMS, and this would be a key area for future research, which could involve more stakeholders to engage on both this topic and the integration of the GMS energy market.

Note

1 For more information, see the CORE website: <www.core-mekong.org/chapter%201.htm>.

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9 Energy security in the Philippines: Challenges and opportunities

Kevin Punzalan

Introduction

The Philippines, a republic of 7,107 islands in the South China Sea, stands as an interesting case study in the field of energy security. An archipelago with few commercially viable oil or coal deposits available for exploitation compared to its neighbours, the country has historically imported its fuel from abroad. In addition, its mountainous and fractured geography has made it difficult to establish interconnections between electrical grids on the main islands of Luzon and Mindanao to other islands in the Visayas group. The population was projected to reach 94 million people in 2010, and grows by about 2 per cent per year (Australian Government 2010).

In the wake of the Second World War and lasting up to the 1960s, the Philippines was among the first in Southeast Asia to begin an industrialization process. However, an economic decline that began in the 1970s and accelerated in the waning years of the regime of President Ferdinand Marcos resulted in stagnated development. The country was also a pioneer in the development of commercial nuclear power in the region, with the Westinghouse Electric Corporation-built Bataan Nuclear Power Plant (BNPP) ready for core loading as early as 1985. Yet because of controversies surrounding its construction and a hostile political climate in the aftermath of the Chernobyl accident of 1986, the BNPP was never made operational, and sits in stasis today.

Despite these considerable problems, the Philippines also had the earliest large-scale renewable energy development programme in Southeast Asia (Sussman *et al*. 1993: 353–67). In the wake of the 1973 oil crisis, which also spurred the construction of the BNPP, the Philippines' Department of Energy developed a 30-year plan to develop indigenous sources of energy, including hydroelectric and geothermal resources (Bartolome and Refre 1984: 801). These developments have borne fruit in the form of hydroelectric dams that provide up to 80 per cent of the electricity requirements for the island of Mindanao and a combined geothermal capacity of 1.9 gigawatts, second only to that of the USA (Bertoni 2012: 17).

Historically, the Philippine economy has been reliant on agriculture but has diversified to services and manufacturing. Services and private consumption account for roughly three-quarters of the country's economy. An estimated 9 to 11 million Filipinos now work overseas in the Middle East, Western Europe, the USA and parts of East Asia, contributing remittances that amount to 10 per cent of the country's gross domestic product (GDP) (Australian Government 2010).

The contemporary energy security environment

As a result of the stagnation within the country's manufacturing sector, especially compared to Thailand, the demand for energy from this sector has remained relatively low. In contrast, electricity demand on the part of the residential sector in the Philippines accounts for slightly more than that of the industrial sector, while demand between the commercial and industrial sectors is nearly equal (see Table 9.1).

According to the Asian Development Bank (ADB), the country's electrification rate is estimated at 78 per cent (Asian Development Bank 2005: 1). The country also consumes less energy than any other major economy in Southeast Asia, with the exception of Singapore. In 2009, the Philippines' total energy consumption amounted to 40.9 million tonnes of oil equivalent, much lower than Thailand's 107 million tonnes or Malaysia's 74 million tonnes (Economist Intelligence Unit 2010: 9).

In terms of energy supply, the Philippines still relies on imported fossil fuels for the bulk of its energy demand. In 2008, 42 per cent of the country's total energy needs came from imported fossil fuels. However, the Philippine government sought to increase the share of locally produced energy to 60 per cent of total demand by 2010 through the expansion of both natural gas production and renewable energy generation. The composition of energy resources is divided between combustible fuels, which still take up a lion's share of total generation at 11,807 megawatts (MW), but is supplemented by hydro at 3,409 MW, geothermal at 1,196 MW and wind at 33 MW (ibid.: 18).

Table 9.1 Electricity consumption and supply in the Philippines, 2009

Sector	*Consumption in gWh*
Industry	17,200
Transport	120
Residential	17,987
Commercial	16,199
Other	4,785
Total:	56,291

Source: Economist Intelligence Unit (2010: 14)
Note: gWh – gigawatt hours

The fact that the Philippines possesses substantial renewable energy resources but also needs to meet the challenge of providing affordable energy to its population provides an interesting case study for research on renewable energy policy in the context of a developing country. The Philippine case provides an illustration of how a country responded to its energy import dependency by diversifying its energy sources, with a variety of successes and failures. Despite the fact that greater diversification was achieved, the country continues to experience energy supply vulnerability, a 'condition that leaves a system exposed to the risk that needed quantities of energy inputs and services fail to reach the intermediate or final users' (International Energy Agency 2003: 115). In this case, the diversification of the country's energy resources achieved the Marcos government's original goal of reducing dependence on fossil fuel imports, but mismanagement of the country's nuclear energy programme and the privatization of the generation industry also made electricity much more unaffordable for the majority of Filipinos.

This chapter will first provide a comprehensive historical account of the energy security situation of the Philippines, beginning with the 1970s and the country's foray into nuclear power, up to the adoption of renewable energy and a privatized energy market as cornerstones of today's energy policy. Thereafter, the chapter will examine the contemporary energy environment of the Philippines, including challenges and spoilers in the economic arena as well as positive policy developments. Finally, a discussion of policy recommendations for renewable energy will be undertaken to provide a roadmap for policymakers and to mine lessons that the region can apply from the Philippine example.

A Philippines briefer

The history of the nuclear energy programme

The Philippines is the only country in the region to have privatized both the generation and transmission markets for its electricity. In 2010, the country was able to sell off 70 per cent of generation assets of the government-owned National Power Corporation (NAPOCOR), a precondition set a few years earlier to enable open access and retail competition for power generation and to indicate when privatization had been achieved (BusinessWorld 2010). What precipitated the privatization of the NAPOCOR was, ironically, the negative outcome of a deal between a private energy company and the government in the 1970s. In the wake of the 1973 oil crisis, the Marcos government rapidly examined potential alternatives to petroleum-based generation facilities. At the time, the Philippines was 95 per cent dependent on imported oil for its energy needs (Alcaraz *et al*. 1989: 262). This dependency had a catastrophic effect on the economy, with oil prices rapidly rising from US $4 to US $13 a barrel that year. As a result of high oil prices, quotas had to be imposed on petrol, which slowed down overall economic growth.

The Marcos government, badly shaken by the oil crisis, began to examine indigenous and alternative energy sources. Portions of that programme, including the hydroelectric and geothermal development strategies, have been relatively successful, but the nuclear programme did not enjoy the same success. In 1964, the government approached the International Atomic Energy Agency (IAEA) to assess the feasibility of building a small nuclear reactor on Luzon (Bartolome and Refre 1984: 802). At the conclusion of the study, in 1966, the IAEA advised that the low prices of oil at the time limited the economic viability of a nuclear power plant. However, with the rapid rise of oil prices after 1973, nuclear power appeared to become competitive vis-à-vis oil-generated electricity. The cost of imported oil increased from US $1.90 per barrel in 1972 to as much as US $24.76 per barrel in 1979 (ibid.: 799).

Shortly thereafter, the Marcos government drew up a 30-year plan for an initial 11 reactors, to be distributed throughout the country (ibid.: 802). Later, as hydroelectric and geothermal facilities came online, the government revised the plan to just two nuclear reactors. Around this time, General Electric and the Westinghouse Electric Corporation, both American energy companies, submitted proposals to the Marcos government. General Electric proposed two 600 MW reactors for a total of US $700 million. On the other hand, Westinghouse proposed a deal for two reactors at a cost of US $500 million in 1974, which escalated to over US $1.1 billion for a single reactor by March 1976 (Beaver 1994: 272). In later years, it has been alleged that Westinghouse used political connections to secure a deal with the Marcos government through the former's local agent, Herminio Disini. Westinghouse had hired Disini to represent the firm in negotiations and to help ensure that the company's offer complied with Philippine regulations (ibid.: 272). However, Disini was also closely linked to President Marcos, as a close friend and golfing partner.

The site chosen for the plan was Napot Point, on the flanks of the dormant volcano Mount Natib on the Bataan Peninsula (ibid.: 275). Though Westinghouse had certified that the location was geologically stable, dissenters from within the Philippine government expressed reservations about the safety of the site, especially since fault lines in nearby Subic Bay were historically active. The head of the Philippine Atomic Energy Commission, Librado Ibe, had refused to issue a construction permit for the active nuclear portions of the plant (Rodolfo 2010). Despite these and other concerns about safety, construction of the plant began in 1976, interrupted only after the 1979 Three Mile Island incident in the USA. The plant was partially retrofitted with technology that would, theoretically, prevent a similar incident from occurring, and construction resumed in 1981. The plant was ready for core loading by 1985 (Singapore Institute of International Affairs 2010).

Before this could be initiated, however, President Marcos was deposed by the February 1986 democratic revolution that brought Corazon Aquino to power. Shortly thereafter, in April of that year, the accident at Chernobyl significantly shifted public attitudes against nuclear power. Opposition to the

plant by Bataan residents had begun even during the Marcos administration (ibid.). Organized demonstrations were among the activities conducted by the anti-nuclear lobby to highlight this cause, which was greatly strengthened by the events at Chernobyl. The Aquino government decided to mothball the plant, even as it continued to pay for the cost of its construction, as Aquino refused to consider a debt moratorium.

In the end, the BNPP was never activated by the Philippines. The stranded debt of over US $2.3 billion had to be paid for by the government, even though the plant never produced a single watt of power (Pasimio and Turingan 2009: 6). As a result, the Philippine government has faced simultaneous problems: an energy shortage of catastrophic proportions and an insolvent Ministry of Energy that had spent billions of dollars on the BNPP. While most of the plans under the 1980–89 Ten-year Energy Plan had been met by 1984, no substantial generation capacity has since been created (Austria 1999: 108). The non-operation of the BNPP deprived the Luzon grid of a potential 620 MW, a fact that even former President Fidel Ramos acknowledges was a significant factor in the power crisis that emerged after 1988. According to Ramos, the failure to create a departmental replacement for the abolished Ministry of Energy also led to short-sightedness in energy planning (Ramos 2010).

While the Aquino government drew up a Medium-term Energy Plan (1988–92) that called for the production of additional power plants, the eventual generation capacity failed to satisfy increasing electricity demands, especially on Luzon. For several years, energy shortages afflicted Manila (located on Luzon) and its surrounding provinces, hampering industrial production and decreasing investor confidence in the country (Woodhouse 2005b: 5). The World Bank estimated that the Philippines lost US $600–800 million per year, equivalent to 1.5 per cent of GDP. The electricity shortage was estimated to amount to 3,077 gigawatt hours (gWh), of which 78 per cent was attributed to the Luzon grid (Austria 1999: 109).

The privatization of the energy industry

In 1987, the Aquino government promulgated several important reforms that deregulated the energy sector. Executive Order[1] No. 215 ended the monopoly of the NAPOCOR in power generation (Austria 1999: 109). Two years later, however, the release of the rules and regulations of Executive Order No. 215 also stipulated that independent power producers (IPPs) supply energy at prices equal to or below NAPOCOR rates and source their fuel domestically. This had the effect of deterring large-scale investment until the passage of the Philippines' Build–Operate–Transfer law (BOT).

The 1990 BOT law (Republic Act No. 6957) put into place a competitive bidding process for infrastructure projects, and in turn authorized the 'financing, construction, operation and maintenance of infrastructure projects by the private sector' (ibid.: 109). However, it was only in 1994 that the law was

modified by Republic Act No. 7718 to allow unsolicited bids for power generation projects (Woodhouse 2005b: 15). Prior to this, the only projects that IPPs could participate in were essentially underfunded NAPOCOR projects, which were further hampered by restrictive terms such as specified sources of fuel and fixed locations for plants.

By 1992, the incoming Ramos administration began to draw up a plan to address the energy crisis. The proposal that was signed into law was titled the Electric Power Crisis Act of 1993 and permitted the government to negotiate IPP contracts without a time-consuming competitive bidding process. As part of that plan, the government would enter into contracts with IPPs with 'take or pay' provisions, meaning that even when power generated by the IPPs would not be consumed by the general public, the government would still pay for it (Roxas 2000). This incentive, along with other 'performance undertakings' designed to minimize regulatory and market risk, succeeded in luring private investors to put up structures that generated several thousand MW in less than 18 months. The Electric Power Crisis Act expired in April 1994, which ended the executive branch's authority to accept contracts without bidding.

Many of the plants that were initially built were combustion turbines or diesel-based systems. While these are not capital intensive, they do have high operating costs due to the volatility of fossil fuel prices. The choice of IPPs to build these types of plans would prove significant, especially after the 1997 Asian financial crisis. The resulting slump in demand for power, in combination with the devaluation of the Philippine peso, would lead to very high electricity rates, especially after 1998. As a result of the Asian crisis, demand for power slumped. Unfortunately, several large power plants, such as the 1,200-MW natural gas-fired Ilijan power plant, were simultaneously coming online. The Philippine government's decision to offer 'take or pay' provisions proved very costly, as the amount of power being generated by IPPs exceeded actual demand. Though the government had plenty of 'undispatched power', it still had to pay for the generation of this power by the IPPs.

NAPOCOR in turn bore the brunt of the burden of payments and as late as 2009 had stranded debts of up to US $2.45 billion (Remo 2010a). As a result, NAPOCOR had to file for bankruptcy, and a privatization plan was drawn up. That plan required the government-owned corporation to sell a majority of its generating assets, and eventually its transmission infrastructure as well, to cover the stranded debts that it incurred after the adoption of the 1993 Electric Power Crisis bill. A new entity, the Power Sector Assets and Liabilities Management (PSALM) Corporation, was created to dispose of NAPOCOR's assets and to settle its debt obligations to the IPPs.

As a result, many of NAPOCOR's major generation facilities were sold to private corporations, including First Philippine Holdings Corporation, an energy company owned by the Lopez family (Woodhouse 2005b: 17). The Lopez family has historically maintained an interest in energy, having bought the formerly American-owned private corporation Manila Electric Company

(MERALCO) in the 1960s. MERALCO remains the country's largest energy distributor, handling the energy needs of Metro Manila and its suburbs. Other investors include AboitizPower, owned by the Aboitiz family (which maintains an economic interest in power generation and shipping), and Chevron Geothermal Philippines Holdings, a Philippine subsidiary of Chevron formerly known as Unocal Philippines. The largest power generation facilities in the country – including the 1,294-MW coal-fired Sual power plant in Pangasinan province, the 700-MW Tongonan geothermal power plant in Leyte province, and the 727-MW Agus hydroelectric dam in Mindanao – passed into private ownership during the mid-to-late 2000s (BusinessWorld 2010).

An unintended consequence of privatization was the occurrence of uncoordinated blackouts, especially on Mindanao. Several hydroelectric and fossil fuel plants were shut down in 2009 for various reasons, including repairs, shortages of fossil fuels and reduced dam levels for hydroelectric plants. While responsibility for this can also be attributed to natural phenomena such as the El Niño, the distribution of ownership of the major generation facilities appears to have been conducted without concern for possible coordination in their management.

In 2009, the partial breakdown of the Sual plant, accompanied with shutdowns for preventive maintenance in other plants, subjected parts of Luzon to rolling blackouts (ibid.). At the time, the other plants were being serviced to prepare them for full operation during the country's May 2010 general elections. Simultaneously, Mindanao also suffered from blackouts as El Niño-related weather trends drastically reduced the water supply of many reservoirs. The Agus dam was cut to 10 per cent of its total rated capacity, which further exacerbated the island's electricity shortage. In the end, the Department of Energy pressured the operators of the Sual plant to repair their facilities promptly to guarantee that Luzon's minimum base load could be met. The power situation in Mindanao has remained precarious, though the subsequent onset of the rainy season enabled partial recovery of hydroelectric capacity.

Challenges and spoilers

Due to the 'take or pay' provisions of the contracts that the Philippine government entered into with IPPs, electricity rates in the Philippines shot up rapidly. As of 2006, the country had the second highest electricity rates in Southeast Asia, after Singapore, and the third highest rates in the Asia-Pacific region, after Singapore and Japan (Pasimio and Turingan 2009: 2) (see Table 9.2).

The high cost of electricity deterred many industries from investing in the Philippines, or from expanding their facilities there. A recent survey indicated that the high cost of electricity was a primary obstacle to economic growth in the country (Romero *et al*. 2010). As supplies remain scarce and world oil prices remain high, rates are unlikely to decrease.

Table 9.2 Asian power rates in US cents/kWh, 2006

Country	*Residential*		*Industrial*	
	Low	*High*	*Low*	*High*
Japan	12.9	18.0	10.2	11.2
Singapore		13.3	6.6	11.8
Philippines		17.4	12.8	16.7

Source: Pasimio and Turingan (2009: 2)
Note: kWh – kilowatt hour

The history of nuclear power in the Philippines has made it difficult for the current government to bring up the use of nuclear power as a policy option. While the Department of Energy has not ruled out the inclusion of nuclear power in the country's energy mix by 2025, it has assigned higher priority to developing renewable sources of energy as well as coal and natural gas plants (Department of Energy of the Philippines 2005: 1). When the Arroyo government proposed the rehabilitation of the BNPP, the public outcry was swift and reactive (Freedom from Debt Coalition 2009a). Environmental non-government organizations, including Greenpeace and veterans of the first battle against the BNPP in the 1980s, swiftly mobilized public demonstrations against the plant and against nuclear power in general (AGHAM 2010). A critical difference between the opposition against the BNPP in the 1980s and the contemporary anti-nuclear lobby is that the latter joined debates in the Philippine Congress and employed expert testimony from geologists and economists to argue for its cause (Congress of the Philippines 2008: 1). As a result, deliberations over the bill were drawn out till the Congress dissolved ahead of the May 2010 general elections. The new government, led by Corazon Aquino's son, has not publicly spoken about its policy on nuclear power.

The vulnerability of hydroelectric facilities to natural climatic phenomena such as El Niño illustrates a need to diversify the energy resources of islands such as Mindanao, but also to improve the management of watershed resources to ensure adequate capacity even during periods of drought. More importantly, the government should coordinate between private owners of vital generation facilities to ensure that maintenance schedules are staggered and that backup facilities are put on standby in the event of breakdowns.

Successes and opportunities

Despite these obstacles and spoilers, the Philippines has also benefitted from being a pioneer in the field of renewable energy in the region. The same 30-year plan that created the BNPP also provided for the development of geothermal resources (Sussman *et al*. 1993: 353–67). As the country lies on the Pacific Ring of Fire and possesses many active volcanoes and 'hot spots', the Marcos government realized early on that geothermal resources were a significant potential energy source.

Development of the country's geothermal resources began in Albay province on Luzon, and later on Leyte, in the late 1970s. The initial phase of development, involving geologic mapping and test drilling, was at first difficult and expensive; but once suitable vents were found, construction and operation of the plants proceeded relatively quickly. The initial plants in Albay and Leyte continue to operate to this day, with one facility in Tongonan, Leyte province generating a maximum rated 700 MW, greater than the projected output of the BNPP (Alcaraz *et al*. 1989). While low oil prices in the late 1970s resulted in a reduction in demand for geothermal power, the cost of electricity generated from geothermal has remained stable (Sussman *et al*. 1993: 353–67). As a result, geothermal power has become increasingly attractive, especially when compared to fossil fuel-generated electricity, and new investments have spurred recent growth in the industry (Remo 2011).

While high electricity costs have been an obstacle to greater industrial investment in the Philippines, they also make the adoption of renewable energy more attractive for the country. The grid parity point, where the cost of electricity generated from renewable power becomes equal to that generated from conventional energy sources, has become easier to achieve in the Philippines due to the high cost of electricity. According to Sohail Hasnie, a principal energy specialist in the Southeast Asia Department of the ADB, the Philippines' high electricity tariffs have made grid parity for wind power possible. At present, tariff rates for electricity generated from fossil fuel sources in the country are roughly US $0.15 per kilowatt hour (kWh), whereas electricity generated from wind in the Philippines costs US $0.08/kWh to generate. Solar power remains more expensive than fossil fuel energy but is still close to parity at US $0.19/kWh (Hasnie 2010).

In addition, the country's archipelagic geography has made it difficult to construct and operate large, centralized electricity grids, whose economies of scale benefit conventional energy sources (Teske 2007: 4). Instead, many areas of the Philippines operate grids independent of one another, at scales where it can be feasible to implement renewable energy technologies. The province of Ilocos Norte, for instance, possesses the earliest large-scale wind farm in Southeast Asia, in Bangui. Its 33-MW capacity can satisfy over half the province's energy needs.

A vibrant civil society and a successful environmental movement have made Philippine policymakers acutely aware of the potential benefits of adopting renewable energy technologies. In 2004, they began lobbying for the passage of a Biofuels Bill and, in 2007, for the passage of a Renewable Energy Bill. The latter represents a comprehensive effort by the Philippine government to spur investments in renewable energy. The bill proposes incentives for renewable energy producers, a minimum renewable energy generation requirement for the portfolio of electricity transmission utilities and, most importantly, a feed-in tariff system. This tariff system was in the process of finalization as of November 2010, as the Department of Energy was in the process of consulting stakeholders to determine the appropriate rates.

On 20–21 January 2010, the Department of Energy coordinated with the National Renewable Energy Board (NREB) and the private Biomass Renewable Energy Alliance to discuss the establishment of feed-in tariff rates. This scheme is envisioned to boost demand for renewable energy by obliging 'the power industry to source RE [renewable energy] generation at a guaranteed fixed price over a period of time, which should not be less than a period of 12 years (15 years per ERC [Energy Regulatory Commission]), to be determined by the Energy Regulatory Commission' (Energy Technology Expert 2010).

In June 2010, the ERC proposed feed-in tariff rates of 7–9 Philippine pesos (PHPs) per kWh for energy generated by run-of-the-river hydro and biomass sources, PHP 12–15/kWh for wind power sources and over PHP 25/kWh for solar energy sources (Velasco 2010b). The National Grid Corporation of the Philippines was also designated as the entity that would calibrate feed-in tariff rates and then bill end users for use of renewable energy. By August of 2010, the director of the Renewable Energy Management Bureau, Mario Marasigan, reported that the NREB needed additional deliberation with stakeholders to determine the precise rates for the feed-in tariffs (Velasco 2010a).

The ERC gave the NREB until 4 November of 2010 to finalize feed-in tariff rates. The *Philippine Daily Inquirer* reported that the initial rates, ranging from PHP 7–25/kWh, were considered 'too high' by certain energy industry players, and that a rate of PHP 5.50–56/kWh was being considered instead (Remo 2010b). Energy Secretary Jose Rene Almendras announced on 2 December 2010 that the feed-in tariff rates were under discussion at the NREB and would be submitted to the ERC for approval (Almendras 2010). Once the rates were approved, they would be published by the ERC, and were originally estimated to be completed by the second quarter of 2011. However, as late as November 2011, the rates had yet to be finalized by the ERC (Velasco 2011). To spur investments in renewable energy, the Philippine government must finalize and publish the rates of feed-in tariffs to give international and local investors an idea of how much profit the industry can earn by investing in renewable energy. Feed-in tariff rates assist in long-term planning for infrastructure investment, as the horizon for the application of such investment can range from 12 to 20 years.

Mining the Philippine case: policy recommendations

One of the things that the Philippine experience makes clear, in terms of its energy policy experience from the 1970s to the 1980s, is that knee-jerk reactions to energy challenges do more harm than good. In the case of the 1973 oil crisis, the bid of the Marcos government to pursue a nuclear power programme and the rush to make a plant operational resulted in the approval of a deal that left the Philippine government dangerously exposed on two fronts: to foreign debt obligations and to the risk of substandard construction and design, as a result of a lack of independent oversight over the construction of

the plant. Even though President Marcos did allow a review of the design of the BNPP in 1979, this did not address the most significant risk that the plant faced, geologic activity resulting from active fault lines in the immediate vicinity of the BNPP site.

Ironically, the government decision to mothball the BNPP was also a knee-jerk reaction to popular sentiments against nuclear power at the time, and against the perceived defects of the BNPP. While it is true that there is considerable evidence that the BNPP was constructed under onerous terms dictated by Westinghouse, the decision not to utilize the plant was taken without consideration given to potential replacements for the plant's potential output. Though the risk of operating the BNPP was considerable, the resulting economic damage from the power crisis of the late 1988 to 1992 was serious – a disaster in itself.

Following the power crisis, the government again rushed into producing new generation capacity by signing contracts with IPPs, including power-purchase agreements funded in foreign currency. These agreements were signed without consideration for the long-term risks that economic downturns and slumps in demand create. In an examination of IPP experiences around the world, Woodhouse (2005a) illustrates that exposing countries and their taxpayers to long-term risks as a result of relying on heavy foreign finance in the energy sector is a short-sighted and often dangerous strategy. When governments assume the financial risk for IPPs in foreign-denominated loans, they expose themselves to currency fluctuations and the risk that long-term debt could drastically increase. In turn, the costs of assuming those debts deprive other sectors, such as transport, education and health, of funding.

Furthermore, the experience of the Philippines in allowing the deregulation of the energy generation sector while simultaneously requiring the government-owned generation utility to assume the market risks of the IPPs doomed the utility to financial insolvency (Roxas 2000: 3). In essence, NAPOCOR was forced to sell its profitable assets while assuming massive liabilities for the private sector – a formula almost guaranteed to sink it in debt, which is what eventually occurred (Rimban and Samonte-Pesayco 2002: 1). Eventually, the government, through NAPOCOR, became liable for over US $2.45 billion of debt, which it then passed on to consumers through the aforementioned power-purchase agreements. The scale of the debt required consumers to pay up to 50 per cent more for electricity, to subsidize the insolvent NAPOCOR's debts (Roxas 2000: 2).

Some, such as Edgardo M. del Fonso, the former president of the PSALM Corporation, argue that the debts are not in themselves threats to national security. But the consequences of requiring the public to shoulder a large burden as a result of what is essentially economic mismanagement are considerable. The amount of money allotted to power-purchase agreements in consumer electricity bills is equal, regardless of the consumer's ability to pay. This has the effect of burdening the poor in particular and preventing them from using their limited income for more vital needs.

An unintended consequence of privatization has been the lack of coordination between the owners of major generation installations. As more than 70 per cent of the country's generation plants are now in the hands of corporations, the operations and maintenance schedules for these plants have been modified without consideration to the schedules of other operators. Francisco Viray, the energy secretary from 1994 to 1998, and Jaime Azurin, the senior vice-president for finance and business development of the Global Business Power Corporation (an independent power producer that operates in the Visayas), agree that the privatization plan did not foresee the consequences of a lack of coordination between the new plant owners (BusinessWorld 2010). Some plants have thus been taken offline simultaneously with other key generation facilities.

As a result, Mindanao began to suffer from rolling blackouts in 2009. On 24 March 2010, peak demand reached 1,251 MW, while only 785 MW were available, resulting in a shortage of some 466 MW (Rubrico 2010: 1). Mindanao is currently facing a critical period in its energy security, as there is a shortfall of 21 per cent between its dependable capacity and peak power demand levels on the island, a situation that many expect to continue. Therefore, while governments may elect to sell their generation assets, they must still maintain a central coordinating function to ensure that the maintenance of plants is undertaken with consideration given to maintaining a minimum baseline of power for their end-users.

A more specific recommendation concerns the management of hydroelectric resources. While the Philippines relies extensively on hydropower, little has been done to ensure that reservoirs remain filled, even during droughts. The country has experienced severe droughts in the past, such as in the late 1980s and late 1990s, yet it seems to have been caught by surprise by the droughts of 2009. Given the country's pattern of experiencing major droughts every 10 years or so because of the El Niño phenomenon, the Philippines should prepare better watershed management plans to ensure that power plants have an adequate supply of water even during droughts.

There are more positive lessons resulting from the Philippine energy situation, as well. The first is that diversifying a country's energy mix and decreasing reliance on foreign oil go a long way in ensuring that a country is less exposed to fluctuations in oil prices and supply disruptions. The Marcos administration's energy plan in the wake of the 1973 oil crisis may have failed in terms of its nuclear component, but it was successful in developing the country's hydroelectric and geothermal potential; it also reduced dependency on foreign oil considerably, from 98 per cent to about 57 per cent today (Rein and Cruz 2011: 131).

Another positive lesson is that energy solutions need to take into consideration the geography and natural resources of a country to determine the most optimal solutions. The Philippines is an archipelago with more than 7,000 islands. This has made it extremely expensive for the country to construct large and centralized national grids to supply far-flung islands

(Bartolome and Refre 1984: 804). As a result, new energy investments in the Philippines have tended to target local populations on these islands, which not only require smaller-scale installations but also tap indigenous renewable resources such as solar, wind, geothermal or hydropower (Pasimio and Turingan 2009: 2). As renewable energy technologies also happen to be more sustainable in small-to-medium-sized installations, such technologies are well suited to the Philippines' geographical constraints. The World Wildlife Fund for Nature (WWF) has determined that the Philippines could save as much as US $235 million by switching to renewable energy, as these resources take the place of expensive fossil fuel imports that have also experienced considerable price volatility from 2008 to 2012. As the country does not produce enough oil or natural gas to satisfy domestic demand, the Philippines must purchase these fuels in global spot markets. In addition, renewable energy sources have less potential to damage the environment (Villarin *et al.* 2008: 43).

However, renewable energy technologies also have limitations that must be taken into consideration, especially in a developing country such as the Philippines. Some of these technologies require expensive maintenance services and have limited life spans. Solar energy in particular relies on the capacity of batteries to store energy for use during the night, when no energy is generated; these batteries have life spans of about 10 years. Even small installations – such as the one on Panga-an Island, in Cebu province, with a total of 504 photovoltaic panels – require batteries that cost over US $100,000 to replace, a considerable sum for an island that relies on fishing and agriculture (InWent 2006: 1). Such installations will need to have financial provisions such as sinking funds, provided either by the local or national government, to ensure that such facilities maintain their viability over decades of use.

The years of protest against nuclear power and the growth of civil society organizations (CSOs) in the Philippines has often pressured decision-makers to modify or cancel projects that could have potentially disruptive effects on the environment. Some investors have viewed civil society activities as 'spoilers' and potentially disruptive to investments, but this does not necessarily have to be the case. What distinguishes civil society activity in the Philippines from the rest of Southeast Asia is that CSOs have actively participated in the energy policy-planning process. During the 1990s, CSOs actively campaigned for the passage of a renewable energy law in the country, which was enacted by Congress in 2008. Greenpeace and the WWF have published studies in collaboration with the academe on the viability of switching to an energy mix that relies more on renewable energy (Teske 2007: 10.) Among the policies that Greenpeace has proposed is one to decouple implicit fossil fuel subsidies to reflect the true cost of fossil fuels. Greenpeace has also actively lobbied in Congress against the revival of the BNPP, presenting the testimony of scientists and experts who have argued that the plant is unsafe (House of Representatives of the Philippines 2009: 33). Another CSO, the Freedom from Debt Coalition, has also lobbied against the plant on the basis of its lack of economic viability (Freedom from Debt Coalition 2009b: 1). Providing a venue

for CSOs to constructively engage with government and the private sector has the twofold benefit of ensuring that infrastructure programs comply with environmental standards, while also allowing any opposition against programmes or policies to be managed before it could disrupt key government initiatives on energy.

Conclusion

The field of renewable energy remains promising for both investment and research, especially in the Southeast Asian region. Considering the diverse economies and political structures of the region, and the wide availability of natural energy resources, it seems almost certain that renewable energy will be a viable option for addressing the energy security of nearby states. However, the fate of renewable energy is also tied to the privatization of energy markets and the provision of economic incentives for investment by international and local firms in the sector. These incentives can take the form of carefully calibrated feed-in tariffs, based on the successful example of such tariffs in the German solar energy industry, as well as the implementation of renewable portfolio standards for energy utilities that will allow consumers who elect to do so to use renewable energy. As domestic sources of capital in infrastructure investment are limited in the Philippines, the country will have to ensure its attractiveness to international investors if it wishes to modernize its energy infrastructure.

While, in the past, the state could take on the central role in the development of fossil fuel- and nuclear fuel-based energy resources, the greatest promise of renewable energy now lies in the ability of smaller polities to satisfy their own energy security needs. At the Renewable Energy Conference and Expo, held in Manila on 2–3 December 2010, representatives from energy companies were interested in how local governments could be encouraged to support the development of renewable energy infrastructure by expediting permits and providing incentives for the purchase of land and equipment, and how local leaders could support the implementation of the country's renewable energy law. While national governments can direct policy, local leaders play an important role in implementing a country's energy policy. Their ability to facilitate investments could be crucial especially for smaller investors in renewable energy projects such as those in the Philippines.

However, renewable energy is not the only response to securing the energy security of countries such as the Philippines. A rational plan for the Philippine government should consider the risks of variable base loads for certain types of renewable resources (especially solar, wind and hydro) and balance these with the inclusion of more stable sources, such as geothermal, natural gas and possibly even coal. In diversifying its energy resources, the Philippines should balance cost and reliability with the need to source energy from more ecologically sustainable resources. In the case of micro renewable projects in isolated contexts, both conditions may be met. Once we are able to broaden

our perspectives of what constitutes energy security, and for whom we securitize it, we will finally be able to allow renewable energy to reach its full potential.

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