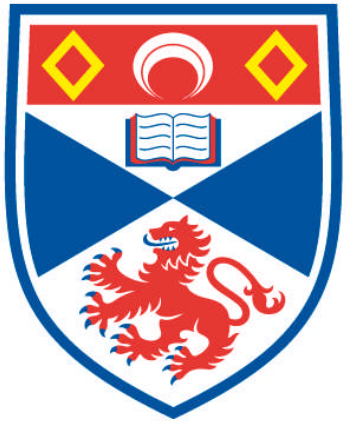
PETROLEUM GEOPOLITICS : A FRAMEWORK OF ANALYSIS

Rupert Herbert-Burns

A Thesis Submitted for the Degree of PhD
at the
University of St Andrews



2012

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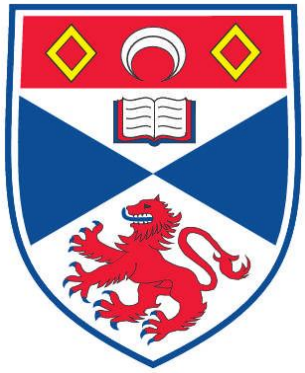

April 2011

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Abstract

The playing field upon which actors, both state and non-state, develop strategies to secure existing supplies of oil and seek access to new ones is as systemically, politically and strategically complex is as it is geographically vast. In considering this activity, the terminology used by pundits and journalists to describe the significance of issues such as oil demand, the complexities of access to petroleum and concerns over security threats to supplies of oil is familiar. Juxtapositions such as the 'geopolitics of oil', 'energy geopolitics', the 'geopolitics of resource wars' and the 'geopolitics of oil and gas' are all familiar. But what do they mean when they use 'geopolitics' in this context? Thus, by extension, can *petroleum geopolitics* - a hybrid conceptual construction used in this thesis - be disassembled into its component parts, analysed and systematically understood. This is the aim of this thesis.

This thesis contends that the very nature of oil and gas reserves, the processes of exploration and production, and the means that govern and characterise the transportation of petroleum overland and by sea is inherently geopolitical - that some core features of geopolitical theory and key geopolitical concepts are pivotal in determining the ontology and process of the international oil business. Indeed, so central has oil been to the advancement of industrial capacity, technology, warfare, transportation and economic prosperity of states since the 20th century, it could be argued that petroleum is the single largest determinant of the geopolitics that characterises the modern international system.

In order to address the interrelationship and correlations between core aspects of the petroleum industry and causal geopolitical phenomena, I begin by advancing a framework of analysis that systematically binds key geopolitical features and concepts – specifically: *Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State and Non-state Concepts;* and, *Strategic Resources and Geopolitics* - with examples of empirical findings revealed in subsequent chapters in the thesis. Fundamentally, this process works to assess causality and correlations between geopolitical phenomena such as space and distance, sovereignty, territory, boundaries, chokepoints, resource nationalism, transnationalism, resource security and conflict, and the features and processes inherent in petroleum reserves and the exploration, production and transportation of oil and gas.

The framework is followed with a sequential analysis of the three empirical foci of the project: the ontology of oil and natural gas reserves; the planning and processes of exploration and production; and, the processes of the conveyance petroleum. I have concentrated my research to activities within Eurasia, which comprises the traditional continents of Europe and Asia, and the Indo-Pacific maritime realm, which extends eastwards from the Red Sea to the western Pacific Rim. After systematically assessing the empirical findings and examining key areas of geopolitical theory, I conclude that there is an identifiable and logical correlation between geopolitical phenomena, petroleum reserves, and the means to produce and distribute oil and gas between source and market.

Acknowledgements

Firstly, I would like to thank my supervisor, Dr. Rick Fawn, for his endless and unfaltering support for my work on this thesis over the years in which I have been studying from afar. Despite my not being resident at the university during this project, Dr. Fawn has always managed to provide insightful, focused and pivotal advice and guidance throughout by phone and e-mail. I am particularly grateful to him for his encouragement and help during the last several months as I put in the final 'surge' to get the thesis ready for submission and examination.

I would also like to make special mention of my wife, Haya Herbert-Burns, who has given me the encouragement and love that I needed to see this through. Simply put, I would not have been able to complete this project without her unselfish support; my deepest love and thanks to her for everything. My profound thanks go also to all my family and friends for their support throughout.

There are many individuals that gave me very useful technical advice and guidance during the course of my studies, and to those individuals I offer my sincere thanks. I would like to like to make particular mention of the following: Bill Vlcek, Sergei Vinogradov, Mary Kettle, Amit Pandya, Mark 'Bruce' Roberts, Colette Finlay, Daryl Williamson, Ellen Laipson, Magnus Ranstorp, Hans Tino Hansen, James Lloyd, James Davis, Jason Franks, Paul Wilkinson, Peter Dodd, Peter Lehr, Raad Alkadiri, Robert Johnston, Rosemarie Forsythe, Sam Bateman, Scott Campbell, Tom Holroyd and Wally Mandryk.

Table of Contents

Figures and Tables

Figures

Tables

Abbreviations

ABOT	Al Basrah Oil Terminal
ACG	Azeri-Chirag-Gunashli oil field
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BBL/D	Barrels per day
BBLS	Barrels
BOE	Barrels of oil equivalent
BTC	Baku-Tblisi-Ceyhan Pipeline
CACP	Central Asia-China Pipeline
CIA	Central Intelligence Agency
CIS	Commonwealth of Independent States
CMT	Ceyhan Marine Terminal
CNOOC	Chinese National Offshore Oil Corporation
CNPC	China National Petroleum Corporation
CPC	Caspian Pipeline Consortium
CTL	Constructive Total Loss
DOE	U.S. Department of Energy
E & P	Exploration & Production
EBRD	European Bank for Reconstruction and Development
EEZ	Exclusive Economic Zone
EIA	Energy Information Agency
ENT	Effective National Territory
EOR	Enhanced oil recovery
ERT	Effective Regional Territory
EU	European Union
FPDA	Five Power Defence Agreement
FPSO	Floating, production & storage unit
FSO	Floating storage unit
FSU	Former Soviet Union
GDP	Gross Domestic Product
GGC	Gulf Cooperation Council
GNP	Gross National Product
GTL	Gas to Liquids
H2S	Hydrogen Sulphide
IBRD	International Bank for Reconstruction and Development
IEA	International Energy Agency
ILSA	Iran-Libya Sanctions Act
IMF	International Monetary Fund
INOC	International National Oil Company
IOC	International Oil Company
IPC	Iraq Petroleum Company
IPSA	Iraq Pipeline to Saudi Arabia
ISA	Iran Sanctions Act
KCP	Kazakhstan-China Pipeline
KCTS	Kazakhstan Caspian Transportation System
KHAOT	Khawr Al Amaya Oil Terminal
KMG	KazMunaiGaz
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas

MBD	Million barrels of oil per day
MMBLS	Million barrels of oil
MMt	Million metric tons
MMt/y	Million metric tons per year
NGL	Natural Gas Liquids
NGO	Non-Governmental Organisation
NIOC	National Iranian Oil Company
NOC	National Oil Company
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
PdVSA	Petróleos de Venezuela, S.A.
Q-Flex	Class of LNG carrier with a cargo capacity of 210,000 m^3 to 216,000 m^3
Q-Max	Largest class of LNG carrier with a cargo capacity of 266,000 m^3
R/P	Reserves to production ratio
SCO	Shanghai Cooperation Organisation
SCP	South Caucasus Pipeline
SEC	Securities and Exchange Commission
SEE	Strategic Energy Ellipse
SLOC	Sea Lines of Communication
SPC	Singapore Petroleum Company
SPE	Society of Petroleum Engineers
SPM	Single Point Mooring
SPS	Strategic Petroleum Stream
Tcf	Trillion cubic feet
Tcf/y	Trillion cubic feet per year
Tcm	Trillion cubic metres
TSA	Technical Sharing Agreement
UAE	United Arab Emirates
ULCC	Ultra Large Crude Carrier
UN	United Nations
UNCLOS	United Nation Convention of the Law of the Sea
USGS	United States Geological Survey
VLCC	Very Large Crude Carrier
YtF	Yet to Find

Chapter 1 Introduction

'The spice must flow…' – Frank Herbert[1]

In the second quarter of 2010, China surpassed Japan to become the second large st economy in the world behind the United States; based on current growth trends, China's economy will eclipse that of the U.S. to become the largest in the world by 2027.[2] In 2010, India's economy expanded by 8.5% and some observers suggest that India's economy will grow faster than any other large country over the next 25 years.[3] In 2010, the IMF projected that by 2030, Asian GDP will exceed that of the western countries within the Group of Seven major industrial economies (G-7).[4] Admittedly forecasts change and economic health, even on a global scale, can wane considerably when viewed over long cycles, as evidenced by the global financial crisis that started in 2007. Nevertheless, this long-term expansion in Asia over the next two decades will require enormous quantities of energy; principally in the form of increasing imports of oil and gas for power generation and transportation.

Released in November 2010, the International Energy Agency's *World Energy Outlook 2010 (WEO 2010)*, which forecasts energy trends out to 2035, revealed that over this period non-OECD countries will account for 93% of projected increases in global primary energy demand; driven by faster growth rates of economic activity, industrial production, population and urbanisation, primarily in Asia. This expansion will be led overwhelmingly by China, which accounts for 36% of projected global energy use growth over the next quarter century, with its aggregate energy demand rising by a massive 75% in the same period. By 2035, China will account for 22% of total world energy demand. India's requirements will also be considerable, with its demand amounting to 18% of total global requirements; however, the U.S. will remain the world's second largest energy consumer behind China.[5]

Notwithstanding the increasing contribution of renewable forms of energy – such as bio fuels, geothermal, hydropower, solar and wind - oil and gas will continue to dominate the energy mix during this period. According to projections in BP's *Energy Outlook 2030*, global oil demand is likely to exceed 102 million barrels of oil per day (Mb/d) by 2030, with non-OECD Asia accounting for more than 75% of net global increase.[6] Unsurprisingly, China is the largest driver of this growth, with consumption reaching 17.5 Mb/d by 2030, overtaking the U.S. to become the world's largest oil consumer. Overall, non-OECD consumption is

projected to overtake the OECD countries by 2015, approaching some 61 Mb/d by 2030, twice the levels used at the beginning of the 1990s.[7] The demand requirements for natural gas have an even more pronounced trajectory, which is forecast to be the fastest growing fossil fuel out to 2030. In keeping with the aggregate energy demand growth picture revealed above, Asia accounts for the largest increase in both production and consumption, with China driving 56% of the continent's consumption growth.

Certainly, the petroleum demand picture depicted above is startling; however, this is only one side of the story. Demand must be met by supply, both in terms of dependable access to sources of oil and gas and a secure means of its transportation and distribution. It is the inescapable strategic importance of this reality that asks why a clear understanding of the interrelationship between petroleum reserves, its production and means of conveyance, and the geopolitics that determines, and is shaped by, this process is both essential and worthy of study.

1.1 Early 21st Century Petroleum Production and Distribution Landscape

The present-day playing field upon which actors, both state and non-state alike, develop strategies to secure existing supplies of oil and seek access to new ones is as systemically, politically and strategically complex is as geographically vast. The range of actors includes: IOCs, NOCs, INOCs, diplomats and statesmen, financiers and bankers, oil service companies, seismic companies, geologists, security firms, ship-owners and terminal operators, to name some of the most common. The activities of aforementioned actors are numerous and varied: governments need to invest in upstream projects to ensure the energy security required to sustain economies; IOCs must strive for future growth in all sectors to satisfy shareholders; governments will endeavour to gain geopolitical advantage over vital oil transit territory to ensure conveyance control; a French IOC and a Russian INOC find themselves compelled to engage in complex gas exploration and production partnerships because of the need to share financial burdens and offshore production technology; and, militaries, INOCs and tanker crews need to cooperate and exchange information to help ensure the security of vital crude oil export routes.

When the industry is viewed in its totality, these actors and activities exist within, and combine to shape, a petroleum world that produces approximately 80 million barrels of oil per day in 113 states, worth some $7 billion. Each year, roughly 3 trillion cubic metres of natural

gas are produced in 90 countries, of which 240 billion cubic meters was shipped as liquefied natural gas (LNG) across most of the world's oceans to 22 countries. Amidst an estimated global proven reserve base of 1.352 trillion barrels of oil, located in 97 countries around the world,[8] a new balance of power between oil companies has taken hold that will determine much of the complexion of petroleum geopolitics for the coming decades.

Between the mid-1940s and the 1970s, the petroleum world was dominated by the world's largest western oil companies – Jersey (Exxon), Socony-Vacuum (Mobil), Standard Oil of California (Chevron), Texaco, Royal Dutch/Shell and British Petroleum – which were colloquially-referred to as the 'Seven Sisters.[9] Since the 1980s, these companies have since evolved and merged into ExxonMobil, Chevron, Royal Dutch/Shell and BP. However, today petroleum production is dominated by the group of the world's most influential national oil companies (NOCs) - Saudi Aramco (Saudi Arabia), Gazprom (Russia), CNPC (China), NIOC (Iran), PDVSA (Venezuela), Petrobras (Brazil) and Petronas (Malaysia), which the *Financial Times* has suggested are the 'new seven sisters'.[10]

Predominantly state-owned, these giant companies control 30% of the world's petroleum production and over one-third of the world's remaining proven oil and gas reserves. In contrast, the super-major international oil companies (born from the former 'seven sisters') combined, produce just 10% of the world's oil and gas and maintain an equity stake in a mere 3% of reserves.[11] Nevertheless, the technological prowess, refining capacity and endemic downstream distribution networks ensures that ExxonMobil, Chevron, Shell, BP and Total maintain the very high levels of revenue and market capitalisation that enables them to remain vital players in an oil game now dominated by those countries that control the majority of petroleum still in the ground.

In the post-modern petroleum world, in return for facilitating access to their oil and gas reserves, NOCs must frequently partner with the major IOCs to gain access to vital capital and the essential exploration and production technology needed to make production possible now that the era of 'easy oil' is arguably drawing to a close. It is this interdependent relationship that characterises much of the geopolitics that shapes, and is shaped by, the contemporary petroleum industry.

1.1.1 Envisioning 'Petroleum Geopolitics'

The terminology used by political and economic commentators, pundits and journalists to describe the strategic significance of, and interplay between, issues such as oil demand, the complexities of competing access to allegedly dwindling sources of supply, the relative decline in the influence of the once domineering international oil companies (IOCs), and concerns over potential security threats to supplies of oil and gas around the world is familiar. Newspaper and news service headlines with the following titles are common: 'Oil geopolitics shifts as China taps Saudi crude'[12] in the *Financial Times* in February 2010; 'A paradigm shift in oil geopolitics'[13] in *The Hindu*, in March 2010; 'Iran Stuck in Neutral: Energy Geopolitics Hinder Iran's Oil and Gas Industry's Development'[14] in *Oil, Gas and Energy Law* in March 2010; and, 'Azerbaijan President attends summit on oil and gas geopolitics in Davos'[15] as reported by *Trend* in January 2010.

Indeed, use of 'geopolitics' as a term has become rather common among commentators and analysts, largely in the media and in the financial sector, when referring to petroleum prices, perceived threats to supplies, security and relations between states. But what do they mean when they use 'geopolitics' in the context of oil and gas? Is it being applied correctly? Thus, by extension: can *petroleum geopolitics* as a concept, as it relates to reserves, production and conveyance of oil and gas, be disassembled in its component parts, analysed and systematically understood. Essentially, the study seeks to answer the question: what is fundamentally *geopolitical* about petroleum? The answer to this not only provides greater clarity regarding the relationship between the oil and gas business, geography and power, but also offers some composite perspective on the study of geopolitics itself.

The hypothesis of the thesis contends that the very physical geographical nature of petroleum reserves, the processes of exploration and production, and the means that govern and characterise the transportation of crude oil, natural gas and refined petroleum products is inherently geopolitical. The project will demonstrate that some core features of geopolitical theory and key geopolitical concepts are not only germane to our understanding petroleum, but also pivotal in determining the ontology and process of the international oil business. Indeed, so central has petroleum been to the advancement of industrial capacity, technology, warfare, transportation, economic prosperity and the fate of nations and mankind since the early 20th century that it could be argued that petroleum is the single largest determinant of the geopolitics that characterises the modern international system.

For the purposes of this project, I define geopolitics as: a paradigm or range of hypotheses that identify correlations and causal variables linking geographical dimensions and phenomena on the earth and political, strategic, economic and commercial relationships between actors in the global arena. This definition is the product of assessing a range of definitions in the literature on the subject that is examined in chapter two. These geographical phenomena can include, but are not limited to: the distribution and orientation of land and oceanic space and the size of coastlines; spatiality; sovereign and natural boundaries; climatic variations; the distribution of raw materials on the earth (both on land and under the sea floor); and, the distribution of populations and institutions.

Within the context of this definition, the means of analysing the empirical material in the case studies and proving the hypothesis is achieved by dismantling the concept of geopolitics into useful component parts, namely - Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State and Non-state Concepts; and, Strategic Resources and Geopolitics – and applying these themes to the examination of the three most vital aspects of the oil industry highlighted earlier.

1.2 Methodology and Structure of the Thesis

As shown above, the international petroleum industry, sometimes simply referred to as the 'oil business', has a multiplicity of components and moving parts, and embraces a vast array of organic, geographical, technological, commercial, legal, financial and political phenomena and processes. Thus it would be impossible to examine and discuss the industry in its totality as it intersects with geopolitics in a project of this finite size. For this reason, I have selected what I regard as arguably the three most important and certainly the most interesting aspects of the oil and gas industry with which to demonstrate my contention:

1. The physical nature, geographical location and scale, and relative geopolitical importance of petroleum (oil and natural gas) reserves
2. The planning and processes of contemporary oil and gas exploration and production
3. The conveyance and distribution of oil, natural gas and refined petroleum products overland and by sea

The geographical scope of the oil and gas industry is extensive, covering considerable parts of all major continents and maritime spaces. Consequently, for the most part I have concentrated on Eurasia and what I refer to as the Indo-Pacific maritime realm, which incorporates the

Indian Ocean north of the Tropic of Capricorn and the western Pacific Ocean west of 150°E. Clearly, parts of these spaces are adjacent to the Continents of Africa and Australia, and in some cases the influences and relevance of parts of these land-masses are also addressed. I also examine the Arctic in discussions relating to reserves and frontier exploration and production. Though referred to as locations of strategically significant reserves of oil and gas, I do not examine industry exploration and production or conveyance operations within the Americas.

The first chapter in the main body of the thesis, Chapter two - Petroleum Geopolitics: A framework of Analysis – establishes the structural context, the prism, through which the empirical findings that follow are assessed. Using an examination of various definitions of geopolitics as initial context, the chapter takes the form of a systematic *triangulation*, which identifies key geopolitical features, concepts and forces that are intrinsic and germane to the petroleum industry, explains them, and then identifies correlations with selected empirical findings from the case studies in the preceding chapters. Theoretical and conceptual geopolitical phenomena are arranged under the following main headings: *Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State and Non-state Concepts;* and, *Strategic Resources and Geopolitics*. Fundamentally, the chapter works to establish definitive causality and correlations between geopolitical phenomena such as space and distance, sovereignty, boundaries, shatterbelts, chokepoints, resource nationalism, transnationalism, resource security and conflict and the features and processes inherent in petroleum reserves and the exploration, production and transportation of oil and gas.

With the framework in place, the ensuing chapters systematically examine each of the three key themes in turn using a series of specifically-chosen narrative and case studies to reveal important empirical foundations with regards to macro oil and gas reserve status and key production and conveyance projects in the aforementioned geographical spaces, which reveal germane connectivity with geopolitical features and concepts. Throughout the examinations I have endeavoured to utilise recent (and in many cases ongoing) industry operations and activities to give the project as much contemporary relevance as possible.

Chapter three - Oil and Gas Reserves – has two main functions: Firstly, it sets the scene for the chapters that follow by examining arguably the most fundamental element in the petroleum business – the reserves of oil and gas that are acknowledged to exist in the world, in what form, where they are located, and their estimated quantities. It considers the types,

locations and volumes of reserves, the significance and contribution of 'frontier' reserves, and the implications of 'undiscovered' reserves. The latter two being of particular importance in the contemporary era as companies are compelled to seek out and explore new, difficult to access and hostile parts of the world, such as the Arctic, to supplement declining production elsewhere. This confers an appreciation of the form, scale and location of oil and gas available to interested actors. Secondly, the chapter analyses what is fundamentally *geopolitical* about oil reserves and why this is so.

Chapter four – Exploration and Production – examines this most fundamental part of the oil industry in the context of geopolitics, specifically with relation to issues of access to reserves inside foreign sovereign territory, strategic control of resources and resources nationalism, the often intense competition between companies and states in acquiring and maintaining access in order to extract petroleum, concerns over security and the potential for conflict between competing actors, and opportunities and increasingly the necessity for cooperation. The chapter is built around case studies involving: the reacquisition of control of a vital liquefied natural gas (LNG) production project by the Russian government, alongside Gazprom's initiatives to reach out to foreign companies to produce gas from an offshore field in the Arctic; the offering by the Iraqi government to foreign international oil companies (IOCs)/international national oil companies (INOCs) partnerships to engage in service agreements to significantly boost the country's output from its major oil fields; the effect of international sanctions on Iran's capacity to reconstitute and increase its oil and gas production; competition between Chinese and Indian NOCs for exploration and production (E & P) deals in Kazakhstan; and, the competition between India and China and between China and Japan over access to gas reserves in Myanmar and the East China Sea respectively.

In the first of the two chapters that examine petroleum conveyance and distribution, Chapter five – Pipeline Development in Eurasia explores perhaps one of the most familiar aspects of the petroleum industry's impact upon, and adaptation to, regional geopolitics and great power strategic posture, the competing projects to build and control oil and gas pipelines from the petroleum-rich Caspian region. Here I examine the competing objectives of the major great power brokers – Russia, the U.S. and China for pipeline supplies of oil and gas from Azerbaijan, Kazakhstan and Turkmenistan. The case studies chart the development of the Russian-dominated Caspian Pipeline Consortium (CPC), the U.S.-sponsored Baku-Tblisi-Ceyhan pipeline (BTC), and China's drive to build the Kazakhstan-China Pipeline (KCP) and the newly constructed Central Asia-China gas pipeline (CACP). Within each study, critical

strategic requirements and geopolitical forces are assessed amidst the power-plays between oil companies and the financial and commercial realities so intrinsic to the oil business.

The second chapter that addresses transportation - Petroleum Conveyance in the Indo-Pacific Maritime Realm – embraces a deliberately eclectic range of petroleum and shipping industry features that constitute major influences within the industry as a whole. However, these features and activities are simultaneously enabled, shaped and constrained by the geographical and geopolitical forces and commercial requirements of the maritime realm in which they exist, much as pipeline schemes are in a terrestrial environment. Following an identification of the geographical canvas upon which this activity is conducted, centred on the geography, politics, security and trade that characterises the critical sea lines of communication between points of export and consumption and associated chokepoints, the chapter examines: the critical nodes of crude oil export in the Persian Gulf and volumes of supply to the major Asian consumers; the significance of Ras Laffan in Qatar as the world's single-most import source of LNG; the nature and impact of a major maritime-based petroleum refining and trading gateway, using Singapore as the example; and, an analysis of the impact of the Iran-Iraq war and the security of oil supplies from the Persian Gulf.

Notes

[1] Frank Herbert, *Dune* (London: Orion Publishing group, 2001)
[2] Jim O'Neil, Chief Economist at Goldman Sachs is quoted as suggesting this in a Bloomberg news story 'China Overtakes Japan as World's Second-Biggest Economy' Http://www.bloomberg.com/news/2010-08-16/china-economy-passes-japan-s-in-second-quarter-capping-three-decade-rise.html
[3] India's surprising economic miracle, *The* Economist, 30 September 2010 http://www.economist.com/node/17147648
[4] Anoop Singh, 'Asia Leading the Way' http://www.imf.org/external/pubs/ft/fandd/2010/06/pdf/singh.pdf
[5] International Energy Agency, Wold Energy Outlook 2010 http://www.worldenergyoutlook.org/
[6] BP Energy Outlook 2030, January 2011 http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/2010_downloads/2030_energy_outlook_booklet.pdf
[7] *Ibid.*
[8] https://www.cia.gov/library/publications/the-world-factbook
[9] Daniel Yergin, *The Prize: The Epic Quest for Oil, Money & Power* (London & New York: Free Press, 1991), p. 503
[10] Carola Hoyos, 'The new Seven Sisters: oil and gas giants dwarf western rivals', *The Financial Times*, 12 March 2007
[11] *Ibid.*
[12] Gregory Meyer, *Financial Times*, 22 February 2010. Http://www.ft.com/cms/s/0/83a0142a-1f52-11df-9584-00144feab49a.html#axzz1FdklF581
[13] *The Hindu*, 22 March 2010 http://www.hindu.com/biz/2010/03/22/stories/2010032250711400.htm
[14] *Oil, Gas and Energy Law*, in OGEL 2 (2007), in 'Geopolitics of Energy' http://www.ogel.org/article.asp?key=2461
[15] *Trend*, 28 January 2010 http://en.trend.az/news/politics/1628295.html

Chapter 2 Petroleum Geopolitics: A Framework of Analysis

In order to create a relevant and applicable analytical framework, this chapter takes the form of a theoretical amalgam that binds germane components of geopolitics with key phenomena that shape, and are shaped by, the nature of petroleum reserves, oil and gas exploration and production, and the conveyance of petroleum explored in this project. In so doing, I posit that it is possible and analytically useful to view these key features of petroleum (as both a resource and as features of industry process) as drivers of what can be viewed as *Petroleum Geopolitics.*

2.1 Methodology

Using an examination of various definitions of geopolitics and a concise appreciation of appropriate theoretical and conceptual geopolitical imagining as initial context, the methodology I have selected to articulate the theory is a form of systematic *triangulation.*[1] In this instance, the *triangulation* is a method which intersects seminal facets of the empirical findings and case studies in the chapters that address oil and gas reserves, exploration and production, and conveyance of petroleum with a wide spectrum of established and contemporary geopolitical theories and concepts. In this way, the process of triangulation is both rigorous and allows for various different ways of analysing the nature and processes of petroleum from different nuanced theoretical angles.

The theoretical and conceptual geopolitical phenomena are arranged under the following main headings: *Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State & Non-state Concepts; and, Strategic Resources & Geopolitics.* Within each sub-section, the relevant theoretical and conceptual tenets of geopolitical understanding will be set out. I have also embraced other concepts not necessarily or traditionally viewed as part of any given geopolitical *theory* but that are particularly germane to petroleum geopolitics in a conceptual sense; several are theories in their own right, such as transnationalism and globalisation and nationalism, whilst other concepts such as shatterbelts and chokepoints are also referred to as geopolitical 'features'. Thereafter, empirical examples from the case studies will be assessed through the prism of the corresponding geopolitical and conceptual tools, which are broken down into sub-headings in the table below.

Table 2.1 – Theoretical and conceptual geopolitical phenomena

Spatial Phenomena	*Space*
	Distance and Time
Environmental Ontology	*Terrestrial*
	Maritime
Territorial Access	*Sovereignty*
	Boundaries
	Diplomacy and Trade
Geopolitical Features	*Compression Zones and Shatterbelts*
	Flashpoints and Chokepoints
	Gateways
	Effective National Territory and Effective Regional Territory
State & Non-state Concepts	*Resource Nationalism and Mercantilism*
	Transnationalism, Extraterritoriality and States
Resource Security & Geopolitics	*Resource Supply Security, Geopolitics & Conflict*
	Resource Location, Scarcity & Geo-strategy

All the groupings of theory-empirical triangulations and resultant assessments will combine to form a nuanced theoretical perspective – petroleum geopolitics – that is hoped will be both applicable and useful as a refined way to assess the nature of petroleum reserves and the core operational features of oil and gas production and conveyance. Before proceeding with the main theoretical construction using the series of triangulations, it is useful to establish what is meant by geopolitics and how it is defined. In this way, it can be shown why geopolitics in its various theoretical and conceptual components is intrinsically pertinent to our understanding of core facets of petroleum, both as a resource and as an industry.

2.2 Geopolitical Imagining and Definition

Geopolitics is a sub-theory of international relations and as such, like many other theories, is complex and indeed arguably impossible to systematise into an agreed upon singular concept. The reason for this is two-fold. Firstly, because geopolitical imagining is principally a product of the times in which the thinkers were living and can thus only be a reflection of their observations during their lives and an analysis of theorists' work that preceded them. The second reason, which is clearly related to the first, is that different thinkers have differing perspectives and produce wide ranging conclusions about what constitutes geopolitics.

2.2.1 Eclectic definition

For the historian, Geoffrey Parker, geopolitics 'is quite simply the study of international relations from a spatial or geographical perspective'.[2] His use of *international relations*

reveals a state-centric perspective in his interpretation of geopolitics, which though widely applicable and indeed central to many areas of the theory, is also somewhat confining and arguably exclusive. In studying many areas of international relations, particularly in an era of globalisation,[3] and specifically amidst the petroleum industry, the influence of non-state actors in both an inter-state and an intra-state geopolitical context is as important as it is unavoidable, whether they are terrorist or insurgent groups, on the one hand, or international oil companies (IOCs) on the other.

In the 1960s and 1970s, when geographers began to re-engage in geopolitical discourse, some of them introduced a nuanced theory of *universalistic* or *holistic* geopolitics, and considered the dynamic ontology of geographical space and phenomena within it as determining factors of international politics. In this way they challenged the Cold War's bi-polar ordering and posited a polycentric view of the world. This is interesting and somewhat paradoxical given the time they were working in, and the inescapable dominance of the dichotomous relationship of the U.S.-Soviet power struggle as the underpinning dynamic of Cold War era geopolitics. Nevertheless, for one such geographer, the American scholar Saul Bernard Cohen, geopolitics is the '…analysis of the interaction between, on the one hand, geographical settings and perspectives and, on the other, political processes'.[4] However, perhaps because of the dominance of the political-ideological forces explicit in the logic of the Cold War, Cohen's 'universalistic' work during this time does not sufficiently include economic factors that one might think intrinsic to a holistic approach.

Cohen also describes geopolitics as '…the applied study of the relationship of geographical space to politics'.[5] In this way, Cohen's interpretation concentrates not only on *space* in the literal sense, but also in its qualitative and relative manifestations – its patterns, physical features, constituent geology and structure.[6] In considering *settings* and *perspectives* he is referring to territorial and sovereign juxtapositions and geometric orientations, and their impact upon the politics of states and others. Some key parts of Cohen's work will be embraced later in this chapter as part of the triangulation.

In steering a more neutral course between polemical definitions of geopolitics, and also because it is more congruent with the realities and logic of the global petroleum systemic, particularly in its contemporary guise, a series of alternative definitions and amalgamations of some of the elements they contain is revealing. Geopolitics can thus be variously defined as:

- ‘a method…of analysis which seeks to understand, explain and predict international political behaviour primarily in terms of geographical variables, such as location, size, climate, topography, demography, natural resources and technological development and potential’.[7]
- ‘The study of political relations between three types of power (states, intra-states – e.g. separatist movements, terrorist networks and multinational companies) in relation to geographical factors (physical geography, identity geography and the geography of resources)’.[8]
- ‘The way geography, politics, and economics influence international relations, individual countries, their foreign policies, as well as their economic and political security’.[9]
- ‘The study of geographic influences on power relationships in international politics. Geopolitical theorists have sought to demonstrate the importance in the determination of foreign policies of considerations such as the acquisition of natural boundaries, access to important sea routes, and the control of strategically important land areas’.[10]

Leading from the above and with specific relevance to the task of examining correlations between petroleum and geopolitical phenomena, geopolitics can be seen as: *a paradigm or range of hypotheses that identify correlations and causal variables linking geographical dimensions and phenomena on the earth and political, strategic, economic and commercial relationships and behaviour of, and between, actors in the global arena*. These geographical phenomena can include, but are not limited to: the size, distribution and orientation of land and oceanic space, and the length of coastlines; spatiality; sovereign and natural boundaries; climatic variations; the distribution of raw materials on the earth (both on land and under the sea floor); and, the distribution of populations and institutions.

The definition and specification set forth above encapsulates the functional and thematic orientation of geopolitics that is most germane to the nature of petroleum and the processes by which it is accessed, produced and transported. The fundamental inter-relationship of the ‘geo’ in geopolitics and the inherently *geographical* nature of oil and gas as natural resources forms a fundamental basis upon which the ensuing analytical framework is designed and the choices of the empirical material used in the thesis.

2.3 Development of 'Petroleum Geopolitics' as an Analytical Framework

As stated previously, this methodological triangulation will process key findings from the empirical case studies that address petroleum resources, production and transportation sequentially amidst the following selected subcategories of geopolitical facets, causal variables and thinking: Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State & Non-state Concepts; and, Resource Security and Geopolitics.

2.3.1 Spatial Phenomena

Space

If one considers the relevance of the somewhat formulaic interpretation of *geopolitics* using its stem – *geo*, meaning of the earth, then the concept of space within which physical features exist and human activity is conducted within is a core concept. After all has been said and argued about geopolitical theory and concepts, one cannot help but be drawn back to fundamentals – the physical make-up of the planet, specifically the expanse and configuration of the terrestrial and oceanic spaces on the surface of the planet, and the earth's crust from which we access our resources. In looking at the elements of geography – where is everything? How large is it? Where is it in relation to other features, and how long does it take to traverse this space?

A very precise appreciation of the Earth's surface from a geographical perspective (including topography, vegetation cover and meteorology) has long been appreciated since the advent of satellites. Furthermore, the ages old cartographic project to exactly map the landmasses and oceans has been largely completed with the advent of technologies such as the Global Positioning System (GPS). More specific to this project, these technologies combined with the vast improvements in seismic and computer-generated visualisation and modelling technology has enabled far more precise definition of what exists within the Earth's crust - the mineral deposits such as oil and gas both in terms of typology, location and quantity.

It could be argued that it is also important to start here because there is always concealed value in considering the intellectual primers of the natural and social sciences, and secondly, because spatial and temporal inter-relationships, and their impact upon the ontology and behaviour of states, serves as one of the mainsprings of geopolitical process. Geoffrey Parker conceptualized this inter-relationship in the late twentieth century as the 'Geopolitical time and space matrix'.[11]

Spatial conceptualisation has roots in philosophy prior to, during and following the Enlightenment. Plato mused about the structure and disposition of the world in *Timaeus*, and he is still credited with grasping a concept of space that is still prevalent in our thinking. Later, Aristotle considered the concept of *place* as well as space. As he advanced his thinking, Aristotle went on to view these phenomena not just in terms of the distance and direction between different places but also in the sense of the containment of a given space,[12] what we would now think of a natural boundaries such as mountains, rivers and oceans, as well as artificial ones such as sovereign boundaries drawn on a map. These observations are reflected in the logic of movement between, and control over, different locations, and contemporary relationships across geopolitical demarcations.

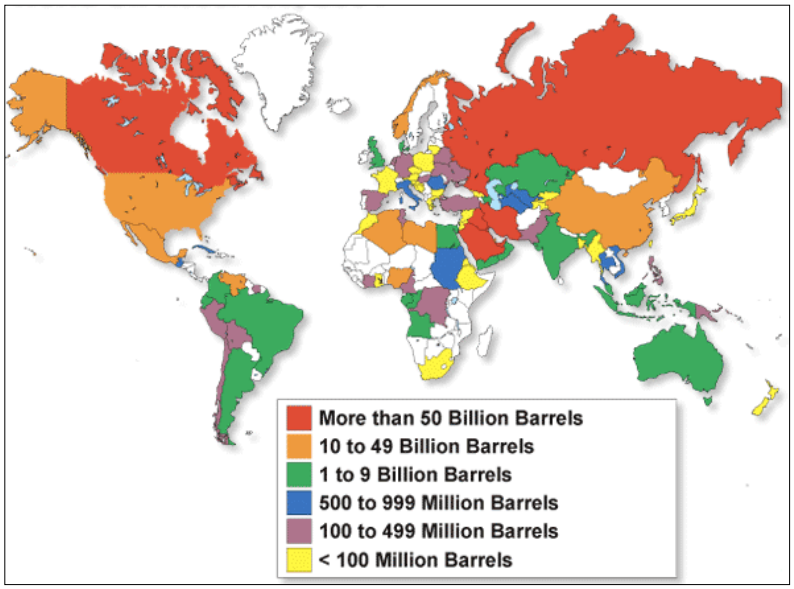
During the 18th century, Kant highlighted that different entities arranged in separation were distinct both because they occupied different places but also because they were conceived differently by individuals. This insight is revealing when applied to contemporary concepts of the distant and the foreign, which are intrinsic to geographical science. Writing in *The Critique of Pure Reason*, Kant submits that: "Space is a necessary *a priori* representation, which underlies all outer institutions".[13] In extrapolating from this and setting it in the context of geopolitical imagining, Kant is suggesting that in order to appreciate how one entity in space relates to another, one must first have an appreciation of the dimensional concept that is *space*. This conception facilitates fuller appreciation of the affect of causal variables such as topography, boundaries, distance, resources, climate, population dispersal and geology as they apply to contemporary geopolitical ontology.

Some post-modern thinkers have refined theorising of space to include the notion of *spatiality*, which 'refers to how space is represented as having effects'.[14] In this context, Agnew and Corbridge posit that *space* 'is taken to refer to the presumed effect of location and spatial setting – or where political-economic processes are taking place – upon those processes'.[15] They elaborate that space can also be viewed as structural. In this way, 'geographical entities…nodes, districts, regions etc. have spatial effects that result from their interaction or relationship with one another'.[16]

Chapter three poses the question: 'why and to what extent are petroleum reserves geopolitical?' In addressing this, it will be posited that oil and gas reserves are inherently geopolitical because of what they are and represent, where a given deposit (or a grouping of deposits) is located, and the significance of the magnitude of the deposit. The chapter assesses

relative geopolitical implications of the reserves typology and estimated quantities of all of the most important proven reserves of oil and gas. In a cartographical sense, the dispersal of reserves of oil and gas is global (see Fig 2.1 below). Given this, the operational reach of modern IOCs and NOCs needed to access and produce resources on a canvas of this scale must be considerable; though it is fair to say that capabilities in this regard vary a great deal.

Fig.2.1 Distribution of global oil reserves



Source: Oil & Gas Journal

Proven oil and gas reserves are located across all of the continents of the world and under parts of all of the earth's oceans. Almost 90% of the world's proven oil reserves are located in territory that constitutes almost a third of the planet's land surface area.

Much of this project is centred on petroleum resources, production and transportation that occurs within Eurasia (which represents 10.6% of the earth's surface area[17]) and through the oceanic space that surrounds it, indeed the majority of the world's petroleum in terms of BOE is located within it and transported across its landmass and interconnected maritime spaces. In considering Kant's view of the *a priori* significance of space, to have an understanding of the vast distances involved, regional differentials, and physical relativities (land and sea) in Eurasia (see Fig. 2.2) alone is as complex as it is paramount for those seeking to access its petroleum and distribute it.

Fig. 2.2 Eurasia

Source: Http://en.wikipedia.org/wiki/File:Eurasia_(orthographic_projection).svg

Distance and time

In a modern industrial context, space and the distances between two widely separated points within that space, is very much related to time. Specifically, the amount of time it takes to traverse a given distance over land or by sea, or in the case of pipelines, how long it takes to build a pipeline across great distances and the flow rate of oil or gas along a pipeline? Having to build pipeline across great distances in Eurasia, such as the line linking Kazakhstan and China or the BTC pipeline is not only a massive logistical challenge but also has commensurate cost implications. The 1,768 km (1,099 mile) long BTC line cost $3.9 billion,[18] which equates to approximately $2.2 million per kilometre, requires 10 million barrels of crude oil to fill it. The oil flows at 2 metres (6.6 ft) per second,[19] which means that a cross section of oil takes 10.2 days to travel from the Sangachal Terminal in Baku, Azerbaijan to the Ceyhan Marine Terminal (Haydar Aliyev Terminal) on the south coast of Turkey. In addition to the selected diameter of the line (the BTC is 42 inches for most of its length), the distance and terrain that a pipeline must traverse also determines the number of pumping stations required (8 for the BTC line) and thus the speed and volume of oil that can be transferred. When all of this is summed up, the commercial value and importance of a pipeline thus is determined to a great extent by the distance it has to traverse; this

commercial/business value also confers commensurate geopolitical value or significance for the users and markets it was designed to service.

In a maritime context, distance and time are arguably even more significant factors in terms of implications for conveyance of petroleum. For example, there are considerable distances between primary sources of production of crude and natural gas and some key consumers in Asia. Some key distances and times of voyages illustrate the point: The distance from Ras Tanura in Saudi Arabia to Yokohama in Japan is 6,641 nautical miles (nm) via the Malacca Straits, which takes a VLCC transporting 2 million barrels of crude approximately 19 days to traverse. The distance from Kharg Island in Iran to Shuidong in China is 5,143 nm via Singapore, a voyage that takes a VLCC almost 15 days to complete. The distance between the Ras Laffan LNG terminal in Qatar and Chita in Japan is 6,424 nm, which takes a laden Q-Max LNG carrier just over 18 days to complete.[20]

To add some additional perspective on the potential implications for producers, shippers and consumers of oil and gas, if shipping flows through the Phillips Channel off Singapore were to be disrupted or the strait blocked, these deep draft vessels would have to be diverted via the Lombok Straits between the Islands of Bali and Lombok in Indonesia. This would add another 1,000 nm to voyages between the Persian Gulf and oil terminals in South Korea, Thailand, China and Japan, and increase the sailing time by another 3 days.[21] This has implications for delays in delivery of vital oil and gas supplies, increases in insurance and charter rates, the numbers of vessels required to keep up the necessary frequency of supply in the case of contracted LNG deliveries. Such a diversion of this kind could also potentially have serious security implications during times of intra-state or regional tension or conflict, or if the threat to shipping from piracy or maritime terrorism in the Sulu Sea or Celebes Sea were to increase or evolve in the future.

The logistical, commercial and financial implications of extensive (and potentially increased) distance/time factors in the Indo-Pacific maritime context are considerable. This would be of increased significance during times of economic hardship when some shippers might be unable to operate such voyages with no profit or even at a loss (as happened during the 2008-2010 global economic crisis). Were such a climate to be prolonged, some countries might be compelled to import petroleum using their nationally-flagged vessels, thus creating a strategic 'bridge' to ensure vital supplies. This works for states like China that is expanding its national

fleet, but it might not be possible for small states. The geopolitical and geo-strategic factors affecting SLOCs will be explored further in the next section.

2.3.2 Environmental Ontology

Terrestrial

The distinction between the land and the sea is seemingly obvious from a physical standpoint; however, the ability to traverse across land and sea, the time taken to do so, and the quantity of materiel that could be transported has been governed throughout history by practical means, technology, intent, power, the ability to gain physical access via treaty, reciprocity, cooperation or force of arms, and not least, one's particular location on the planet's surface in relation to others. These realities have led several theorists of geopolitics to consider the features, strictures and opportunities afforded by the terrestrial and maritime environments.

The two settings govern *a priori* where resources are located, what geographical features confine them, whether they are easily accessible – near the surface of the earth, or deep under the seabed, or in a polar environment, and how they can be transported – overland or via the sea. The terrestrial setting is clearly favourable as this is where mankind lives and resources can be more easily accessed and transported. However, though the maritime setting offers challenges from a time and space perspective and is often hostile as an environment to function in, it offers unique and essential opportunities for access, trade, area control and strategic effect, inter-continental connectivity, and the projection of power.

In the 19th century, the British geographer Halford Mackinder's 'Heartland' theory dealt specifically with contrasting the strategic military effectiveness of maritime versus land power. For Mackinder, notwithstanding Britain's status as the world's dominant naval power, the balance had shifted in favour of continental (terrestrial) power by the early twentieth century; specifically in Russia's favour. By Mackinder's reckoning, the speed and reach of Russia's radiating rail system, and the continent's resource base and strategic depth would predominate over naval mobility.[22]

Though Mackinder's theory has limited applicability within the context of contemporary *global* twenty-first century geopolitics, given the advances in transportation, military and communications technology, his theorising nevertheless captured the essential logic of terrestrial and maritime settings; specifically, how those that dominated over the maritime sphere could only have a limited influence over the terrestrial interior of the vast Eurasian

landmass, even with the advent of long-range air power. Russia still exerts predominant power and influence over the access to, and land transportation of, petroleum resources in the Eurasian landmass, notwithstanding the emergence of new states following the break-up of the USSR. Conversely, the dominant contemporary maritime power – the United States, cannot exert the same level of influence over this space (and the resources within it) in the same way that Britain could not in the 19th century when she was the dominant sea power in the age of the 'Great Game'.

The 'Great Game' was the geopolitical struggle between Britain and Russia, which involved the British pushing north into Central Asia from India and the Russians extending their influence southwards.[23] In his book *The Great Game: On Secret Service in High Asia*, Peter Hopkirk states that though the 'ultimate prize…was British India';[24] the real battle was over control over the natural and fabricated communication and transportation links; the mountain passes and the railways. The Russians built railways across Central Asia and the Caspian, whilst the British extended their network across India and what is now Pakistan to the Afghan Border.[25]

The 'New Great Game' – Petroleum pipeline geopolitics in Central Asia

Conceiving of a holistic and coherent perspective to examine and analyse the oil and gas geopolitics of the region is not only complex because of the large number of players and the enormous geographical space involved, but also because of its dynamism. However, some important analytical work has been done in this regard; the most significant is the concept of the so-called 'New Great Game'. This expression was used by the Pakistani journalist and author, Ahmed Rashid, in his book *Taliban: Militant Islam, Oil and Fundamentalism in Central Asia*. In the book, Rashid extrapolates from the Great Power rivalry of the 19th century and applies it to the contemporary picture: As Russia moves to regain influence over its southern Asian flank and fortify its control over the means of oil and gas conveyance through its territory, the U.S. strives to build upon its East-West petroleum export corridor and develop strategic alliances with the former Soviet Asian and Caucasus states. Within this contest, China is also expanding its influence; deepening its trading ties with Kazakhstan, Turkmenistan and others in order to construct pipeline transportation routes eastwards from the Caspian to its Xingjian region.[26]

In the 19th century, control over communication and transportation routes was to enable or deny the potential movement of armies. In the New Great Game, the same form of

geopolitical control and alliance building is intended to guarantee secure corridors for petroleum conveyance. This process is self-fuelling: geopolitical *corridor* and *area* control is essential to construct and secure the means and routes of petroleum conveyance that are geo-strategically favourable to a given major power. 'Ownership' over these means and routes in turn confers power and influence for the patron power, and enables it to further expand its access to petroleum and the means to convey it to its spheres of geopolitical control or influence.

In the context of the Eurasian terrestrial setting, appreciating the interaction between actors in this *geostrategic realm* is central to understanding the petroleum conveyance geopolitics in the Caspian, Caucasus and Central Asian spaces; either because of the power and influence they wield, and/or because of their geographical status as a source of and/or as conduit for petroleum. A number of states are players in the so-called 'New Great Game': Armenia, Azerbaijan, China, the EU, Georgia, Iran, Kazakhstan, Russia, Turkey, Turkmenistan, the United States and Uzbekistan. Four powers within the group are highly influential in determining its outcome: China, Russia, the United States, and to a lesser extent the European Union. It is also important to remember that key NOCs and IOCs are based within one or more states within this power broker grouping; actors that also have varying levels of influence and relativity in the drive to access and produce petroleum.

In more recent work on the subject, the German journalist, Lutz Kleveman, also adopted the New Great Game idiom as the underpinning logic or pattern that explains the power-play between Russia, the United States and China for control over the petroleum resources and pipeline conveyance routes from the Caspian and Central Asia. Kleveman argues that in this far more complex contemporary version of the original geopolitical contest between Tsarist Russia and Victorian Britain, the U.S, having assumed Britain's role, is now in direct competition with Russia amidst the wider interference of China, and to a lesser extent Iran.[27]

With the passing of the Cold War, the veteran U.S. statesman and geo-strategist, Zbigniew Brzezinski, focused on Eurasia, which the U.S., Russia and China would compete over for geopolitical and strategic advantage in what he referred to as 'The Middle Space'.[28] Interestingly, Brzezinski viewed America as being the pre-eminent power in Eurasia, which he considered 'geopolitically axial' because of its massive natural resource base and emerging major Asian powers. Brzezinski saw that the key to gaining access to petroleum reserves was for the U.S. to work to diminish Russia's geopolitical control over the Eurasian core. He

made the point that: 'If the main pipelines in the region continue to pass through Russian territory…the region will remain a political dependency, with Moscow in a strong position to determine how the region's new wealth is to be shared'. As an antidote to this unfavourable situation he posited that: 'if another pipeline crosses…to the Mediterranean through Turkey…no single power will have monopoly over access'.[29]

Aside from securing access to the significant oil and gas deposits in Azerbaijan, Kazakhstan and Turkmenistan, the objective is simple – to control the means and geographical routes of conveyance. For the Russians, this is to the north and northwest through its already vast but dated pipeline network. For the U.S. (and its European allies), the goal is a corridor to the west via a route that by-passes Russian territory completely. The Chinese, on the other hand, strive to ensure a steady and substantial stream of oil and gas eastwards to their western border with Kazakhstan. The rich historical and contemporary thinking variously by Mackinder, Cohen, Brzezinski, Rashid and Kleveman with regards to great power geopolitics and control of pipelines and petroleum flows set out above fuses coherently with the empirical examinations in chapter four, in which the projects to establish and control competing pipelines are characterised by the inescapable logic of terrestrial strategic and geopolitical realities and objectives of the major powers in the Eurasian strategic realm. In the New Great Game, mountain passes and railways have been replaced by terrestrial export corridors and oil and gas pipelines.

Maritime

The maritime space has its own distinct and defining strategic and geopolitical ontology. Many components make up the geopolitical and geo-strategic forces and confines that determine the access to, and conveyance of, petroleum within the maritime spaces on the earth, including: space, distance and time (as examined earlier); physical contours between coast and sea (including chokepoints, which are examined in a later subsection); the size, capacity and geographical reach of tanker fleets; port and terminal development and investment; international law, specifically the United Nations Convention on the Law of the Sea – UNCLOS; bilateral and multilateral diplomatic and commercial alliances, such as ASEAN; and, the size and power projection capabilities of naval forces, including alliances such as NATO.

In considering important historical perspectives that have shaped thinking on maritime space geopolitics, the contribution of American Admiral Alfred Thayer Mahan (1849-1914), is

widely valued. Not surprisingly, in view of his professional background, Mahan's view was the opposite of Mackinder's: he argued that naval power projection and endemic maritime access in oceanic and littoral spaces, rather than land-power and rail links, were the deciding keys to strategic supremacy and geopolitical manoeuvre. Nevertheless, like Mackinder, this influential naval tactician and historian, also focused his concern upon the ascending power of the Russian empire and its potential as a threat to the European powers, particularly Great Britain.[30]

Though he never lived to see it accelerate in the way it did during the first four decades of the twentieth century, Mahan was aware of the growing power of his own country. He understood its increasing tendencies and need to expand its interests and influence beyond its continental boundaries; significantly, via its ability to project power across oceanic divides, as seen in the First World War. As with all of the theorists who developed and structured their thinking in response to the political, economic and technological impulses and developments of their times, Mahan was guided by the impact of the industrial revolution's defining effects on advances in naval and merchant vessel technology (such as fuel-use, propulsion, range, and naval gunnery), sea trade routes, communications, and improved sea access.

Though the nuances of his geopolitical stance reflected and served the strategic environment of the times, Mahan's ability to harness the fundamental realities of mobility at sea and the political significance explicit in the potential of endemic maritime access are enduring realities in contemporary geopolitics. The mutually reinforcing and interdependent bond between the merchant ships that function as the life-lines for maritime powers and the warships that afford them their home state and longer range protection, help sustain the vitality of the global economy and enable maritime powers to monitor and constrain, if not dominate, traditional continental powers such as Russia and now China.

Chapter six establishes how SLOCs are a pivotal feature of systemic petroleum trading in the Indo-Pacific maritime realm. In an empirical form, the relevance of SLOCs is self-evident. Viewed in a more theoretical light, they are the arteries of global oil and gas trade at sea, and are part of the life-support system for global economic security, which is why I also refer to them as Strategic Petroleum Streams (SPS). From the point of view of petroleum geopolitics, the geopolitical nature and strategic importance of three primary SPSs (the *Westward SPS*, the *South-eastward SPS*, the *North-eastward SPS)*, and the two secondary SPSs (the *South-westward SPS* and the *Northern SPS)* is determined by two main factors: the volume of oil,

refined petroleum products and liquefied gases that is transported along them (the number, type and size of the tankers and gas carriers steaming along each route); and, what chokepoints, flashpoints and zones of insecurity or tension these vessels pass through or close to. The combination of these results in the third main feature that characterises an SPS – the military effort needed to ensure its security both in times of peace and war.

The ability to utilise and control maritime space, still facilitates the ability to protect (and if necessary interdict or destroy) tankers transporting crude oil, liquefied gases or products between sources of supply and demand. Though the technologies of shipping and particularly naval power have greatly altered the way we conceive of oceanic and littoral control, Mahan's fundamental work that fused the logic of maritime and terrestrial geographical realities, the strategic necessities faced by maritime states, and naval power and its deployment are elemental as components for the security of sea trade.

Many of the world's largest oil consuming countries, such as China, India, Japan, South Korea, the United States and those from the EU, do not have access to the quantity of oil and gas within their own territories that they would like or need. However, they all have (to varying extents) the ability to ensure the maritime conveyance of those resources from where they are concentrated (particularly in regions where the deposits are near to coastlines or indeed under the sea such as the Persian Gulf and Southeast Asia) to where they are needed. Navies and coalitions therefore seek to ensure the security of shipping in the Persian Gulf, the Arabian Sea, the Gulf of Aden, the Red Sea, the Andaman Sea, the Malacca Straits, the South China Sea, the East China Sea, and the Timor Sea, to name the most obvious.

The best example of an international effort to protect tankers in a key part of an SPS was during the Tanker War in 1987 to 1988, which is examined in detail in chapter six. This eventually became a very robust international naval and military operation that eventually compelled the Iranian government to halt its military operations and sign a ceasefire agreement. Since the Iran –Iraq War, merchant shipping and infrastructure (including oil tankers, gas carriers and terminals) has not been threatened or attacked to anywhere near the same extent despite the Gulf War in 1990-91 and the invasion of Iraq in 2003. Threats and attacks have been limited to terrorist operations, such as the al-Qaeda attack against the VLCC *Limburg* off Aden in October 2002, the AQ-I attack against the Iraqi oil terminals in April 2004, and the Abdullah Azzam Brigade attack against the VLCC *M.Star* in July 2010. It

has been because of attacks such as these that coalition navies continue to patrol vital SLOCs as highlighted above.

In many respects, the security of the SPSs examined in chapter six, including the vital chokepoints that exist in the Indo-Pacific maritime realm, is enabled through the logic of collective security given that the security of the world's maritime trading routes is to the benefit of all. Nevertheless, this collective security in some cases will continued to require the deployment and use of military force, such as in the Gulf of Aden, Arabian Sea and in the Strait of Malacca.

2.3.3 Territorial Access

The concept of *access* in geopolitics is a central one. The ability for people, an organisation, a government, a multinational company (such as an IOC or an NOC) or an armed force (army, navy or air force) to gain access to territory, another country, a resource, a coastline or even an entire region is achieved in several ways. Some are determined by the physical location, proximity, configuration, size and topography of a given territory, in other words by pure geography. Others are defined by the geopolitical and geostrategic realities that are in part a product of the geography such as sovereign right of access, border agreements, transnational protocols, power, and of course the ability to obtain access through conflict or war. In reflection of the last few points, Colin Grey has argued that these kinds of activities must be 'done within geography'.[31] In this regard, Grey is arguing that when it comes to human activity, the parameters of physical, practical and political geography determine whether it can happen, where and in many respects how it can happen; his thesis 'is that geography is inescapable'.[32] One of the first means of determining access is *sovereign* access, which is arguably the most straightforward; either one can get it (or benefit from it) or it is denied. The government or those organisations and groups (government and private) that are of that state are by definition allowed access to land and resources within the sovereign confines of that country, including its overseas dependencies, territorial waters and EEZs.

Sovereignty

One of the core features of geopolitics is the identification, control and integrity of a state's territory (including territorial waters); this is underpinned by the notion of sovereignty. On a broader empirical and epistemological canvas, it is one of the vital enabling concepts of international relations. Sovereignty is in theory the absolute political decision-making, control and enforcement authority with regards to a specific and internationally-recognised territory

and population.[33] It is a legal notion that applies to a formally constituted state that is recognised by an international system of states, and it implies that the competency of a given government to control the territory, those entities and resources within it, and its relationships with other states and non-state actors alike. A sovereign state is under no obligation to accept people, goods and ideas (influences) from other state or non-state actors, and 'it may restrict or control all that is within the territory'.[34]

Normatively, sovereignty is absolute and inviolate within the international system; however, paradoxically, it is the very concept of sovereignty that produces an anarchic international system, and this system gives rise to multiple threats and challenges to a state's sovereignty. Indeed, it could be argued that this anarchy actually enables direct and tangential challenges to the notion of sovereignty.

The geopolitical scholar, John Agnew, recognises that 'sovereignty and state-centricity has continuing normative attractions for both intellectuals and political activists even as the empirical reach of states to control and regulate recedes. It provides a grounded set of social-geographical units for…analyses'.[35] I would agree that Globalisation and transnationalism has indeed given rise to partial dilution of state influence over various state activities, and over the years has allowed, for example, IOCs to gain sometimes significant foot-holds inside states to extract natural resources. Nevertheless, the geographically physical and legal establishment of sovereign confines over territory, and the strategic significance of certain resources such as oil and gas, and their importance to the national and economic security of the state in which they are located combine to establish a very tangible sense of geopolitical, sovereign control over such resources.

As examined in chapter four, the geopolitics that characterises, shapes and emanates from Iraq's current internal predicament, its status within a shatterbelt region, and the government's aggressive project to massively boost the country's oil production in the aftermath of the U.S.-led invasion and occupation to liberate the country from Saddam Hussein is a powerful reflection of the features of sovereignty examined above.

Since the 1991 Gulf War, Iraq's sovereignty has been challenged and rescinded through sanctions, a UN weapons inspection regime, the imposition of a patrolled 'no-fly zone' over parts of its airspace and eventual invasion in March 2003 by a U.S.-led coalition. However, in considering issues pertaining specifically to Iraq's petroleum production and sovereign

control, it is more recent developments concerning the government's drive to boost production that is most illustrative of the inter-action of access and sovereignty.

The case study in chapter four reveals that the government possesses total control over its reserve base in the main producing area in the south of the country. However, control over the reserves and production around Kirkuk is dominated by the Kurdistan Regional Government, and this is part of the reason why the codification of an inclusive national petroleum law has been so problematic. However, the government in Baghdad is basing its project to massively boost the country's oil output to 12 million b/d by 2017 on the southern producing area.[36] This is a wholly unrealistic target, and even an increase of half that volume would be impressive. Nevertheless, despite Iraq not having had full sovereign control over its oil production between August 1991 and March 2003, the central government, despite its fragility and divided nature, now has full control.

This is most obviously reflected by the challenges faced by foreign IOCs and NOCs in their dealings with the government, in the latter's project to award 20-year production contracts with foreign oil companies in order to boost output. Given that the country's oil was the only means by which Iraq could rebuild and prosper after the 2003 invasion and over a decade of sanctions prior to that, the central government would maintain full sovereign control by signing contracts that only allowed IOCs and NOCs a very limited share in profits from sales of oil produced. They would have no equity shares in Iraqi reserves. In this instance, thus, the former transnationalist power and influence of major oil companies was completely diluted. Paradoxically thus, despite the fact that Iraq could not boost production, raise national earnings and advance its power and status within the region without the involvement of IOCs and NOCs, the foreign companies have little or no ability to bargain for more favourable terms or manipulate the government's position in the ways that had been possible in the past.

Boundaries

Within geopolitics, boundaries can be viewed in several contexts: in its legal manifestation wherein borders determine *de jure* the political demarcations that separate one sovereign state from another (these 'contractural' boundaries are based upon legal norms and agreements such as those set forth by UNCLOS or 'geometric' boundaries that are drawn along lines of latitude and longitude); in its physical sense whereby given spaces are confined and demarcated by rivers, coasts, coastal features, valleys and mountain ranges; in a *natural* sense where populations of differing ethnicity or nation can shape the reach of a boundary between

peoples; and lastly, the *power-projection* capability of a state (or alliance of states) can determine far-reaching delineations of 'power margins' across, or through, nominal sovereign borders and territory (both terrestrial and maritime) to establish *de facto* realms of control and influence.

If one assesses notions of political borders and state power in a compound sense, the concept of boundaries presents the student of geopolitics with an important dichotomy. On the one hand, differing magnitudes of state power determine the extent to which it can exert sufficient influence, control and protection over that sovereign space and the resources within; whilst on the other hand, differing levels of power also shape the ability of states to transgress the borders of other states to acquire access to the resources within it. Where state power is more evenly matched, boundaries can thus be a source of conflict, particularly if natural resources, such as deposits of oil and/or natural gas, sit astride boundaries that have been demarcated by differing methods or those that exist within overlapping maritime boundaries of EEZs. A very good example of the latter is proved in chapter four, in which China and Japan were contesting rights of access to gas reserves located in the East China Sea. In this case, had the issue not been resolved and military tensions not de-escalated, a conflict could have resulted in the same way that border disputes have precipitated conflict throughout history.

As set forth in chapter four, in 2003 China and Japan were both actively seeking access to gas deposits in the Chunxiao field which is located inside an area of both Chinese and Japanese EEZs in the East China Sea. The crucial features of the dispute are routed in competing methods of determining the limits of EEZs as set forth by UNLOCS, which is examined in greater detail in the case study. However, what is significant here is that according to both methods of measurement used by Japan and China, the EEZs actually overlap. Interestingly, considering the potential riches at stake, China and Japan managed to resolve their differences over the boundary dispute, and after a series of tense military actions decided to develop the field jointly, thereby avoiding a conflict that could have escalated dangerously. Nevertheless, it would be fair to point out that from the point of view of each side, the boundary dispute itself is still not fully resolved.

Similarly, as assessed in the section in chapter three that considers potential vast undiscovered oil and gas reserves in the Arctic, disputes over sovereign boundaries exist between several of the states with territorial claims in the Arctic Ocean region. For the time being, these disputes, such the competing territorial claims to the Lomonsov ridge under the ice cap, are somewhat

latent given that the existence of resources has not been proven, and also because the ice cover and depth of water currently prevent production with the available technology. Nevertheless, this territorial and accessibility *status quo* could be changed and the dispute energised in the event substantial deposits of gas, and particularly oil, are proven to exist. In this instance, the need to address and resolve this quintessential geopolitical issue could become urgent in order to avoid conflict. In looking at other ways for states to avoid conflict, develop mechanisms to foster interdependence, shared access to resources and reciprocity in terms of logistics and technology, diplomacy and trade have important roles to play when it comes to the access to, and production and transportation of, petroleum.

Diplomacy and trade

Whilst not necessarily viewed as features of geopolitics in a purist sense, diplomacy and trade or rather *diplomatically-driven trade*, are key enablers for states (and associated IOCs and NOCs) in their quest to access, produce and transport oil and gas within and from neighbouring or distant states that have significant reserves. Indeed, those states that have the financial and political capability and influence can often reach across vast distances to open up trade and cooperative agreements that enable access to strategic reserves of petroleum in the same way as it does for other vital raw materials, such as bauxite and iron ore.

In the post Cold War era, and especially during the first decade of the 21st century, one country has demonstrated its unrivalled capacity in this regard – China. In its quest for advantage in securing access to oil and gas around the world, China has mastered the art of binding diplomatic acumen, trade and conspicuous funding to outmanoeuvre rival bidders and obstructing states. Examples of this include: demonstrated its ability to engage in thorough and coherent bilateral diplomacy to secure upstream oil and gas equity for its NOCs in Kazakhstan; utilising the forum of the Shanghai Cooperation Organisation (SCO) to help foster pipeline project deals with source countries in the Caspian;[37] and, challenging the U.S. and UN sanctions regimes against Iran to acquire access to oil production inside the country.

In chapter four, the case study the examined competing Chinese and Indian bids for PetroKazakhstan, which has proved and probable BOE reserves of over half a billion barrels. In this instance, CNPC outbid India's ONGC Videsh to acquire the previously Canadian-owned Kazakh company and its booked reserves. Despite the higher Chinese bid, a number of other reasons were cited for India's loss to China in this instance. Firstly, and most importantly, CNPC already had a large and long-standing presence in the country's upstream

sector. Added to this was the fact that at the time CNPC was also close to completing a major section of the Kazakhstan-China Oil Pipeline linking other Chinese-owned Kazakh fields with China;[38] a clear reminder to the Indians of the geopolitical reality that Kazakhstan and China shared a land border, which clearly they did not.

China has also successfully courted some member states within the SCO and other bilateral trading partners to limit Russia's previously dominant capacity to determine pipeline routings in Central Asia. As an example, this has assisted China in signing deals with Kazakhstan and Turkmenistan (not currently a member of the SCO) to supply gas to Chinese-built and controlled pipelines connecting the Caspian and China's industrial heartlands.[39] Its skills at diplomatic manoeuvre and forging high-value petroleum deals with energy-rich states notwithstanding, it is also important to note that China's geopolitical power projection in this regard is underpinned by enormous financial means. China can maximise its strength in this regard to fund multiple avenues of foreign direct investment and acquisitions in Asia and Elsewhere on a scale that its rival India simply cannot match.

Chapter four also uses the case of the long-term and sometimes intense competition between China and India to illustrate the roles played by diplomacy and trade agreements that work to facilitate access rights and production and conveyance deals involving gas resources in Myanmar. This has necessitated adroit diplomacy by both sides in their attempts to gain geopolitical as well as commercial advantage. Given the significance to both powers of the Shwe project (with reserves estimated at some 9.1 trillion cubic feet of gas),[40] in terms of boosting energy security and geopolitical advantage in an important part of the south-east Asian rimland for energy resources and geographical access, it was vital for each side to boost its chances of success in gaining access rights to production and pipeline deals using high-level diplomatic intervention. In September 2007, following setbacks for India in the previous year when PetroChina managed to sign a memorandum of agreement with Myanmar for exclusive rights to 6.5 trillion cubic feet over 30 years, the Indian Minister of Petroleum and Natural Gas, Murli Deora, witnessed the signing by ONGC Videsh of a $150 million deal for three deep-water blocks off the Arakan coast. This high-profile diplomatic drive was a deliberate move to put India firmly back into projects to acquire gas resources in Myanmar.

During 2008 and 2009, China became more concerned about growing competition in Myanmar from other countries, particularly India, which Beijing felt would be quick to take advantage of any actual or perceived cooling in China-Myanmar relations or deal-making

inertia. General Than Shwe's state visit to India in July 2010, intended to deepen bilateral trade ties, certainly concerned Beijing[41]. Following the visit, Indian energy companies announced a $1.3 billion investment in gas-field development and pipeline deals.[42]

China's ensuing efforts to secure its energy deal relationship with the Junta in Myanmar was reflected in increased levels and frequency of senior diplomatic visits by Chinese officials. Between March 2009 and June 2010, three Politburo members visited Myanmar, which contrasts with the fact that there were no visits between 2000 and 2008. During a recent Chinese diplomatic charm offensive, officials signed 35 trade agreements, including important oil and gas deals.[43]

Energy-driven diplomatic and trade deal competition between India and China certainly enables Myanmar to diversify sales of its resources, whilst simultaneously using India as a counterweight to expanding Chinese geopolitical influence. However, on the other hand, this kind of diplomacy also constitutes a form of 'geopolitical power-projection' for these two ascending major powers as they compete for petroleum resources in Asia. Interestingly, it does appear, however, that to have common boundaries confers some strategic advantage in this respect as China has with Kazakhstan and Myanmar. Notwithstanding the vital roles of diplomatically-driven trade in pursuit of access and rights to oil and gas production and transportation projects, particularly in countries where competition is intense and/or the government in question seeks to play actors off against one another, such as in Myanmar, governments, NOCs and IOCs are also confronted with fundamental geopolitical features, which is the focus of the next section.

2.3.4 Geopolitical Features

In shaping and categorising his post-cold War 'universalistic/geographical' and 'reality-based' geopolitical theory, Saul Cohen suggests that geopolitical structures comprise geopolitical *patterns* and *features*. *Patterns* refer to the literal physical form, scale and 'physical/human geographical characteristics of geopolitical units, and the networks that tie them together'.[44] The *features* are the 'political-geographical nodes, areas, and boundaries that contribute to the [geopolitical] unit's uniqueness and influences its cohesiveness…and effectiveness.'[45] To this I would add they contribute also to its *influence* upon other features and the nature of interactions between them. In analysing the petroleum industry and the systemic trading of oil and gas as both reactionary phenomena and also as determinants of contemporary geopolitics, the following features as advanced by Cohen - Compression Zones

and Shatterbelts; Flashpoints and Chokepoints; Gateways; Effective National Territory (ENT) & Effective Regional Territory (ERT)[46] – stand out as useful components of his geopolitical theorising that can be usefully applied to this analytical framework.

Compression Zones and Shatterbelts

Compression Zones, which are smaller in geographical expanse than shatterbelts (see later section), are politically and/or ethnically-nationally fragmented areas located within or between geopolitical regions. Typically, such zones have been (or are in the process of being) violently destabilised by civil war and/or the intervention of neighbouring countries that are not great powers. Such intervention may not necessarily be aggressive, but rather the deployment of peacekeeping forces.[47]

Cohen argues that compression zones can emerge, intensify, wane and disappear altogether depending the change in behaviour of the adjacent (and intervening) states or due to the socio-political ontology inside the zone itself.[48] Though he imaginatively likens the flux of compression zones from periods of structural instability to stability of the movement and isostacy of the earth's tectonic geology, he does not really expand on exactly what forces create such changes. Specifically, he does not discuss whether internal phenomena, such as a nationally-driven civil conflict, are more influential as causal variables or whether it is the behaviour of external actors that contributes more to these changes. I would argue that it is the latter that has greater impact in fuelling instability within a compression zone, though these external influences tend to be existential and latent and thus not always immediately discernable.

This last point is important because compression zones that lie within oil and gas producing regions, or amidst or adjacent to areas through which petroleum must be transported, may lie dormant for many years or even decades. They may, thus, be deemed to be 'safe' or of acceptable risk for oil production and transportation operations. In other words, the geopolitical and security-risk level is acceptable to allow exploration, production and transportation operations to proceed. However, a seemingly stable compression zone can sometimes ignite into instability in the event of an internal political change or the inimical interference of a neighbouring state with little or no warning. This can seriously compromise any oil and gas operations extant within or adjacent to it; such as occurred in Chechnya during the First Chechen War of 1994-96.[49]

From a geopolitical perspective, the phenomena that contribute to form and characterise the status of a compression zone can include: the ethnic or national composition and balance of the population within it; the states that are adjacent to it and their relative power and influence; the presence of strategically important mineral resources within the zone; the topographical and physical (including land corridors and coastal access) utility of the zone for the transmission of resources; and, the levels of transportation infrastructure that can be utilised (or miss-used) by internal conflictual groups and neighbouring forces for the purposes of waging armed conflict.

Examples of current and possible future compression zones that have significance for the petroleum industry in the Eurasian and Indo-Pacific realms are: Armenia, Chechnya, Dagestan, Egypt, Georgia (Abkhazia & South Ossetia), the Horn of Africa, Iran, Iraq, Saudi Arabia, Sudan and Yemen. Some zones, such as those in the Caucasus, impact more upon conveyance projects, whilst others, for example those in Iraq and Yemen, have a greater effect on upstream operations as well as conveyance. Cohen and others have raised the issue of compression zones; however, the phenomenon has not been thoroughly analysed as a distinct concept in relation to the wider geopolitical, strategic, conflictual and political risk concerns explicit to the petroleum industry. This is one of the component tasks in this project, specifically within the formulation of the theoretical framework and also amidst elements of the case studies.

As examined in detail in chapter four, Iraq's importance to the global supply of crude oil will increase as its production expands between 2010 and 2016. The government's overly optimistic projections of increased daily production capacity of 12 million barrels per day are unrealistic in the extreme. Nevertheless, an increase to 4-6 million barrels per day is feasible and even this level will elevate the country's strategic importance to the global market commensurately. That said, Iraq remains a compression zone, and there are few signs that the country's internal security situation will improve measurably and stabilise at greatly improved levels for some time to come. Moreover, the country also lies within the world's most enduring shatterbelt – the 'Strategic Energy Ellipse' (which is examined in a subsequent section), which merely serves to complicate prospects for lasting socio-political stability and security within the country.

Essentially, this means that IOCs and NOCs engaged in large-scale projects to boost production in the southern 'super fields' – Rumaila, West Qurna 1 and 2, Majnoon, Zubair

and Halfaya – and the Kirkuk fields will have to accept the political and security risks associated with operating in a 'petroleum compression zone' or delay operations until the security and political situation improves and stabilises. Based on the situation in early 2011, it appears that projects are proceeding despite the uncertainties. This, of course, is unsurprising; oil and gas operations have been ongoing in compression zones for decades and risk management is an integral part of this reality, particularly given the increasing challenges faced by IOCs and NOCs in gaining access to produce oil and gas.

In chapter five, the U.S. drive to establish the 'East-West Energy Corridor' – a conduit linking the main oil and gas fields in Kazakhstan, Turkmenistan and Azerbaijan with a pipeline across Turkey to a terminal on its Mediterranean coast – will be examined as an integral part of the Baku-Tblisi-Ceyhan (BTC) pipeline case study. The BTC line is routed through a sizable and vital part of the 'East-West Energy Corridor' (the southern Caucasus (specifically Georgia)), which remains a compression zone due to the ongoing tensions between Georgia and Russia over the status of the two break-away republics of Abkhazia and South Ossetia.

Tensions over the republics led to a brief but violent war in August 2008 in which Russian forces defeated the Georgian army. Though the BTC was not directly threatened or attacked, tensions remain over the disputed territories that are recognised only by Russia and a hand-full of other states, and the potential for future clashes that might threaten the East-West Energy Corridor more widely (and possibly the BTC directly) certainly exists. It is worth noting, for example, that some sections of the BTC are also located just a few miles from parts of the tense Nagorno-Karabakh contact-line. Despite long-standing international mediation and monitoring, occasional exchanges of fire between Armenian and Azerbaijani forces occur across the line, which is also heavily mined.

Shatterbelts, which have also been referred to in the literature as 'Crush Zones' or 'Shatter Zones', have been of central interest to geographers and geopolitical thinkers for a long time. At the turn of the 21st century, Mahan, referred to the geopolitical brittleness and inherent instability of the area (or *zone)* between the 30th and 40th parallels in Central Asia – the region caught between the competing influences of Britain and Russia during the 'Great Game'. In 1915, James Fairgrieve referred to the vast swathe of territory that lay in a northwest-to-southeast arc between the maritime powers and the Eurasian heartland, which incorporated the Balkans, Turkey, Iran, Afghanistan, Siam (Thailand) and Korea as a 'crush zone'.[50] Later,

in World War II, Hartshorne spoke of the 'shatter zone' in a north-south axis in Eastern Europe from the Baltic to the Adriatic that was contested over by Nazi Germany, the Allies and the USSR.[51] Shatterbelts were a central feature of Cold War geopolitics, wherein the superpowers vied for influence and dominance over three shatterbelts: the Middle East and the Horn of Africa; sub-Saharan Africa; and, Southeast Asia.

Given the examples established above, the logic of the various definitions of a shatterbelt is easy to grasp. For Cohen it is: 'a large, strategically located region that is occupied by a number of conflicting states and is caught between the conflicting interests of adjoining Great Powers'.[52] Philip L. Kelly describes a shatterbelt as 'a geographic region over which major powers engage in competition because they have strong perceived national interests…Therefore, the potential for major conflict escalation is present'.[53]

These descriptions reveal the *spatial dimension* of a given geopolitically brittle area or region (which may encompass sea areas as well as terrestrial ones) that is located in a strategically critical part of the world, and demonstrates the greater likelihood of it becoming the site of major conflict given the interference of major powers. It is worth noting that this interference might not initially take the form of a direct air attack, naval deployment or a land invasion. Indeed, the intervening, competing great powers may not necessarily be geographically neighbouring or even proximate to the shatterbelt in question. Early intervention may be latent and take the form of materially or financially supporting proxy protagonists and opponents within the region. Support in the early stages of tension may be confined to political succour for an ideologically like-minded state or sub-group.

A shatterbelt is thus, a classic illustration of geopolitics and geo-strategic posture that is produced from the causal interrelationship between geographical realities such as its sensitive location on the map, strategically favourable access and the presence of vital mineral resources such as oil and gas, the location and size of opposing nations, and the application of external sources of power and coercion. An important feature of shatterbelts, in keeping with the geographical and spatial dimension of the manifestations of rivalry, tension and the outbreak of open armed conflict, is how conflict can spread and diffuse across borders – a form of *conflict osmosis*. This facet of shatterbelts is examined by Kirby and Ward who posit that where there are regional groupings of states that have common borders and are prone to conflict with one another, tensions can be transmitted to neighbouring states within the shatterbelt.[54] Similarly, Most and Starr also concluded that an extant conflict or major war in

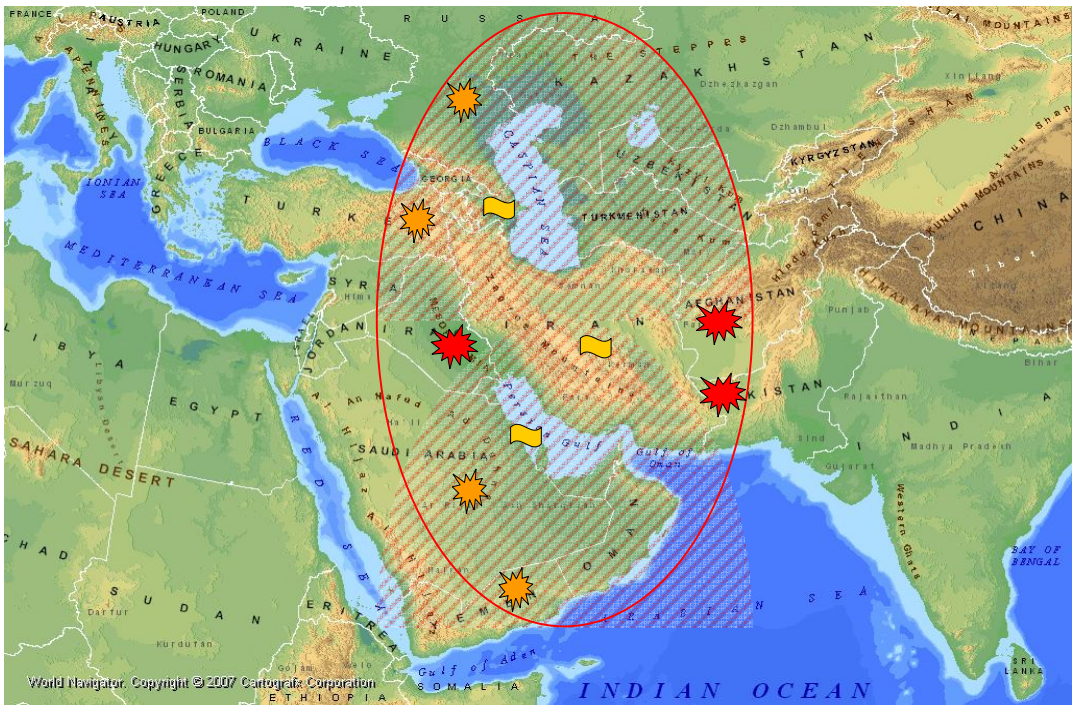
one state increases the chances of conflict in its neighbour.[55] Today, the wars in Iraq and Afghanistan, both important countries for the production, transport and potential future transport of oil and gas in Asia, are impacting on the national security of other petroleum-rich or vital gateway states such as neighbouring Saudi Arabia, Syria, Turkey, Iran and Pakistan.

The above clearly explores the existence and causal logic of shatterbelts during the era in which the term was coined – the Cold War. Indeed, given the strength of the ideological cleavage between the superpowers and their immense capacity for power projection it is no surprise that shatterbelts arose; even in areas in the strategic margins where their continental and maritime spheres of influence collided but which often contained no vital resources as such. However, does this phenomenon exist in the contemporary geopolitical and geostrategic environment where there is only one remaining superpower and several major powers of varying and changing capabilities? The void left by the monolithic ideological divide as the impetus for great power intervention has been filled by the presence of strategically vital resources in certain parts of the world. This is where the combination of strategic location and large natural resource bases within the separate ERTs - the Persian Gulf and the Caspian Basin/Trans-Caucasus regions - give rise to today's most prominent and important shatterbelt. Indeed, some commentators have even fused these shatterbelts into one; a region that Kemp and Harkavy have referred to as the 'Strategic Energy Ellipse' (SEE).[56]

Strategic Energy Ellipse

The SEE extends along a north-south ellipsoid axis from the Russian oil and gas fields at the northern margin of the Caspian Basin to southern extent of the Arabian Peninsula. Along its broadest west-east axis, the SEE extends approximately from the nexus of the Iraqi-Syrian-Turkish borders in the west, eastwards to the conjuncture of the Afghanistan-Uzbekistan-Turkmenistan borders. I have slightly expanded the SEE set out by Kemp and Harkavy to also include some vital petroleum conduit states. Thus from a sovereign territory perspective, the SEE includes: Afghanistan, Armenia, Azerbaijan, Bahrain, Georgia, Iran, Iraq, Kazakhstan, Kuwait, Oman, Pakistan, Qatar, Russia (Caucasus & Caspian region), Saudi Arabia, Syria Turkey, Turkmenistan, the United Arab Emirates, Uzbekistan and Yemen. Though clearly not all of the territory of all these states is located inside the SEE, the petroleum-bearing areas within it contain over 70% of the world's proven oil and gas reserves. [57]

Fig. 2.3 Strategic Energy Ellipse-Shatterbelt



War:
Severe crisis:
Crisis:

When considering major sources of petroleum and those countries that are currently strategically vital as conveyance corridors, parts or all of the following states are germane: Azerbaijan, Georgia, Iran, Iraq, Kazakhstan, Kuwait, Qatar, Russia, Saudi Arabia, Turkey, Turkmenistan, the UAE and Uzbekistan. Important future pipeline conveyance corridors could include Afghanistan and Pakistan.

Viewed as a shatterbelt, the SEE comprises numerous countries that are either involved in active wars and conflicts or suffer from histories of existential, latent conflict and insecurity. The issue of conflict will also be examined in later sub-section that addresses conflict and petroleum specifically. According to the Heidelberg Institute for International Conflict Research's *Conflict Barometer 2010*, Afghanistan, Iraq and Pakistan are in a *de facto* state of 'war', whilst the following states are in a state of 'severe crisis' with regards to high-intensity violent conflict: Russia (insurgency and terrorism in southern Caucasus region – Dageshtan & Ingushetia), Saudi Arabia (terrorism and conflict near the Saudi Arabia-Yemen border region), Turkey (terrorist threats from Kurdish separatists) and Yemen (terrorism, insurgency with Houthis rebels, and friction with secessionist south). Bahrain and Iran are in a state of 'crisis'.[58] [The definitions for the conflict types are given in the end notes.]

Viewed through a more generic political risk lens, countries within the SEE also score highly in terms of extant and potential risk for war and civil war, riot and civil commotion, terrorism and political interference. According to *AON's 2011 Political Risk Map*, countries that are deemed 'very high risk' include: Afghanistan, Iran and Iraq. Armenia and Pakistan are categorised as 'high risk', whilst Azerbaijan, Georgia, Kazakhstan and Turkmenistan are regarded as 'medium-high' risk states.[59]

The complexities and dangers inherent in the SEE shatterbelt encompass and impact variously upon facets within numerous case studies and countries examined in the reserves, exploration and production and conveyance chapters in this project. These include: exploration and production projects in Iraq, Iran, Saudi Arabia, and Qatar; pipelines in Azerbaijan, Georgia, Russia, Kazakhstan; and maritime conveyance challenges in the Persian Gulf, the Straits of Hormuz and Bab al Mandeb. There are extant tensions between the following states: Iran and Iraq; Saudi Arabia and Yemen; Afghanistan, Iran and Pakistan; Russia and Georgia; Turkey and Iraq; and between Iran and several of the countries within the Gulf Cooperation Council. There is existential friction between Sunni and Shiite Muslims in Iraq, Saudi Arabia, Bahrain, Iran and Yemen, and notable terrorist threats in Yemen, Saudi Arabia, Iraq, Turkey, Russia, Pakistan and Afghanistan. Furthermore, the SEE has long been the setting for potential great power rivalry and competing interests variously between the United States, Russia and China, which are driven by, and impact directly upon, the petroleum resources and industry in states in the Caspian, the Caucasus and the Persian Gulf.

Flashpoints and Chokepoints

Related to the concept of chokepoints within geopolitics literature, a flashpoint refers to a single state, land area, or sea area that is itself disputed in terms of its sovereignty, or is the site of an existential ethno-politico, political, religious, strategic, resource or national dispute to the extent that it could provoke violent conflict; one that could also impact on the security of surrounding spaces. They are distinct from shatterbelts due to their much smaller geographical scale and because their transition to instability, conflict or violence does not necessarily obviate great power intervention or result from it. Nevertheless, the consequences of tensions and violence ignited within in a given flashpoint can indeed radiate outwards and induce geopolitical problems in other areas. Ewan Anderson, who has focused specifically on the concept of flashpoints in his work, suggests that they tend to be small geographical spaces

that constitute 'the epicentres of geopolitical upheaval with consequences that can extend far beyond their point of origin'.[60]

In the context of this project, of the 123 global flashpoints[61] identified by Anderson, 32 can be identified as located in oil and gas producing areas and countries, or are located near to, astride or at the junctures of primary pipeline routings or SPSs in the Asian and Indo-Pacific realms; examples of these include: the Caspian Sea; the East China Sea (Chinese and Japanese EEZ demarcation) (see earlier section concerning boundaries); Lomonsov Ridge sovereignty (Arctic Ocean); Nagorno-Karabakh; Paracel Islands, the Shatt al Arab waterway; the Timor Sea, and the Tunb Islands and Abu Musa Island. High profile potential examples include the Spratly Islands, the Straits of Hormuz, Bab al Mandeb, the Suez Canal and the Malacca Straits. Thus, in this way, some flashpoints are also sometimes synonymous with chokepoints.

Some flashpoints have triggered open conflict such as the dispute over the Shatt al Arab Waterway, which was arguably a pretext for Iraq's attack on Iran in September 1980. However, others such as the Tunb and Abu Musa Islands dispute between the UAE and Iran, and the Spratly Islands dispute are persistent concerns but are more latent in nature.

Spratly Islands Dispute

The Spratly Islands are a collection of over 750 islands, islets, cays and reefs located in the South China Sea between Brunei, China, Malaysia, the Philippines, Taiwan and Vietnam. Though the Spratlys comprise less than 4 sq km of land area, the group is spread over more than 425,000 sq km of sea area. The Island grouping is claimed by the five aforementioned states and Taiwan. The sovereignty dispute over what would seem initially as an unremarkable territory arises because it is the site of very important and highly-valued fishing grounds and the fact that it sits astride a strategic SLOC (also one of the primary SPS) linking South-east Asia and Singapore with the major north-east Asian economies. Over 50% of the entire world's VLCC and product tanker tonnage trading each year transits along the SPS that passes adjacent to the Spratlys, which makes the security and status of these waters of considerable geopolitical importance to China, Japan and South Korea. LNG shipments along this SPS total over 75% of the world's overall LNG trade,[62] which further elevates the strategic importance of shipping routes in this part of the South China Sea.

However, it is the oil and natural gas reserves (estimated at approximately 17.7 billion tons) in the area encompassed by the islands that is the most significant reason for rendering the Spratlys a petroleum-impact flashpoint. Were these resources deemed *proven*, they would constitute the fourth-largest single-area petroleum reserve in the world. As testament to the potential petroleum reserves in the area, the first major Philippine oil discovery occurred off the coast of Palawan in 1976, and the oil from these fields now account for 15% of all oil consumed in the Philippines. [63]

Since 1968, some 45 islands are (or have been) occupied by small military contingents from China, Malaysia, the Philippines, Taiwan and Vietnam, and there have been a number of low-level military clashes between China and other claimants to the Spratlys, mostly involving Vietnam and the Philippines during the 1990s.[64] In keeping with one of the key features of geopolitical flashpoints – the fact that they can serve as an epicentre for wider regional/area conflict – the Spratly Islands must now be viewed in the context of China's strategic goals for expanding its capacity to project power throughout the South China Sea. This has raised concerns amongst other regional states and the U.S., which has long been the security guarantor in the Western Pacific.

In March 2011, China reaffirmed its "indisputable sovereignty" over the South China Sea, including 'sovereignty over the South China Sea islands and their adjacent waters';[65] the Asian power has long asserted historical claims across the vast expanses of South Sea (as China refers to the South China Sea). During 2010, the U.S. intensified its attention regarding the South China Sea after China reportedly threatened ExxonMobil with retaliation (unspecified) if it continued oil exploration off Vietnam in waters China considers its own; a development that follows the harassment of U.S. surveillance ships by Chinese warships in the South China Sea in 2009.[66] In September 2010, China announced its opposition to plans by the Philippines to restore a military outpost on the Kalayaan islands in the Spratlys.

Despite the signing of the Declaration on the Conduct of Parties in the South China Sea 2002 in November of that year - a confidence-building and deconfliction protocol intended to lessen tensions between the claimants over the Spratly Islands - tensions still persist, and the combination of the ongoing territorial dispute and Chinese geo-strategic expansion and geopolitical claims in the South China Sea could fuel the chances of activating this flashpoint in the medium term.[67]

Chokepoints

In the context of the conveyance of crude oil, products and LNG or LPG by sea, there are few features of greater potential security concern with regards to their geopolitical status and stability than maritime chokepoints. In a maritime trading context, a chokepoint can be defined as a narrow sea passage (conduit) or waterway that bisects two land masses, such as a strait between two peninsulas or islands, or one that has been artificially created through a land mass, such as a canal. Physically, a chokepoint is such because the waterway's width and also in some cases its depth limits the size of vessels (length, breadth and displacement) and the volume of shipping that can safely navigate through it; this creates a potential trading bottleneck.

From a strategic and naval perspective, chokepoints were important features in Mahan's work on geopolitics. Central to Mahan's analyses was the notion that Britain's rise to hegemony had been enabled in part because 'she had exploited her location[s] across…sea routes'.[68] In articulating that chokepoints were strategic linking-narrows that were dominated by *point locations*[69], Mahan argued that it was unnecessary, indeed strategically improvident, for a state that aspired to dominate the maritime realm, to do so by having warships and coastal military power located throughout the world's oceans. All that was required was to strategically locate small, but highly trained and well-equipped forces and nodes of political influence at vital trading chokepoints.[70] Once such deployment had been established, the dominating state would essentially control the world's most important trading routes and strategic naval passages. During the Cold War, the U.S. Navy identified sixteen chokepoints[71] around the globe that were viewed as essential to the flow of raw materials, supplies, [military materiel] and goods to Western states.[72] Many of these are common to the contemporary global trading routes of oil and gas by sea for all countries, not just the NATO powers.

Jean-Paul Rodrigue's perspective on chokepoints provides useful clarity and analytical utility when considering the geopolitical nature of chokepoints both in terms of commercial trade and strategic importance; both of which resonate clearly with the strategic nature of the flow of petroleum and the means by which this flow can be protected or threatened by the use of military force. Essentially, he argues that there are three concepts that define a chokepoint: its *physical characteristics*; level of *usage*; and, *access* to it.[73] Chokepoints, thus, become 'geopoliticised' for four main reasons that are related to Rodrigue's observation:

1. Because of the political nature and influence of the states on either side of the chokepoint and their relationship with one another (or a single state in the case of the Suez Canal, Panama Canal and the Bosphorus).
2. As a result of the chokepoint's practical and economic value to international shipping. In other words, does the chokepoint in question present the only connector between two maritime spaces (as is the case for the Straits of Hormuz and the Bosphorus), and what is the magnitude of distance, time and cost in cases of having to divert to another means of access (if one exists) in the event access to the chokepoint is compromised.
3. As a result of the chokepoint's strategic value to major and regional powers for expedient and unimpeded naval/expeditionary force deployment and power projection, and indeed the opposite of this – the ability of the adjacent or proximate states to hinder or deny such access.
4. Because of the sheer volume of trade that can and does transit a given chokepoint, which confers upon the strait or canal its *commercial strategic* significance to the world. Arguably, it is the conveyance of petroleum, particularly oil, which is of greatest strategic importance in this regard.

From a theoretical stance, the strictly military views of chokepoints are only of partial utility in considering contemporary significance of chokepoints to maritime trade, and some of the nuances explicit and implicit in the flow of oil and gas through certain parts of the Indo-Pacific realm. Though the inescapable geographical and navigational axioms remain, *all* oil-exporting and consuming states that rely on maritime trade are stakeholders in the integrity and essential neutrality of chokepoints rather than just past hegemons and current great powers.

It is essential thus for all maritime trading states to have the right of free transit passage for commercial shipping through these vital waterways. In some cases, these rights are provided for in international Maritime Law under special treaties that apply to specific waterways: for the Bosporus (Montreaux Convention of 1936); for the Suez Canal (the Convention of Constantinople of 1888). For others, such as Hormuz and Malacca, right of free passage is facilitated under Section 2 of the United Nations Convention on the Law of the Sea (UNCLOS).[74]

From a normative perspective, international maritime law provides protection for transiting shipping from the potential coercive or punitive behaviour of adjacent states. In theory, such

protection is available to the international community under the umbrella of collective security. However, in practice, contemporary notions of geopolitics with regards to chokepoints are rather more complex and potentially rather more realist in nature. States that control access to vital chokepoints can deny access to others if it becomes a strategic necessity, such as in the case of Egypt's closure of the Suez Canal during the 1967 Six Day War. The Strait of Hormuz, the world's most vital petroleum chokepoint, has been threatened repeatedly by Iran when regional tensions have escalated, most notably during the Iraq-Iraq War. The strait is examined in greater detail in this regard in chapter five; both in its role as a conduit for petroleum cargoes; and, for its status as geopolitical feature and potential strategic target in times of war.

Gateways

Gateways are usually small states or significant urban-industrial-trading nodes strategically located so as to link different regions or that link sea-trading access to land-locked or continental interiors. They serve as a strategic economic 'bridge' between sources of raw materials and manufactured goods and markets. For Cohen, though they vary in detail, his selection of seventeen 'Gateways' around the world,[75] 'play a novel role in 'facilitating the exchange of peoples goods and ideas…[Though] small in area… and frequently lying athwart key access routes, Gateways usually possess highly specialised natural or human resources upon which export economies can be built'. [76]

In contextualizing current and possible future gateways as features of the international petroleum production and transportation system, Cohen's work is a good point of departure; however, it is worth expanding the concept to give it a little more relevance in terms of non-state and transnationalist features and moments. In Demko and Wood's *geopolinomic world*, strict geographical patterns of states, regions, city-states and boundaries are supplemented or even supplanted by more transnational communications and exchanges, reflected in the activities of multi-national corporations.[77] Decisions regarding the locating of production, trading, banking, and business facilities are founded upon financial networks and services, magnet-areas for foreign direct investment, advanced communications infrastructure, aggregations of skilled labour, and in-flows and convergences of information and ideas. Demko and Wood also posit that in a *geopolinomic* environment, existing nodes of politico-industrial/trading activity based on state-centric phenomena are weakened in a relative sense by the increased 'internationalisation of capital and the accelerating flow of information'[78] via advanced, endemic telecommunications technology. These 'traditional' entities, they argue,

based solely upon territorial geopolitical variables may be diluted or undermined or under the weight of the technological forces associated with globalisation.[79]

Though Demko and Wood did not refer explicitly to the notion of gateways *per se*, their discussion of nodes of activity offers some implicit commonality with Cohen's work. However, I disagree with their idea that the forces in a *geopolinomic* world erode the significance of the geographical forces that are intrinsic to the creation a *geopolitical* feature such as a petroleum gateway. These centres must be geographically located to take advantage of sea, air and land transportation networks. Furthermore, nodes by definition must service both sources of material supply and regions of consumption. In the case of the production and trade of a physical resource such as oil and gas, notwithstanding the cutting-edge technology that now pervades these processes, this makes physical access and relative location to sea lines of communication as important as cutting-edge information technology.

Though not specified by Cohen as such, several *petroleum gateways* exist in the world and there are several likely emerging ones. Moreover, they need not necessarily be states or city-states to function as such; in this way, Demko and Woods' favouring of the competing relevance of non-state forces and globalisation also offers a relevant contribution. Current petroleum gateways around the world include: New York/New Jersey; the Houston-Texas City-Galveston conurbation; Rotterdam; Singapore; the Ras Tanura-Juaymah-Abqiaq complex, Baku in Azerbaijan, Novorossiysk on Russia's Black Sea coast, Port Harcourt in Nigeria, and the Ceyhan Marine Terminal in south-eastern Turkey. However, it is the emerging (and potential) petroleum gateways that are also important drivers of petroleum geopolitical phenomena, particularly in Asian and the Indo-Pacific spaces. They include: the UAE; South Korea; Pakistan; Sikka and Jamnagar in India; Yan and Bachok in Malaysia; Ningbo and Qingdao in China; and Russia's far eastern Pacific coast. Geographical proximity to chokepoints and transportation infrastructure leading to enclosed hinterlands, access to SLOCs (SPSs), technology, communications, finance and skilled workforces (industrial, engineering and business services) all combine to render these gateways as pivotal features of the contemporary petroleum geopolitical landscape.

In chapter six, the case study that assesses Singapore as a petroleum trading hub for Southeast Asia, linking sources of crude from the Persian Gulf with markets requiring refined products, distillates and petrochemicals, considers features that combine to make up a petroleum gateway. Indeed, it is argued that Singapore is a leading example of what a petroleum

gateway should be or incorporate: It is strategically located at the primary maritime trading juncture between the Indian and Pacific Oceans; it has massive storage and refining capacity; numerous deep-water berths and loading/discharge facilities for tankers; a well-educated and experienced work-force; comprehensive communications infrastructure; it is a world-renowned banking, finance and shipping hub; and has a stable and effective government that provides comprehensive security for the country and the surrounding waters.

Effective National Territory and Effective Regional Territory

ENTs and ERTs are defined by Cohen as: 'moderately populated areas with favourable resource bases'[80] within the confines of a nation-state or an area that might transcend more than one or more states within a given region. A resource base in this context are concentrations of natural resources (such as oil and/or gas), an educated workforce (both indigenous and migrant), communications networks, trading infrastructure (import/export terminals), strategically favourable geographical location, and sufficient sources of power (electrical) for industrial activity. ENTs/ERTs are either already industrially mature or have the potential for commercial, business and trading development. As such, they are loci for large-scale resource extraction and production and the evolution of associated economic-development and population aggregations. For Cohen, their relative capacities correlate directly with their future potential.[81]

As before, Cohen has struck upon and defined a useful geopolitical feature, but not really investigated it as a specified feature nor identified ENTs or ERTs of importance and placed them in a causal or correlative context with other geopolitical, economic or industrial phenomena. However, this is not to say they are problematic to identify or extrapolate from as identifiable features within a petroleum resource and industrial context. Within the Asian and Indo-Pacific realms, important petroleum ENTs include: Samara, Perm, Volgograd, Astrakhan/Volga Delta, Stavropol, and Novorossiysk/Krasnodar in Russia; the Baku peninsula in Azerbaijan; the Atyrau-Makat-Kulsary-Sarykamys 'box' in Kazakhstan,[82] Qatar, Saudi Arabia's Eastern Province; and Abu Dhabi in the UAE. With regards to production and transportation of oil and gas analysed in the chapters that follow, I examine operations (and parts thereof) located in and/or associated with Azerbaijan, Kazakhstan, Qatar, and Saudi Arabia's Eastern Province as these are key spaces for some of the most important petroleum operations currently underway in Asia. Additional geographical detail and geopolitical inclusion is given below for strategically vital ERTs that are central to several case studies examined in the chapters that follow. They include:

1. the western and southern Persian gulf coastal region incorporating Kuwait, Saudi Arabia's Eastern Province, Bahrain, Qatar and the UAE;
2. the crescent-shaped oil field/refining/export amalgam in the eastern and northern parts of the Persian Gulf that stretches in an arc from Bushehr to Ahwaz to Abadan in Iran, and westwards across the Shatt al Arab Waterway to the Tigris/Euphrates confluence and Muftiah and Basrah in Iraq;
3. and, the Caspian Sea petroleum producing region incorporating Azerbaijan, western Turkmenistan, Kazakhstan and Russia.

Chapter six examines a very good example of a petroleum ENT – Qatar; a state that is now the world's primary source of LNG. Though it was discovered in 1971, the full scale and export implications of the reserves in the North Dome gas-condensate field became clearer in 1989 when phase one production first started. However, despite a comparatively gradual start to the development of Qatar's gas production, it was the acceleration of LNG production and export by Qatargas and Rasgas from the Ras Laffan Industrial City that demonstrated how the country had utilised its full potential as an ENT to become an LNG producer and exporter of strategic proportions. Though Qatar has existential qualities and features that enabled its evolution as a petroleum ENT – massive resource base (gas-condensate and crude oil), strategic location, educated indigenous workforce and secure political environment for investment – is was the investment in and development of offshore gas production, the expansion of skilled migrant professionals, the expansion of power and communications facilities, and the construction and growth of LNG production and export infrastructure that has cemented Qatar's status as a petroleum ENT with global influence in the energy market.

Petroleum ERTs have similar attributes as their national-scale counterparts; however, there are often vital distinctions, the most obvious of which is a lack of political homogeneity or congruence, a far larger geographical extension and correspondingly complex geopolitical ontology. This project has variously examined parts of the three ERTs mentioned above, which collectively make up virtually all of the Persian Gulf region's petroleum producing space and the Caspian Sea. All of the ERTs lie within the strategic energy ellipse and, as shown previously, contain over two-thirds of the world's proven petroleum reserves.

However, though they are 'effective' in several important ways – suitable communications and trading infrastructure (terminals and means of conveyance), favourable geographical location, and sufficient sources of industrial power, this effectiveness is diluted in some

respects: historically there has been a lack of sufficient indigenous skilled labour to exploit resources without foreign oil industry professionals and investment; and, there are persistent concerns regarding geopolitical stability given that they are located inside a shatterbelt, particularly in the Persian Gulf's ERTs. Nevertheless, despite this latter existential reality, the petroleum value of these ERTs to the world's economy continues to mitigate against seemingly insurmountable security and geopolitical obstacles, not least the occurrence of several major wars.

The geopolitical features examined in this section constitute a group of important phenomena in terms of the *physical* geographical settings for petroleum resources and various oil industry activities and functions; indeed, as shown in differing ways they are often key to shaping these functions. However, other concepts and processes, state and non-state alike, are also highly significant as geopolitical determinants and as means of analysis in the context of modern petroleum processes, such as resource nationalism, mercantilism, transnationalism and extraterritoriality, and it is to these that I now turn.

2.3.5 State & Non-state Concepts

Resource Nationalism and Mercantilism

Since the beginning of the 21st century, the notion of strategic resources (such as oil and gas) and the need for those states that had significant reserves to maintain or regain sovereign control over those resources and means of production began to feature prominently within the petroleum industry and in commercial and academic discourse. Nationalisation and re-nationalisation of hydrocarbon resources located in a given state is certainly not new, and numerous important petroleum-producing states nationalised their oil industries during the 20th century: the Bolshevik Russia in 1918, Mexico in 1938, Iran in 1951, Iraq in 1961, Burma and Egypt in 1962, Indonesia in 1963, Abu Dha bi in 1971, Nigeria in 1971, Venezuela in 1976 and Saudi Arabia in 1980.[83]

Prior to nationalisation most oil-rich countries needed U.S. and European finance and technology to exploit their reserves and consequently these foreign companies controlled the oil and its production despite it being inside another sovereign territory. However, as oil use became globally prolific and as it also became the primary income generator for producing countries, the need for these counties to nationalise their oil industries was both logical and inevitable. According to the Washington DC-based energy consulting firm, PFC Energy, today only some 7% of the world's estimated proven petroleum reserves are located in

countries that allow IOCs free access and equity stakes, whilst 65% of the remaining reserves are fully under the control of the state or NOCs.[84]

Resource nationalism is the inclination of governments to assert (or reassert) sovereign and operational (if desirable or possible) control over natural resources, such as petroleum) located on their territory. The concept is by implication clearly associated with the decreased influence over previously controlled resources previously controlled or even owned by IOCs or foreign NOCs.[85] Though nationalisation as a concept per se is infrequently associated with geopolitics in theoretical literature, in the context of resources and territorial sovereignty it is certainly germane. As an added theoretical refinement, resource nationalism, or the nationalisation (or re-nationalisation) of strategic resources is reflected in elements of mercantilism. Though nominally a phenomenon considered within International Political Economy (IPE), mercantilism is defined as the process by which the prosperity of a nation is dependent upon its acquisition and control of capital, thus a mercantilist government would ensure this acquisition by encouraging exports and controlling the volume of imports.[86]

In the modern petroleum industry environment, Robin M. Mills suggests that: 'the modern breed of mercantilist seeks to secure oil supplies for their countries by buying oil assets'.[87] In this way, it can be seen that there are two kinds of state mercantilist in the petroleum world: those from consuming countries that seek access to equity stakes in another state's oil and/or gas reserves and the means of production (such as China, Japan and India); and, those petroleum exporting countries that seek to retain (or regain) state control over their natural resources (such as Iraq, Iran, Saudi Arabia and Russia), otherwise referred to as the 'resource nationalists' highlighted earlier in this section.

Chapter four examines the issue of resource nationalism in some detail as it relates to Iraq and in particular – Russia, which alongside Venezuela, became the one of the states most widely associated with the re-acquisition of control over its oil and gas and the means of production at the expense of foreign IOCs during the first decade of the 21st century. Aside from regaining control over a previously privately-held oil Russian company, Yukos, once controlled by the former oligarch, Mikhail Khodorkovsky, the most well-known cases involving the government's reacquisition of vital reserves of oil and gas and their means of production involve the giant Siberian Kovykta gas field, once controlled by TNK-BP,[88] and the Sakhalin II LNG project off the Russian Pacific coast in which Shell was formerly the largest shareholder.

Two other important petroleum actors also exist within the state-level realm – national oil companies (NOCs) and a recent evolution of the latter – the new breed of 'internationalising' NOCs or INOCs. However, their behaviour and roles in the international oil industry arena reveal a more nuanced, even hybrid approach in exploration and production and/or distribution projects. Though NOCs are of course managed by the parent state government, which is also the majority stake-holder, many of the most prominent and influential companies must conduct their affairs in ways more reflective of IOCs so they can generate better profit margins and remain competitive by harnessing leading-edge technology, optimum scales of business efficiency and management. In this way NOCs from China, Japan, Brazil and Malaysia are better configured and adapted to seek deals and partnerships with other NOCs and IOCs in foreign companies. This is reflected in the operations of Russia's Gazprom and Rosneft, and Norway's Statoil; which have interests in several of the Sakhalin projects and the Shtokman gas field.

The new breed of super NOCs or INOCs have refined previously state-dominated operating and management philosophies, and as they have 'internationalised' themselves with ever expanding global upstream acquisitions and partnerships they have adroitly fused their potent state funding reserves with cutting-edge commercial business acumen more reflective of the transnationalist practices and philosophies of the super major IOCs. INOCs such as PetroChina, CNPC, Petronas, Gazprom, and Petrobras have thus been using their very strong capital reserves and balance sheets to acquire increasing market share previously held by smaller NOCs and IOCs.[89]

Paradoxical Fusion: Transnationalism, extraterritoriality & states - state-INOC-IOC alliances

Given the fact that *physical* geographical variables are intrinsically linked to the fact that oil and gas deposits are located inside sovereign state boundaries and territorial waters as discussed earlier in this chapter, one could be forgiven for leaning towards a state-centric view of geopolitics as a the dominant means of analysis. However, as highlighted in the previous section, there are important actors within the international petroleum industry – IOCs and evolving INOCs – that necessitate the inclusion of elements of transnationalist, pluralist, and mixed-actor views of geopolitics. This inclusive approach lessens the chances of not to falling into what Agnew and Corbridge identify as the 'territorial trap'.[90]

The vital message posited by Agnew and Corbridge in their analysis of the territorial trap is that geopolitics has changed to the extent that fixed notions of territoriality and control over the flow of once state-controlled capital, ideology, technology and skilled labour, have given way to a more transnational, geopolitically-emancipated flux of these phenomena. However, they caution against the 'dangers of hypostatizing the territorial state at a time a rapid deterritorialisation of the global political economy'.[91] In other words, there still remain some fundamental features, some inescapable ontological truths of territoriality and sovereignty that govern important parts of oil and gas geopolitics and operations - how it is accessed, produced and transported. However, the geopolitical interpretations above have some compelling cogence when applied to the logic governing a fungible global petroleum market, transnational operations of IOCs and INOCs, and the endemic flow of petroleum-related capital, technology and skilled labour.

The capital, technology and expertise required to locate, extract, transport and purchase oil and gas also flows transnationally. Given the issue at hand, vis-à-vis the placement of the global petroleum systemic amidst a more nuanced embrace of geopolitical thought and processes, some important common logic comes to light. Overlapping sovereignties and networks of power have enabled IOCs to establish operational footprints in most of the most important sources of oil and gas supply, and the routes via which they are exported. In relation to NOCs and INOCs, it would also be fair to say that the influence of their parent governments also contributes to their ability to do operate in foreign regions.[92]

Interestingly and rather ironically, however, during the last decade this phenomenon has also enabled the ascension of INOCs (such as Gazprom and Statoil) in terms of both power and greater global presence (even inside other sovereign territories) at the expense of once dominant IOCs such as Royal/Dutch Shell, BP and Total. 'Market (and market access)' has widened the playing field across sovereign borders in which IOCs and INOCs can acquire reserves, market their products, and profit operationally from (and be regulated by) intergovernmental or multilateral bodies. The 'circuits of capital' have freed the industry from the yoke of solely government sources of capital for new operations. Now, the rapid arbitrage of commodities, the rise of hedge funds as important players in the petroleum industry, and the dynamism of the global oil market have also enabled more aggressive investment in the exploration of once prohibitively expensive or 'stranded' reserves.

These processes have allowed IOCs to both flourish and suffer as INOCs in particular have began to dominate using the paradoxical pairing of nationalisation and globalisation. As shown earlier, the nationalisation of petroleum resources in an era of sustained high prices for oil, has boosted once stagnant and declining oil-based economies. This phenomenon has taken on strategic significance for Russia as it used this sustained inflow of petrodollars to try and recapture its previously waning great power status. However, transnationalism, on the other hand, has enabled INOCs to participate with IOCs and NOCs inside both their own countries and other sovereign spaces to exploit reserves.

A good contemporary example of this is examined in chapter four - the project to develop Russia's Shtokman gas-condensate field in the Barents Sea. The complexion of those INOCs and IOCs that were in contention to partner in the project, and the processes that resulted in the triumvirate of Gazprom (INOC), Statoil (INOC) and Total (IOC) that was eventually formed to develop Shtokman is very reflective of many of the transnationalist, state-centric and internationalising variables examined above. As the case study reveals, initially Russia wanted to develop Shtokman alone thereby retaining total sovereign control of the gas and all the profits. However, it preferred to lessen the initial E & P costs and risks by accepting Statoil's financing, and also sought the Norwegian company's technical expertise in production in harsh offshore environments. In addition to its investment share, Total was selected to organise the overall design, financing, construction and operation of the project.

This pioneering and complex gas production project essentially binds together a state and its leading INOC, a foreign INOC from a neighbouring state with which it had until recently a territorial dispute in the Barents Sea very close to the site of the Shtokman field, and a French IOC. Currently, Gazprom owns 51% of Shtokman Development, whilst Total and Statoil have 25% and 24% shares respectively. Shtokman Development will own the infrastructure for 25 years from field commissioning. However, upon completion of phase one, the French and Norwegian companies will transfer their shares in Shtokman Development AG to Gazprom.

The processes and influences of nationalism, mercantilism, transnational movements of capital, knowledge and technology and notions of extraterritoriality as they impact upon the process of the industry and influence the behaviour of key states and companies occur for the most part in times of general peace amongst nations. However, they can and will become more forceful and complicated in times of tension or conflict. Additionally, they are more

frequently assessed by those observers debating over the state of petroleum resource scarcity and geopolitics. These issues are the focus of the next section.

2.3.6 Resources, Security & Geopolitics

Resources, geopolitics and conflict

Paul F. Diehl suggests that the study of geography and conflict within geopolitics has had two main foci: Firstly, the notion that geography (land and sea areas and relative locations of terrestrial and maritime spaces) is a variable in and of itself for *enabling* and shaping conflict; in other words, the provision of a battlefield. Secondly, that the notion of geography is itself a source or *cause of* conflict.[93] As this observation relates to non-renewable resources in particular, these foci are obviously interrelated. Secondly, conflicting actors cannot engage without somewhere to do it, and logic dictates that there is no point in engaging in conflict within a given geographical space unless there is something worth fighting over – the space itself (or part of) or something (e.g. a resource) contained within it. Thus, in the context of petroleum resources, conflict can arise over disputed terrestrial or maritime space because there are important reserves of oil and gas located within it, and/or because that space (or an area proximate to it) is vital to facilitating secure extraction, processing, loading and transportation.

In chapter six, the case study that assessed the narrative and implications of the Tanker War as both reflections and determinants of Persian Gulf and petroleum geopolitics is arguably the best modern example of petroleum resource supply security and geopolitics amidst a major war. The geopolitical context, implications, drivers and outcomes of the Tanker War with regards to Persian Gulf oil is addressed thoroughly in the case study; however, some observations and projections regarding war and conflict in general and petroleum are warranted.

Firstly, as the Tanker War shows, conflicts involving petroleum will not necessarily be triggered by or fought over these resources *per se*. Nevertheless, such resources - the access to them and particularly their means of production and distribution, will inevitably become a feature of a major war. This is especially so if the petroleum resources by one or both sides are significant as in the case of Iran and Iraq. Oil and gas fields, production and processing infrastructure (well-heads, drilling rigs, production platforms, gas-oil separation plants and refineries) and means of conveyance (pipelines, pumping stations, loading/discharge terminals and tankers) are strategic targets in war. This is particularly true of inter-state wars

but it also applies to intra-state conflict, such as the war in Chechnya in the 1990s. Targeting petroleum producing, processing and transportation infrastructure is a means of applying strategic effect in war and can diminish an enemy's means of funding its war effort or using its refined petroleum for war-fighting (e.g. marine diesel, gasoline and jet fuel).

Secondly, as resource and conflict study shows, if attacking petroleum resources has been determined as a primary objective of a military strategy then approach can be used to theorise as to where such conflicts could arise in the future. This process could include an analysis of several key themes: the location and typology of a state's own resources (oil and/or gas deposits); whether these resources are actually in production; where necessary extra sources exist; and, which other regional powers might have an interest acquiring or controlling these sources? In this way, academics and policy-makers can contemplate where future resource wars might likely occur, what states or actors might be involved, and the potential scale of such a conflict? Conversely, this process can be applied to the study of how such conflicts might be avoided or how competition over resources could be turned into cooperative, shared access and production schemes. This also leads us to examine the interrelationship between resources and geo-strategy.

Resource security, scarcity and geo-strategy

Geo-strategy is a subfield of geopolitics for which there is no standard definition. However, most definitions have similar logic that essentially binds strategic posture and considerations of geopolitical factors. Thus a working definition for the purposes of this analysis is as follows: Geo-strategy can be seen as the form, orientation and affectation of political and/or military objectives by a state as determined by the geographical and geopolitical variables within or across a given space. Geostrategic posture by states and geostrategic variables with regards to resources, in particular oil, are thus arguably symbiotic by definition.

Thomas F. Homer-Dixon has written extensively on the correlations between the quantities of remaining non-renewable resources juxtapose human requirements, and suggests that conflict over these resources is inevitable. In founding his conclusions upon numerous case studies around the world, Homer-Dixon found that states have generally conflicted more over non-renewable resources rather than renewable ones such as water, agricultural land, forests and fisheries.[94] For Homer-Dixon, therefore, access to non-renewable resources such as oil and gas is synonymous with, and indeed essential to, the maintenance and evolution of state power. As an adjunct to this, notions of resource scarcity or declination within a state, a

region (particularly a shatterbelt) or even in the entire planet will precipitate economic deprivation and social tensions that could in turn lead to political pressures and even the weakening of state cohesiveness and/or regional stability. This connects with governmental drives to preserve control over petroleum resource bases that are indeed finite and critical for export earnings; earnings vital for the integrity of the state's economy, such as is the case for Russia and Iraq as shown in chapter four.

Philippe Le Billon, in a concise but incisive essay – *The Geopolitical Economy of 'Resource Wars'* – manages to explore the intra-state and the inter-state geopolitics of resource conflict so as to show the two environments as both discrete and as interconnected in terms of their impact upon one another.[95] This produces somewhat of a linear demonstration of how geopolitics operates at different levels of analysis as it pertains to the drive to access sufficient resources for state survival and/or expansion. Le Billon reflects on how Western geopolitical posture concerning resources has been dominated throughout history by 'the equation of trade, war, power, at the core of which were over-seas resources and maritime navigation'.[96] The priorities of Western powers with regards to ensuring access to vital resources in this context was demonstrated by their eventual involvement in the Tanker War in 1987. More recently, China has clearly demonstrated its posture in this regard through its claims to the South China Sea and parts of the East China Sea. Both of these cases are examined in chapter six.

From the mercantilist period of the 15th century, when trade and war became more logically and closely related, to the colonialist and imperialist eras of the 18th and 19th centuries that highlighted the need to protect the trade routes that connected resource-rich colonies with industrialising powers, to the world wars and Cold War that saw the drive to ensure access to strategic supplies of petroleum to fight wars and ensure superpower capability, conflict over resources and the spaces they were transported via was a singular feature of geo-strategy.[97]

There are three important manifestations of this perception that are significant:

1. Firstly, are the wide ranging perceptions, informed or otherwise, regarding the physical level of remaining oil and gas reserves in the world, and the perceived putative or future ability of actors inside and peripheral to oil producing regions to control the flow-rate of that oil, which determines pricing.
2. Secondly, perceptions by major consuming states that as access to easily recoverable and cheaply-produced oil diminishes over the coming decades, the need to secure

sources by whatever means necessary from even the most unstable of oil-rich states and in frontier regions will be overwhelming, such as in the Arctic. This means that the level of political and security risk likely to be tolerated will increase, as will the preparedness for commensurate 'acceptable' levels of conflict and perhaps even violence, as actors compete with one another for these resources in keeping with Homer-Dixon's model.

3. Thirdly, as IOCs face increasing pressure to maintain 'booked' reserves and production capacities wherever they can, their experiences of governmental behaviour (whether seemingly accommodating and benign) in the source-country *at the time of the agreement* to develop nationalised reserves must not obfuscate their continued assessment of the government's attitude to the partnership as it matures. Concerns over remaining levels of proven and probable reserves and sustained high prices will tempt governments into a less cooperative stance and could result in reneging on prior agreements. This is already happening in some countries and is likely to increase. For well-endowed states, their resource bases are the facilitator for maintaining and expanding state power and influence; as demonstrated by Russia in its acquisition of a controlling stake in the Sakhalin II project.

The work of the American scholar, Michael T. Klare, centres chiefly on the correlation between competition among states over access to critical resources (and the states and regions in which they are located) and violent conflict.[98] I include a review of some of the most fundamental and relevant aspects of his analyses not only because of the importance of their contribution to the understanding of petroleum and geopolitics but also because his views represent arguably the most realist and certainly the most pessimistic assertions of future trends regarding inter-state conflict over access to sufficient supplies of diminishing reserves.

Klare's most fundamental argument is that given its strategic value to economic security and the maintenance of state power, of all the resources in the world, it is oil that is the most likely to induce conflict. He reasonably posits that given no industrialised society can currently function without it; if supplies were threatened, crisis would ensue. In extreme cases this would provoke the use of military force. Though I disagree with the seeming inevitability of the latter outcome, the logic of his argument is both reasonable and proven in history. For Klare, the future picture is bleak: 'Big or small, conflicts over oil will constitute a significant feature of the global security environment in the decades to come.'[99] He suggests that the three regions most likely as settings for future conflict over access to petroleum are the

Persian Gulf, the Caspian Sea basin, and the South China Sea, drawing in the U.S., Russia and China as the pivotal outside powers respectively.

Notwithstanding the seriousness of the possible outcomes revealed in the theoretical models and perspectives examined above, this must be tempered by an alternative, more sanguine, analysis of the environment in which governments, NOCs and IOCs react to geopolitics as it pertains to types, locations and quantities of petroleum. Given that oil and gas are essentially fungible commodities and that these resources are traded in a global and regulated market available to all, it is important to challenge the bleaker picture of a mercantilist grab for petroleum at the expense of others. The logic of a collective security dynamic is formed by the interrelationship between states that have resources and those countries and IOCs that have the necessary E & P technology but few reserves of their own.

The theoretical perspectives examined above are rich in geopolitical thought and geostrategic logic, and elements of them have been reflected in segments of the empirical case studies presented in this project: specifically, competition for access to petroleum in the Caspian and Central Asia; geopolitical tensions in the Persian Gulf; and, the Tanker War. However, it is essential to balance the pessimistic theorising of the seeming inevitability of a realist posture, characterised by the need of major powers to secure supplies of petroleum, with a more sanguine and collective security perspective.

It is true that in Eurasia the three influencing major powers – the U.S., Russia and China will seek to drive their geostrategic agenda with regards to ensuring they obtain and control as much supply as they deem necessary for their national security. However, this does not necessarily mean they will go to war to do so. In an interdependent, globalised and internationalised world, each of these powers and supplier-states has numerous mutually-dependent IOC/NOC/INOC partnerships. Thus, to go to war over the resources involved would also mean destroying the very projects that ensure a secure supply for each and all of these states. This also relates to pipeline projects; the development of which requires accord and cooperation between often multiple (sometimes competing) states, such as in the case of the CPC pipeline. Moreover, interstate conflict compromises the security of SLOCs upon which all states depend for their imports and exports. In the post-modern era, security of the seas is certainly more effectively guaranteed through collective security and international cooperation. This is evidenced by the multinational naval patrols currently deployed in the Indian Ocean to counter the piracy threat to shipping.

In contemplating the future, this project has exposed concerns over putative competition between states and massive petroleum reserves thought to exist in the Arctic. It has also considered the possibilities for conflict driven by competition to control oil and gas resources in the South China Sea, and the expansion of Chinese geostrategic ambition and capability. However, in regards to both of these cases, though geostrategic logic is seemingly compelling as a possible inducement of inter-state conflict for access and control over oil and gas deposits, in the first instance these reserves have not been 'proven'. Indeed, even if they were to be proven, the means to exploit them would necessitate international and transnational cooperation in terms of capital investment, technology, project management expertise, and sovereign territorial access and facilitation. Such cooperative, interdependent features and forces underpin the stronger logic a collective security approach for stakeholders that mitigates against seemingly or theoretically compelling realist logic of zero sum conflict over finite petroleum resources. These oil and gas resources are the underpinning of everything explored in this thesis. For this reason, it is this topic that is the focus of the first of the empirical study chapters that follow.

Notes

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[20] Calculations made using BP distance Tables
[21] *Ibid.*
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[45] *Ibid.*
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[53] James E. Dougherty & Robert L. Pfaltzgraff, Jr., *Contending Theories of International Relations, A Comprehensive Survey (Fourth Edition)* (Harlow, England & New York: Longman, 1997), p. 166
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[55] *Ibid.*
[56] Geoffrey Kemp & Robert E. Harkavy, *op.cit.*
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[58] Heidelberg Institute for International Conflict Research: **Manifest conflict:** stage preliminary to violent force, e.g.: verbal pressure, threatening explicitly with violence, imposition of economic sanctions. **Crisis:** a tense situation in which at least one of the parties uses violent force in sporadic incidents. **Severe crisis:** a conflict is considered to be a severe crisis if violent force is used repeatedly in an organized way. **War:** a violent conflict in which violent force is used with continuity in an organized and systematic way. The extent of destruction is massive and of long duration. See: Http://www.hiik.de/en/konfliktbarometer/pdf/ConflictBarometer_2010.pdf
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Straits of Gibraltar respectively) on which is sited a commanding military unit, or a warship or submarine patrolling in its midst.
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[92] Tom Bower, *The Squeeze: Oil, Money and Greed in the 21st Century* (London: Harper Press, 2009)
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Chapter 3 Oil and Gas Reserves

3.1 Why and to What Extent are Petroleum Reserves Geopolitical?

This chapter is concerned primarily with providing a concise analysis of what oil and gas exists, where and in what quantities. In so doing, this sets the context for ensuing chapters that address exploration and production and conveyance. This section considers: the status of generally accepted types, locations and volumes of proven oil and gas reserves; the significance and contribution of 'frontier' petroleum reserves; and thirdly, the implications of oil 'yet-to-find' or undiscovered reserves.

Before assessing the scale and significance of the world's major oil and gas reserves in the second main section of this chapter, it is worth considering what is *geopolitical* about this extraordinary natural resource when it is static – in other words – petroleum that has yet to be extracted, processed and transported. Indeed, is petroleum in *stasis* geopolitical, and if so, to what extent? I suggest that oil or gas deposits in the earth can be viewed as geopolitical in nature, or as having geopolitical value, by examining it in the following ways:

1. Because of what petroleum is – what it represents
2. Because of where a given deposit is located
3. Because of what quantity it is estimated to exist in, and whether it is *proven, probable* or *possible* in typology
4. By considering the geopolitical significance, or status, of oil juxtapose that of gas
5. By acknowledging that there is different geopolitical significance for reserves that simply exist (and reserves thought to exist) and oil or gas reserves that are actually in production; those that have been commoditised (or monetised).

3.1.1 The Nature of Petroleum

Once oil became the primary fuel for transportation and the fuelling for the modern military machines in the early 20th century, marked by major transitions such as Great Britain converting Royal Navy warships from coal-fired to oil-driven propulsion in 1912, and the initiation of the mass production of the Model-T ford in 1909,[1] it became geopolitical. This was fortified to a lesser extent as oil became the base component for the manufacture of plastics and vital petrochemicals and as a means of electrical power generation.

Oil was the means to drive and expand economies and in so doing expand state power and influence. Furthermore, as oil dominated the means of fuelling military vehicles, warships and combat aircraft it became a strategic resource for great powers.[2] For these reasons it became essential to establish where deposits of oil were located, gain and control access to them, extract it and transport it. Thus, the initial nature and magnitude of a reserve in a geopolitical sense was establishing that it existed. Any given sizable deposit therefore acquired *latent* geopolitical meaning or nature because of what it represented in terms of potential wealth for the nation in which it was located and for those that were able to access and produce it, and also in terms of the converted economic, political and strategic power that it would eventually represent.

3.1.2 Location

Oil and gas deposits become geopolitical in nature because of where they are located. Different countries and regions have distinct and varied geopolitical features and causal variables, all of which impact in various ways upon the nature of resources and the ability to access them. Important fields that are found in countries such as Norway, Canada, the U.S. and the UK that are politically stable, that are run with transparent and accountable governance and laws that codifies and protects ownership and contractual norms are valued by IOCs and NOCs alike.[3] Conversely, those states that are not governed in this way pose differing levels of political risk for those wishing to acquire access to reserves. Additionally, reserves situated inside states that are located in volatile or contested regions, or within shatterbelts, assume inherent geopolitical complexity and challenge, such as those oil and gas deposits within the Persian Gulf and Arabian Peninsula and within the parts of the Caucasus.

3.1.3 Quantity and Typology

An oil or gas deposit that is deemed economically viable or worthwhile to recover by virtue of its scale in relation to the extraction costs has geopolitical relevance commensurate with its

size. However, for the majority of deposits this is problematic to determine because most fields are moderate in size and production costs can fluctuate considerably as a reflection of constantly changing oil and gas prices, particularly oil. That said, massive structures and clusters of giant fields clearly have potentially enormous geopolitical relevance and, in theory at least, this impacts concomitantly upon the relevance of the host country. Such oil fields include: Ghawar, Safaniya-Khafji and Shaybah in Saudi Arabia; Azadegan and Esfandiar in Iran; Rumaila and Kirkuk in Iraq; and, Burgan in Kuwait.[4] Massive gas fields include: North Dome/South Pars in Qatar and Iran; and Yurnegoy, Yamburg and Shtokman in Russia.[5] However, it is vital to bear in mind that this comparative geopolitical relevance or magnitude is essentially nominal or potential in nature unless and until these reserves are being exploited. As an additional important refinement of this form of geopolitical relevance, is the exact type of deposit in question; whether it is a *proven*, *probable* or *possible* reserve.[6]

Oil reserves are defined as estimated volumes of oil or gas that are claimed by an IOC or state to be recoverable under 'existing economic and operating conditions' (with currently available extraction technologies). There is always more oil in a given discovered structure than can be (or is) actually extracted. The total quantity of oil estimated to exist in a given reservoir – both oil that can be extracted and that which cannot – is referred to as 'oil in place'.[7] Given the acknowledged uncertainty governing the true (or absolute) quantity of a deposit of oil, reserves around the world fall into two main categories – *proved* and *unproved*. Whilst typically thought of in terms of crude oil, the terminology of proved and unproved reserves is also applicable to natural gas. Indeed, the industry's recent realisation of the vast scale of proven natural gas reserves in the United States (in the form of Shale Gas) has transformed the strategic significance of the domestic gas picture in North America. Largely due to shale gas discoveries, estimated reserves of natural gas in the United States in 2008 were 35% higher than in 2006.[8]

Proved reserves are those claimed to have a 'reasonable certainty' (nominally, 90% confidence) of being produced (extracted) under current economic conditions, operating methods (recovery technology), and government regulations (geopolitical conditions).[9] Proved reserves are the only kind allowed by the Securities and Exchange Commission (SEC) to be reported by IOCs as 'bookable' reserves. Unproved reserves are determined to exist using the same geological methodology and engineering data as for proved reserves. However, due to various technological constraints, regulatory and contractual obstacles or indeed political obstacles, they cannot be deemed as *proven*.

Unproven reserves fall into two sub-categories – *probable* and *possible*. Probable are deemed as those oil deposits which analysts of geological and engineering data suggest that are 'more likely than not' to be recoverable, and that there is at least a 50% probability that volumes extracted will 'equal or exceed the total of proved plus probable reserves'. Possible reserves are also determined on the basis of geological and engineering data analysis; however, they are deemed to be less recoverable than probable reserves. Probable reserves are those wherein there is a 10% probability that the quantities produced will 'equal or exceed the sum of estimated proved and probable possible reserves'.[10]

Why are these distinctions significant from a geopolitical perspective? Proven reserves, as will also be shown elsewhere in this dissertation, have clear geopolitical value. Indeed, they are in many respects the very essence of *petroleum geopolitics* in that as a natural resource located in an identifiable location within a geological structure they are inherently geophysical phenomena, and their economic and strategic importance confers political value and relevance to the state and/or region in which they are located, such as in the Persian Gulf, the Caspian, North America or Russia.

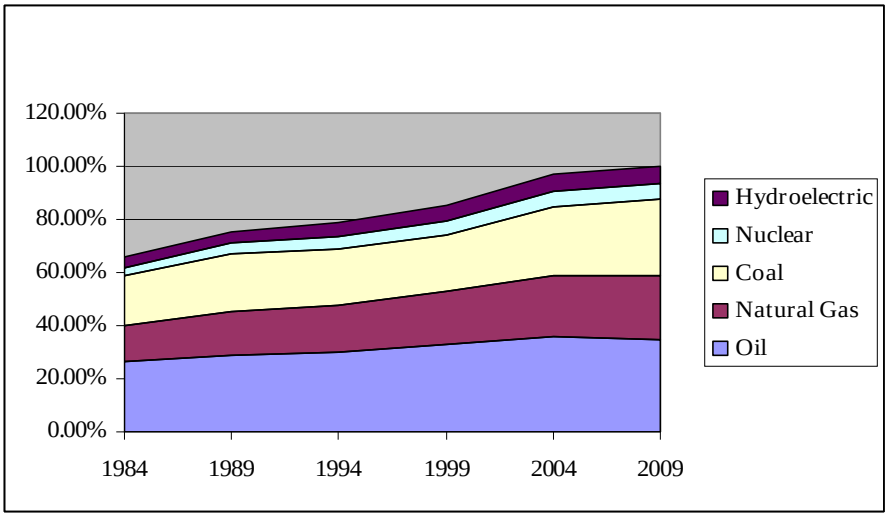
Probable reserves, by definition, have far less tangible significance in an actual, or 'current' geopolitical context because efforts to extract them are not considered economically viable and usable estimations of recoverable oil in a practical sense are too inaccurate or intangible. This situation is even more pronounced in the case of possible reserves. Indeed, such is the intangible nature of unproven reserves that governments and NOCs usually only use these figures for internal planning purposes and tend not to specify them in any meaningfully quantifiable manner.[11] Thus, in terms of geopolitical significance, unproven reserves are viewed by the industry as speculative; a resource base that might be of future significance if demand, technology and pricing justifies and facilitates recovery.

3.1.4 Oil Reserve Geopolitics and Natural Gas Geopolitics

The geopolitics of petroleum *reserves* should not be viewed as all encompassing. In other words, the geopolitical value of a significant oil reserve is not the same as that for a similar sized gas reserve. In holistic terms, oil is still 'king' for the basic reason that currently oil remains by far the dominant fuel for transportation (road, air and sea) and is also crucial for the production of Light Naptha, which is the primary refining feedstock for petrochemicals.[12] There are still few meaningful economic alternatives to oil for powering road, aircraft and

even shipping transportation. However, there are several widely used alternatives to natural gas for electrical power generation including coal, nuclear, hydroelectric and increasingly renewables such as wind. That being so, natural gas has been increasing as a proportion of the global energy mix, whereas oil has been decreasing (see Fig 3.1).

Fig 3.1 Global energy mix: primary fuel consumption



When compared against two different sources for aggregate proven global oil reserves, the global total proven reserves of gas in barrels of oil equivalent (BOE) is still less than that for oil: approximately 1.35 trillion barrels for oil and 1.142 trillion BOE for gas. However, this also needs to be viewed in terms of global mean reserves to production ratios: 45.7 years for oil and 62.8 for gas; a difference of over 27%,[13] to say nothing of the fact that gas is a far cleaner burning fuel with less impact on climate change. The combustion of natural gas emits almost 30% less carbon dioxide than oil, and just under 45% less than coal.[14]

From a geopolitical perspective, it is also interesting to compare what kinds of countries oil and gas deposits are located in. In other words, comparing the volumes of proven oil and gas reserves situated in countries that are generally considered to have either consolidated democratic or transitional or authoritarian governments. Additionally, in what proportions reserves are located in countries that are at war and/or experiencing elevated levels of conflict and/or terrorism? The tables below (which are inspired by, and in part founded upon, the intuitive profiling carried out by Rosemarie Forsythe in ExxonMobil's *Global Trends* - Analysis of changing political profiles of oil and gas production around the world[15]) illustrate the comparisons. Aside from a few that are highlighted below, most of the differentials are nuanced and moderate, which is to be expected, given that large deposits of oil and gas are frequently located in the same countries and regions.

Table 3.1 Reserves by political type

Political System	% Oil	% Natural Gas
Authoritarian	72.21%	83.30%
Transitional	10.31%	6.18%
Consolidated Democratic	17.47%	10.50%

Sources: BP Statistical Review, June 2010 & Freedom House government listings 2011

Table 3.2 Reserves by political & economic risk level

Political & Economic Risk Level	% Oil	% Natural Gas
Very High	28.71%	23.10%
High	2.85%	5.50%
Medium-High	4.82%	8.62%
Medium	38.21%	39.48%
Medium-Low	10.45%	16.04%
Low	14.95%	7.24%

Sources: BP Statistical Review, June 2010 & AON's 2010 Political Risk Map

Table 3.3 Reserves according to conflict and crisis status

Conflict Status	% Oil	% Natural Gas
War	0.24%	0.50%
Severe Crisis	49.86%	52.53%
Crisis	11.78%	58.28%
Manifest Conflict	5.11%	6.45%
Latent Conflict	15.99%	2.14%
Peace	17.01%	26.72%

Sources: BP Statistical Review, June 2010 & University of Heidelberg Institute for Conflict Research 2010

Table 3.4 Reserves located in shatterbelts

Inside Shatterbelt?	% Oil	% Natural Gas
Yes	60%	52.98%
No	40%	47%

Source: BP Statistical Review, June 2010

According to data collected by Freedom House, there is over 13% more reserves of gas than oil located in countries with authoritarian governments.[16] Almost five times more gas is located in countries that are in a crisis status with regards to intra-state conflict, yet 1.5 times as much of global gas reserves versus oil reserves are located in countries at peace.[17] Furthermore, a greater percentage of the world's oil reserves are situated inside shatterbelts. However, twice the percentage of global oil reserves versus gas reserves are found in countries with low political and economic risk. The implications of the relative kinds of political risk associated with locations of important reserves of petroleum are key to understanding the challenges experienced by IOCs and NOCs alike as they strive to gain access for upstream projects. The case of Iraq, as analysed in chapter four, is emblematic of the complications explicit in accessing reserves located inside a shatterbelt.

Overall, there is an overwhelming share of the world's petroleum reserves located in countries with authoritarian governments rather than democratic ones,[18] and almost 40% of the world's oil and gas is located in countries with medium political-risk levels. However, an average of over 50% of the world's petroleum reserves are located in states that are in crisis in terms of the risk of experiencing intra-state conflict, which includes the effects of terrorism and/or insurgency. Finally, a greater percentage of the world's oil and gas is located inside shatterbelts; though that is also to be expected given that the Persian Gulf and Middle East and the Caspian/Central Asian spaces are the two major shatterbelts in the world.

3.1.5 Static Reserves and Reserves in Production

The last lens through which I want to consider the geopolitical nature and value of reserves is straightforward. As I have mentioned earlier, a deposit of oil or gas that is not being produced, in other words, petroleum that is simply lying in a geological structure, has geopolitical significance or value, but it is primarily *latent*. A sizable static reserve has geopolitical *potential*. On the other hand, a large single oil or gas field or cluster of reserves become instantly more geopolitical in significance, value and nature once it is in production or technical and operational preparations are underway to bring it into production. This will be examined in greater detail in the next chapter.

3.2 The Earth's Petroleum Reserve Base

The purpose of this section is to set out a concise appreciation of the world's 'acknowledged' or 'stated' proven reserves (both conventional and unconventional), which serves to contextualise ensuing analysis and discussion in the chapters that follow. This is followed by an examination of the significance of what has become referred to as 'frontier' oil and gas as a contemporary feature within the reserve landscape. Thirdly, in light of the concern and rigorous debate over the 'true' volume of recoverable oil and gas, I will investigate the concept of petroleum reserves 'yet-to-be-found' or YtF, and how this phenomenon does and does not affect the future landscape of petroleum geopolitics; specifically with regards to the strategic posture of states competing for access to the purportedly massive undiscovered reserves of oil and gas thought to exist in the Arctic.

3.2.1 Acknowledged or Stated Reserves: What We Know (and Have Been Told)

Reserves are defined as volumes of oil and gas claimed to be commercially recoverable by the application of recovery processes to known accumulations under defined conditions.[19] Reserves must:

1. be discovered through one or more exploratory wells
2. be recoverable using available technology
3. be commercially viable
4. and, be remaining in the ground[20]

The 'true' volume of reserves is impossible to know for certain, given that an oil or gas reservoir in a geological structure in the earth cannot be seen or inspected in its entirety and cannot be definitively measured. What we do know is that *recoverable* petroleum deposits are far smaller than the full extent of the total hydrocarbon deposit; what is also referred to as 'oil in place'.[21] The amount of petroleum that can be produced is called the 'recovery factor', which is determined by a various combination of geological, technological and economic factors.[22]

The recovery factor of an oil deposit can change over time as a result of changes in technology and prevailing economic parameters, notably the price of oil. If the price of oil increases then reserves that had previously been abandoned become economically viable once again. The recovery factor will also likely increase if notable additional E&P capital investment is applied. From a geopolitical perspective, this means that the relative commercial significance of a reserve can fluctuate somewhat over time depending on the

recovery rate, and this can induce a geopolitical differential, particularly at a regional level. A good example of this is some of the mature Iranian fields, such as the Agha-Jari oil field, which initially went into production in 1938. The world's largest gas injection project currently being applied to Agha-Jari is intended to dramatically increase the yield and life-span of this field.[23]

Oil reserves, therefore are based upon *estimates* and as explained earlier in the chapter are deemed as *proven* and *unproven* reserves. It would be fair to say that a comprehensive array of tools, experience and technology can be applied to help determine estimates of reserves; however, they remain nevertheless – approximations. For this reason the whole concept of oil and gas reserves has always been contentious, and the subject of scepticism and manipulation; as such, statements by governments in particular, concerning their proved reserves, is motivated and shaped by political concerns. This latter issue will be discussed below; however, let us examine what is the commonly 'accepted' state (or quantity) of the earth's petroleum reserves.

3.2.2 Conventional & Unconventional Reserves

Conventional resources is petroleum (liquid crude or condensate and of course gas) recovered using drilled well-bores and typically requires minimal processing. Unconventional oil, which includes extra heavy oil, natural bitumen, and oil shale deposits, are those that are produced using techniques other than the conventional method of oil well extraction.[24] Unconventional gas is that which is complex or less economical to extract (often because the technology to extract it is embryonic and/or too expensive). Examples of unconventional gas include: deep gas, tight gas and shale gas.[25]

Oil

The dissertation does not intend to examine the debate regarding differing estimates of the world's total reserves. It is not of central value to the purpose and function of the thesis and there is insufficient scope to dissect the debate between the pessimistic view of 'peak oil' theorists[26] and the optimistic petroleum economists and geologists. Nevertheless, it is important to mention that there are differing estimates of petroleum reserves, particularly for crude oil and some of them are considerable. For the purposes of this project I will utilise some standard figures to establish a working empirical foundation; however, in some specific cases where declarations of country reserves are changed deliberately with no apparent

technical and geological basis, notably among some OPEC producers, I will suggest that this activity has germane geopolitical implications.

For the purposes of this analysis, the world's proved oil reserves are estimated at 1.352 trillion barrels, which are located in 97 countries around the world.[27] This figure is derived as a mean of the following differing estimates: 1.426 trillion (CIA World Fact Book 2010); 1.342 trillion (*Oil and Gas Journal* – January 2009); 1.184 trillion (*World Oil* – December 2007); and, 1.333 trillion or 1.476 trillion (inclusive of oil sands) - the estimate published by the *BP Statistical Review of World Energy* in June 2010.

The Table at Annex M lists the top 30 reserves in the world by country in order of magnitude, which collectively account for just over 98% of the global total. Most of the largest reserves are indeed very familiar. Interestingly however, the top 15 account for just over 91% of reserves, the top 7 account for just over 72%, and perhaps most notably the top four largest reserves – Saudi Arabia, Canada, Iran and Iraq – between them hold over 50% of the earth's oil. In descending order, these reserves confer (in nominal terms at least) geopolitical significance upon the states in question. Over 66% of the world's oil is located in Asia, with Europe having 0.71% of the total. Significantly, North America contains almost 15% of the world's proven oil; however, much of this is Canadian tar sands, an unconventional form of oil reserve that is complex, costly and environmentally damaging to produce.[28]

Natural Gas

The world's proved gas reserves are deemed to stand at approximately 6,448.9 trillion cubic feet, based upon a mean of the following four differing estimates: 6,342.4 trillion cubic feet (CEDIGAZ, January 2008); 6,254.4 trillion cubic feet (Oil & Gas Journal, January 2009, 6,621.2 trillion cubic feet (BP Statistical Review of World Energy, June 2010); and, 6,577.5 trillion cubic feet (CIA World Factbook 2010). This global endowment is located in 103 countries.

The table at Annex N shows that the top 40 deposits in the world account for almost 98% of the world's entire proven gas endowment, whilst the top 18 countries collectively contain less than 88%. Most startlingly, the world's three largest reserves – Russia, Iran and Qatar – account for over half of the planet's proven gas reserves. Almost 79% of the world's gas reserves are located in Asia, whilst only 3.4% are located in Europe. This is a starling logistical contrast, considering that Europe is currently the larger consumer of gas. Asia, the

fastest growing consumer, has the advantage of having the most reserves, despite them being spread over vast distances.

3.2.3 The World's Indispensable Reserve Bases

Having examined the world's most important oil and gas reserves in turn, by way of conclusion it is perhaps compelling to view certain major petroleum reserve bases in aggregate terms – as a product of total of oil equivalent (BOE).[29]

Table 3.5 Reserves rankings in terms of aggregate BOE

Country	Oil	Natural Gas BOE	Total BOE
Iran	150,310,000,000	206,875,000,000	357,185,000,000
Russia	79,000,000,000	270,625,000,000	349,625,000,000
Saudi Arabia	264,100,000,000	45,743,750,000	309,843,750,000
Canada	178,100,000,000	10,250,000,000	188,350,000,000
Qatar	27,190,000,000	157,875,000,000	185,065,000,000
Iraq	143,100,000,000	19,812,500,000	162,912,500,000
United Arab Emirates	97,800,000,000	37,943,750,000	135,743,750,000
Venezuela	98,590,000,000	30,250,000,000	128,840,000,000

Source: CIA World Factbook

By aggregating their oil and gas reserve bases to produce a compound petroleum reserve value, table 3.5 reveals a ranked view of the world's major petroleum powers. Viewed in this way, it is interesting to see the contribution of natural gas as a component of the total endowments of petroleum for Iran and Russia in particular. The countries are the indispensable sources of oil and gas for the future. However, the table also shows that there are two tiers of reserves bases: Iran, Russia and Saudi Arabia are massively dominant over the second tier reserves led by Canada. Despite Saudi Arabia's well known pre-eminence in proven oil reserves, it is in fact Iran and Russia that dominate almost equally in terms of their total petroleum endowment. However, as stated previously, it is important to remember that oil is widely considered a more valued hydrocarbon due to its versatility, energy yield and dominance as a transportation fuel.

Another important point to note from a geopolitical perspective is that though Iran tops the list, due to sanctions much of its reserves remain under-utilised and inaccessible. Vast quantities of its gas reserves in particular remain effectively stranded. This is a valuable example of the limitation of the geopolitical value and meaning of a reserve that exists to varying extents in situ – the geopolitical impact of this static reserve is thus only nominal.

Nevertheless, regardless of current and future challenges for IOCs and NOCs in gaining more endemic access to reserves in Iran, it is collectively too massive and important a reserve base to be contained indefinitely by sanctions.[30] The complex situation of access to Iranian reserves, diplomacy and trade, the country's location inside a major shatterbelt, geopolitical posture and international sanctions is examined in greater detail in chapter four.

3.2.4 Oil Reserve Growth

As mentioned earlier, there has been considerable revision of proven reserve bases in countries over the years, particularly among some of the major Arab OPEC producers. Upward revisions of petroleum reserves, particularly oil, can be applied for a variety of legitimate reasons, the most significant of which are advances in recovery technology (such as Horizontal Directional Drilling and deep reservoir drilling)[31], improved reservoir management, and improving 3-D seismic survey techniques.[32] However, the reasons for the arbitrary upward revisions in reserve growth commonly associated with some OPEC producers are rooted in politics. In theory at least, reserve growth would be expected to alter the nominal geopolitical profile of the producing country; however, this is not as straightforward as it might seem.

Several states in the Persian Gulf and Arabian Peninsula have openly revised their proved reserves upwards (also referred to as 'reserves growth'). Unsurprisingly, doubts persist concerning the reliability of 'official' OPEC reserves estimates, which are typically not accompanied with audits or other technical means of substantiation that would satisfy external reporting standards, such as the Society of Petroleum Engineers or the Securities and Exchange Commission. For the most part, OPEC countries will declare a reserves growth because each country's daily production quota is in part calculated upon the volume of its stated reserves – the more oil they have, the more they are allowed to produce. This was even if the country in question had the necessary production capacity to achieve the set quota.[33]

Table at Annex O shows the notable 'overnight' increases in declared reserves by five OPEC producers – Iran, Iraq, Kuwait, Saudi Arabia, and the UAE. Following the change in the rules governing quotas that emerged in the early 1980s, at some point, all of the countries made major sizable upwards revisions, sometimes on more than one occasion. What is also interesting is that despite all of the countries producing at or near their maximum capacity during the 1990s and 2000s, reserve bases have rarely fallen from one year to the next. Notwithstanding advances in recovery techniques, this is clearly absurd. Reserves growth by

many OPEC countries has geopolitical as well as economic motives. The most obvious example is the escalation and counter escalation by Iraq and Iran from 1982 until the end of the Iran-Iraq war in 1988.[34] Once one announced an increase the other was compelled to respond, not only because it enabled quota increase which was urgent for revenue, but it was also about sending a message to the other – despite the war, each side could keep 'pace with the other' by expanding arguably their most potent manifestation of political power – their oil reserve base.

Not to be outdone, sizable increases were made by Kuwait in 1984, Saudi Arabia in 1988, and the UAE in 1986; each declaring increases of 28%, 33%, and a staggering 66% respectively. The most recent increases are particularly interesting. In October 2010, Iraq's oil minister, Hussain al-Shahristani, announced that the country's proven "extractable" oil reserves had risen to over 143 billion barrels,[35] representing a significant rise on Iraq's previously stated reserves of 115 billion barrels; a figure that had been consistent for nine years. Perhaps not surprisingly, in the same month the Iranian oil minister, Masoud Mirkazemi, announced that because of the discovery of a new oil layer containing approximately 34 billion barrels of oil in the Ferdowsi gas field in the Persian Gulf, the country's proven oil reserves had now increased to 150.31 billion barrels.[36]

Iraq's action was intended largely to send a signal to the rest of OPEC that in line with its project to greatly expand the country's production through the revitalisation of its major oil fields in partnership with outside IOCs and NOCs through to 2016, it would need a greatly expanded daily quota. Iraq has been exempt from OPEC's quota protocols since Saddam Hussein's invasion of Kuwait in 1990. However, this situation would inevitably become untenable in the event it output grew discernibly above its current level to the level where output volumes could depress prices. OPEC's secretary general, Mr Badri, stated that an Iraqi production of 4 to 5 million barrels per day would "trigger that discussion of how to accommodate them in any future quota agreement".[37] This is precisely the kind of statement that the Iraqi government wants to hear as a reflection of their regaining the recognition of their geopolitical petroleum status amongst the top world reserve holders and producers.

Given the international pressure that Iran is under due to sanctions and its stand-off with Western powers over its nuclear programme, and a nationalistically-fuelled need by its weakened president, Mahmoud Ahmadinejad, to send a strong message of national strength to the Iranian people, the reciprocal announcement was almost inevitable.[38] This utilisation of

the political value of a state's oil reserves is a shining example of how a government can convert the latent geopolitical value of 'new' expanded reserves (that might not be in production) into usable geopolitical influence. The effects of this can be seen at an inter-state level - Iran's long-term brittle, competitive relationship with Iraq, and at a multilateral level, where Iran must assert itself sufficiently within OPEC to ensure its continued influence among other major producers.

3.3 Reserves in 'Frontier' Regions: Hard-to-Get Petroleum

Concern over the arguably accelerating rate of depletion of reserves found in the primary producing countries, the mean increase in the price of oil (which makes high-risk exploration feasible) and improving exploration and extraction technology, have prompted many oil companies (including small firms) to seek out the potential of much smaller pockets of oil and/or gas reserves known to exist in previously unexploited areas. It will also precipitate exploration for as yet undiscovered new reserves. This is referred to as 'frontier' petroleum.[39] The purpose of this brief sub-section is to discuss the relevance of both existing and nominal reserves in frontier regions in many parts of the world.

If one looks at a map showing the world's main reserves, as discussed above in the main part of this chapter, it quickly becomes apparent that there are large parts of the globe that seemingly has no petroleum, or deposits that exist in only very small quantities. However, many of these 'empty' areas are thought by optimist commentators, such as Robin Mills and Duncan Clarke, to contain economically viable quantities of oil and/or gas that have hitherto been overlooked or ignored due their remoteness, technological challenges (such as in ultra-deep waters) or because of geopolitical and security risk issues.

Frontier regions can be found in parts of Africa, Russia, South Asia, Southeast Asia, Central and South America, the Gulf of Mexico and the Arctic.[40] Some of the most promising countries/areas where frontier reserves are being exploited or sought are set forth in table 3.6. Notwithstanding optimism among industry experts and professionals regarding the prospects for meaningful finds and potential production yields (which vary considerably), it is important to assess the frontier reserve phenomenon in the correct context. The relative contribution of such reserves must be viewed for both their extant and potential contributing value juxtapose

the major established reserves in the world; many of which continue to yield vast quantities of oil or gas and are far cheaper to produce.

In considering the geopolitical facets of frontier petroleum, those *proven* frontier reserves that are of sufficient scale and type to be economically viable, must also be located in countries or maritime spaces that are sufficiently secure (or can be secured) to facilitate durable exploitation. Secondly, the various reserves that have not been fully assessed in terms of their size, and thus remain somewhat conceptual, can only be valued for their *potential* to add to (or alter) the global reserves landscape alongside the major extant reserves that have been examined earlier. Thirdly, is the question of the most distant prospects – reserves yet-to-be-found (YtF) or, so called, 'undiscovered' oil.

Table 3.6 Extant and nominal 'frontier' reserves

Africa	Asia	North America (inc. Gulf of Mexico & Caribbean)
Chad	Cambodia	Bahamas
Congo (Brazzaville)	India (inc. offshore)	Deepwater Gulf of Mexico
Côte d'Ivoire	Indonesia (Borneo)	United States (Shale Gas)
Equatorial Guinea	Malaysia (Sabah & Sarawak)	Arctic
Ghana	Myanmar (Burma)	Canada
Guinea-Bissau	Pakistan (offshore)	Greenland (Denmark)
Kenyan (inc. offshore)	Papua New Guinea	Norway
Liberia	Spratly Islands (South China Sea)	Russia
Mauritania	Timor-Leste	United States
Mozambique coast	Vietnam	
Namibia	Central & South America	
Niger	Brazil	
Republic of the Congo	Colombia	
Sao Tomé and Principe	Cuba	
Senegal	Falkland Islands	
Sierra Leone	Guyana	
Tanzanian coast	Peru	
Uganda	Suriname	
Western Sahara		

Sources: Robin M. Mills (*The Myth of the Oil Crisis)* & BP Statistical Review of World Energy, June 2010

3.3.1 Frontier Reserves in Production

Chad

In 2003, the Darfur crisis in Sudan spilt over the border into Chad and has destabilised the country as a result of the hundreds of thousands of Sudanese refugees living in and around camps in the east of the country. Though political power rests firmly with the Patriotic Salvation Movement,[41] the country remains plagued by political violence and there have been recurrent attempts to seize power by rival forces, most recently in 2008. Chad remains one of the most corrupt countries in the world and most Chadians live in abject poverty.[42]

Though Chad's oil reserves are estimated at between 1 to 3 billion barrels,[43] crude oil production did not supersede the cotton industry as the country's primary source of export earnings until 2003. Nevertheless, the country is a good example of a frontier reserve that exists within a geopolitically turbulent region of Africa. Previously, in the 1980s and the first half of the 1990s, when global crude supply was plentiful and prices low, Chad's comparatively small reserves would not have been viable or attractive to exploit. However, in the contemporary climate of high prices and IOCs seeking out new opportunities to replace lost production in aging fields, elevated security-risk countries such as Chad are now being actively exploited by those companies with the appetite for higher-risk E & P schemes.

In the case of Chad, IOCs and NOCs are confronted with the risks of exploiting resources and operating in a fragile state located in a geopolitical compression zone. Chad is a state in which oil resources constitute the underpinning of power for a wholly corrupt government whilst simultaneously being important source of 'booked' reserves for major IOCs. In basic terms, the revenue gained from production in this frontier reserve is worth the security and corporate social responsibility risk.

3.3.2 Uncertain Reserves

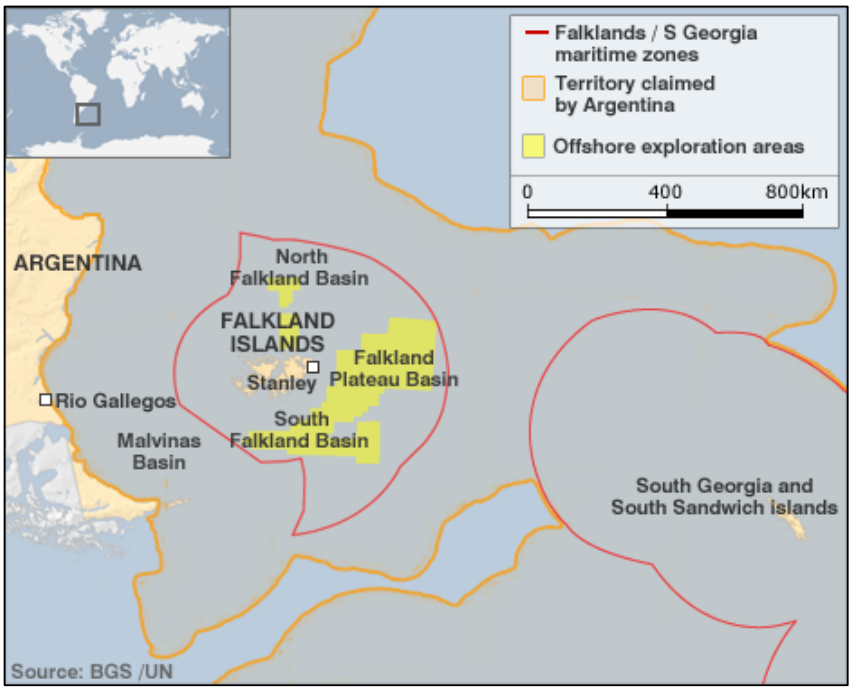
Falkland Islands

Following the discovery of oil in the Malvinas Basin in 1981, some estimates claimed that the adjacent North Falklands Basin might contain source rocks with as much as 100 billion barrels of oil, and it has been suggested by some geologists that the South and East Falkland (Plateau) Basins might have even greater reserves.[44] Until recently, the Falklands have been largely ignored due to concerns of logistical challenges and the harsh environment. However, in February 2010, a small British oil company, Desire Petroleum, began drilling an

exploratory well in the North Falkland Basin. Unfortunately, as of early 2011, Desire's attempts to strike oil have been unsuccessful.[45]

In November 2010, ExxonMobil decided that the islands contained insufficient reserves to make any exploration worthwhile.[46] Nevertheless, speculation and optimism still remains. In May 2010, another British firm, Rockhopper Exploration, announced that initial data collected from its well indicated an oil discovery.[47] Regardless of whether sizable oil is found in the short-term, IOCs continue to try to reconcile the lure of potentially vast reserves with concerns over the ongoing geopolitical risks that stem from the disputed sovereignty of the islands and EEZs between the UK and Argentina. Notwithstanding diplomatic efforts by both sides to maintain the *status quo*, this still uncertain oil reserve and disputed sovereign space remains a geopolitical flashpoint.

Fig 3.2 Falkland Islands maritime zones & exploration areas



Source: BBC [BGS/UN]

It is very likely that the *status quo* regarding the sovereignty and territorial claims concerning the Falklands will remain so for as long as the existence of oil remains questionable. Under these circumstances neither the UK nor Argentina is likely to risk another crisis or war over the islands and the EEZ without a compelling reason. However, both governments will certainly maintain a very close watch on any ongoing and future E & P activity in the region. If exploratory drilling were to confirm sizable, recoverable deposits, this remote part of the

South Atlantic will rapidly become a flashpoint that will need to be addressed before large-scale production could commence.

3.3.3 Undiscovered Reserves - The Arctic

Arguably the most intriguing example of frontier petroleum is the suggestion that vast quantities of oil and gas lie undiscovered in the Arctic, which represents by far the most challenging and inaccessible frontier in the world; for geographical as well as potentially for geopolitical reasons. Notwithstanding this, parts of the Arctic also have sizable proven reserves that have been producing oil and gas for many years, such as those in northern Alaska (North Slope), the Barents Sea, and the Timan-Pechora and West Siberian Basins in Russia.[48]

New exploration and production initiatives are also gathering pace: Norway is developing its Arctic Snovit field; Russia is developing plans for the Shtockman gas field with Total and Statoil (see chapter three);[49] Total and Shell are likely to partner with Russia's Gazprom to produce gas (and possibly LNG) in the prolific Yamal region;[50] and, U.S. IOCs are pushing deeper into Arctic Alaska. However, it is the speculative, YtF oil and gas that is generating the greatest interest, and has given rise to some inevitable early geopolitical posturing by states that border and have territory in the Arctic.

In July 2008, the U.S. Geological Survey (USGS) released a report, the *Circum-Arctic Resource Appraisal (CARA)*, in which they stated that 25 Arctic petroleum provinces contained an estimated combined total of 90bn barrels of oil (approximately 13% of the world's undiscovered remaining oil) and some 1,669 trillion cubic feet of natural gas (approximately 30% of the world's remaining undiscovered reserves).[51] Of the total estimated to exist, approximately 84% is expected to be found in offshore areas.[52] Upon release of the findings, one academic commentator, David Pumphrey - the deputy director of the Energy and National Security Program at the Center for Strategic and International Studies, went so far as to suggest that: "The USGS review confirmed that the Arctic is an area with significant potential to meet future oil and gas needs".[53]

Despite the international publicity that was generated when the report was published, not least because of the sparse seismic surveying, much less exploratory drilling that has been conducted in the Arctic outside of those well-known producing regions such as Alaska. The report's methodology relied largely on probabilistic methodology of geological analysis and

modelling. Without proper and endemic seismic surveying at the very least, CARA is essentially only a theoretical estimate - an elegant and intriguing one, but nonetheless just a hypothesis.

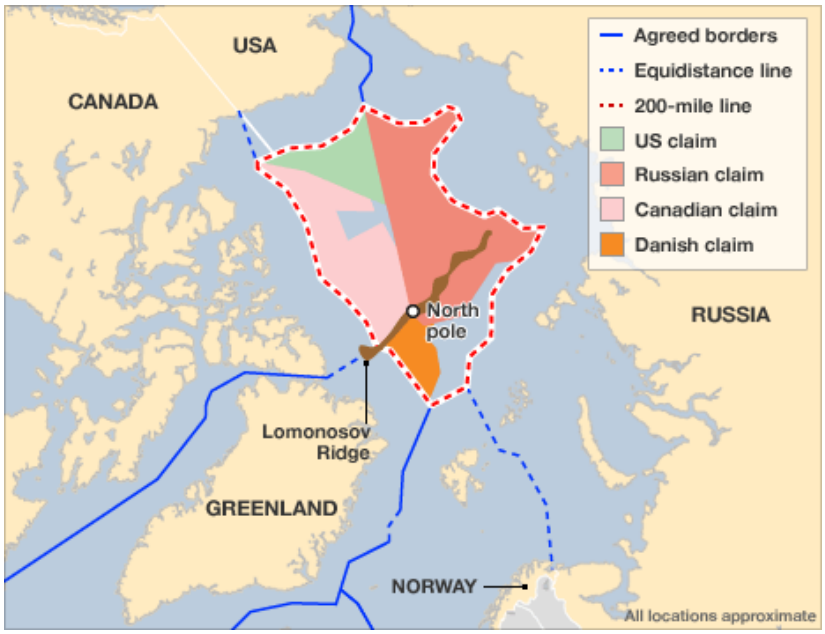
The CARA report must be considered alongside findings by other respected industry experts in order to better judge the reality of the possible future of the region in regards to petroleum reserves. In a 2006 report entitled 'The Future of the Arctic', the Edinburgh-based industry consulting firm Wood Mackenzie concluded that, although the Arctic offers opportunities for oil and gas production, particularly for companies prepared to undertake high-risk exploration, the region may not be the long-term global reserve frontier that some posited could supplement maturing production regions with large volumes of oil.[54]

The study also argued that only about 25% of the oil reserves initially estimated in key North American and Greenland basins was likely to exist. It further assessed the Arctic to be primarily a natural gas province; with 85% of proven petroleum reserves and 74% of theoretical reserves being gas rather than oil. Moreover, Wood Mackenzie argued that the remoteness of this gas rendered it far from ideal given the considerable extraction and transportation challenges.[55] As an adjunct to statements by other U.S. government scientists that stated the Arctic did not generally appear particularly interesting as a commercially meaningful petroleum reserve, Andrew Latham, the vice president for Wood Mackenzie, argued that the 4,000-metre water depth in the polar region would effectively render hydrocarbon deposits inaccessible with current ultra-deep production technology, even if it was not covered with summer ice.[56]

Despite the geological, technological and commercial uncertainties and challenges concerning the potential reserves thought to exist by the USGS, the lure of this potential reignited somewhat dormant territorial disputes in the region and raised the spectre of more potentially conflictual geopolitical crises involving the five states with Arctic territory – Canada, Denmark (Greenland), Norway, Russia and the United States. In a highly publicised action, a Russian submersible placed a national flag on the seabed at the North Pole in August 2007, making a territorial claim to some 460,000 square miles of territory 2.5 miles beneath the ice cap. Russia claims its Siberian shelf is connected to the Lomonosov Ridge, an underwater mountain crest, which extends 1,240 miles from Russia to the North Pole, rendering it part of its continental territory.[57]

Currently, under international law, no country has territorial rights to the North Pole or the region of the Arctic Ocean surrounding it. The five surrounding Arctic countries are limited to a 200-nautical-mile EEZ extending from their coasts (see Fig 3.3), and for this reason the space beyond these limits is administered by the International Seabed Authority (ISA).[58] Thus, according to international law, resources located in this area normatively belong to the international community, and is not included as part of any one country's territory. Gaining access to explore for petroleum in these spaces gives rise to questions and likely contention over EEZ boundary demarcations and the spectre of resource security and conflict.

Fig 3.3 Polar region territorial demarcations & disputes



Source: BBC [University of Durham, United Nations & Marum]

- All costal states entitled to claim an exclusive economic zone (EEZ), extending up to 200 nautical miles from their coastline
- Russia and Norway have submitted such claims to the UN
- Where a maritime boundary remains disputed, a line equidistant between the two countries is shown

In May 2008, in part as a response to Russia's high-profile claim to the North Pole, Denmark called a summit of the five Arctic states to try to reiterate collective commitment to the UN's Law of the Sea Convention that governs territorial jurisdiction. However, a problem exists in that only four of these states are signatories to UNCLOS (the U.S. Senate has yet to accede to the treaty). The Arctic Ocean Conference agenda addressed issues pertaining to maritime

security, mineral exploration, polar oil and gas exploration and production oversight, and transportation. No agreements were reached with regards to territorial disputes. In September 2010, Russia hosted an Arctic summit in Moscow that concentrated more specifically on territorial rights in the region and on claims to the territory under the Pole and the Lomonsov Ridge in particular.[59] At the conference, Russia announced it would spend $64m on research to prove its territorial case that will be submitted to the UN in 2012-13. Canada is thought likely to file its own submission in 2013, and Denmark plans to submit evidence for its claim in 2014.[60]

In a more recent potential geopolitical shift, in June 2009, Greenland's government advanced its bid to gain full sovereign independence from Denmark by initiating self-rule. This initiative is being driven largely by plans to benefit more completely from the development of its petroleum resources.[61] The government has attracted interest from Cairn Energy, Statoil, Shell and A.P. Moeller-Maersk for licensing bids in 2012 and 2013 for reserves thought to exist in Baffin Bay.[62] Denmark, which provides substantial subsidies for Greenland, is unlikely to relinquish its control over Greenland in the event large reserves of petroleum are eventually proven and are extractable. Given the considerable importance of a potentially sizable reserve of petroleum located in what is effectively Danish territory; both in terms of its strategic value to the country and as a source of revenue, it is not difficult to see why Denmark would oppose Greenland becoming an independent sovereign state.

Military and strategic developments

In August 2007, following Russia's planting of its flag under the Pole, Canada announced that it would build two new military bases in its Arctic territory: an army base at Resolute Bay and a deep-water port at Nanisivik on the northern tip of Baffin Island.[63] In February 2009, Norway, Denmark, Sweden and Finland announced they would cooperate in a new Nordic military alliance to protect their interests in the Arctic, and in June 2009, Norway announced it would move the Operational Command Headquarters of its armed forces northwards to a base inside the Arctic Circle. In July 2009, the Danish government announced it would expand its permanent military presence in the Arctic, with plans to establish a regional joint-service command in the Faeroe Islands and increase its troop numbers at the U.S. Air Force Base at Thule in Greenland.

Also in 2009, Russia resumed air force flights over the Arctic and is planning to build a new fleet of nuclear powered icebreakers.[64] Notwithstanding the Russian military posture, Russian

Arctic expert, Lev Voronkov, highlighted the need for cooperation in the Arctic in the process to find solutions to the territorial disputes;[65] however, Russia remains very concerned that NATO-country military presence and troop and base repositioning in the Arctic will serve to inflame an already tense and complex geopolitical situation.

The geopolitics characterised by extant and potential disputes and confrontation in the Arctic Ocean region - the U.S. and Canadian dispute along the international boundary in the Beaufort Sea, future sovereignty over Greenland, competing claims to the UN Commission to territorial rights under the Arctic ice cap, and military deployments above the Arctic Circle - conflate to produce a complex and potentially unstable situation going forward. Quite obviously this is being driven by the possibility of claiming access rights to potentially vast petroleum reserves in the region and the opportunities for easier exploitation and transportation in the event of major ice retreat, particularly during the summer months. However, this situation needs to be moderated by the fact that the majority of existing and potential reserves are located well inside Russian and U.S. territory, and those that are thought to exist outside of the U.S. and Russia are located in contested space that is largely inaccessible with current technology.

Nevertheless, the military dimension – such as the positioning of increased numbers of troops, equipment and bases in the Arctic and the frequency and location naval and air patrols - bears careful monitoring, and has worrying echoes from a Cold War era that has largely been consigned to history. In the medium term, if ice retreat and technology permit, the petroleum geopolitics of the Arctic Ocean could evolve from current tensions over territorial claims and boundary demarcation to one characterised more by states trying to ensure resource supply security through confrontational posture. However, given the necessity for governments and their NOCs and IOCs to cooperate in order to share resources and essential technology in contemporary E & P schemes, there is also room for a more sanguine perspective on the future of the Arctic. Even so, the processes required for access to oil and gas reserves and the ability to monetise them is rarely straightforward, and this reality is most clearly demonstrated in the strategies and challenges explicit in the drive to ensure successful exploration and production operations, which is the focus of the next chapter.

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[27] CIA World Factbook Https://www.cia.gov/library/publications/the-world-factbook
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Chapter 4 Exploration and Production

4.1 Overview

The exploration and production for oil and gas (E & P), commonly referred to as the 'upstream' sector of the petroleum industry, is considered by IOCs and NOCs as the most profitable part of the industry (the others being 'midstream' and 'downstream', comprising activities such as transportation and marketing respectively) and is the most complex (technically and logistically). Furthermore, it is the sector with the highest risk - technically, financially and geopolitically.[1] It is no surprise, therefore, that E & P is shaped, constrained and enabled by many of the theoretical and conceptual phenomena that comprise the analytical framework of this thesis. Using a series of case studies, this chapter will reveal and explain the correlation between relevant phenomena - such as sovereignty, terrestrial and maritime space, boundaries, diplomacy, shatterbelts, resource nationalism and security – and contemporary E & P projects in Asia.

Exploration is the process of searching for oil and gas deposits by geologists and geophysicists. Modern techniques include very sophisticated seismic technology to find and ascertain the extent of deposits using exploration geophysics. Geological features of particular interest are subjected to more detailed seismic surveys to create a visual profile of the geology, which can be studied in detail to determine whether oil and/or gas is likely to be present.[2] The next phase is to drill an 'exploration well' in an attempt to conclusively determine the presence or absence of oil or gas and whether it is commercially and financially feasible to extract (or 'produce').[3]

Production is the process by which oil and/or gas is extracted from the source rock/reservoir and brought to the surface. Production starts with the drilling of a well-bore down to the reservoir/source rock. This is done on land or offshore. Once the well-bore has been prepared and the drill rig removed, oil or gas is recovered to the surface in a controlled process using primary, secondary and tertiary (also referred to as 'enhanced recovery') recovery processes.[4] The exploration and production is a high risk, capital intensive and increasingly technologically complex process. Nevertheless, it is the very core process within the oil business.

E & P faces some of the most technologically challenging, operationally diverse and geopolitically complex facets in the global petroleum industry. In a contemporary era of increasing global demand, rigorous debate over the quantity and longevity of aggregate proved[5] and probable[6] reserves and the well-established norms of resource nationalism, the geopolitics surrounding E & P has gained particular significance for IOCs and NOCs alike in their quest to maintain both existing 'booked' reserves and gain access to additional ones.

Increasingly, since the process of widespread nationalisation of oil industries gathered momentum in the 1970s, the inability of IOCs to gain access to the remaining abundant (and more easily-produced) oil deposits in the Middle East under concession agreements compelled foreign companies to seek out opportunities under alternative partnership constructs in the form of Production Sharing Agreements (PSAs).[7] PSAs enabled IOCs and NOCs to access reserves inside countries disinclined to allow foreign ownership in strategic resources vital to national economic security. However, once the norm, even PSAs have now largely been replaced by Technical Service Agreements (TSAs). Under these contracts, the IOC or NOC is paid a nominal (often modest) fee for every barrel produced, but does not garner any of the revenue from the sale of the oil and has no equity stake.

IOCs have been involved in the Persian Gulf's upstream sector since the 1930s. Indeed, for decades the grouping of Western oil majors - Anglo-Persian Oil Company (now BP), Gulf Oil, Royal Dutch Shell, Standard Oil Company of New York (now ExxonMobil), Standard Oil of California, Standard Oil of New Jersey and Texaco (now Chevron), once colloquially referred to as the 'Seven Sisters'[8] – once dominated all aspects of oil and gas E & P and conveyance in the region. However, as countries began to nationalise their petroleum sectors starting in the 1950s, IOC control and dominance shifted back to sovereign control by the host governments. Today the world's major IOCs and NOCs still urgently need to overcome that most obvious and critical facet of geopolitics in the context of the upstream sector – access. In the Persian Gulf, companies from the U.S., Europe, Russia, India, Japan, China and others are seeking access to upstream opportunities in the region, including inside two of its most unstable and geopolitically complex states - Iran and Iraq.

Viewed at a global level, the geopolitics of E & P is increasingly being characterised and shaped by the competition between India and China, as both of these fast evolving powers seek out access to find and produce oil and gas wherever they can locate opportunities, particularly in parts of Africa and Asia. Indeed, this competition, which is largely dominated

by China, is now a very prominent force in shaping the very nature of petroleum and resource geopolitics in the Asian and Indo-Pacific strategic realm. As the expanding middle classes (with increasing disposable income) in these two Asian giants drives the need for greater amounts of energy, power and fuel, their governments are compelled to ensure secure supplies of oil and natural gas (including LNG) across vast land and oceanic distances.

Set in the context of these realities, this chapter, comprising a deliberately diverse collection of complex contemporary cases, sets out to shed some light on the range of geopolitical axioms and parameters that govern the challenges and realities facing governments, NOCs and IOCs as they strive to maintain existing E & P operations, and strategise to establish new ones. To this end, three main geographical/issue areas have been selected for this chapter: IOC/NOC upstream operations in parts of Russia; E & P realities, opportunities and obstacles for foreign companies in Iraq and Iran; and, the interrelationship between India and China, and China and Japan, in their quests for upstream access to oil and gas deposits in Asia.

I have selected Russia not only for its considerable importance as one of the world's top oil and gas producers, but also because of the tactics and aggressiveness of its efforts to reacquire greater control over its petroleum resources and the means of production. Iraq and Iran were chosen as they remain critical for future increases in daily production volumes. China and India and Asia's largest and fastest-growing consumers are vital to any analysis concerning E & P, and Japan remains a substantial Asian economy and a very large consumer of LNG. Amidst the case studies, geopolitical factors such as state size and location, the extent of a given resource base, the nature of borders and neighbouring states, access to sovereign space and sovereign control, state power, influence and effectiveness, resource nationalism, conflict and alliances will be explored.

The geopolitics that governs, and is shaped by, the strategies and operations of IOCs and NOCs striving to obtain and maintain access to oil and gas plays in those countries that have significant reserves is fluid, and thus company leadership must remain flexible. For example: countries previously inaccessible for long periods to foreign companies can become viable prospects for investment, such as Iraq; the need to forge transnationalist joint ventures between private and state-owned companies from different countries to acquire technology and raise capital is now common; and, the inevitable changes in government leaders and strategic priorities will regularly force changes in approach to negotiations and operations by IOCs and NOCs alike.

Nevertheless, what is also clear is that the balance of power has clearly shifted from the IOCs to the governments and their NOCs that are for the most part firmly in control of the world's remaining significant deposits, particularly those in Russia, the Persian Gulf and Arabian Peninsula, and Central Asia. It is this power-play, and increasingly, the intense inter-company competition that characterises E & P around the world today; notably in Russia, which is the subject of the next section.

4.2 Exploration and Production in Russia

4.2.1 Formulation of Russia's Petroleum Politics and Nationalisation Strategy

The business and political environment for large non-Russian oil companies, particularly Western IOCs, has become not merely challenging but in some cases openly hostile since 2003. This is particularly true for those IOCs that have, and have had, equity oil and gas in upstream deals, and also for those companies that are trying to maintain their position in deals that were forged under Yeltsin and during Putin's early tenure, or those that are attempting to gain fresh access to the country's reserves. For decades, major international oil companies, such as Royal Dutch/Shell, BP, and what is now ExxonMobil, have managed to function effectively in foreign oil-rich countries that are politically fragile, in urgent need of FDI and/or awkward to do business with. However, since 2000, the ability of IOCs to gain access to upstream plays in the form of legitimate licensed access rights, joint ventures (JVs), and PSAs has become increasingly problematic.

Following the collapse of the USSR in 1991, the ensuing auctioning off of the state oil industry, the inexorable decline in oil production between 1991 (10.4 mmbls/day) and 1998 (6.1 mmbls/day)[9] and the devaluation of the Rouble in 1998, Russia's petroleum industry was viewed by Western IOCs as an attractive prospect for investment in the 1990s.[10] Furthermore, this opportunity was rendered as attractive as it was important because of the continued inability of IOCs to gain any meaningful access to the upstream sector in the Persian Gulf, notably in Iraq and Saudi Arabia. Nevertheless, the financial risks associated with the upstream sector persisted as almost fifteen years of low oil prices up to 2000 had constrained the majors' ability to invest too heavily in new E & P due to reduced capital reserves.

Similarly, with oil prices remaining between $10 and $25 per barrel for much of the 1990s,[11] newly formed oil firms, such as Yukos, Sibneft, and Lukoil, had neither sufficient spare capital or adequate technology to invest in new E & P projects or expand existing operations. Indeed, even when Putin became prime minister in 1999, oil was just $18 a barrel; at this price much of the country's oil production was unprofitable, and in some cases actually loss-making.[12] For production to be expanded and the industry's dilapidated petroleum infrastructure sufficiently modernised, significant inward investment would be needed. This situation enabled some Western IOCs to purchase shares in key Russian firms, establish new strategic partnerships, and gain favourable terms and deals in obtaining licensing rights to certain major deposits through PSAs.

At the turn of the new century, the situation began to change as global oil demand picked up, coupled with the associated price rise. By the summer of 2002, production was booming after a full decade of decline. In March 2002, Russia overtook Saudi Arabia to reclaim its position as the world's largest producer. Since 2000, the major Russian companies, having taken advantage of the profit windfall, invested heavily in reservoir management, sought new production opportunities, utilised Western E & P technology[13] and technical services providers, and partnered with selected IOCs under JVs and PSAs. For several years, the harmonious and profitable partnership between Russian firms and Western IOCs continued. However, the tide began to turn in mid 2003 in the aftermath of the Yukos affair and the arrest of its then CEO, Mikhail Khodorkovsky.[14]

In March 2004, Putin was re-elected to a second term as president. Though clearer in hindsight, at the time the opaque and intricate series of events that led to the expropriation of Yukos and the imprisonment of Khodorkovsky for alleged tax evasion and fraud can be seen as the opening move by the government to put vital elements of the petroleum sector in the hands of Putin's retinue.[15] It marked the inception of the Kremlin's strident reacquisition of the state's oil industry to ensure the government's total control over the single-most important propellant for the country's surging economic revival and the underpinning of its march to regain great power status. Essentially, as oil prices rose (and stayed high) there was a commensurate drive by the Russian state to ensure it gained maximum advantage from this; both in terms of the resulting increase in the value of any newly reacquired equity share in E & P projects, and also of course from the sale of oil and the taxation of others selling 'Russian' oil. Thus, the targeting of foreign-held assets was clearly an intrinsic part of this strategy, which will be highlighted in the case of the Sakhalin 2 project that follows.

4.2.2 Sakhalin 2

Arguably the most obvious, if thinly disguised, manoeuvre by the Kremlin (using Gazprom as the logical and most effective proxy) to gain control of a strategically important petroleum upstream asset was the forced sale of Shell's controlling stake in the Sakhalin 2 project in December 2006. For months prior to Shell's capitulation, Russia's environmental and petroleum ministries had been applying increasing pressure on Sakhalin Energy (the project's Shell-led consortium), and threatened to rescind its operating licenses. The method used was to accuse Shell of environmental violations in the process of infrastructure construction (specifically pipelines) in tandem with increasingly vociferous objections over escalating costs and project delays (all of which would have seriously compromised the government's ability to recoup its costs and start generating net revenue from LNG exports).[16]

Interestingly and unsurprisingly, Gazprom had previously been in months of fruitless negotiations with the consortium to acquire a 25% stake in the project via an asset-swap with Shell.[17] In December, 2006 Shell eventually sold a majority stake to Gazprom very soon after the government filed a law suit to sue Shell $30 billion for 'environmental damages'. The Anglo-Dutch major received just $7.5 billion in cash and shares; far less than the stakes true value. This turn of events was also marked by the withdrawal of the European Bank for Reconstruction and Development (EBRD) from the project.[18]

The Sakhalin 2 deal had been forged in the early 1990s when oil was in the $20 per barrel range and Russia's own oil companies were unable to exploit domestic opportunities for E & P expansion. Indeed, at that juncture, the Russian economy was in urgent need of foreign currency earnings to maintain its viability as well as the technical know-how to develop deep offshore drilling in ice-covered waters, and especially in the development of LNG. However, with the acceleration in oil prices at the start of 2004, the economic rewards and commensurate strategic importance of gaining access to a project of Sakhalin 2's enormous scale and potential for growth were clear to the Kremlin.

Project description

Sakhalin 2, like its sister project Sakhalin 1, is an oil and gas development project located on Sakhalin Island and in the Sea of Okhotsk littoral; it is currently the largest combined oil, natural gas and LNG development in the world. The project is founded upon the exploitation of two fields: Piltun-Astokhskoye and Lunskoye. The former is predominantly an oil field

and the latter largely a gas structure. The two structures contain approximately 1.2 billion barrels of recoverable oil and 500 billion cubic metres of gas respectively. This will translate into the production of some 180,000 barrels per day and approximately 9.6 million tonnes of LNG per year.[19]

Sakhalin 2 is arguably one of the most technologically and logistically challenging E & P projects ever undertaken, as well as one of the most expensive. Aside from rising costs in materials, notably finished steel, costs escalated due to the very technically-challenging nature of the scheme. In fundamental terms, Shell referred to it as "the equivalent in size of five world-scale projects, located in a hostile sub-arctic environment, and covers a vast area in a region with almost no existing infrastructure".[20]

Sakhalin 2 was developed under a PSA that now includes Gazprom, Shell, Mitsubishi, and Mitsui. The project's cost will eventually likely exceed its initially estimated total of more than $20 billion, rendering it the largest single FDI package in Russia. Following the take-over of the project by Gazprom, Shell kept a 27.5% share, and Mitsui and Mitsubishi retained 12.5% and 10% respectively. Gazprom intends to maintain a dominant role as the major shareholder, with Shell remaining the lead technical advisor. The 9.6-million tons per year facility is contracted to supply LNG shipments to the United State, Japan and South Korea, [21] and Shell is lobbying to gain markets in China and India,[22] which would greatly extend the geographical reach and significance of the supply for Asia.

President Medvedev officially opened Sakhalin Energy's Sakhalin 2 facility on 18 February 2009. On 29 March 2009, the first cargo was successfully loaded onto the LNG carrier, *M/V Energy Frontier*, which delivered Russia's first ever LNG to Tokyo Gas and Tokyo Electric.[23] By the end of 2010, Sakhalin 2 reached its full production capacity of 9.6 million tons of LNG per year, thereby giving the consortium a 5% share of the global production market, and rendering it the largest LNG producer on the northeast Eurasian landmass and the largest supplier on the northern Pacific Rim.

Key geopolitical features & analysis

The most important facet of this case to recognise is that Russia got what it wanted: sovereign and financial control over a strategically vital reserve; the capacity to service signed Japanese and South Korean customers and open up new East Asian markets supplied from a geographically well-situated area; and, the potential to extend gas exports across the

Pacific and into the Indian Ocean. Moreover, the government laid down an unmistakable marker for all foreign companies operating (or aspiring to operate) in Russia's upstream petroleum sector: technology and FDI is welcome, but any instances of current controlling ownership over strategic resources by foreign companies will be rescinded, and future access limited to production participation agreements only.

As part of the deliberate gas marketing strategy to sell Sakhalin 2's gas to Asia-Pacific and even to North American markets, the signing of major long-term LNG delivery contracts to Japanese customers (Tokyo Gas, Tokyo Electric, Kyushu Electric and Toho Gas) was a major shift for the export direction and criteria for Russian gas. Indeed, this project marks the first time that Russian gas has been sold to these markets. Furthermore, Sakhalin 2's activation heralded the opportunity to export Russian gas by sea to Asia's fastest growing energy consumer – China. From a petroleum geopolitical and geo-economic perspective, this is a quantum leap for the Kremlin: the ability to export natural gas eastwards, southwards and south-westwards by sea to complement its already substantial pipeline exports westwards to Europe. This is a strategic position the government had long coveted – the ability to influence and participate in international petroleum trades and markets in distant countries that could not be accessed by its extensive pipeline network. Essentially, Sakhalin 2 has provided Russia access to the maritime petroleum energy sphere to complement the terrestrial.

From a petroleum geopolitical standpoint, Sakhalin 2 is revealing and important in a number of ways. As shown earlier, the strategic and monetary value of the resource base in this part of Russia's eastern fringe was too important to the Russian government to allow foreign IOC ownership and production control. This led to the strong-handed resource nationalism exerted by the government to regain control of a vital production means. Once the facility was completed, Sakhalin 2 bestowed upon Russia the ability to significantly expand and strengthen its gas production and export capacity and open upon market opportunities across the Pacific, and crucially to be able to compete for market-share among Asia's largest gas consumers - Japan, South Korea and, most importantly, China. In this way, Sakhalin 2 has helped to tie it in more closely the geopolitics of petroleum energy trade interdependence with its most important East Asian neighbours. If the market demand is sufficient in the future, and if planned-for expansions of oil and gas E & P projects in the Sakhalin region go forward thereby expanding maritime-sourced and exported petroleum, this will serve to fortify not only Russia's geopolitical trading influence with Pacific and Indian Ocean

partners but also with US, European and Asian IOCs and NOCs seeking to benefit from commercial inclusion.

4.2.3 Shtokman

Shtokman, which lies 600 km north of the Kola Peninsula in the Barents Sea, is the world's eighth largest gas field, and is the largest undeveloped offshore gas field. It is estimated to contain 3.8 trillion cubic metres of natural gas and over 37 million tons of recoverable gas condensate.[24] However, given the field's location in the harsh conditions of the Arctic offshore, the depth of water in which it lies (320-430m of water), and its distance from shore-based support and the likely site of land-fall for the sub-sea pipeline at Murmansk Oblast, the technical challenges of the project are enormous. Added to this, are the tremendous costs involved for extraction and conveyance, and the eventual construction of the planned liquefaction plant at Teriberka (100 km northeast of Murmansk).

For these reasons (though it might ideally have wanted to develop the field on its own), Gazprom needed the participation of companies with the specialised technical capabilities and sufficient finances to operationalise the scheme. Despite its considerable resources, production experience and arguable predominance in supplying the international gas market, Gazprom does not have the necessary technological or operational offshore expertise to exploit Shtokman, which is why it was essential to reach out to Japanese and in particular Western IOCs and NOCs to further the project.

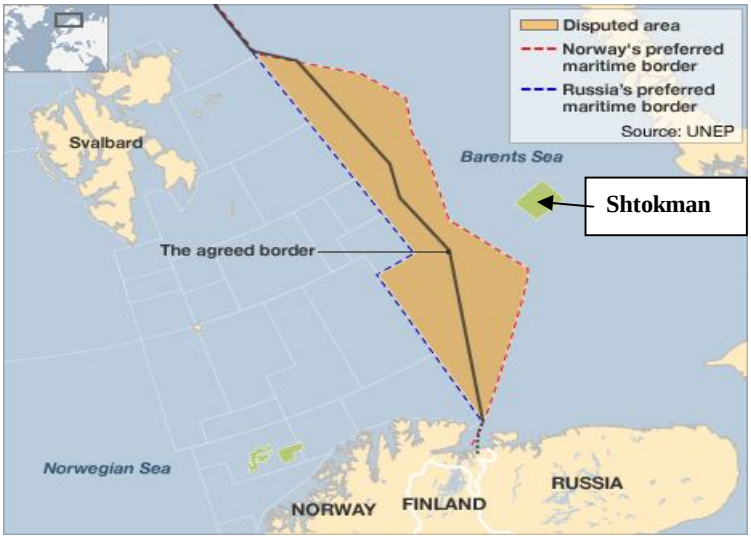
Initially, Gazprom invited many IOCs from around the world to tender for partnerships; the list included: Hydro (Norway), Statoil (Norway), Chevron (U.S.), ConocoPhilips (U.S.), ExxonMobil (U.S.), Total (France), Shell (UK/Netherlands), Sumitomo (Japan) and Mitsui (Japan).[25] Eventually, on the basis of their considerable technical and logistical expertise in E & P in these harsh frontier environments, Gazprom selected Total and the newly-merged StatoilHydro to join the scheme with 25% and 24% holdings respectively. The three companies created *Shtokman Development AG*, which would be responsible for bringing the field into production. At the time of the company formation, planned-for gas production is intended for Atlantic Basin consumers: piped gas to Europe; and, in a secondary phase, LNG for North America.[26]

The Shtokman project is of considerable importance, not only for Gazprom's revenue but also for Europe's future energy security, specifically its ability to diversify its gas sources.

Theoretically, the field could supply all of the EU's gas requirements for over three years.[27] In a bold statement, Gazprom has suggested that the field could also supply the U.S. with 10% of its LNG imports for 50 years (if the proposed liquefaction facility and terminal were to be built).[28] However, with the discovery of massive shale gas deposits in the U.S. in 2008, that country's need to import LNG becomes questionable, which could negate the need for Gazprom to build an expensive LNG liquefaction plant.

Notwithstanding the US requirement issue, for very obvious strategic, geopolitical and energy security reasons, this enormous reserve is being treated with considerable interest and gravity by the associated Russian and European IOCs and NOCs alike. Ultimately, the Russian government intends to strengthen its position as the largest supplier of gas to Europe in the future. A more localised example of the strategic importance and geopolitical effect of the Shtokman project to both Russia and, in particular, Norway was the agreement in September 2010 to settle a long-standing maritime border dispute in the Barents Sea, near to where the field is located.

Fig 4.1 Shtokman gas field and territorial boundaries

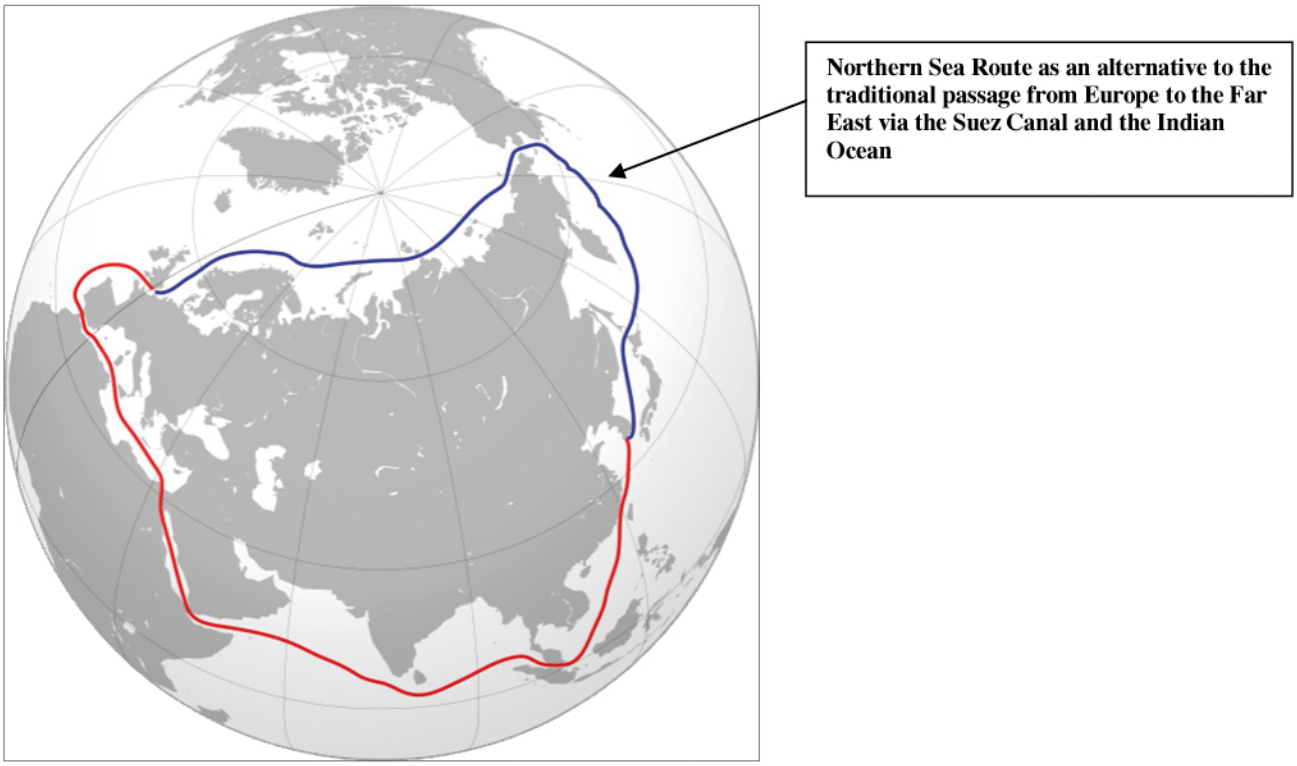


Source: UNEP

Though the field is located to the east of the agreed border, the dispute was a complicating factor for the two countries, whose NOCs were partners in the scheme (including Total of France). In the absence of the agreement, it was possible that the optimal routing of undersea pipelines connecting the production platforms with processing and storage facilities ashore near Murmansk might have been compromised. More broadly, the agreement has improved chances of the two countries cooperating in future offshore E & P projects in the Arctic

region. Interestingly, the resolution of this classic geopolitical dispute could help facilitate further development of gas and condensate in this hostile environment that could be exported as far away as China via the Northern Sea Route (NSR), which connects the Atlantic with the Pacific via Russia's northern coastline.[29]

Fig 4.2 Northern Sea Route



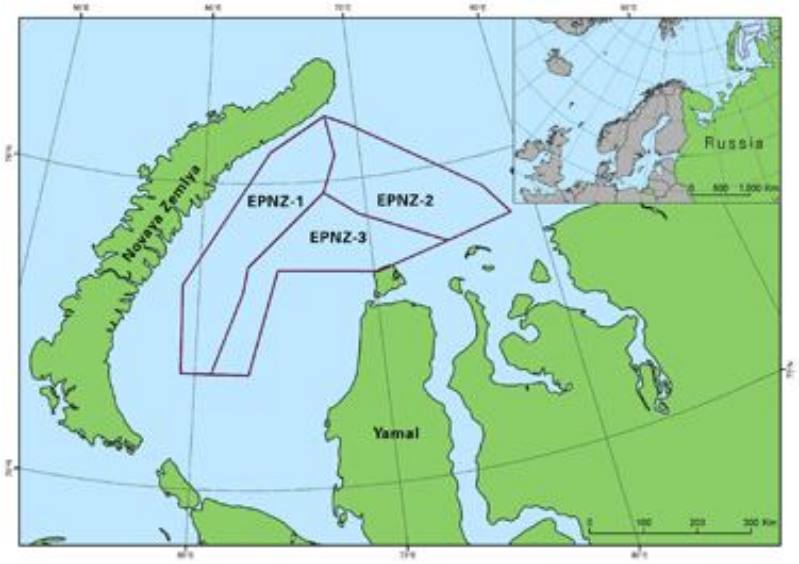
Source: Http://en.wikipedia.org/wiki/Northern_Sea_Route

However, in practice, this possibility of using this routing remains uncertain for several reasons: uncertainty over whether the future market price for natural gas will enable the highly expensive production of these offshore resources; long-standing environmental concerns regarding the development of petroleum resources in the Arctic; and, the practical viability of the of the use of the NSR year-round given the geographical complications of winter ice limits and concerns for safe navigation, given the limited number of available icebreakers.

Notwithstanding Russia's keenness to exploit its Arctic reserves, Shtokman is of more immediate importance to Norway, which is facing the reality of the inevitable depletion of its North Sea gas. Russia, on the hand, can rely for many years on its enormous reserves in Siberia and on its newly monetised Sakhalin 2 production. It is also worth noting that once Shtokman commenced production, it would mark an important milestone in partially

determining the sensitive geopolitics of Arctic petroleum upstream endeavour, which is examined in chapter 3. Though the true scale of reserves located in the Arctic maritime space is uncertain, successful international cooperation on Shtokman would be an important guide for other potential projects. As of summer 2011, Rosneft was in talks with several IOCs and NOCs – notably, Shell, Chevron, ExxonMobil, CNPC, Petronas and Petrobas - to develop the Russian company's Arctic offshore blocs in the Kara Sea Shelf.[30] In mid-2011, in an ironic twist, given its experiences with Sakhalin 2, it began to look likely that Shell could replace its rival BP to play a leading role in Arctic E & P projects in partnership with the leading Russian oil firm.

Fig 4.3 Rosneft's three blocks in the Kara Sea



Source: www.bp.com

4.3 Complexities of foreign access to Persian Gulf reserves - Iraq and Iran

4.3.1 Iraq: Current Complexities and Future Potential

Iraq's huge petroleum endowment and future production potential is of considerable importance both to the complexion of OPEC's reserve base, the setting of Iraq's future production quotas (which confers commensurate geopolitical influence amongst the cartel's members), and the organisation's wider geopolitical influence amongst world crude producers. Indeed, as the supply-demand dynamic becomes ever tighter in the mid-to-long term, an Iraqi petroleum industry producing at maximum capacity will not merely be an important addition to the supply side of the equation; it could also prove to be essential to assuage concerns of sufficient global oil supply volumes in the long term.

The importance, therefore, of boosting the country's daily production volumes through an intensive and wide-ranging modernisation of existing oil field infrastructure with the technical assistance and inward investment of IOCs and NOCs is very clear. However, historical geopolitical factors, conflicts, and contemporary governmental and security issues ensure that such a complex investment and modernisation programme will be very challenging to implement.

In broad terms, there are three realities that characterise the geopolitics of Iraq's upstream situation:

1. The enormous scale and obvious importance of Iraq's proven reserves and reserve potential amidst the country's delicate wider geopolitical situation - the long-standing triangular balance-of-power relationship with Iran and Saudi Arabia, and its location at the epicentre of the world's most geopolitically fragile and important shatterbelt.
2. The parlous state of oil and gas extraction and production infrastructure, which is the result of almost three decades of war, sanctions and foreign occupation, has rendered inward investment and foreign IOC and NOC expertise essential to the rebuilding process; thereby making their eventual access to E & P opportunities virtually guaranteed.
3. Following finalisation and codification of proper and robust petroleum legislation that will enable the rebuilding of the country's petroleum industry with international assistance, there is a need to significantly expand crude oil and gas production through the agreement and activation of technical sharing agreements (TSAs) and follow-on long-term E & P projects with foreign IOCs and NOCs.

Iraq's ascension, conflict, regional balance of power, and shatterbelt geopolitics

According to Robert Harkavy, geopolitics as it pertains to the petroleum-rich regions of the Middle East, rests upon two fundamental issues: the function of strategic geography - country size and location relative to its neighbours; and, the interrelationship between the militarily-important terrain, maritime chokepoints, and terrestrial and/or maritime spaces containing critical natural resources (in this case petroleum).[31] This is a good reflection of the realities that simultaneously characterise Iraq's geopolitical status and its place within the wider strategic ontology of the Persian Gulf. It also reveals the context of two core facets of the country's explicit geopolitical situation - its relationships with Iran and Saudi Arabia, and its location within a key *shatterbelt*. This situation has long shaped the nature and success of past E & P activity inside Iraq, dominates current upstream prospects and complexities, and will continue to determine future production.

Once the scale of Iraq's petroleum resources became apparent to Western Powers in the early 20th century, intervention, dominance and rivalry were almost inevitable. The competition over Mesopotamian oil between Britain, France and the U.S. in the 1920's was a decisive chapter in shaping the distribution of embryonic E & P in the region finalised in the "red line agreement", which heralded the establishment of the Iraq Petroleum Company in 1928.[32] Foreign intervention was largely responsible for large-scale exploration in Iraqi and the associated growth in production capacity. In 1958, the Iraqi monarchy (established by the British in 1925) was overthrown in a coup by Nasserites and Communists, and in 1963 the newly-formed nationalist government gave the Iraqi National Oil Company rights to the vast majority of oil acreage in the country, effectively nationalising the entire industry.[33] Iraq now had its sizeable production capacity under sovereign control and therein the means to use it to build strategic posture in the region, which began in earnest in 1968 under the Ba'athist government of Saddam Hussein. This evolving politico-economic power, built almost entirely upon oil, accelerated in the early 1970's following the Oil Crisis and the sharp upswing in crude prices in 1974. By the late 1970s, Iraq was one of the three leading regional powers alongside Iran and Saudi Arabia.[34]

In following years, Iraq's growing economic muscularity and modernisation enabled it to exert greater influence over OPEC and the smaller Gulf kingdoms, develop important investment and arms deals with the West and Russia, wage a major war with Iran, and later invade neighbouring Kuwait to challenge Saudi Arabia for primacy in the control of the

region's oil output.[35] All of this derived largely from the government's total control and utilisation of its oil production capacity. Iraq's behaviour towards its neighbours in the region has been one of the most significant influences on shaping the region's geopolitics, and has been one of the main features in defining the Persian Gulf's status as a shatterbelt. The most obvious manifestation of this has been recurring conflict in the region since the Iranian Revolution of 1979, which has variously involved all three regional powers – the Iraq-Iraq War, the First Gulf War, Operation Desert Strike in 1996, Operation Desert Fox in 1998, and the 2003 Invasion of Iraq.[36] Revealingly, Iraq has been at the centre of all of these conflicts.

The 1980-1988 Iran-Iraq War, occurring during the Cold War, inevitably attracted interference from the Superpowers and some Western great powers, either in the form of taking sides, or through arms sales. Ironically, this support helped the protagonists in destroying each others' oil production infrastructure; yet much of this support, interference and occasional direct involvement in combat operations, was also largely implemented to ensure the flow of oil out of the region. Subsequent external geopolitical and military interference by major powers focused on containing Iraqi aggression and 'shaping' the behaviour of Saddam Hussein, merely served to further the Gulf's status as a shatterbelt. None of this activity would have occurred or been strategically-driven unless Iraq had such important petroleum reserves and production potential.[37]

Looking to the future prospects for E & P activity in the region, the ironic net result of the continued instability in Iraq is that compared to Iran and Saudi Arabia, it is likely to be the site of greatest and most enduring IOC and NOC involvement, facilitated by foreign intervention and the country's urgent need for revenue for post-conflict re-building. In the end, periods of unrestrained interstate war, interstate power rivalries, and persistent intrastate instability - all enmeshed inside a shatterbelt - will certainly hamper and delay exploration and production. However, the drive to acquire access and production opportunities in this region will always endure. Indeed, continued schemes by IOCs and NOCs to gain access to the country's upstream sector, despite the long history of Iraq's contribution to the region's persistent geopolitical turbulence, is testament to the resilience of the oil industry in the face of adversity; a feature that has been demonstrated repeatedly during the history of oil exploration and production.

4.3.2 Impact of Conflict, Sanctions and Occupation on Infrastructure and Production

Sanctions and occupation

The scale of Iraq's resources and its production capacity, notwithstanding ebbs and flows during times of conflict and sanctions, has generated wealth and power for the country.[38] Nevertheless, conflict and punishing international sanctions have also resulted in the serious degradation of its upstream and midstream infrastructure, from which the country has yet to fully recover. This has resulted in stalled exploration, diminished production and retarded economic growth since 1980, which has muted the country's geopolitical potency in a positive way within OPEC.[39] The added impact of the 2003 invasion and ensuing insurgent attacks against vital infrastructure exacerbated need for the rebuilding of the country's petroleum industry and the expansion of oil production capacity. This has necessitated (and enabled) foreign investment and technical and operational involvement.

Iraq's oil production capacity reached new levels under the Saddam regime, reaching 3.8m b/d in 1979, with a subsequent goal to reach 5.5m b/d by 1983. However, war with Iran put a halt to this plan, due to the massive destruction of production and export facilities. Following the war, production was raised again to 3.5mn b/d by 1989, with a target of 6mn b/d by 1995. Yet the war with the U.S.-led coalition in 1991, followed by 13 years of sanctions and then occupation, further degraded Iraqi oil facilities. The net result of the cycle of war, rebuilding, sanctions, and further conflict, is that the industry has faced endemic destruction, a lack of investment, low fiscal priority in state objectives, and steady degradation during the past quarter of a century.[40]

The parlous state of the country's economy was exacerbated during the 1990s as the government used most of the oil revenue it did derive (legally and illicitly) to ensure its hold on power and to maintain what diminished sovereignty remained intact. Essentially, from 1991 until 2003, oil production was the Ba'athist government's only means of holding onto political power.[41] Interestingly, it could be argued that the very fact that sanctions remained in place for so long and because Saddam Hussein's government remained so defiant, despite the country's greatly diminished ability to project military power, demonstrates the resilience of its geopolitical influence and certainly its importance. Furthermore, though knowing full-well the oil deals could never come to fruition whilst sanctions remained, Saddam Hussein managed to win some measure of diplomatic support from two permanent members in the Security Council by awarding E & P contracts to Russian and Chinese oil companies.[42] This

arguably demonstrated the potency of 'virtual' petroleum production in helping to shore up the country's geopolitical bargaining posture.

2003 occupation to the present

Following the invasion and deposing of the Ba'athist government, the main objective of the Coalition Provisional Authority (CPA) (with regards to the country's oil industry) was not immediately to set about a large-scale rebuilding programme, but just to restore production capacity to its pre-war level of 2.8 million b/d. Somewhat prematurely, attempts were made during this early period by some within the Governing Council to invite IOCs into Iraq to complement the restoration task already being undertaken by the U.S. Army Corps of Engineers. However, the proposal was never adopted.[43] Indeed, there was a considerable sense within the CPA to keep its distance from Iraq oil politics; not only because oil has long been inherently central to the domestic political psyche and elemental to Iraq's political identity and purpose, but also because of the endemic criticism around the world of the U.S.'s alleged intention to dominate the country's oil production future for its own ends. The combination of all these factors essentially stalled the rebuilding programme. From 2004 onwards, the bitter insurgency continued to prevent inward investment and IOC/NOC involvement due to the high political risk and chronic security situation. By 2008, the surge in production capacity expected following the significant fall-off in large-scale combat operations had not materialized.[44]

For the next four years, IOCs and NOCs maintained contact with the Iraqi oil authorities, though the security situation prevented any meaningful involvement on the ground outside of ongoing technical studies, oil field data re-evaluation, and training assistance. However, by June 2008 there were signs of improvement in the situation regarding upstream activity involving foreign IOC and NOC access, but concerns over security in and around the oil fields in the south near Basra persist.[45]

4.3.3 Challenges to Current and Future Upstream Projects and Opportunities

Foreign petroleum companies have been denied access to many of the sizeable reserves in the Persian Gulf region due to long-standing nationalisation of oil and gas deposits and industries; however, access to Iraq's upstream looks far more promising. Nevertheless, the level of foreign participation will depend entirely on a stable symbiotic relationship between IOCs and NOCs and the fledgling Iraqi government. Inter-government accord is also vital in

this regard as the Iraqi government remains in a politically awkward and rather delicate situation, and a fully stable security situation remains difficult to ensure.

Aside from concern over security, larger-scale involvement by foreign companies cannot meaningfully proceed without proper codified petroleum legislation being passed by the government. This became far more urgent in 2008 as the possibility of significant involvement of foreign companies became apparent. Indeed, the entire future of Iraq's petroleum politics as it impacts upon the expansion of E & P to the benefit of the national economy, and also the fortunes of the foreign companies seeking access to the few large upstream plays remaining in the world, hangs on the successful adoption of the Iraq Hydrocarbon Law; a proposed piece of legislation submitted to the Iraqi Council of Representatives in May 2007. The law confers authority on the government to distribute remaining oil revenues throughout the country on a per capita basis, and would enable the provinces freedom to award production contracts to foreign companies without central government involvement.[46] By early 2011, the legislation was still mired by disagreement over the ability of the three main groupings – Sunnis, Shiites and Kurds - to negotiate contracts autonomously and the equitable distribution of revenue.

Getting sufficient agreement to pass the law is also hampered in the country's main producing region in the south where nationalist oil unions have threatened to strike if the law is passed, arguing that it would cede control of the country's resources to foreign companies. These concerns over losing sovereign control of upstream access and production have also been echoed by senior Iraqi oil-field managers.[47] Yet this is the very leadership that would be the immediate administrative and operational bridge with their counterparts in foreign IOCs and NOCs partnering to expand Iraqi production capacity.

Interim Technical Sharing Agreements (TSAs): Paving the way to fuller upstream access

Following an invitation by the Iraqi government to 120 U.S., European and Asian IOCs and NOCs, 35 companies pre-qualified to bid on TSA projects in Iraq comprises the world's largest and most active petroleum companies; the list clearly demonstrates the scale of international interest in Iraq's upstream sector (see list of companies at Annex A). It further reveals the geopolitical prism that binds Iraq's future oil and gas E & P with the fortunes the world's largest energy companies and the energy security of the countries in which they are based. Though it would be fair to say that several countries have more companies than others and there are different levels of operational and technical capability, the list also shows the

comparative geopolitical influence of the countries and their associated IOCs and NOCs, some of which is also derived from their respective upstream operation legacies. This is particularly true for the major U.S. and European IOCs.

In addition to the listed TSAs, two other sizable projects being led by foreign companies are notable. The first, and one very reflective of the impediments explicit in conflict-generated geopolitical obstruction, involves the China National Petroleum Corporation (CNPC). In March 2008, CNPC and the Iraqi Oil Ministry were close to concluding negotiations on a $1.2 billion contract to develop the one billion barrel *Al-Ahdab* field; a scheme originally agreed to in 1997 under Saddam Hussein. The deal was originally stalled due to prohibitive UN sanctions.[48] This project is interesting not only for its practical scope, but also because it shows that a major power that was opposed the 2003 U.S-led invasion has also managed to benefit from E & P opportunities inside Iraq despite obviously not being part of the coalition. Indeed, it will be interesting to gauge over time the net gains in upstream access and deals for the allies juxtaposed those for countries that were not involved (notably China, Russia and France); all of which have long histories of trade and relations with Iraq under the Ba'athist government.

The second project, one seemingly unexpected considering Iraq's geographical location and the dominance of its oil production over that of its natural gas, involves the potential development of the 4.6 trillion cubic feet *Akkas* gas field (located near the Iraq-Syrian border in the Western Desert) by *Total*, *Shell* and *Edison* to produce gas that might eventually find its way to the EU via Syria and Turkey. In May 2008, the EU agreed to work towards eventual gas deliveries of 5 billion cubic metres per year from Iraq; gas that could eventually feed its Nabucco pipeline.[49]

The Akkas project represents a compelling E & P case study demonstrating a complex binding of two sovereign governments and their NOCs with the technical, financial and project management of three IOCs (all from different EU countries) to develop a very large isolated field that could eventually supply domestic, regional and very distant international markets. It represents an innovative and elastic geopolitical extension of EU energy policy that is fuelled by its drive to diversify gas supply, even into a shatterbelt. It is reflective of one of the contemporary paradigms of 'frontier', elevated-risk projects that are being devised by IOCs that can achieve a form of 'virtual' upstream access to reserves by providing equipment, financing, technical input and project-management, but little or no foreign

physical footprint as the construction will be undertaken by Iraqi engineering firms. In high-risk upstream environments like Iraq, this may well become a more familiar approach for IOCs and NOCs that are deliberately kept (or chose to remain) operationally/practically peripheral to turbulent geopolitical and insecure environments.

This is important because at the end of 2010, the government had awarded 12 oil-service contract TSAs and three gas licenses as part of a plan to boost production. Of these, the most significant deal involves a joint BP-CNPC project to boost capacity from the giant Rumaila field to 2.85 million barrels a day from its current level of 1.07 million barrels a day.[50] BP has said Rumaila may become the world's second- largest producing field by 2015, which will likely transform Basra into one of the most important petroleum nodes in the Persian Gulf. Indeed, once production has been boosted across all of the other major fields in southern Iraq (such as the West Qurna-1), Basra and the associated production and expanded oil and gas exporting infrastructure will likely constitute a major new 'petroleum gateway' in the Middle East.

Another major project being headed by foreign companies is the ExxonMobil/Shell-led partnership to develop the West Qurna-1 oil field, also in the south of the country. Exxon Mobil and Shell initially didn't secure the deal earlier in June 2009 because they rejected the maximum production remuneration fee of $1.90 a barrel set by the oil ministry. The fee had also been rejected by Russia's OAO Lukoil Holdings, China's CNPC, France's Total SA and Spain's Repsol SA.[51] However, in October 2009, Exxon Mobil and Shell, along with Lukoil and CNPC, capitulated and accepted the offer; calculating that to be involved even under these disadvantaged terms was better than having no access at all to this major Iraqi reserve. The consortium has announced that it will raise production to 2.325 million barrels a day in seven years from the current 270,000 barrels per day.

4.3.4 Iraq's Petroleum Geopolitics and the Wider Regional Perspective

As demonstrated above, the importance to the global market of Iraq's known (proven) oil reserve base and its production potential just from existing wells (once this infrastructure has been fully repaired, upgraded and afforded sufficient protection) is beyond question. Regardless of the forceful showcasing of Saddam Hussein's alleged arsenal of WMD in the UN Security Council in February 2003 by the U.S., which served as the pretext for the invasion, the war's initiation by the Coalition proves this reality and the logic of the war's purpose. A clear sense in the Bush Administration that global demand for petroleum would

continue to grow was compounded firstly by concerns regarding the power Saudi Arabia had over OPEC and its wider commensurate influence over the market, and secondly, concern over the stability of the kingdom's government in the face of domestic restiveness and terrorist attacks against key infrastructure.

Iraq's reserves and production potential are simply too important in the wider strategic calculus to be left under-utilised. Moreover, the possibility of potentially enormous untapped reserves in the Western Desert means that Iraq could very likely re-shape the region's petroleum geopolitics; not only by propelling its own re-emergence as a major oil producer, but it could also be instrumental in easing the tight supply-demand margin, and dilute some of Saudi Arabia's dominance over OPEC.

In October 2010, Iraq's oil minister, Hussain al-Shahristani, announced that its proven reserves had been upwardly revised from 115 to 143.1 billion barrels, an increase of 20%. The oil ministry declared that increases had derived largely from its West Qurna and Zubair fields. Al-Shahristani, also added that the West Qurna field had reserves of 43 billion barrels, making it the second largest field in the world.[52] Notwithstanding the clear political motives of these kinds of reserve announcements, which is certainly characteristic of Gulf producers over the years (see Chapter Two), the claim ranks Iraq's reserves *de facto* the third largest in the world and the second largest in OPEC. This is precisely the kind of move that a struggling government of a recovering country in the region would want to make to boost its geopolitical profile in the face of long-term Saudi dominance of OPEC, a politically restive and interfering Iranian regime, and nervous (if adventurous) foreign IOCs and NOCs essential to the production revitalisation project that is pivotal to cementing Iraq's future prosperity and regional geopolitical influence.

Only a week after the Iraqi announcement, the Iranian government unsurprisingly declared that its proven reserves had been boosted to 150.31 billion barrels with the discovery of 34 billion barrels of associated oil in the Ferdowsi offshore gas field.[53] This suspiciously sudden, vast and independently unverified discovery, ostensibly put Iran back in third place in terms of 'proven' oil reserves.

Overall, the Persian Gulf will remain a shatterbelt for the foreseeable future, and Iraq is set to regain its position as a major producer within it; perhaps even overtaking Iran in time if its reserve-base expands and foreign IOC and NOC-assisted E & P takes hold. Aside from its

prodigious reserves, the county is geographically well-positioned to export oil and gas through corridors and gateways to the north, west and south. However, the upsides to the country's petroleum geopolitical ontology and its considerable potential in the upstream sector cannot be realised until the security situation on the ground is fortified and maintained (particularly in and around the southern oil-baring region). This must also be underpinned by equitable and reliable petroleum legislation. Notwithstanding the challenges still facing Iraq's government and those foreign companies seeking long-term upstream involvement, Iraq is now far more accessible for IOCs and many NOCs than is currently the case for Iran, which is the focus of the next case study.

4.4 IOC and NOC Access to Iran amidst Regional Tensions and Sanctions

4.4.1 Drivers and Implications of Inward investment

The majority of Iran's oil comes from aging, poorly-managed fields, and the National Iranian Oil Company (NIOC) does not possess the necessary technical capabilities or financing required to redress this. Much of the original NIOC's managerial and technical leadership was replaced by politically-compliant appointees when Ahmadinejad came to power, which has eroded the company's technical, operational and project-management capabilities at all levels. The NIOC is also struggling with developing new E & P projects, largely because of government-imposed constraints on its finances and fiscal decision-making autonomy. These problems, to say nothing of the complications arising from international sanctions, have constrained the development and pace of fresh E & P projects inside Iran by IOCs and NOCs alike; companies that possess the capital and technology needed to fund and carry out new upstream schemes, which the country so urgently needs.[54]

Whilst Iran's oil and gas production potential is as vast as it is significant, and the fact that its geographical ontology clearly confers relative strategic advantage in terms of regional conveyance potential, its petroleum industry is confronted by serious problems. The country once aspired to attain a production rate of 4.5 million barrels per day in 2005, and reach 7.3 million by 2020. However, the plan is failing and oil production is well below targets set.[55] At the beginning of 2007, production remained at 4.2 million barrels per day, and it was estimated that exports were shrinking by 10-12% per year.

Furthermore, as production remains stagnant, domestic demand is increasing; due largely to the government's continued over-subsidisation of gasoline. Iran is now a net importer of product fuels because its ageing refining infrastructure cannot refine sufficient volumes to meet burgeoning domestic demand. Despite these flat production rates, the accelerating price of oil in 2007 through to 2008 ensured massive earnings for the government. However, much of this windfall is channelled into costly welfare schemes rather than being re-invested into improving production and refining infrastructure.[56] Given these circumstances, the need for large-scale foreign direct investment and expertise by IOCs and NOCs is clearly essential for any hope of major expanded production and export to become a reality.

Foreign governments, NOCs and IOCs will continue to pursue investment in upstream sector opportunities inside Iran for as long as they are able, and provided contractual terms are

acceptable (even under the lean buy-back formula).[57] However, fundamentally, the ability of Iran to maintain current production, much less boost it, will depend entirely on its ability and willingness to fund new upstream projects. Ostensibly, it needs to reinvest an estimated $9-10 billion every year to just maintain current output, but it currently allocates only a third of that amount.[58] Despite a seemingly impressive foreign direct investment portfolio (see table at Annex B), not all the funds committed are in play and many deals have yet to be finalised. If this is added to the likelihood that production schemes take years to reach targeted productivity and longer for profits to be realised, then the net result is rather more modest.

The list is revealing for the amount of investment that is already in play, investment that is allocated but not yet transferred, and also for the projected estimates for future production growth. However, it is the large numbers of countries involved, and the mix of IOCs and NOCs within the projects that is perhaps the most interesting part of the picture. This representation is also indicative of the intense competition for E & P access in upstream environments, particularly ones as bountiful as Iran's. Most significant, are the number of Chinese, Indian and other Asian NOCs that are heavily involved. Companies such as ONGC, Sinopec and CNOOC, among other NOCs, are quick to signal their interest to fill the places of those western IOCs that are compelled to withdraw because of escalating costs, failure to win improved terms under the buy-back schemes, and most significantly, due to the punitive impact of the ongoing sanctions regimes.

Moreover, the investment portfolio also contextualises the Iranian position. On the one hand, it demonstrates to the government that there is a wide spectrum of willing and committed foreign partnerships to choose from; many of which are willing to take the financial and geopolitical risks inherent in obtaining access to Iran's upstream sector. However, on the other hand, many of these projects, though agreed to, remain operationally stalled or well behind schedule. This should send a clear signal to the NIOC and the government that if they are really determined to realise its production potential, as described elsewhere in this chapter, there is considerable logic in moderating its position towards the international community regarding its nuclear programme, and enabling the dilution and eventual eradication of sanctions thereby allowing investment to flow and upstream projects to flourish.

4.4.2 Regional Geopolitical Tensions, Sanctions and Relations with the U.S.

Richard Hass, the Chairman of the Council on Foreign Relations, has posited that whilst he anticipates continued U.S. influence in the Middle East, it will be reduced over time. Central to his argument is the encroaching impact of regional powers, particularly Iran.[59] The clearest manifestations of its external interference are its support for the Shiites (specifically the militia groups) sects in southern Iraq in their intra-state struggle with the Sunni insurgent groups and Iraqi security forces, and their long-standing ideological and political support of Hezbollah in Lebanon, and to a lesser extent, Hamas in the Gaza Strip. Also, Iran has long had a more subtle influence among the Shiite populations in other parts of the Gulf, specifically in Saudi Arabia's Eastern Province, Bahrain and Yemen (Shiite Houthis).[60]

Viewed on a regional geopolitical level, Iran is most certainly a major regional power; by virtue of its resource base, economic potential, land-mass, location, population and military capabilities. Not surprisingly therefore, it will behave as a regional power, and perhaps most significantly, it demands to be treated as such. Furthermore, Iran is surrounded by, and within strike range of, regional powers that have large standing militaries: namely, Turkey, Saudi Arabia, Israel, India and Pakistan, which the country's leadership is only too aware of and clearly concerned about. In the case of Israel, Pakistan and India, these countries also have nuclear weapons.[61] Furthermore, Iran is bordered in the east by two countries with chronic security problems – Afghanistan and Pakistan – which understandably presents concerns for Iranian security in its eastern and south-eastern regions. Lastly, the U.S. has a commanding military presence on Iran's western borders in Iraq and within the Persian Gulf; the most conspicuous being U.S. Navy strike carriers.

Notwithstanding, the debate over the veracity of Iran's claims that its nuclear enrichment programme is for the production of fuel for its nuclear power station, and that it is within its right to conduct a nuclear programme for peaceful purposes under the auspices of the NPT, it is hardly surprising that it would seek to have a nuclear weapon capability given its geo-strategic predicament. Disputes aside, gradually escalating levels of sanctions (including energy-related sanctions) have been in place to try to compel the government to abandon its enrichment scheme since 2006. These measures are the most recent in a series of punitive sanctions imposed by the U.S. with the specific purpose of the geopolitical containment of Iran,[62] through trying to encourage diplomatic and economic isolation.

The Iran Sanctions Act (ISA) (originally the Iran-Libya Sanctions Act (ILSA)), introduced by the Clinton Administration, was implemented in response to Iran's stepped-up nuclear program and its support for Islamic militant organizations, such as Hezbollah, Hamas and Palestinian Islamic Jihad (PIJ). ISA was designed to ban U.S. trade with, and investment in, Iran. However, a key feature of the sanctions regime was to impose a punitive effect on those foreign companies (including IOCs) that were operating in or trading with Iran, which were also active in the U.S., trading with the U.S. or using U.S.-patented technology. The logic of the sanctions was that they would curtail Iran's geo-strategic ambitions by throttling its ability to modernize its petroleum sector, thereby curtailing its economic muscularity.[63] Iran's oil infrastructure is aging and need substantial investment; but it is its large offshore natural gas projects that require intense IOC investment and technical expertise, particularly those projects slated for LNG export.

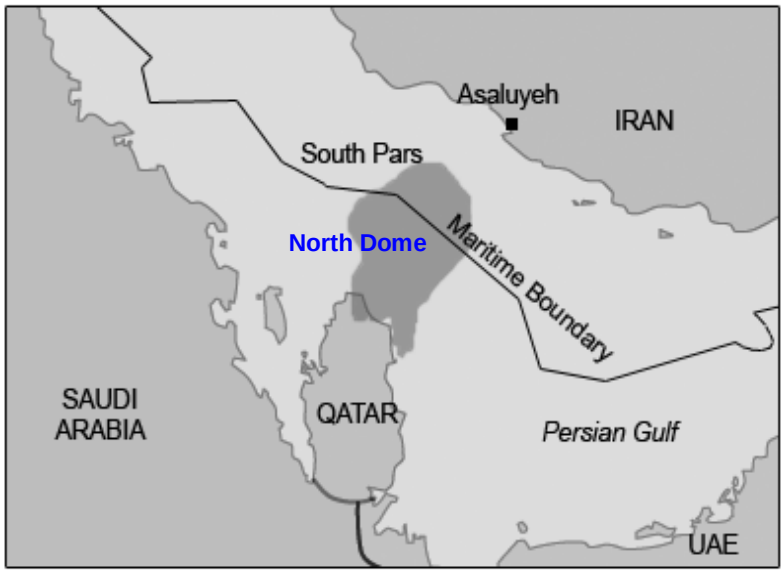
An expansive analysis of all the main projects currently underway (or in the planning stage) inside Iran involving IOCs and NOCs that have been affected in some way by sanctions is not possible within the scope of this chapter. However, an assessment of one of the more high-profile schemes (Phase 13 and 14) of the South Pars gas field development project – is exemplary for the inclusive range of key petroleum geopolitical features currently characterising Iran's wider dealings with the major powers and prominent IOCs and NOCs; geopolitical issues that are also ultimately key to the specific fate of this high-profile project.

4.4.3 Exploration and Production of the South Pars Gas Field

The South Pars/North Dome field, located offshore in the Persian Gulf and shared between Iran and Qatar, is the largest single gas field in the world. The field covers 9,700 sq km, of which 3,700 sq km is in Iranian territorial waters (South Pars) and the remaining 6,000 sq km located in Qatari territorial waters (North Dome).[64] The South Pars field, which contains an estimated 450 trillion cubic feet of gas (some 47% of the country's total proven reserves), is the most significant petroleum development project in Iran.[65]

Development of this massive play is built around a 25-phase scheme nominally spanning 20 years. The Iranian National Oil Company initially intended for the first 16 phases to be online by 2010, with the majority of production allocated for domestic consumption and gas re-injection to boost oil production. However, by mid-2011this had not happened, and there are few signs that such an ambitious target is likely in the short-to-medium term.

Fig 4.4 South Pars gas field



Source: Http://store.businessmonitor.com/article/300478

All of the currently producing phases are for domestic consumption, not export.[66] Non-Iranian companies involved in those phases currently in production and those previously intended to come on-stream by the end of 2008 (1-10) include: *Eni* (Italy), *LG Korea*, *StatoilHydro* (Norway) and *Total* (France). It is highly problematic for these companies to be involved in Iran due to the range of international sanctions arrayed against Iran. [The sanctions regime can potentially have inimical and indeed punitive implications for foreign companies that also have a presence and/or interests in the U.S.] This has stalled all phases of the project involving European and many Asian IOCs and NOCs. Phases 11, 12, 13 and 14 are reserved for LNG projects, and thus by design are intended for export. Phase 11 is dedicated to the *Pars LNG* (a partnership between NIOC (50%), Total (30%) and Petronas (20%)). *Iran LNG* (wholly owned by NIOC) is the sole operator of phase 12. Given that the LNG schemes in particular require Western IOC or NOC technology and investment to become reality, and because the gas is intended for export, these projects have been heavily targeted by the ISA regime.[67]

The importance of South Pars to Iran's domestic energy security and the importance of its potential for large-volume export (by pipeline and LNG shipments) to Asian and European markets is difficult to overstate (working on the basis that increasing quantities of gas will be in demand for power generation – particularly in Europe and increasingly in India and China). Not surprisingly, this reality has not been lost on the U.S., which views South Pars as a strategic target for economic sanctions as part of its bid to constrict (and if possible roll

back) Iran's plans to increase petroleum earnings. Consequently, any participation by western IOCs in South Pars was inevitably going to collide with the protocols explicit under ISA mentioned above. This set the stage for one of the more high-profile instances where IOCs, keen to gain access to South Pars, have collided with (and some have fallen victim to) the high politics that shapes Iran's relationship with the western powers, specifically the U.S.[68]

On 27 January 2007, in partnership with the Spanish company Repsol, Royal Dutch/Shell signed a preliminary agreement with INOC to develop Phases 13 and 14 of South Pars. The project involves production of 3 Bcfg/d and 110-120 MMbc/d, with the lean gas being fed to the planned Persian LNG plant to be located at the Tombak Industrial Complex. The plant's two trains would have a capacity of 8.1 million tons per year in its initial phase.[69] The overall project is valued at $12-13 billion, with production start-up initially scheduled for 2011, though this date has slipped considerably and the eventual project completion date is now far from certain. Repsol and Shell had each been assigned 25% interests, with National Iranian Oil Company (NIOC) holding the remaining 50%.[70]

Even at this initial stage Shell's CEO, Jeroen van der Veer, knew that geopolitical complexities (namely the ISA regime) would impact on the decision as to whether the company could proceed with, and eventually commoditise, the project.[71] Nevertheless, as with other IOCs in need of access to upstream opportunities, Shell and Repsol were willing to take on the geopolitical risk inherent in the scheme. Though BP had decided not to become involved in large projects in Iran due to the risk, France's Total remains heavily entrenched there. Manochehr Takin, the director of London-based Global Energy Studies captured the purpose of Shell's strategy, saying that: "Shell has decided to be in Iran, and they have done oil-field development projects, offshore in the Persian Gulf, and they have been in gas, and they want to go ahead, regardless of the risk, and this is just part of an oil company's strategy…"[72]

Despite its intentions to proceed in South Pars, Shell was mindful of its experience at Sakhalin 2 at the hands of Gazprom, and thus proceeded with caution. Takin further noted that political interference and pressure was nothing new to IOCs, and has been part of doing business since oil began to be commercialised in the 19th century. "They [IOCs] have always been exposed to political risk, as well as geological risk, and reservoir risk…they have a wide portfolio in different parts of the world, and they spread the risk".[73] From a wider strategic energy security perspective, Shell's involvement with South Pars represented a potential

opportunity for some consumers to further diversify sources by adding to those streams of LNG already exported from Qatar, thereby lessening reliance upon Russian piped gas.

Iran's ambitions for gas production were highlighted in 2006 when Reza Kasaei Zadeh, the deputy oil minister and general director of National Iranian Gas Company (NIGC) stated that the country's policy was: "to achieve 8-10% of the world gas trade and its by-products within 20 years".[74] However, given how many new initiatives are proceeding far slower than hoped, Zadeh's target is overly optimistic. From the perspective of field geology, NIGC is very concerned because the South Pars and North Dome fields are essentially a single structure, thus as Qatar increases production from its side, gas will migrate from the Iranian side to the Qatari side, which is clearly inimical to Iran's production potential from this vital field.[75]

For the Iranians, thus, speed is essential, and this pace is best achieved by trying to gain the participation of Shell, Repsol and Total (among others) in the South Pars LNG projects as quickly as possible, particularly because these phases are located very near the sovereign territorial demarcation of the field. However, in the short to medium term this is unlikely to happen. From the point of view of the IOCs, aside from rising development costs, the unfavourable terms of the buy-back formula and the retarding effect of Iran's cumbersome petroleum ministry bureaucracy, the biggest impediment remains the sanctions.

The relationship between the permanent members of the UN Security Council (P5) plus Germany and Iran regarding the dispute over the latter's determination to pursue its nuclear fuel enrichment programme, despite the offers by the major powers of safe nuclear technology and expanded trade, remains a complex stand-off. China and Russia essentially oppose the need for further sanctions given their continued investment interests inside Iran, and in China's case, its ongoing requirement to import Iranian petroleum, which dilutes the chances of a united Security Council in this regard. This diplomatic and trade dimension is only part of the problem: geopolitical tensions between the U.S. and Israel on the one side and Iran on the other also remain elevated, and though this situation remains in flux, there remains the possibility of it worsening to the point of military confrontation.[76]

The net result is that the prospects for western IOCs and NOCs to get involved in South Pars in the short to medium term remain bleak. This was reflected in May 2008 when Shell and Repsol announced their withdrawal from phase 13 and 14 in the hope of swapping the original scheme for later phases when the geopolitical risks have lessened. Though not stated

officially, the move was said by officials linked to both companies to be the result of the increased geopolitical uncertainty associated to pressure from the U.S. in its campaign to diminish or terminate foreign company involvement in Iran's petroleum sector;[77] a campaign that has been energised by the deterioration in relations as discussed above. Publicly, the companies cited spiralling development costs as the reason for the announcement.

In the heightened international competitiveness of today's upstream sector, and with the clear increase in technical capability, financial muscularity and diplomatic attractiveness of the Russian and several of the Asian NOCs, it is hardly surprising that these organisations are (and will continued) to fill the void left by Western IOCs unable to full-fill their contracts due to the sanctions regime that disadvantages them. Indeed, it is possible that Gazprom, Sinopec, CNPC, ONGC Videsh and Sonatrach could gain discernable degrees of advantage in those phases of South Pars rescinded by Shell and Repsol.[78] Gazprom is aggressively seeking to expand its international E & P portfolio, and Sinopec and ONGC are at the centre of the Chinese and Indian governments' drive to acquire upstream access in Iran to supply their expanding economies and bolster their national energy security.

Whilst these national champions certainly have capital to invest and are not politically constrained from operating in Iran in the way Western companies are, many still lack vital technical expertise necessary to develop an LNG production train, and others are deterred from running the risk of using licensed U.S.-patented LNG technology in Iranian projects because of fear over possible litigation or termination of future U.S. partnership in other projects. Whilst this may result in some breathing room for Shell and Repsol as they wait for a more permissive geopolitical environment, the aforementioned NOCs may eventually develop or acquire the requisite know-how by other means. This possibility means that any signs of future progress towards creating a favourable geopolitical and diplomatic environment that enables investment and participation in Iran's petroleum sector will likely be of clear importance to the aforementioned European IOCs so that the risk of forfeiting participation in South Pars are reduced.

4.4.4 Convergence: Geopolitical factors and Upstream Projects within a Strategic Resource Base

Geopolitics shapes virtually all of the enabling facets of Iran's upstream sector. Though many of the features of Iran's specific situation with regards to the combination of its enormous resource base, its production potential, its strategically enviable location, its brittle

relations with the Western powers and its dealings with prominent IOCs and NOCs remain unique, the geopolitical forces that result from this convergence are prominent features of 21st century *petroleum geopolitics*. Iran is also a remarkable case study in dialectical processes and counter-productive strategising, particularly on the part of the Iranian government.

Vital features of the convergence stand out. Iran's petroleum resource base, whether viewed individually as proven oil or gas reserves or in its most profound aggregate sense as potential BOE reserves in place, is a geopolitical and geophysical asset of almost un-matched proportions (see chapter two). This confers *actual* and *latent* political power upon Iran, in the forms of production potential and reserve base respectively. Main features include:

- manifested as its capability as a regional power, particularly its influence among Shiite populations in Iraq, Saudi Arabia, Lebanon and Yemen;
- its diplomatic influence within OPEC;
- its ability to attract support among the non-aligned states within the UN and even permanent members of the Security Council keen to gain access to Iran's upstream sector, such as China and Russia;
- and, ultimately in the way Iran continues to generate such considerable problems for the United States.

Nevertheless, it is the *latent* power that also exists by virtue of its considerable future oil and gas *production potential* that variously reveals some of the most compelling and, in places, self-defeating causal relationships between high politics and strategically-essential petroleum projects: both for the Iranian government, keen to expand production; and also for those countries that need to enable participation in the country's E & P sectors, which will ultimately help facilitate, expand and convey this vital resource stream into the global market.

The operationalisation and/or furtherance of many important petroleum E & P schemes remain compromised or held hostage to other strategic priorities by both sides: Iran stubbornly clings to a desire for a nuclear capability for power generation and weaponisation; and, the U.S. wants to curtail Iran's geopolitical potency through prohibitive economic sanctions and the implicit threat of punitive military action. However, Iran urgently requires the foreign investment to boost the oil and gas production needed to underpin the expansion of the very economic and geopolitical power its government so obviously covets. At the same

time, the global market would benefit from the oil and exported gas potential that Iran has in potential abundance in order to ameliorate the increasingly tight supply-demand balance; a process which will help stabilise prices and support macro economic growth. This geopolitical dialectic is set to remain in place certainly for the short-to-medium term, unless some brave and frankly radical steps are taken by fresh leadership on both sides.

In the current situation there are no clear winners. Both the West and Iran are playing a waiting game. Boosted oil revenue due to high prices enables the Iranian government to ride out the sanctions as she courts investors from Russia and Asian powers, but harsh buy-back terms, chronic reservoir management, sclerotic administration, and limited technology will dampen progress. The U.S.'s containment of Iran is effective in moderating its regional power through sanctions and conspicuous military deployment in the region, but this posture also fuels Iran's influence among insurgents and extremists in the Middle East, and keeps oil and gas production growth out of the market. IOCs and NOCs are long used to functioning in this often adverse geopolitical environment, albeit on a more limited scale than they would ideally like. However, if a *status quo ante* could be established, then several of the geopolitical features in the analytical framework advanced in this thesis - permissive access to sovereign space, transnational-exchange, constructive diplomatically-driven trade, and collective energy security could help enable, build and sustain a strategically-significant resource stream for the future to complement those sources from Saudi Arabia, Russia, the UAE, Qatar and Kuwait, Kazakhstan, Turkmenistan and Azerbaijan.

4.5 Upstream Competition between Asian Powers: China, India and Japan

4.5.1 Overview

The primary driving force behind international oil companies' desire to gain access to upstream sectors of the petroleum industry, the need to commoditise oil and gas deposits and 'book' reserves, is of course the pursuit of profit. Their survival as businesses depends upon that priority. NOCs, which are essentially operational articulators of national petroleum objectives and policy parameters, have increasingly potent financial capacity, institutional mobility, political support and technological acumen. However, a state's drive for petroleum exploration and production, whether inside its own territory or that of another country's, is also firmly based upon the strategic imperative of ensuring the supply of energy to its economy; an economy that enables domestic political grip, geopolitical influence and the potential to generate further prosperity. This process, of course, becomes self perpetuating: as a country's economy and power grows, the need for greater energy is thus axiomatic. Since the last decade of the 20th Century, the logic of this process is exemplified by the steady rise in the economic growth of much of Asia. In contemplating the impact of this growth upon the demand for petroleum worldwide, it is China, India and Japan that stand out.

Taking a step back, looking at the broader geopolitical landscape, notwithstanding the repercussions of 9/11, arguably the most important long-term phenomenon for the first half of the 21st century is the shift in politico-economic power and influence to Asia. Amongst the most cited economic forecasters (especially so in the context of the confluence oil, politics and economics), *Goldman Sachs*, amidst the explication of their paradigm of the economic surge of the BRIC states [Brazil, Russia, India and China], has forecasted that the latter two could conceivably triple their economic output over the next ten to fifteen years.[79] Indeed, regardless of the precise fluctuations and values of Chinese, Indian and Japanese GDP figures over time, and the inevitable impact of periodic economic contractions, former editor of *The Economist*, Bill Emmott, has argued that the trend is clear: "Asia is going to carry on getting richer and stronger, probably for a long time to come…the trade and innovation that are generated will make the West richer and stronger too…but it will change the relative balance of power in the world." Significantly, however, Emmott further suggests that: "The rise of Asians is not just…going to pit Asia against the West…It is going to pit Asians against Asians".[80]

Emmott crystallises the significance by concluding that this is the first time in history when there have been three powerful states in Asia (four, if one includes the Asian parts of Russia). However, this would not matter, he argues, if they were naturally compatible and amenable to one another, but they are not on both counts.[81] This has potentially significant ramifications for these respective states in their drive to achieve and ensure petroleum energy security – specifically, access to upstream oil and gas sources and E & P project opportunities. Not surprisingly thus, these major Asian players are at the core of the forces currently shaping global petroleum geopolitics as a direct corollary of their extant economic and geopolitical status (Japan), the need to fuel unprecedented economic expansion (China), the drive to further their evolving military power and geo-strategic influence (both India and China), and the need to ensure energy security (all three powers).

India and China, faced with ballooning energy requirements to fuel increasing industrialisation, electricity demand and transportation, are scouring the globe for petroleum E & P opportunities. This is occurring in parallel with Japan's long-standing international drive to satisfy its considerable need for crude oil and natural gas, neither of which can be sourced in any meaningful quantities from within its own borders. Whilst India and China have domestic sources of supply (see table below), neither country has any where near sufficient reserves for their steadily growing demand.

Given the pace of their economic expansion, and their clear intention to expand their politico-economic muscularity, India and China have for several years been engaged in unambiguous petroleum 'check-book diplomacy' in order to ensure upstream access to production opportunities in Asia and Africa. Japan continues to engage primarily in Asia and Russia to ensure its energy supply security at source. This process naturally brings the three states into competition. But, importantly, it has also yielded opportunities for cooperation in upstream projects in instances where soaring material and development costs elevate the project's financial risk, where there is a need to share and access technology, and when the advantages explicit in fostering diplomatic convergence outweigh the possible gains for a given state in a zero sum energy security game.

Table 4.1 China and India: proven reserves

Country	Proven Crude Oil Reserves (Billion Barrels)	% of Global Total	R:P Ratio (Years)	Proven Gas Reserves (Trillion Cubic Feet)	% of Global Total	R:P Ratio (Years)
China	14.8	1.1	10.7	86.7	1.3%	28.8
India	5.8	0.4	21.1	39.4	0.6%	28.4

Source: BP Statistical Review of World Energy 2010

This section explores instances of competitive schemes to gain upstream access, and to examine an example of an initially high-stakes confrontation between two states that eventually evolved into a shining example of where cooperation eventually triumphed over conflict. Prefaced by a table (see table at Annex C) that captures the vast geographical expanse, diversity and status of the most important E & P schemes in production, under development or pending involving major Chinese, Indian and Japanese companies, three cases will examine the realities shaping the petroleum geopolitical strategies of these most important Asian powers:

- Chinese-Indian NOC competition in Central Asia;
- Chinese and Indian NOC competition in high geopolitical-risk countries;
- and, Chinese-Japanese conflict turned cooperation in the East China Sea

In the first instance, the table at Annex C reveals the considerable geographical expanse the E & P environment within which the three states are present, operationally and prospectively. The countries are spread across western, central, eastern and south-eastern Asia, North and South America, Africa and Europe. Many of the long-established and emerging 'frontier' schemes are also represented. Unsurprisingly, not only are many of the companies involved in the same countries, but several are partners in the same projects. Most of the projects result from years of planning and development, notable examples being Nigeria, Myanmar, Kazakhstan, Algeria, Australia, Oman, Russia, United Kingdom, United States, Azerbaijan UAE, Sudan and Iran. Strictly in terms of current and potential near future production volumes of crude oil and/or natural gas (including LNG), the most significant plays are in: Brazil, Canada, Iran, Iraq, Kazakhstan, Libya, Nigeria, Qatar, Russia, the United Arab Emirates, the United States and Venezuela. Notwithstanding the more highly publicised and analysed foreign E & P activity of Chinese and Indian companies, the table is also revealing for the large number of highly active, well-managed and technologically-capable Japanese NOCs and IOCs that are long-standing players in the upstream sector.

4.5.2 Chinese-Indian Competition for Upstream Access in Kazakhstan

Though certainly not typical of all of the interactions between China and India in their drives to acquire upstream access (several are cooperative), there are notable examples of competition between the two countries' major NOCs as they seek to secure international E & P opportunities. Two such contests for access in Kazakhstan and Myanmar are important examples of *petroleum geopolitics* with identifiable zero sum characteristics, which have important components of this complex and sometimes dialectic paradigm.

With 39.8 billion barrels of proven reserves of crude (3.2% of the world total), Kazakhstan has the Caspian Sea region's largest recoverable reserves, and accounts for over 50% of the region's daily production (2.8 million barrels per day).[82] However, though these figures are impressive in regional terms, it is the country's potential oil production capacity and reserves to production ratio (73.2 years) that confers its importance to the global energy market, and also by implication its E & P attractiveness to India and China. Increased production has largely been the result of inward foreign investment in the form of joint ventures, PSAs and exploration/field concessions.

In spite of having been involved in Kazakhstan's upstream sector since 1997 (following its acquisition of a 60.3% stake in AktobeMunaiGas, the fourth-largest oil company in the country[83]), CNPC has long strived to acquire more reserves in the country, and in August 2005 the Chinese company outbid ONGC Videsh to acquire previously Canadian-owned PetroKazakhstan. Previously, in June 2005, PetroKazakhstan (which has proved and probable BOE reserves of 550 million barrels, and accounts for approximately 12% of the country's production),[84] had been approached by ONGC Videsh, whose bid of $3.9 billion narrowly eclipsed CNPC's initial offer of $3.6 billion. However, in August, the Kazakhstan government accepted CNPC's revised offer of $4.18 billion.[85] Upon signing, CNPC transferred 33% of the stock to the state-owned KazMunaiGaz, and retained 67%. ONGC Videsh's attempts to appeal for a reversal of the decision were effectively neutralised with the approval of the deal by the Canadian court.

Despite the higher Chinese bid, a number of other reasons were cited for India's loss to China in this instance. Firstly, and most importantly, CNPC already had a large and long-standing presence in the country's upstream sector. Added to this was the fact that at the time CNPC was also close to completing a major section of the Kazakhstan-China Oil Pipeline linking

other Chinese-owned Kazakh fields with China.[86] This was a clear reminder to the Indians of the significance of key geopolitical factors that conferred advantage to China:

- Kazakhstan and China share a land border, which clearly they do not with India, and this makes China a more accessible trading partner (particularly with regards to pipeline connectivity).
- Notwithstanding the enormous distances involved between sources of Kazak petroleum and industrial/urban centres of Chinese demand, as very large terrestrial states, China and Kazakhstan's trading perspective is also shaped by their acceptance of the vast distances and space that need to be traversed to facilitate trade.
- The two countries are also mindful that the need to balance Russia's influence as a regional petroleum power is best achieved through strengthening their trading, diplomatic and commercial ties.

In a telling reflection of the muscular, geopolitically-driven diplomacy affected by the Chinese on behalf of CNPC, the then Indian Minister for Petroleum and Natural Gas, Mani Shankar Aiyar, stated that despite the Kazakh government's reservations over granting the Chinese company greater access to its petroleum reserves, paradoxically, India was outmanoeuvred diplomatically by China, and that India's petroleum policy was not backed up with sufficient government support and foreign policy. Indeed, the Indian government's insufficient backing of its NOCs in other cases of this kind during the last decade is well known in the industry. Nevertheless, Aiyar had for some time prior to the loss of the PetroKazakhstan deal been advocating closer Sino-Indian cooperation in securing foreign E & P opportunities.[87] Fundamentally, in this instance, China had the upper-hand in almost every way: long-term presence in the target country; greater financing; better bilateral political connections; common geography; energy project interdependence; and, far more focused and experienced petroleum-centric diplomatic acumen. As testament to this, it is revealing to note that since 2000, Chinese NOCs have acquired equity stakes in over 25% of Kazakhstan's oil production.[88]

Essentially, China views Central Asia as a pivotal and obvious *de facto* feature of its sphere of influence, and access to petroleum lies at the heart of this geopolitical perspective. As stated briefly above, CNPC's acquisition of PetroKazakhstan is a recent manifestation of a long-standing, high-level and mutually beneficial relationship between the two countries; characterised by Kazakhstan's need for investment and the desire to diversify its market, and China's drive to diversify its sources of supply and reduce its dependence on tanker-supplied

oil from the Persian Gulf.[89] China's strategic posture towards the region is further underpinned and characterised by being a founding member the Shanghai Cooperation Organisation (SCO),[90] which gives it diplomatic and treaty-forming advantage with Russia and member Central Asian States. In a wider geopolitical sense, the PetroKazakhstan deal addressed China's need for new and secure sources of energy and solidified Beijing's influence in Central Asia, all at India's expense.[91] This was not the only instance where India had lost out to China; it has also forfeited upstream bids in other Asian countries with important petroleum reserves, such as Myanmar.

4.5.3 Chinese and Indian NOC Competition for Offshore Gas Fields in Myanmar

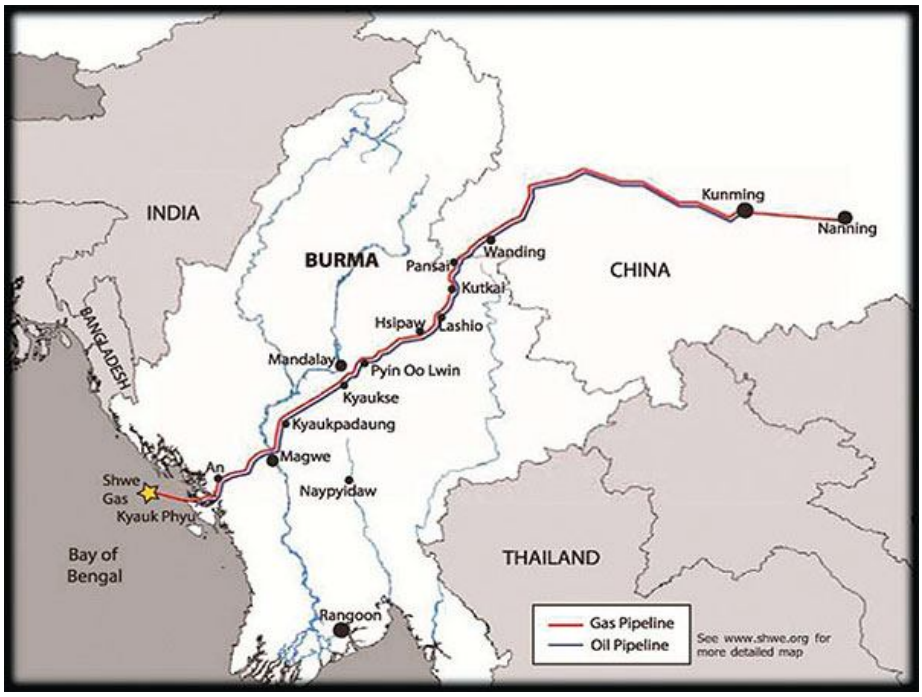
For India and China, the prospect of gaining access (exclusive or otherwise) to Myanmar's significant reserves of natural gas is an energy security and geopolitical phenomenon of intriguing complexity. It fuses the reality of fierce competition over potential access to an estimated 21 trillion cubic feet of natural gas,[92] forging an internationally contentious working relationship with an arcane and repressive military junta, and the establishment of a strategic energy supply close to areas where it is needed. All this occurs amidst wider geopolitical and geo-strategic issues, specifically: Chinese commercial and trade access to the Indian Ocean; the implications of China reducing its reliance on tanker shipping transiting the Malacca Straits; and, India's drive to strengthen its strategic influence over an oceanic space that it regards as a vital sphere of influence.[93]

Though other deposits have yet to be uncovered off the coast of Myanmar, and the final volume of its total proven reserves of natural gas yet to be determined, the site for arguably the most intense contest between India and China for upstream access to foreign reserves to date are the fields of the Shwe project, which are estimated to contain some 9.1 trillion cubic feet of gas deposits.[94]

Following conclusively successful appraisal drilling in the Shwe structure in 2004 and 2005, India's ONGC Videsh and GAIL acquired 20% and 10% interests in the A-1 and A-3 blocks in the Shwe field, respectively. The other consortium partners being Korea's Daewoo, the project leader with a 60% stake, and KOGAS with a 10% share. India had hoped that it could turn this E & P success story into an important strategic gas supply stream for the country by transporting its share of the gas via a 960-mile pipeline from Myanmar to India. However, in mid 2006, as plans for the $3 billion pipeline were being considered by the Indian NOCs in concert with the Junta, PetroChina managed to sign a memorandum of agreement with

Myanmar's government for exclusive rights to 6.5 trillion cubic feet over 30 years.[95] Indian diplomats only found out about the deal after it had been agreed. In an ironic twist, this essentially means that if the Chinese managed to secure exclusive purchase rights, the Indians (along with their Korean partners) would end up having to produce gas to sell to its rival. On the one hand that could be viewed as a reasonable business deal; however, on the other hand, this was a major setback, as India had viewed its acquisition as a source to fortify its own energy security. This subsequently prompted an Indian presidential visit to Burma in March 2006, which included the signing of additional gas sales to India.

Fig 4.5 2,800 km oil and gas pipelines from Shwe to Naning, China



Source: http://www.bangkokpost.com/news/investigation/207425/the-colour-of-money

In September 2007, the Indian Minister of Petroleum and Natural Gas at the time, Murli Deora, re-injected fresh impulsion into India's quest to secure additional upstream access to Myanmar's offshore gas by witnessing the singing by ONGC Videsh of a $150 million, seven-year deal for three deep-water blocks off the Arakan coast. This success came soon after the realisation that the planned scheme to develop the Iran-Pakistan-India gas pipeline (IPI) had stalled once again, thereby prompting the government to urgently seek additional sources elsewhere. Unfortunately, given the obstacles to building the proposed Myanmar-Bangladesh-India gas pipeline, any equity gas India's NOCs may have in Myanmar still remained effectively 'stranded' in terms of their utility for India itself. Put another way, though India is seemingly making up for earlier losses to China, if the Chinese manage to

secure exclusive rights to buy the gas from the Shwe field, which is then transmitted to China via their own proposed 560-mile gas line to the Chinese-Myanmar border, then this remains a net strategic loss for India.

Underlying India's economic and energy interests in Myanmar, is a desire to counter China's growing influence on the country and if possible regain some measure of influence over the volumes and destinations of these important gas reserves. Arguably, the Shwe project can be seen as a microcosm of the contest for resources and political influence in the region between the two rising Asian powers. However, at this juncture, in the contest for access to Myanmar's gas, China is winning, and aptly demonstrating the significant geopolitical advantage in having an un-obstructed common land border with Myanmar, added to its clearly stronger diplomatic influence over Myanmar's government juxtapose that of India's. The latter is due in no small part to the importance of China's veto-wielding power in the UN Security Council, which affords the Myanmar government considerable diplomatic cover in return for favoured status in terms of access to, and conveyance of, its petroleum resources.

In the medium-to-long term, the wider geopolitical and strategic implications of this contest over petroleum between India and China are profound. If China continues to build upon its current advantage in Myanmar, it will help to further its ambition to gain direct *de facto* maritime access to the Indian Ocean, which is in keeping with the evolution of the so-called 'String of Pearls' theory. This nominal geo-strategic phenomenon is the non-confrontational project of the PRC to acquire maritime port access, air bases, sea trading nodes, and transportation linkages from mainland China, south-westwards through the South China Sea and the Malacca Straits, and then westwards to the Persian Gulf and Arabian Sea littorals. According to Christopher J. Pehrson, author of *String of Pearls: Meeting the Challenge of China's Rising Power Across the Asian Littoral*: "Each 'pearl' in the 'String of Pearls' is a nexus of Chinese geopolitical influence or military presence".[96]

Given that the sourcing and secure supply of petroleum constitutes the centre of gravity for Chinese national security, the ability of Chinese NOCs to gain the upper-hand in petroleum-rich states such as Myanmar, combined with the PRC's wider geopolitical/military scheme intended to protect the sea lines of communication (SLOCs) that link the 'pearls' with the Chinese mainland, the Sino-Indian competition examined above constitutes a powerful example of one of the telling features in contemporary *petroleum geopolitics*: the linkage

between competition for access to upstream E & P projects, amidst the geopolitics of national security, access, spatial influence, and long-term strategic posture.

4.5.4 Chinese-Japanese Conflict Turned Cooperation over Gas in the East China Sea

The initial drilling by a joint CNOOC-Sinopec consortium of the Chunxiao gas field along the disputed delineation of the Chinese and Japanese EEZs in 2003 was quickly followed by a protest by the Japanese government, which declared the Chinese E & P project threatened (Japanese) gas deposits on its side of the median line. From a resource extraction perspective, the Japanese were very concerned about the possibility that CNOOC and Sinopec's drilling operations could in theory also be directed laterally across the dividing line of the EEZ claimed by both countries using modern horizontal directional drilling techniques (HDD). The conflict between Asia's second largest economy and its fastest growing economic power over gas-rich sectors of the East China Sea essentially became a conflict over upstream access by two powers whose economies are reliant upon ensuring supplies of petroleum, embedded within a long-standing, unresolved maritime territorial and geopolitical dispute. For a period, this petroleum-territorial conflict threatened to escalate into an international security crisis.[97]

The Chunxiao natural gas field (referred to as Shirakaba by the Japanese) lies in the East China Sea within China's EEZ, and 4 km from Japan's EEZ boundary line. Chunxiao is the first of a group of four gas fields in the Xihu Trough. CNOOC estimates the field contains 31.6 billion BOE: 3.8 billion barrels of which is oil and 166.9 billion cubic feet (4.7 billion cubic metres) of gas. Gas production eventually started in January 2006.[98] Unocal and Shell withdrew from the project in late 2004 for reasons of excessive project costs, uncertainty over the proven reserves estimates, and the potential geopolitical risk implications over the persistent territorial dispute, which threatened to compromise the viability of the project if it turned into a flashpoint,[99] as established in the analytical framework in chapter 2.

Fig 4.6 Chunxiao natural gas field in East China Sea

Source: The Economist, 19 June 2008

Boundary disputes are a cornerstone theme of geopolitics and a key part of the analytical framework of this thesis; characterising key interlocking features of the paradigm such as: sovereignty, territorial delineation and EEZ claims, zones of power projection and influence, national identity, international law and potential flashpoints. However, the potential implications of boundary/territorial disputes are greatly amplified when the geographical space in question also contains strategically vital raw materials, in this case petroleum. In the case of the East China Sea dispute, once the presence of significant deposits petroleum had been established, the issue was transformed from a simmering, long-standing territorial dispute into a geopolitical flashpoint.

A petroleum geopolitical flashpoint merely refines the focus of the phenomenon and can certainly lend further strategic and national security gravitas to its effect. Whilst not reflective of all petroleum-centred flashpoints, the dispute between China and Japan over Chunxiao (Shirakaba) is useful as a case-study in demonstrating the complexities and potential high-consequence effects of states vying for upstream access to disputed reserves, and, importantly, the case also demonstrates the paradox that such disputes can sometimes also lead to cooperation rather than crisis.

The gas fields located amidst the Xihu Trough lie within the EEZs claimed by China and Japan according to United Nations Convention of the Law of the Sea (UNCLOS).[100] Given that the area of the East China Sea between the two countries is less than 400 nautical miles (varying between 180 nautical miles at its narrowest and 360 nautical miles at its widest), quite aside from the legal reality of China's claim to the continental shelf, the EEZs of China and Japan in fact overlap. The net result of the international maritime law governing this case is that the dispute is an effective stalemate, despite the continued Chinese contention that Japan's drawing of its EEZ line is geographically erroneous, and thus illegal. Finally, much of this specific dispute is also incubated within, and further complicated by, the longstanding and unresolved dispute over the sovereignty of the Diaoyutai/Senkaku island chain, also located within the East China Sea and variously claimed by China, Taiwan and Japan.[101]

The geopolitical dispute over the right to access and extract the gas reserves located in the Chunxiao field flared in July 2005 when the Japanese government rescinded its initial position not to establish E & P operations in the area (a measure implemented to ameliorate tensions between the two countries over the issue). Japan publicly announced it was granting a licence to Teikoku Oil to commence drilling operations along their EEZ median line adjacent to the Chinese rigs already operating in the field.

On 7 July, Japanese survey ships were sent to begin seismic surveys of its side of the Chunxiao/Shirakaba field. The Chinese Foreign Ministry responded initially by stating that: "If Japan persists in granting drilling rights to companies in disputed waters it will cause a serious infringement of China's sovereign right".[102] This development added fuel to an earlier incident in April of 2005, when accusations surfaced of the alleged possibility that CNOOC and Sinopec's drilling operations could be directed laterally across the nominal EEZ median divide established by Japan (which lies just 4 km to the east of the Chinese rigs) thereby siphoning gas from within the Chunxiao/Shirakaba structure that is inside the Japanese EEZ; gas to which Japan is legally entitled.

In September 2005, an already tense situation was compounded by China's deployment of five warships, including a *Sovremenny*-class guided missile destroyer, to patrol the waters surrounding the Chinese drilling and production platforms in the Chunxiao field.[103] Several days after the deployment, a patrolling Japanese P-3C Orion maritime reconnaissance aircraft detected that it had been locked onto by a Chinese naval fire- control radar (widely regarded as a hostile act) and potentially a sign of an imminent weapon launch. The Chinese

deployment was not viewed as mere coincidence, as it preceded the scheduled initiation of gas production in the Chunxiao field by a few weeks, and also occurred two days prior to the Japanese general election and a day prior to the resumption of bilateral talks on the issue.[104] The incident was not helped by being followed by public demonstrations in both countries highlighting the growing sense of nationalist sentiments in China and Japan at the time.

During 2006 and 2007, both countries gradually tempered their official positions on the conflict and constructive diplomacy quietly began to take hold in order to tease out a way to end the dispute, and perhaps find a way for the two countries to cooperate in the E & P projects underway. On 18 June 2008, both sides announced that they had agreed to jointly develop the field.[105] This can be viewed as an important diplomatic break-through, and can also be seen as shining example of where two powers, each striving to diversify and where possible control their respective sources of petroleum, can cooperatively realise their E & P ambitions. In this way, what was once seen as a zero sum game in the quest for exclusive upstream access to a strategically significant gas deposit was reworked into an example of collective energy security. In this sense, the quest for petroleum functioned, paradoxically, as a constructive moment rather than a divisive or inimical one. The wider imperatives of expanding bilateral trade and reciprocal foreign direct investment between the two countries, however, also served as a powerful incentive to find an accord.

However, caution is warranted when assessing this case, as considerable geopolitical concerns governing disputed territory and access to it remain. The agreement does not yet cover the E & P rights in the other fields in the area, nor does it address the outstanding EEZ boundary quandary or resolve the wider territorial dispute concerning Diaoyutai/Senkaku Islands. Furthermore, in considering the more strategic-level geopolitical issues in this region, issues with a definitive Mahanian characteristic, China remains deeply concerned over the possibilities of sea-area access and potential littoral area-denial with regards to more endemic resource exploitation, and implications for naval deployment flexibility due to the reality of encroaching and proximate EEZs by neighbouring states. This means that the conflict has the potential to escalate and worsen again in the future, particularly if E & P in the remaining fields is not managed openly between the two countries and territorial issues remain unresolved. Indeed, in July 2010, the PRC military declared that it had ‘indisputable sovereignty’ over the entire South China Sea,[106] which added fuel to extant concerns by other regional governments (Vietnam, the Philippines, Malaysia and Indonesia) and the U.S. of increasing Chinese geopolitical ambition in the western Pacific rim.

This chapter has aimed to demonstrate the relevance and complexity of geopolitical factors that shape, determine and constrain E & P activity; phenomena such as sovereignty, boundary demarcation and disputes, the location and nature of shatterbelts and flashpoints, resource nationalism and resource security. Not surprisingly, many of these same factors are equally influential upon the nature of conveying oil and gas by pipelines across vast territories and multiple sovereign states, which is the subject of the next chapter.

Notes

[1] Morgan Downey, *Oil 101* (Wooden Table Press LLC, 2009), p. 83
[2] *Ibid.,* pp. 99-100
[3] *Ibid.,* p. 101
[4] *Ibid.,* pp. 128-141. The technical and operational means and processes explicit in the drilling and recovery of oil and gas are not covered in detail in this thesis. For a concise and accessible description of the specifics of E & P technical stages and processes see Morgan Downey, *Oil 101* (Wooden Table Press LLC, 2009)
[5] For definitions of reserves see chapter three.
[6] *Ibid.*
[7] In PSA the country's government awards the right to exploration and production activities to an IOC or NOC (or a consortium. They can be very profitable agreements for the oil companies involved; however, PSAs often involve considerable risk. See: Dr. Irina Paliashvili, President of the Russian-Ukrainian Legal Group, at the Seminar on the Legislation on Production Sharing Agreements
[8] Daniel Yergin, *The Prize: The Epic Quest for Oil, Money & Power* (London & New York: Free Press, 1991),
[9] James Schofield, Russia's oil renaissance, BBC News, 24 June 2002
Http://news.bbc.co.uk/1/hi/business/2058214.stm
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[11] *Ibid.*
[12] Edward Lucas, *The New Cold War: How the Kremlin Menaces both Russia and the West* (London: Bloomsbury Publishing Plc, 2008), p. 113
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[20] Shell Http://www.shell.com/home/content/aboutshel-en/our_strategy/major_projects_2/sakhalin/sakhalin_12032008.html
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http://www.eia.doe.gov/emeu/cabs/Sakhalin/Background.html
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[25] http://www.oil-and-gas.net/site/main/les_mer.php?page_id=3631
[26] The Jamestown Foundation: Http://www.jamestown.org/edm/article.php?article_id=2372294
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[29] http://www.telegraph.co.uk/sponsored/russianow/opinion/8048374/Agreement-on-Kola-Peninsula-on-Norwegian-Russian-border-opens-way-for-investment.html
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[81] *Ibid.*
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Chapter 5 Pipeline Development in Eurasia

5.1 Overview

Few topic areas in the business of petroleum and national energy security capture both the complexity and importance of geopolitics as pipeline routing selection, construction and control across potentially multiple sovereign landmasses. Indeed, it is arguable that so-called 'pipeline geopolitics' constitutes much of the underpinning logic of what could be viewed as *petroleum geopolitics*. However it is viewed, the processes and strategies that determine where and how oil and gas pipelines are built and operated is most effectively explored and analysed within a large geographical space comprising the Caspian Sea, the Caucasus and Central Asia. Though the region's as yet un-produced reserves are not as extensive as those within the Persian Gulf and Arabian Peninsula, the scale of the proven and likely probable reserves of oil and gas in the Caspian Sea basin in particular have exerted a very powerful draw on consuming states, some located great distances from the source.[1]

The purpose of this chapter, thus, is to examine the fundamental features and causal variables such as - geography, sovereignty, access, commercial and business imperatives, state power and influence, and strategic necessity - that coalesce to determine which oil and gas pipelines within the aforementioned region get built, for what reason, and which actors control them. The chapter is split into three main sections that are a series of case studies that examine the major powers that have had, and continue to have, the greatest impact in determining the means to facilitate construction and operation of pipeline conveyance from the Caspian and Central Asia – Russia, the United States and China. The three sections explore the vital strategic interests of each power as they relate to ensuring secure supplies of oil and/or gas amidst an analysis of specific pipeline schemes, which reflect the complexities and forces explicit in pipeline development and control, and the relevant causal geopolitical phenomena.

The Russian study considers the Caspian Pipeline Consortium (or CPC), the U.S. case study centres on the evolution of the Baku-Tbilisi-Ceyhan pipeline (BTC), whilst the final study explores China's Kazakhstan-China Pipeline (KCP) and the newly constructed Central Asian-China gas pipeline (or CACP).

With the exception of IOCs and NOCs that have actions and means of influence specific to these entities, the principal actors are of course states, which have varying features both in terms of number and magnitude. It is these features, fused with the stakeholder states, which form the state role and status matrix below. These features characterise the country in terms of whether they are:

1. a regional petroleum ***source***
2. a conveyance ***corridor***
3. a major petroleum ***consumer***
4. a ***major/global power***
5. a ***regionally-located power***
6. a conveyance ***gateway***
7. a ***host*** for influential IOCs or NOCs.

Table 5.1 State roles and status in Caspian petroleum geopolitics

Country	Petroleum source	Conveyance corridor	Major petroleum consumer	Major/Global power	Regionally-located power	Conveyance gateway	Host for influential IOCs or NOCs
Armenia		x					
Azerbaijan	x	x				x	x
China	x	x	x	x	x		x
European Union		x	x	x			x
Georgia		x				x	
Iran	x	x	x		x	x	x
Kazakhstan	x	x				x	x
Russia	x	x	x	x	x	x	x
Turkey		x	x		x	x	x
Turkmenistan	x	x				x	
United States			x	x			x
Uzbekistan	x	x					

States marked in red can be considered as major powers with considerable influence in the region under examination, whilst countries marked in orange are regional powers or external powers with a lesser ability to shape petroleum geopolitical outcomes in the region. Countries that are not major or regional powers but are major sources of oil and gas are influential in determining the geopolitics or the region to varying degrees; these states are marked in gold. However, these countries are also targets for control and manipulation by the major powers, notably Russia, China and the U.S. In this way, states such as Azerbaijan, Kazakhstan, Turkmenistan and Georgia can benefit from protection and support from major powers, but can also be seen as vulnerable targets by opposing great powers.

The matrix helps to chart where the state actors reside juxtapose one another in terms of relative and outright power, influence and importance, and has been a key tool for selecting which pivotal powers to examine in greater detail, namely: Russia, the United States and China.

5.2 Russia

5.2.1 Historical and Contemporary Geopolitical Status in the Region

Aside from being one of the Caspian Sea's littoral states and thus residing at the geographical core of most issues concerning this sub-region, Russia is arguably not only the most influential actor both in terms of wider Caspian and Caucasus geopolitics, but also amidst the dynamics and ontology of petroleum conveyance in the broader Eurasian space. Simply put, little if anything happens at a regional or continental level without Russia's direct involvement or interest, either as a sponsor or opponent. Due in no small part to the historical legacy of what was once the USSR and the circumstances in which it was dissolved, Russia considers this region as firmly within its sphere of influence, and that its economic and geopolitical strength are inextricably determined by its ability to influence or dominate its neighbours.[2] Quite apart from its inherent power, the geopolitical reality of its numerous contiguous borders all along its southern margin from Europe to the Pacific, the shear size of its landmass, and its domination of the petroleum land-transit routes from the region to the north and northwest merely solidifies Russia's primacy in this regard. However, geopolitical primacy notwithstanding, Russia's influence and power has ebbed in comparison to the Soviet era and this has created opportunity for other powers, states and non-state actors (such as

IOCs) to influence matters in the region, notable issues pertaining to petroleum production and conveyance.[3]

During the last decade of the Cold War, the Soviet Union's influence in the region was seriously diluted by its defeat and withdrawal from Afghanistan during the 1980s. This status was exacerbated by the eventual collapse of the USSR and the gradual erosion of the Russian economy under Yeltsin, and the corrosive burden of the war in Chechnya. However, under Putin's leadership, which began in 1999, Russia's economic fortunes have risen steadily in tandem with strengthened oil prices, with a commensurate rise in Russia's power and geopolitical assertiveness.[4] This was demonstrated convincingly and unambiguously by its brief, intense war with Georgia in August 2008 over the disputed sovereign status of South Ossetia and Abkhazia. The Russo-Georgian War was a clear indication of Russia's growing geopolitical confidence in the region as it sought to re-impose its dominance over the southern Caucasus.[5]

The Kremlin's systematic drive under Putin to reassert control over Chechnya and Dageshtan, both longstanding and important land-corridors for Russia's ability to convey oil from Azerbaijan northwards and north-westwards, is also reflective of its strategic project to exert preponderant influence over vital export routes in the region. On a broader geopolitical canvas, Russia continues to exert its influence over, and re-build ties with, former Soviet republics through the successful Shanghai Cooperation Organisation (SCO). In this regard, it has been particularly successful; notably in improving trading ties and military cooperation agreements with Kazakhstan and Turkmenistan in particular.[6] However, this has not prevented the former from developing important commercial ties with Western oil companies.

5.2.2 Petroleum Conveyance Routing and Geopolitical Realities

In addition to its considerable oil and gas reserves and production capacity, the petroleum transmission infrastructure in the Eurasian space is still dominated by the vast pipeline system built during the Soviet era. Though in need of significant modernisation, and operating far below its nominal through-put capacity, the Transneft-operated 48,000 km system affords Russia considerable leverage in the pipeline geopolitics in the region. The system's *export* capacity is, however, currently unable to meet all the demands being imposed upon it.[7] The emergence of Caucasus and Central Asian states following the break-up of the USSR, several of which with considerable oil and gas deposits, has proven to be both a curse and an opportunity for Russia.

Oil and/or gas from Kazakhstan, Turkmenistan, Uzbekistan and Azerbaijan was, and continues to be, conveyed in varying quantities by Russian pipelines. However, their expanded production (due largely to massive investment of Western IOCs and Asian NOCs in their E & P and conveyance sectors) and the capacity limitations of the Transneft and Gazprom grids have forced these countries to seek alternative routes to export and monetise their oil and gas.[8] This has also been enabled as a result of their strengthening political ties with the U.S., Western Europe countries and China.

Russia has been long resentful of the erosion of its dominance and control in this regard, and is seeking to re-establish its primacy. However, in order for this to happen, it must reconstitute and expand its pipeline infrastructure, whilst also striving to ensure that the petroleum-rich republics once part of the USSR, favour Russian export means rather than newly completed and planned/proposed Western-backed or Chinese-owned pipelines. Whilst a general appreciation of Russian objectives and manoeuvring is important to enable understanding of the conveyance geopolitics in this massive space, a more focused case study on a single pipeline scheme is useful for its revelations of the details of how power and policy is applied in the quest for control of export routes and means in the region.

5.2.3 The Caspian Pipeline Consortium

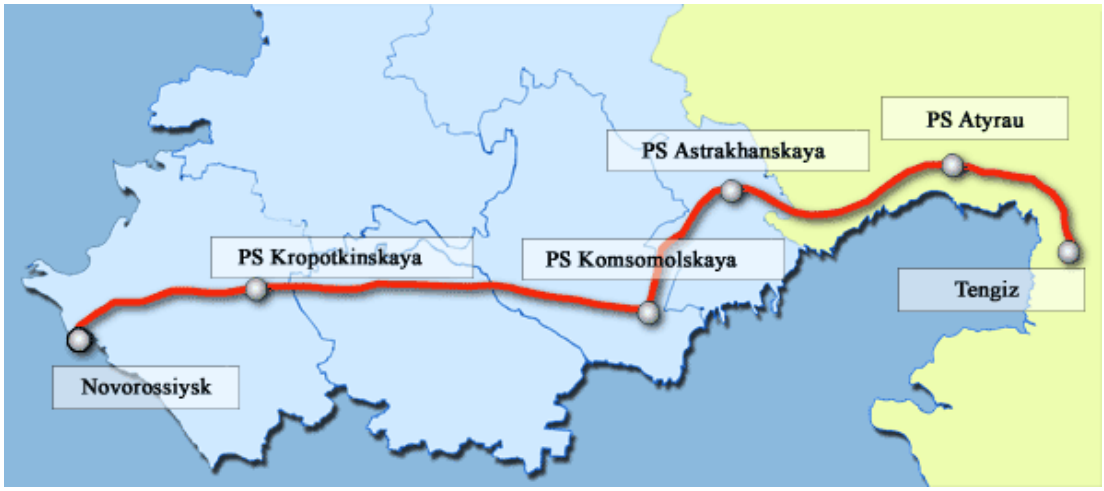
Arguably one of the most geopolitically complex and compelling pipeline schemes that Russia became involved in from the mid-1990s was what became known as the Caspian Pipeline Consortium (or CPC). The CPC remains the only pipeline exporting Kazakh crude westwards, and is unquestionably one of the most important oil pipelines in the region.[9] It remains a classic example of the simultaneous collision and collusion between states vying for

geopolitical advantage and the commercial and business imperatives that characterise the aggressive manoeuvring of IOCs in the drive to acquire and monetise petroleum.

CPC's Main Features

- 1,510-km pipeline extends from the Tengiz oil field in Kazakhstan to the Novorossiisk-2 Marine Terminal on Russia's Black Sea coast. It could also serve as an export line for oil from the massive Kashagan field, also in Kazakhstan
- The CPC is currently the only oil export line that traverses Russian territory that is not wholly owned by Transneft
- The throughput of the first phase of the pipeline is rated at 28.2 million tons of oil per year. After all phases of the pipeline have been completed, the maximum throughput of the CPC pipeline system will reach 67 million tons of oil per year
- The first stage of the CPC was opened on 27 November 2001. However, a second stage that is under construction will increase capacity to 1.3 million barrels per day by the time it is completed in 2012[10]

Fig 5.1 CPC routing from Tengiz to Novorossiysk



Source: http://www.cpc.ru/portal/alias!press/lang!en-us/tabID!3357/DesktopDefault.aspx

The fundamental logic of CPC was simple: given that the maximum export capacity of Chevron's Tengiz production was limited to 30,000 barrels per day (half of the volume required to finance Chevron's field refit operation) through the Russian-owned and operated pipeline system north to the Russian petroleum intersection at Samara, an alternative high-volume pipeline was urgently needed to monetize the oil in Tengiz. To this end, Chevron proposed and negotiated a deal with Kazakhstan to the sole rights to build and operate a pipeline from Tengiz that could export 700,000 to 1 million barrels per day. At this stage,

Chevron expressed an interest in the opportunity to negotiate for equity in the syndicate at a future date but chose not get involved at the project's inception.[11] Chevron was initially concerned about the high finical burden it would have to bear in relation to the offered equity in the scheme.

Project negotiations

From the outset, the key to CPC was Russia. Initially, eight possible routes outwards from Tengiz were considered, terminating variously at ports in Iran, Turkey and Russia. Notwithstanding the clear reality that a route to Russia's Black Sea coast was the shortest, cheapest and easiest to construct (not least because some sections of the eventual system were already built as part of Russia's existing network), the CPC project team was well aware, as were all of the other actors in the region, that Russia was the dominant power in the Caspian and it was easier to have it as part of any eventual scheme rather than in opposition to it.[12] That the line was to run through Russian territory not only made this logic axiomatic but also ensured that the highly influential and charismatic Russian prime minister of the time, Viktor Chernomyrdin (also the most powerful of Russia's petroleum tycoons) would support the scheme. Clearly, however, the potential downside for CPC's non-Russian partners was Moscow's eventual total dominance of the project.

During the period October 1992 until January 1996, the CPC project turned into a virtual political and commercial stalemate, which pitted Russia against Chevron, and, inevitably placed Washington and Moscow on opposite sides. In the early stages of CPC's evolution it seemed the project's lead negotiator, John Deuss, held all the advantage: he had the backing of Russia; he was effectively the sovereign representative of the Omani government (which was fronting most of the project's costs in the early stages in return for a sizeable share in the completed line); and, he had the blessing of Kazakhstan's government to act as the sole driver in the project.[13]

As Deuss's standoff with Chevron dragged on (Chevron would not grant CPC with the oil throughput agreement Deuss needed as collateral for his bank loans from the European Bank for Reconstruction and Development (EBRD),[14] the impasse was exacerbated by Chernomyrdin's fundamental dislike of, and opposition to, Chevron's potential involvement in the project. Russia essentially viewed the Caspian as its exclusive domain, and most of the senior figures in the Russian government were aware that the Tengiz field in Kazakhstan had been discovered by Russian geologists during the Soviet era. Losing the rights to it during the

fall of the Soviet Union seemed bad enough, but eventually seeing it in the hands of a U.S. IOC was seen as a humiliation for many in the Chernomyrdin government. To this end, Russia maintained tight limits on the quantity of oil Chevron could export through Russian pipelines, which threatened the U.S.-dominated Tengizchevroil consortium's[15] financing streams for its development of Tengiz.[16]

Kazakhstan, meanwhile, already aggravated by Chevron's refusal to build a new export line for Tengiz in the first place, was becoming increasingly frustrated with Kerr's persistent unwillingness to enter into an agreement with Deuss to partner in the CPC project. For Kazakhstan, the critical thing was to export the oil; for the Kazakh president, Nazarbayev, stranded oil was obviously useless. Eventually, the Kazakh government appointed the veteran oil deal negotiator, Jim Geffen, as their chief oil advisor; a man who had been instrumental in brokering the deal for Chevron to gain access to Tengiz.

During this period, Geffen had developed close contacts and trust with Nazarbayev's inner circle, and had introduced them to the oil and diplomatic power brokers in Washington, D.C. Geffen set about building a formidable team to support Kazakhstan in its bid to promote its position against the other powerful actors, not least of which was Russia. Geffen's appointment marked the beginning of the process to break the deadlock on CPC, and also eventually precipitated the direct participation of the U.S. government.[17]

As the U.S. interest deepened with its unambiguous backing of Chevron, evidenced by its clear attempts to force Deuss out of the CPC scheme and openly questioning the value of the Omani government's involvement in CPC, Russian concerns about their level of influence over the project increased. As far as Chernomyrdin was concerned, the U.S. government was gaining too greater foothold in a project, which in his view was rightly Russia's to shape.[18] From an objective stance, given that the majority of the line would transit Russian territory and terminate at a Russian port, the Kremlin's position was arguably as inevitable as it was geopolitically logical.

Two further developments added to the Russian's disquiet. Following the accidental death of Deuss's main sponsor in the Omani government, the deputy prime minister, Qais al-Zawawi, other Omani ministers not previously involved rescinded their support of Deuss; they also reneged on the government's previous position to fund the 155-mile section of the pipeline connecting existing Russian lines to Novorossiysk.[19] Secondly, the decision by Azerbaijan's

government to build another Early Oil pipeline running direct to the Black Sea coast through Georgia (to complement the line running north to Novorossiysk) indicated to Chernomyrdin that Russia's dominance of pipeline routing and the petroleum exports from the Caspian was now clearly threatened. The Russian prime minister was now plainly concerned that Kazakhstan, emboldened with firm U.S. government support and the independent move demonstrated by Azerbaijan, would move decisively to find an alternative route for Tengiz oil.

Fortifying geopolitical control over CPC

Chernomyrdin moved quickly to regain strategic position and forged what would become Russia's lasting advantage in CPC. In order to redefine their position, the Russians now demanded an equity share in the Tengiz field itself to complement their share in the proposed pipeline. As a way of sending an unambiguous message to both Chevron and the U.S. government, Chernomyrdin demanded that it would seek an ownership stake for Lukoil out of Chevron's existing 50% stake in the field, rather than from Kazakhstan's share. Though dispatched to acquire Lukoil's stake in Tengiz, Vagit Alekperov, the firm's CEO, Lukoil did not have the liquidity to purchase the 5% share needed. Prior to Lukoil's advance, the Russian government had shut down the pipeline section used by Chevron to export its Tengiz oil in a clear move to coerce the U.S. IOC into negotiations.[20]

This aggressive action was clear evidence of Moscow's confidence in the dominance of its position juxtapose those of the other actors: The key existing pipelines that Kazakhstan relied upon for exporting oil were located in Russian sovereign territory. Kazakhstan's land boundary delineations in the west did not offer options with regards to negotiating or facilitating pipeline route alternatives with states other than Russia. Due to winter ice-cover and very shallow water in the northern sectors and deep waters in the south, the Caspian Sea itself was a geographical feature that complicated the building of sub-sea pipelines that could connect the oil terminals on Kazakhstan's coast with Baku in Azerbaijan. Furthermore, in terms of minimum (cost effective) terrestrial distances to a favourable export terminal, U.S. actors were well aware that Novorossiysk on Russia's Black Sea coast was the optimum facility. All of this conflated in such a way that Moscow could apply increasing diplomatic and technical coercion to maximise its advantage in the evolving CPC scheme.

Even if Chevron's upper management had never fully appreciated the scale of Russia's power and influence in the region with regards to the control over petroleum conveyance, the

company's chairman and CEO, Ken Derr, always had. Derr knew that if CPC was ever to become a reality the Russians would always have to be involved. Essentially, CPC was never going to come into being merely because of the U.S. government's involvement, nor that of the banks or Kazakhstan. The key to the entire scheme remained as it had from the beginning - Russia. They could shut down the only existing export lines that both Kazakhstan and Chevron relied upon to export Tengiz oil, and Russia also controlled most of the in-place line that was to be part of CPC as well as most of the sovereign space for the CPC's route to the Black Sea.[21] Notwithstanding Russia's geopolitical advantages and aggressive obstructionism, Chevron refused to be pressurized into a sale. The dealings that followed represented a compelling ironic twist for the Russians in their bid to regain the geopolitical initiative over the scheme.

Russian and U.S. NOC/IOC partnership

As the Russian moves remained stalled, an American IOC, Arco, which had been seeking to boost its equity oil reserves portfolio in the region, partnered with Lukoil and offered to finance the newly formed LukArko's 5% stake in Tengiz. Essentially, a private firm based in the U.S., the country posing the greatest threat to Russia's continued dominance of the Caspian, had effectively bought its way into the geopolitical game largely dominated by factors such as favourable sovereign territorial control, boundaries and distance, to decide who would dominate the means of export for Tengiz.[22]

Lukoil's decision to accept the advances of a U.S. firm could be viewed as a move of considerable flair; however, it also presented the risk of diluting Russia's holding and leverage at a later date, were the LukArco partnership to become compromised. In the end, the move by the two companies demonstrated the opportunity that could be gained from this unusual, and rather ironic, hybrid Russian/U.S. NOC/IOC fusion. Furthermore, it showed that IOCs and NOCs still have the ability to adapt so as to make use of their capacity for quick transnational manoeuvre in a complex commercial engagement. This factor was not lost on the 'parent' governments as they sought to benefit geopolitically from proxy actors in this way.

After another period of awkward negotiations and shifts in the balance of power, and with the addition of other key players in the Kazakhstan/Chevron/U.S. contingent, in the form of Mobil, British Gas and Agip, an agreement was eventually signed in Moscow in April 1996, which would mark the formal establishment of the final form of the consortium. The forming

of the consortium enabled the construction of the pipeline segments that would join the existing Kazakh and Russian sections to form the completed line from Tengiz to Novorossiysk. In its final form, the agreement saw that Chevron, Mobil (later part of ExxonMobil), British Gas (later BG) and Agip would fund the entire cost of the remaining construction in exchange for a 50% stake, with the remainder being shared variously between the governments of Russia, Kazakhstan and Oman. Russia and Kazakhstan received $520 million in exchange for their combined 400 miles of existing line and also received ownership shares of 23% and 20% respectively, whilst Oman received a 7% stake. Arco gained its share as part of its alliance with Lukoil.[23]

The table 5.2 below offers a concise snap-shot of vital elements of the unusual international complexion of CPC. Considering also that the line is constructed mainly on Russian territory and terminates at a Russian port, what is immediately apparent from the table is the Russian dominance of the CPC's ownership and operational composition. This dominance was further increased in 2008 after Russia acquired Oman's share, thereby giving Transneft a commanding 31% stake in CPC. Moreover, a further 15% is held by companies with Russian shareholders - LuKArco B.V. and Rosneft - Shell Caspian Ventures Ltd. Western IOC interests collectively amount to 43.25% (though Russian shareholders are also included in this grouping, as mentioned previously). Kazakhstan maintains the second highest share after Russia with an influential 19% stake in CPC.[24]

Table 5.2 Eventual CPC shareholder structure

Shareholder	Stake	National affiliation (if applicable) & Notes
States		
Russia (operated by Transneft)	24%	-
Kazakhstan	19%	-
Oman (Russia)	7%	In September 2008, Russia agreed to acquire Oman's full share[25]
Companies		
Chevron Caspian Pipeline Consortium Co.	15%	United States
LuKArco B.V.	7.5%	Russia & United States
Mobil Caspian Pipeline Co.	7.5%	United States
Rosneft - Shell Caspian Ventures Ltd.	7.5%	Russia & UK/Netherlands
Eni/Agip International (N.A.) N.V.	2.0%	Italy
BG Overseas Holdings Ltd.	2.0%	United Kingdom
Oryx Caspian Pipeline LLC (Kerr McGee Group of companies)	1.75%	United States
Kazakhstan Pipeline Ventures LLC	1.75%	

Source: Caspian Pipeline Consortium

5.2.4 Russia's geopolitical primacy amidst the evolution of CPC

The story of the CPC is one in which the geopolitical dominance and manoeuvring of Russia, through its commanding territorial advantage, favourable boundaries and spatial relativity with regards to short distances between oil field location and means of maritime export, a determination to re-assert sovereign control, historical geopolitical legacy in the region, and its ability to coerce weaker state and non-state actors, enabled Moscow to shape and command the pipeline project, despite, ironically, not actually having to invest any finance in the early phases.

The Russian posture benefited from, and was determined by, a host of vital geopolitical phenomena explicit in the framework of this thesis: spatial and distance realities; sovereign control and boundary demarcation; commanding diplomatic position; and, the possession of a vital petroleum gateway in the form of Novorossiysk. Interestingly, however, notwithstanding the dominating geopolitical advantages held by Moscow, the CPC project was also characterised by the important influence of transnational activity on the part of the various IOCs and NOCs involved; indeed, it is arguable that the pipeline could not have been built without the financial participation of these actors.

Russian dominance was achieved in spite of considerable U.S. support for its companies (principally Chevron) and for the government of Kazakhstan. Though the other shareholders have sizable equity, and therefore theoretically potent nominal leverage in CPC, the pipeline remains firmly in Russian control. Notwithstanding the line's considerable importance to IOC interests as a critical export means needed to monetise its upstream interests in Kazakhstan, the inescapable ramifications of this Russian dominance over this strategically important export route would push the U.S. to strive for dominance in later projects that by design excluded Russian interference and participation; the most important of which is the Baku-Tblisi-Ceyhan pipeline (BTC), which is examined in the section that follows.

5.3 United States

5.3.1 Historical and Contemporary Geopolitical Status in the Region

During the 1990s, which were undoubtedly turbulent times for the Caucasus region, not least the brutal war in Chechnya that was presided over by Yeltsin, Russia's control over the Caspian weakened progressively.[26] As the magnitude of the petroleum reserve-base in the region became increasingly apparent (if regularly and optimistically overstated), the United States began to take an increasing interest in the oil and gas reserves in the newly independent states, particularly Kazakhstan and Azerbaijan. Previously, when the Caspian region was part of the USSR, the U.S., as a maritime power with a classically Mahanian approach[27] to geopolitics, had confined its strategic treatment of this continental space as parts of its geopolitical periphery; namely its alliance with Turkey and the containment of Iran. However, as the rush to access the region's petroleum gathered momentum in the 1990s, it quickly became apparent to the U.S. (as it did to all of the other interested stakeholders) that problems of developing this significant potential were all refracted through a common prism: the region was landlocked, and what conveyance existed was controlled by Russia through an operationally faltering system that in no way favoured routes to Western-controlled sea access.[28]

Discernable U.S. engagement was first initiated by the George H. W. Bush administration, which in the aftermath of the Fist Gulf War began to see the Caspian as at least a partial answer to America's over-dependence on vulnerable Persian Gulf oil supplies.[29] Later, the Clinton administration refined the broader geopolitical approach to the region in the form of its policy of "dual refusal",[30] the basis of which was the strategy to deny further Russian and Iranian entry into the pipeline 'game' that was taking shape. To this end, Clinton created the somewhat hybrid political appointment of 'Special Adviser to the President and the Secretary of State for Caspian Energy Diplomacy' to guide through the policy of "dual refusal". The policy was an interesting example of the unswerving strategic priorities of a great power that seemed at odds with the clear geographical realities of distances and maritime access extant in the Strategic Energy Ellipse and the ostensive geopolitical advantages of regional powers.

Notwithstanding its own security challenges in the region, notably in Chechnya, Russia was clearly the best-placed and cheapest conduit for petroleum from the Caspian Sea region. Iran was also clearly an economically favourable route for pipelines to the Persian Gulf, which had considerable existing storage and terminal facilities to load crude oil tankers.[31] Both of these

realities were not lost on the IOCs positioning themselves to take advantage of the region's oil and gas potential; a posture that would give rise to a compelling tussle for influence between the IOCs and the U.S. government in the drive to develop new pipelines leading out of the Caspian.

U.S.-favoured conveyance routing and geopolitical objectives

The clearest initial public declaration of the U.S.'s intentions in the New Great Game was given by Bill Richardson, the then Secretary of Energy in Bill Clinton's administration, who stated that:

> This is about America's energy security, which depends on diversifying our sources of oil and gas worldwide. It's also about preventing strategic inroads by those who don't share our values. We're trying to move these newly independent countries [in the Caucasus and Central Asia] toward the West. We would like to see them reliant on Western commercial and political interests rather than going the other way…We've made a substantial political investment in the Caspian and it's important that both the pipeline map and the politics come out right.[32]

The "dual refusal" policy, which can be seen as a reflection of Bill Richardson's statement, was manifested in the concept of the "East-West Energy Corridor" (see Fig 5.2) - a geographical conduit linking the main oil and gas fields in Kazakhstan, Turkmenistan and Azerbaijan with a pipeline system across Turkey to a deep-water terminal on the Mediterranean.[33] The security of this entire infrastructure and the territory on which it was to be situated would be guaranteed through a series of agreements between each of the countries involved and the U.S. In a broader geopolitical sense, the U.S. focus on Caspian oil politics and pipeline routing was designed to foster deeper linkage between the now independent states of the Caucasus and the Caspian, promote deeper regional economic integration and interdependence along the East-West corridor, and solidify conveyance links from the Caspian Sea thorough the South Caucasus and on to Turkey. In a strategic sense, the corridor could be seen as an access-way for the U.S. and its allies from a Turkish maritime gateway right into the heart of Central Asia.[34]

Fig 5.2 Georgian part of the East-West Energy Corridor

Source: Financial Times

The method of operationalising the U.S. project was to galvanise the efforts of major Western IOCs already involved in (or seeking partnership in) the most important sources of oil and gas in the region – the Kashagan, Karachaganak and Tengiz oil fields in Kazakhstan; the Azeri-Chirag-Guneshli (ACG Complex) oil fields in Azerbaijan; and, the South Yolotan-Osman and Yashlar gas fields in Turkmenistan – in conjunction with agreements and/or alliances with the source countries and those states crucial as conveyance corridors (Georgia and Turkey). The strategy called for the building of three main pipelines through the corridor: the South Caucasus Pipeline (gas), the Trans Caspian Pipeline (gas) and the Baku-Tblisi-Ceyhan pipeline (oil). The latter project was considered by the U.S. as the most strategically important,[35] but also the one presenting the greatest geopolitical challenges at the time of its conception, and is the focus of the case study that follows.

5.3.2 The Baku-Tblisi-Ceyhan Pipeline

As previously highlighted, the Baku-Tblisi-Ceyhan Pipeline (BTC) project evolved into the most geopolitically complex manifestation of the U.S. 'East-West Energy Corridor'. The 1,768 km (1,099 mile) crude oil line was designed to connect the offshore ACG Complex, via the shore-side Sangachal Terminal (45km south of Baku in the Garadakh District), to the Ceyhan Marine Terminal (CMT) located on the Turkish Mediterranean Coast. Of the total length of pipeline, 443km passes through Azerbaijan, a mid-section of 249km passes through Georgia, and 1,076km transits southwest across Turkey. The line, which has eight pumping stations (two in Azerbaijan, two in Georgia and four in Turkey), is the second longest oil pipeline in the world after the Druzhba line in Russia.[36] The first oil pumped from Sangachal

Terminal on 10 May, 2005 reached CMT on 28 May.[37] A total of 10 million barrels of crude oil is required to fill the line, which has a capacity to convey 1 million barrels per day. The line occupies a corridor eight meters wide, and is buried along its entire length. The South Caucasus Gas Pipeline, which transports natural gas from the Sangachal Terminal to Erzurum in Turkey, runs parallel to some of the initial Turkish section of the BTC.[38]

Fig 5.3 BTC Route from Baku to Ceyhan

Source: New York Times

BTC's purpose/logic

The purpose or logic that gave rise to the decision to implement and build the BTC can be broken down into four main categories:

1. Firstly, and most obviously, as it become increasingly apparent to both states and NOCs and IOCs alike, the proven and probable reserves-base and production potential of oil and gas in the Caspian region had increased to the point where a major new means of high-volume petroleum export was necessary (particularly for oil). Kazakhstan has 39.8 billion barrels of proven reserves (3% of global total) and produced a mean total 1,682,000 barrels per day in 2009 (an increase of 8.5% over 2008). Azerbaijan has 7.0 billion barrels of proven reserves, and produced and average of 1,033,000 barrels per day in the same year (an increase of 13.5% over 2008).[39]

In 2010, the EIA estimated that the countries of the Caspian Sea Region would produce between 2.9 and 3.8 million barrels per day, which would exceed the annual output from Venezuela, currently South America's largest producer. Given that Kazakhstan will be requiring extra pipeline capacity to export its growing volumes of crude (particularly when the Kashagan field comes into production), it can be quickly appreciated that another major regional crude export line was vital in order to monetize these sizable production volumes.[40] [Kazakh crude from Kashagan would initially be transported to Baku via tanker where it would enter into the BTC system].

2. The second major rationale underpinning the BTC line is one of the clearest and most outstanding examples of the contemporary linkages between strategic posture and petroleum geopolitics. Once it became clear that the Caspian region contained significant volumes of petroleum, even allowing for the considerable down-sizing of previously exaggerated estimates (once postulated at a staggering 200 billion barrels of 'implicitly' recoverable reserves by the U.S. State Department in 1997),[41] there was little chance that the U.S. government would allow newly expanded production volumes to pass through Russia or Iran. Furthermore, the U.S. was keen to develop alternative petroleum streams from outside of the Middle East, so as to help lessen dependence on supplies from the Persian Gulf. However, in reality, the amounts that could realistically be sourced from the Caspian and Central Asian region were small in comparison to shipments from Saudi Arabia, Kuwait and the UAE. Nevertheless, as a direct result of these rationales, the Clinton administration (followed by the second Bush administration) put the full weight of U.S. leadership and diplomacy behind a pipeline initiative that would pass along the 'East-West Energy Corridor' to the Mediterranean; one free from Russian control or potential Iranian interference.

3. The third reason was one that collectively addressed several concerns regarding the transit of oil through the Bosporus - the chokepoint linking the Black Sea with the Mediterranean Sea – principally: vessel congestion, environmental concerns in the event of an oil spill, questions over Turkish political support, and above all, supply security. Given that the Turkish government had previously agreed to allow Chevron more tanker transits for its Tengiz oil (via CPC and the terminal at Novorossiysk), they were unwilling to allow further increases in the event of expanded crude shipments from Supsa on the Georgian cost. The Turks were unvaryingly concerned about the risk of a major environmental and ecological disaster in the event of a large oil spill

resulting from a tanker collision or foundering. There had already been nine major accidents involving tankers in the strait since 1951.[42]

These Turkish concerns, and the determination to lessen the pressure on the Bosporus, form a segue to a related concern for the U.S.: if the pipeline was to be built through to Ceyhan then Turkish support was axiomatic. Thus, the participants in the deal would have to abide by Turkey's ruling that new and increased production from the ACG fields (and later possibly from Kazakhstan) would have to go via an overland line from Baku to Turkey's Mediterranean coast, thereby bypassing the Bosporus. It is also important to note that given the long-standing sanctions against Iraq during the 1990s and into the first decade of the 21st century, which had halted Iraqi oil exports via Ceyhan, Turkey was very keen to secure an alternative high-volume source for the terminal.

The latter arrangement was also advantageous in another respect - energy supply security. If volumes of crude from the Caspian, bound largely for Western markets, were due to become substantial then it was strategically favourable to convey this added stream so that it avoided a vulnerable trading chokepoint. Due to its narrowness, winding course, limited depth of water, and frequently reduced visibility due to sea fog, the Bosporus can only accommodate a finite amount of shipping during any one day, which also limits the volume of oil that can be exported. Some 50,000 vessels (including over 5,500 tankers) pass through the Bosporus each year.[43] Furthermore, its narrow contours and the presence of two major suspension bridges in theory render it vulnerable to deliberate blockade in time of war or due to a terrorist attack.[44]

4. Lastly, an integral feature of the U.S.-sponsored East-West Energy Corridor was the fostering and cementing of important strategic alliances for the U.S. in the region; the idea being in effect to create a geopolitical linkage from Kazakhstan and Turkmenistan (and later even Uzbekistan) across the Caspian and through to Turkey, via Azerbaijan and Georgia. The linkage would be actualised via the supply and transportation of petroleum westwards. The incentive for the aforementioned countries would be the opportunity for the sustained expansion and fortification of their respective economies, via a combination of oil and gas sales and/or the ability to levy transit fees for pipeline usage where applicable. This feature of the BTC's rationale (and that of its companion line - the SCP) has worked in part and benefited some countries, namely Azerbaijan,

Georgia and Turkey. However, the wider scheme is far from complete with regards to those oil and gas producers on the north-eastern and eastern side of the Caspian Sea – Kazakhstan and Turkmenistan, which remain un-connected to the terminals at Baku via dedicated sub-sea pipelines.

BTC project evolution and obstacles

Notwithstanding the logic of the BTC as shown above, the construction of the line was challenged by considerable commercial and political obstacles. Initial obstruction came from the U.S. and European IOCs that would potentially be instrumental as investors, builders and operators of the proposed line. At a meeting at the White House in October 1998, despite listening to (and in part agreeing with) the geopolitical logic of the BTC routing presented by administration officials (principally Richard Morningstar, the coordinator for Caspian Sea policy), oil executives declared firmly that the route from Baku to the northern Persian Gulf through Iran was a cheaper, and thus a more commercially-viable proposition.[45] For Exxon, it was clear that "the wave of the future would be pipelines through Iran," and as such the company continued to lobby this route.[46] This position was also shared by Mobil and BP. Mobil had even been seeking permission to affect and manage oil swaps of Kazakh and Turkmen crude with Iran; a proposition that was always going to be rejected by the Clinton administration due to the sanctions regime imposed on Iran, which prohibited U.S. companies having dealings with Iran.[47]

The U.S. government pushed to solidify its control over the promotion of the BTC scheme by garnering the support of the Azerbaijani, Georgian and Turkish governments, so that they would campaign to reject any alternative southern routes to the Persian Gulf proposed by the U.S. and European IOCs. This was a clear example of the potency of geopolitical influence, including the effect of U.S. sanctions on Iran (see also chapter 4) over commercial logic when the perceived strategic stakes were sufficiently high. Meanwhile, the expected objections from Russia began to surface.[48]

As explored elsewhere in this chapter, Russia has always strived to use its geographical and political preponderance in the land-locked Caspian region to maximum effect, and consequently has consistently pushed to promote the north-south/Russia-Iran export axis for oil and gas in opposition to the East-West axis favoured by the U.S. Russia sensed that the BTC was vulnerable to obstructionism whilst it was only in its conceptual phase, particularly given that a pledge by Kazakhstan to export some of its oil via the new line was deemed

essential simply in order to fill it, and thus make it economically feasible. Also, it was vulnerable whilst the Azerbaijani government could be swayed by offers to export its oil from the ACG complex through the Early Oil line from Baku to Novorossiysk, which by April 2000 had benefited from the completion of the 'Grozny Bypass' line, thereby eliminating possible interference from the conflict in Chechnya in the form of potential sabotage by Chechen rebels.[49]

Fig 5.4 Pipelines in the South Caucasus

Source: *The Economist*, 14 August 2008

In reality, the Russians had few advantageous cards to play for a variety of reasons. They did not want to add additional burden on their pipeline system linked to the Caspian region (there were serious questions pertaining to the true conveyance capacity and structural integrity of the Baku-Novorossiysk line). Moreover, the terminal at Novorossiysk was overstretched and was effectively an export bottleneck given the limitations in tanker size that could load at the few single point moorings (SPMs) available; added to which, the Turks were very concerned about the prospect of additional tankers passing through the Bosporus, and the associated dangers of potential environmental damage due to a shipping accident.[50]

Additionally, in the early stages of the post September 11 spirit of cooperation between the U.S. and Russia, Moscow wanted to appear to be seen (in public at least) as not imposing aggressive political obstacles to U.S. schemes in the region, whether counter-terrorist or commercial. When BP Amoco's president, David Woodward, gave a presentation to the Russian energy ministry regarding BTC in October 2001, he reported that the deputy minister

seemed very keen on the project, who had given assurances that no political obstacles would be placed in the way of any Russian oil companies wanting to participate in the scheme. At the time, Lukoil would have become a junior partner in BTC, had it not withdrawn in April 2002.[51] This rather more sanguine political declaration aside, Moscow never really believed the BTC would ever get built due to the enormous costs and the clear reluctance on the part of the IOCs to take on the financial risks. One of the clear concerns at the time was the lingering doubt over whether Azerbaijan's production capacity would be sufficient to make the pipeline commercially feasible.[52]

IOC catalyst for BTC implementation

Though BP's acquisition of Amoco in 1998 had significantly boosted its equity share in the AGC complex to 34%, making it the lead actor in Azerbaijan's offshore oil and gas industry, it was still reluctant to embrace the BTC scheme given the enormous construction and operational costs involved. Despite BP's misgivings, Turkey and the U.S. continued to apply pressure, which eventually resulted in BP's then chairman, Lord Browne, conceding that shipping additional Azeri (and possibly Kazakh) crude through the Bosporus and Dardanelles was "not an option", and that the company was now ready to conduct an in-depth feasibility study of the scheme to ascertain whether the finance necessary could be secured (from the banks). It is worth pointing out that the British IOC was under considerable pressure to cooperate given that the U.S. government's consent was essential to approve BP Amoco's acquisition of Arco in 1999. Earlier, in a move of clear political blackmail, the Turkish government had shut down all of BP's gasoline retail operations in the country, having stated that: "We're going to do everything in our power to keep you from sending your oil through Supsa [Georgia]".[53]

Under the direction of the senior BP negotiator, Wref Digings, the pieces necessary to bring the BTC from a strategically and geopolitically-inspired conception into a commercial reality were gathered together between October 1999 and June 2003. The Turkish government gave the project its first major boost with the pledge to put a limit on construction costs (which was critical given that 70% of the line was to transit Turkish soil and be constructed by BOTAS),[54] and it further guaranteed low tariff rates for crude oil transit as the Georgian government had also agreed to. Digings also gained pledges from the three transit countries to ensure the security of their line sections against sabotage, terrorist attacks and spills. In parallel with this, the U.S. government attempted to apply further pressure on Kazakhstan to pledge some future crude exports for BTC when it was operational.

In November 1999, President Bill Clinton, and the presidents of Azerbaijan, Kazakhstan, Georgia and Turkey signed the intergovernmental agreement in support of the BTC pipeline during a meeting of the Organization for Security and Cooperation in Europe (OSCE) in Istanbul. This united political front effectively guaranteed financing from the project from the U.S. Import-Export Bank, the Overseas Private Investment Corporation, the World Bank and the European Bank for Reconstruction and Development (EBRD). With finance pledged from these institutions in place, supplementary investment from commercial banks followed, as did meaningful investment interest and support from other IOCs and NOCs. The BTC Company was founded during a signing ceremony on 1 August 2002, and the official ceremony launching construction was held on 18 September 2002. Construction finally began in April 2003 and was completed in 2005.[55]

5.3.3 BTC: Geopolitical Implications and Correlations

Arguably the most important implication of the BTC project was that it effectively constituted the first and most important operational feature of the U.S. East-West Energy Corridor, at the expense of long-standing geopolitical dominance of the Russian north-south export corridor. Essentially, the U.S. managed to use the pipeline to dilute Moscow's control over the export space despite having favourable sovereign territorial advantage in terms of existing pipeline infrastructure. The sustained U.S. diplomatic initiatives by the Clinton Administration and the Bush Administration, that ensured the pipeline's construction, shaped a convergence of state-driven (for the U.S. and its allies) geopolitical logic with oil industry transnational purpose. For those states bound together by BTC – Azerbaijan, Georgia, Kazakhstan and Turkey – the East-West Energy Corridor has strengthened their security ties to the West, which in turn has derived greater resource supply security from BTC and the corridor. However, conversely, the existence of the pipeline has also presented a potentially tempting and vulnerable target in any future interstate or insurgent conflict in the region.

The BTC scheme also accelerated the development of the South Caucasus Pipeline (SCP) (also known as the Baku-Tbilisi-Erzurum (BTE) gas pipeline), which became operational in May 2006. Furthermore, the BTC also marked the southward shift of a major export route for Caspian hydrocarbons away from Russian-controlled routes and means, including the CPC. This had transit-revenue implications for Russia and a partial loss of geopolitical leverage that control over export pipelines confers. The operationalisation of the BTC proved that land-locked Caspian and perhaps Central Asian petroleum could be exported westwards along a

corridor that bypassed Russia for the first time.[56] BTC also enabled an export route that avoided transiting Iran, which though a shorter terrestrial traverse and more economically logical for IOCs, was denied due to sanctions imposed by the U.S. intended to isolate Iran geopolitically and economically.

Overall, the export volume capacity of the BTC has greatly raised the petroleum geopolitical profile of the Caspian region within the Strategic Energy Ellipse, which has long been dominated by the Persian Gulf's high-volume producing states. Notwithstanding previously exaggerated proven and probable reserves (particularly for oil), the BTC has given IOCs and NOCs engaged in upstream projects in Azerbaijan and Kazakhstan another high-capacity option and means of monetizing their reserves. This potential has energised Kazakhstan's plans to develop a means of conveying its projected increased crude export volumes from its Kashagan field to Baku, from where BTC can convey it to world markets. This has the effect of boosting Baku's status as a petroleum gateway, and increasing the chances of Turkmenistan choosing to eventually export some of its gas westwards across the Caspian to complement increased Kazakh crude exports during the next decade.

Kazakhstan has also proposed that it would consider building a trans-Caspian oil pipeline from its port at Aktau to Baku. However, due to alleged 'environmental' opposition to a Caspian offshore pipeline by both Russia and Iran, and also due to potential complications arising from long-standing Caspian Sea territorial demarcation disputes, the oil pipeline is doubtful. Thus as an alternative, Kazakhstan has announced a new project named Kazakh-Caspian Transportation System (KCTS), which was originally scheduled to come into operation in 2010. This scheme, comprises a pipeline from Iskene to the Caspian port of Kuryk, loading/discharge port terminals in Kazakhstan and Azerbaijan, and finally the acquisition of specialized low-draft, ice-classed tankers (the Caspian Sea is particularly shallow in its northern reaches and is ice-covered in winter).[57]

KCTS is currently stalled in the design and facilitation stage given that it is principally intended for the export of crude from Kashagan, which is not yet in production after repeated delays. Current estimates suggest that it is not likely to begin initial, low-volume production until late 2013 or early 2014, and phase-2 production is not expected until 2018 or 2019.[58] KCTS would have the effect of drawing Kazakhstan and Azerbaijan geopolitically closer together across the Caspian as petroleum exporting partners; however, these ties could complicate Almaty's petro-logistic relationship with Moscow if increasing amounts of crude

were exported south rather than via Russian pipelines. China will also be monitoring Kazakhstan's relations with both Russia and the West in this regard as it seeks to ensure sufficient crude supplies to its pipelines heading eastwards from the Caspian, which is the subject of the next section.

Fig 5.5 Kazakhstan Caspian Transportation System (KCTS)

Source: KMG

5.4 China

5.4.1 Historical and Contemporary Geopolitical Status in the Region

Three inter-linked reasons explain China's engagement in the substantial and expanding project to acquire and convey oil and gas from the Caspian and Central Asian space to China's western border. Firstly (and most obviously), China is geographically contiguous with the Asian heartland; it is a major Asian continental power, which has a geopolitical and trading inclination towards its western neighbours, including Kazakhstan.[59] Secondly, China's advancing economic growth requires increasing supplies of energy (for power generation and transportation), and it naturally sees the significant reserves in the Caspian and Central Asian states as a vital and accessible source, particularly given that the necessary pipelines can be built directly to its western borders. Thirdly, the region is seen as the most strategically-important means by which China can diversify its sources of petroleum. Specifically, Beijing is keen to reduce the country's reliance on VLCC-shipped supplies from the Persian Gulf, which is currently China's largest source of oil. From a wider strategic perspective, it is very clear to the Chinese government that the latter source is located within a region that is geopolitically and militarily dominated by the United States, as are the Indian Ocean sea lines of communication that lead from it to the Malacca Straits (see chapter 6).[60]

Whilst China was not an actor of significance during the original Great Game of the 19th century, it is most certainly a pivotal player in the new 21st century version as examined in the framework chapter of this thesis. Indeed, China was central to the formation of the "Shanghai Five" in 1996; a consortium of five regional Asian states comprising China, Kazakhstan, Kyrgyzstan, Russia and Tajikistan, which was formed to cooperatively address issues of regional extremism and separatism. This cooperative was later upgraded in 2001 into a fully-fledged regional body - the Shanghai Cooperation Organisation (SCO), which also included Uzbekistan.[61] The SCO remains primarily a security organisation tackling terrorism and insurgency in Central Asia, with China's main concern being the suppression and control of the Uighur separatists that are waging an insurgency campaign in an attempt to establish an independent Muslim state ('East Turkestan') in what is now the Xingjian autonomous region.

The Chinese government has long strived to eliminate the possibility of neighbouring Muslim countries being used as a safe haven for the separatists. Crucially for the Chinese, Xingjian also forms China's border with Kazakhstan, and it is across this margin that oil and gas pipelines from the Caspian and Central Asia traverse. Furthermore, as a key member of the

SCO, China can also use it as a means of exerting and focusing its geopolitical influence towards Central Asia and the Caspian for the specific aim of limiting Russia's ability to dominate the means of conveyance of petroleum in the region; a position Russia cemented during the Soviet era.[62] The SCO also nominally functions as a counter-weight alliance to the sizable U.S. military presence in Central Asia, which was deployed in the wake of September 11 and the subsequent campaign to destroy Al Qaeda and its Taliban allies in Afghanistan.

Against this background, the SCO, in addition to its regional security remit, has also evolved into an important forum for Asian diplomatic exchange, enabling member states to use it as a forum for promoting vital trade to complement political exchange and cooperation.[63] In this way, China has long used the SCO to help foster dialogue and deals for the advancement of its energy security; specifically the acquisition of sources of oil and gas, particularly from Kazakhstan, Turkmenistan and Uzbekistan. For China, in addition to its bilateral diplomatic ties, the SCO has emerged as a useful means through which to exert geopolitical influence: developing trading ties with the aforementioned energy-rich states; trading diplomatic engagement with Russia; and, ensuring its central position as part of a bloc that helps maintain the cooperative security needed to protect the long, vulnerable oil and gas pipelines linking Caspian and Central Asian oil and gas fields with China's border with Kazakhstan.

Conveyance routing/geopolitical objectives

China's geopolitical strategy, as it pertains to accessing oil and gas in the Caspian and Central Asian region, is built upon two main pillars:

1. gaining access to exploration & production schemes and equity oil and gas reserves at source (see chapter three);
2. and secondly, by forging deals to partner in the building of pipelines from fields in Kazakhstan, Turkmenistan and Uzbekistan to China's western pipeline grid in Xingjian, which in turn links up with provincial lines to its industrial and urban heartlands elsewhere in the country.

In focusing on the second of the two pillars – conveyance – China has concentrated initially and most ardently on its dealings with Kazakhstan, because this is where China's current equity oil is located, and because of the potential to access substantial future petroleum supplies from other fields in the country (such as the giant Kashagan oil and condensate field in the Caspian). Furthermore, notwithstanding the harsh environmental conditions that present considerable technical and operational challenges for oil pipeline routing and construction, the

optimum pipeline route connecting the Caspian fields with Xingjian, and thereafter to Karamay and Urumqi (the site of China's most important oil production and refining complex), is across the Kazakh Steppe.[64] At this juncture, the two most vital pipelines that constitute the strategic backbone of China National Petroleum Corporation's (CNPC) conveyance operations from Caspian and western central Asian space are the Kazakhstan-China Pipeline (oil) and the recently completed Central Asia-China gas pipeline.

5.4.2 Kazakhstan-China Pipeline

The Kazakhstan-China oil pipeline (KCP) stretches from Atyrau on Kazakhstan's Caspian Sea coast to Alashankou in China's Xingjian province. The 2,228 kilometre (1,384 mile) long pipeline, which is owned by CNPC and Kazakhstan's KazMunayGas, is the first oil pipeline to be built that links the Caspian region with China. Construction of the line was agreed by the two countries in 1997; thereafter, the KCP has been completed in a series of sections. The final length of the initial project from Alashankou was completed in December 2005, and the first Kazakh crude oil was delivered to the Dushanzi refinery in August 2006 (via China's existing Alashankou-Dushanzi Crude Oil Pipeline which connects to the KCP at Alashankou).[65]

Upon completion, the KCP initially had two sources of Kazakh crude oil: from the Aktobe region fields and from the Kumkol field. The line was also supplied with crude from Russia's western Siberian fields via a connector with the Omsk (Russia)–Pavlodar (Kazakhstan)–Shymkent–Türkmenabat (Turkmenistan) pipeline at Kazakhstan's Atasu oil terminal. Currently, these sources enable the line to convey some 10 million tons of Kazakh and Russian crude per year to China.[66]

Fig 5.6 Kazakhstan-China Pipeline

Source: CIA Factbook, 2010

In July 2009, in a major development that has significant implications for Chinese long-term energy security, Kazakhstan announced the completion of the Kenkiyak-Kumkol pipeline, which extends the KCP to the Caspian Sea fields. KazStroyService, the operator of this latest section, sent a successful test shipment of crude in early July 2009.[67] It is projected that once it reaches full production towards the end of the decade, the main source of future supply for the KCP will come from the giant Kashagan field ,which is estimated to have forty years worth of production. The 750-kilometer (1,200-mile) extension of the Atasu-Alashankou crude line will connect the western Chinese oil pipeline grid with two oil fields, Kenkiyak and Kumkol, both of which are owned and operated by Kazakh units of China National Petroleum Corp. The pipeline will have a capacity of 400,000 barrels a day, amounting to approximately 5% of China's daily consumption.[68]

In April 2009, China and Kazakhstan agreed to a “loan-for-oil” deal worth US$10 billion that allows CNPC to buy stakes in Kazakhstan’s MangistauMunaigas. This acquisition is of commercial as well as geopolitical and logistical significance for China because the company owns the fields nearby the newly extended oil pipeline. Chinese oil companies have also been buying shares in Kazakh oil companies, including CNPC-AktobeMunaiGaz, operator of Kenkiyak and Zhanazhol fields and PetroKazakhstan.[69]

5.4.3 Central Asia-China Gas Pipeline

On July 10 2009, it was reported that single-line welding had been completed on the first stage of the Central Asia-China Gas Pipeline (CACP). As an indication of the significance of this, President Jiang Jiemin sent a letter of congratulations for the occasion, and CNPC Vice President, Wang Dongjin, and KazMunaiGaz President, Kairgeldy Kabyldin, attended the completion ceremony.[70] This accomplishment, and the high-profile inauguration that accompanied it, served to highlight not only the commercial impact of creating a broader spectrum petroleum export/import system between the eastern Caspian states and China by adding a substantial gas supply to complement the existing oil stream, but also heralds the greater petroleum geopolitical binding of leading regional exporters and the world's fastest growing user of petroleum.

In parallel with its escalating oil needs, there is an increasing drive by the government to convert a greater share of its power-generation requirements to gas-fired means in order diversify its energy mix and reduce CO2 emissions (given that coal is still the major fuel for China's power stations). Currently meeting only 3% of the country's requirements, gas use is set to grow at a compound annual rate of approximately 10% to about 5.49 billion cu m per day by 2020. This represents a potential increase requirement of approximately 18 billion cubic feet per day by 2020, which would make China the world's third largest natural gas consumer after Russia and the United States.[71]

Longer-term forecasts estimate that China's annual consumption of gas could reach 400 billion cubic meters by 2030, with over 150 billion cubic meters (37.5%) coming from imported sources.[72] Against the backdrop of these projections, the country's drive to acquire these additional foreign supplies is not only reflected in its acquisition of upstream access, equity stakes in foreign gas producing companies and the increasing of LNG imports, but also through the largely completed project to build a major new gas pipeline from the Caspian - the Central Asia–China gas pipeline, also known as the Turkmenistan–China gas pipeline.

Fig 5.7 Central Asia-China gas pipeline

Source: Stratfor

When the CACP is completed, it will be some 1,833 km (1,139 miles) long, of which 188 km (117 miles) transits Turkmenistan and 530 km (330 miles) crosses Uzbekistan. Started in August 2007, the first stage of the CACP was completed in July 2009. Construction of the Uzbek and Kazakh sections commenced in June 2008 and was completed by December 2009. The second stage of the line, which will eventually be supplied with gas from Kazakhstan's Karachaganak, Tengiz and Kashagan fields to complement the Turkmen gas, is due to be completed in 2011.[73] When all sections are constructed, the completed line will run from the vast Yolotan-Osman Turkmen gas fields on the right bank of Amu Darya to Olot in on the Turkmenistan-Uzbekistan boarder. Thereafter, the CACP crosses Uzbekistan to southern Kazakhstan via the existing the Bukhara-Ural pipeline (the extended Bukhara-Tashkent-Bishkek-Almaty line – the BTBA). From western Kazakhstan's Caspian fields, the second stage of the pipeline (when completed in 2011) will extend eventually to Alashankou in China, where it will be connected to China's West–East Gas Pipeline.[74] When the full line is completed and gas is being supplied from both Turkmen and Kazakh fields, aggregate export volumes to China are expected to reach some 40 billion cubic metres per year.

5.4.4 Impact of China's Pipelines upon the Geopolitical Contest for Caspian Petroleum Export Volumes and Routes

The impact of constructing and expanding operational capacities of the KCP and the CACP upon the petroleum geopolitics of the Caspian region, set against the context of the other pipeline schemes and competing interests previously examined in this chapter, are as varied as they are significant. To illustrate this, seven key extant and potential ramifications have been identified for other actors and schemes of China's quest to import an increasing large share of oil and gas from the region.

1. The increasing volumes of gas exported from Turkmenistan and Kazakhstan to China during the next decade will inevitably draw away from potential increases in export volumes from those suppliers to Russia (potentially up to as much as 50%). Despite approving national laws in May 2009 by the two exporters to build an additional pipeline to Russia with a nominal capacity of 20 bcm per year, there are concerns over how the line will be financed and whether it will be built. [An additional line is urgently sought by Russia following the explosion that shut down the pipeline from Turkmenistan's Dauletabad field to Russia].[75] If the new pipeline is not built, gas unused by Russia will be bought and imported by China. The clear attractiveness of a petroleum consuming giant such as China to Caspian and Central Asian exporters is that it has incentivised them to end their reliance on Russia both as a market and as a controller of the means of their exports. This all has an inimical effect on Moscow's ability to continue, much less expand, its commercial and geopolitical dominance of its petroleum-rich former Soviet republics. Previously, most pipelines led from source republics into Russia, from where routes to the consumer could easily be controlled. However, Kazakhstan and Turkmenistan's boundary configurations in Central Asia have now enabled China to maximise the effectiveness of its trade diplomacy with petroleum source-countries and dilute former Russian dominance.

2. In the medium-to-long term, if gas exports from Turkmenistan and Kazakhstan (and potentially even from Uzbekistan) are steadily absorbed at an increasing rate by China then this could have the effect of diverting potential export volumes away from the South Caucasus Pipeline (or BTE Pipeline) and the proposed Nabucco gas pipeline to Europe.[76] This could impact substantially on the viability of the latter project if other sources of feedstock are not guaranteed from Iraq, Egypt and perhaps Iran. In this regard, geography and geopolitics have given China a logical advantage over Europe's

Nabucco scheme, which is a particularly complex commercial and geopolitical project due to the potentially large number of conduit and source countries involved and the enormous transit distances. [Feasibility studies have explored Egypt, Iraq, Azerbaijan, Turkmenistan, Kazakhstan and possible even Iran as sources of gas]. Additional challenges include the complicating factor of sanctions against Iran, and competing pipeline proposals from Russia.

3. China's aggressive project to build and expand the capacity of long-distance oil and gas pipelines from the Caspian and Central Asian producers to China requires the establishment of bilateral trade agreements that must be durable for decades to ensure supply security, which is facilitated by stable diplomatic coherence. Pipelines that traverse multiple sovereign territories and the supply volumes required to make them commercially viable cannot be built without these ingredients. In consequence, the KCP and CACP projects have resulted in the cementing of geopolitical convergence between China and Kazakhstan, Turkmenistan and Uzbekistan. Though this factor clearly does not neutralise the geopolitical presence or influence of other major powers (specifically Russia and the United States), it does impact upon the magnitude of their potency in this regard relative to China's ascension. As highlighted earlier, China will also continue use its position within the SCO to further its geopolitical influence in parallel with strengthening bilateral ties in order to ensure energy supply security.[77]

4. As the levels of production from Turkmenistan's and particularly Kazakhstan's oil and gas fields expands in tandem with the means to export eastwards, there will likely be an increasing shift in the regional balance of petroleum-related power and influence from Baku to Turkmenbashi, and particularly towards Almaty in Kazakhstan. This shift will only be moderated if both countries also chose to export significant volumes of oil and gas westwards via the BTC, BTE, Baku Supsa and Nabucco lines.

5. As examined in the preceding chapter, China has been actively seeking and successfully acquiring equity stakes and varying degrees of operational control in oil and condensate fields in Kazakhstan. There are two obvious consequences of this activity in the upstream sector: firstly, this has generated the inevitable rationale for China to want to ensure sufficient means to convey its acquired petroleum through developing pipelines; and secondly, it has added extra weight in its ability to ensure greater cooperation with Kazakhstan's national petroleum companies (KazMunaiGaz)

and also to acquire greater stakes in these entities due to favourable relations with Kazakhstan's leadership. If China is seen as an increasingly important export market and partner, Almaty will want to ensure long-term strategic connectivity with China's NOCs, namely CNPC. As this process continues, China is likely to gain greater influence and equity share of upstream developments in the Caspian that have long been dominated by Western IOCs such as Chevron, BP, Shell and others.

Similarly, China's bilateral relations with Turkmenistan have been advanced significantly during 2009. During a visit in June, China's State Development Bank opened a US$4 billion credit line to Turkmengaz through an intergovernmental agreement, which is expected to finance exploration and development in the new super giant gas fields, South Yolotan and Osman.[78] Thus, China's intake of Turkmen gas is likely to surpass Russia's in the years ahead if these projects are completed. Under another agreement signed on the same occasion, China's PetroChina International and Turkmenistan's Agency for Development of Natural Resources will expand the extraction of gas and condensate in the onshore Bagtyarlik contract area and other gas fields on the right bank of the Amu Darya River.[79] That area in eastern Turkmenistan is the main supply source for the pipeline being built to China.

6. Since China first realised that its western boarders and its north-western landmass was going to be a vital corridor for the conveyance of oil and gas from the Caspian and Central Asia to its industrial and urban concentrations, Xingjian has become of vital strategic importance to China's leadership, specifically its security from the possibility of insurgent uprising from its restive Uigur ethnic minority. As volumes of oil and gas through the KCP, and the CACP and the existing West–East Gas Pipeline expand, Xingjian's geopolitical importance as a transit territory and gateway for China's industrial and urban concentrations further to the east and south-east will increase commensurately with the volumes conveyed.

7. The building of high-capacity pipelines from, and through, Turkmenistan, Uzbekistan and Kazakhstan will enable China and Iran to potentially operationalise terrestrially-conveyed petroleum exports from Iran to China. If this were to occur in significant volumes, it would serve to further cement China's ties to Iran, which could have far-reaching geo-strategic implications for great power relations in Eurasia. Such a development could impact heavily upon United States policies in the region: its

attempts to temper Iran's aspirations to greater geopolitical influence in the Strategic Energy Ellipse and the wider Middle East, its support for Iraq's rebuilding of its petroleum-economy; and, its long-standing alliance with the Gulf Arab states.

Another vital feature of the petroleum trading ties between China and Iran is the conveyance of large volumes of Iranian crude from the Persian Gulf to China's main import terminals via SLOCs that traverse the Indian Ocean and South China Sea. This is a clear petroleum geopolitical reality that is a key part of the chapter that follows.

Notes

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[11] *Ibid.*, pp. 238-239
[12] *Ibid.*, p. 238
[13] *Ibid.*
[14] In order to finance a pipeline with seed loans (sovereign and/or commercial) banks require collateral in the form of guaranteed oil or gas "throughput" – the quantity of commodity that will be transported through a line over a given period – for which the pipeline owner/operator and transit countries can levy a transit fee. These fees are how a pipeline and the transit countries make their money. See Steve LeVine, *Op. cit.*, pp. 243-244
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Chapter 6 Petroleum Conveyance in the Indo-Pacific Maritime Realm

6.1 Overview

The function of this chapter is to identify the intrinstic, germane phenomena within the theoretical framework - such as space and distances; the nature of maritime and terrestrial delineation that gives rise to chokepoints and gateways; the existence of effective national and regional territory in the Persian Gulf; and, the affects of resource supply security, geopolitical posture and conflict upon the supply and price of oil – and assess their causal affect upon selected key features, infrastructure, processes, trading activity and conflict within the Indo-Pacific Maritime Realm.

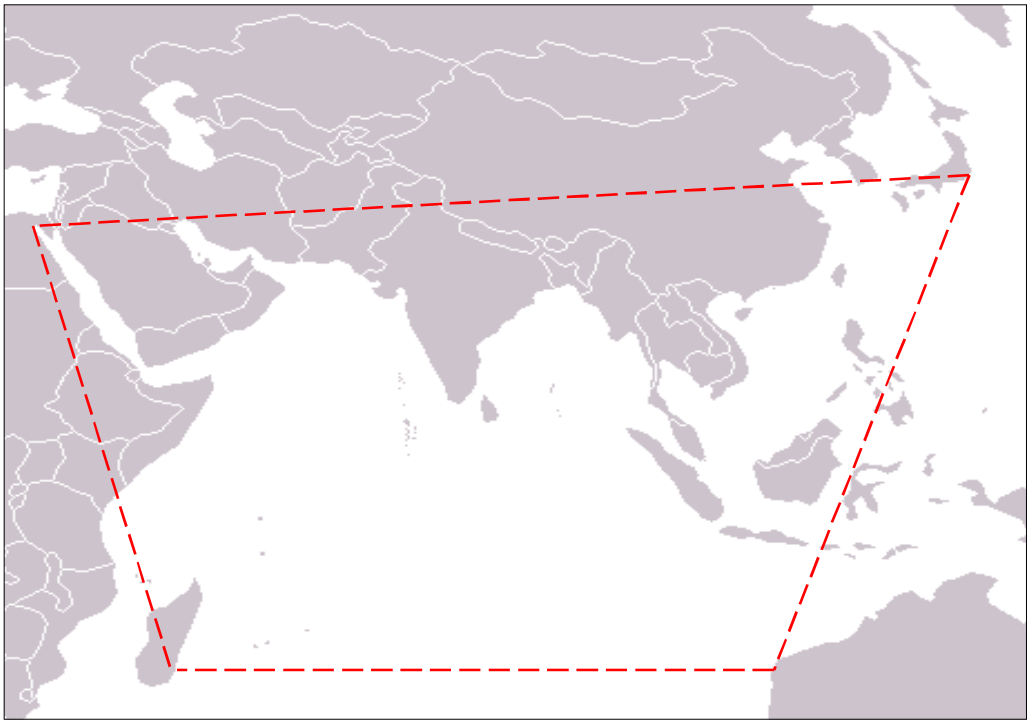
These phenomena include: the sea lines of communication (SLOCs) between points of petroleum export and consumption; the strategic relevance oil and LNG loading terminals in the Persian Gulf, such as Ras Tanuara and Ras Laffan; the streams of oil and LNG from the Persian Gulf to major Asian markets in China, India, Japan and South Korea; the nature and impact of a major petroleum gateway between the Indian and Pacific Oceans in the form of Singapore; and finally, the impact of a major inter-state war at sea upon the security of oil supplies from the Persian Gulf, the outcome of the war, and global oil prices.

6.2 Sea Lines of Communication and Chokepoints

The geographical canvas in this chapter is referred to as the Indo-Pacific Maritime Realm, which is a convex quadrilateral oceanic/terrestrial space delineated in the following way on a Mercator projection (see Fig 6.1):

- In the south, along the Tropic of Capricorn between the west coast of Australia and the east coast of Madagascar
- In the west, by a north-west line between the east coast of Madagascar and the Suez Canal
- In the north, by a line connecting Suez and the Japanese island of Hokkaido
- In the east, by a line between north-eastern Japan and the western coast of Australia

Fig 6.1 The Indo-Pacific Maritime Realm (Mercator projection)



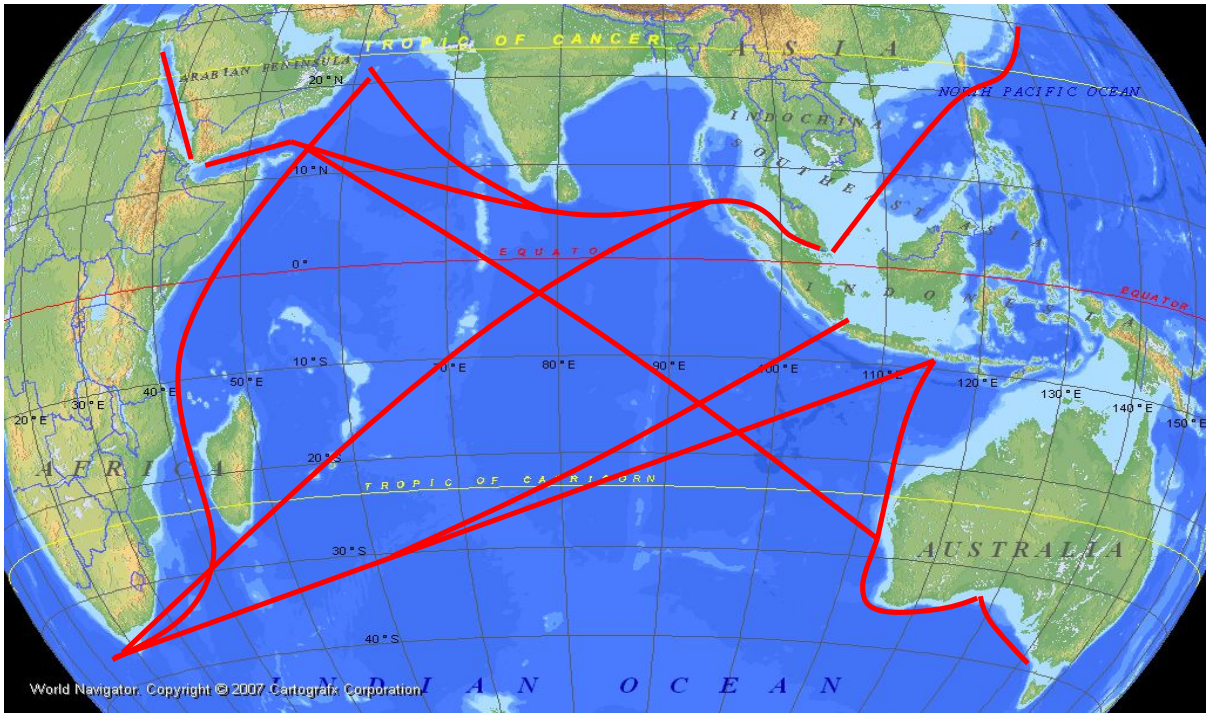
6.2.1 Sea Lines of Communication and Strategic Petroleum Streams

This chapter examines the strategic and geopolitical features, drivers and outcomes amidst the systemic petroleum trade and flow within the maritime environment; specifically within the Indo-Pacific Maritime Realm as established above. Ensuing sections within this chapter consider specific major nodes of maritime-based supplies of crude oil, LNG and large-scale refining and product re-distribution. However, intrinsic to the ontology of this activity on an inter-oceanic and intercontinental level are the maritime synapses and conduits that connect sites or nodes of oil and gas export activity and areas of consumption; these are known as Sea Lines of Communication (commonly referred to as SLOCs) and chokepoints.

SLOCs are defined as: the primary commercial sea trading routes, the commercial arteries, linking ports and/or terminals across oceanic and littoral spaces.[1] In a military context they are the strategic inter-oceanic and intercontinental maritime links that facilitate naval and expeditionary force deployment and power projection. The exact routing of SLOCs is determined in two main ways: by the geographical contours between landmasses and oceanic space, and in several cases also by the narrow corridors that connect two sea spaces or traverse archipelagos, known as chokepoints (see below); and secondly, for any oceanic traverse or open sea traverse, by the most economical and expedient navigational routing. SLOCs can be threatened and characterised by a number of security and geopolitical issues, such as: piracy and armed robbery at sea; human trafficking; the smuggling of narcotics,

weapons and people; marine pollution and environmental changes (such as polar ice limit changes); inter-state conflict and territorial disputes.[2]

Fig 6.2 Primary SLOCs in the Indo-Pacific Maritime Realm



The term SLOC is a military concept and thus can be seen to have rather more strategic connotations rather than commercial shipping ones. However, interestingly, it is this rather strategic nuance that is employed increasingly in the literature with reference to petroleum movements by sea. This is because oil is often seen by national security officials, scholars of strategic and security studies, and military officers as an essential strategic commodity, and in times of war or international crisis the security of vital supplies of petroleum have been facilitated by military power. With this in mind, I have adapted the concept of SLOC to reflect some of the strategic and geopolitical nuances explicit and implicit in the conveyance of oil and gas by sea, which I term: Strategic Maritime Petroleum Streams (SPS).

Merchant vessels navigating in a SLOC, or crude tankers (VLCCs & ULCCs), product tankers and gas carriers (LNG & LPG) navigating along an SPS, can navigate freely in international waters under rights afforded shipping under the terms of the United Nations Convention on the Law of the Sea (UNCLOS).[3] In a normative sense thus, Merchant vessels should be free from all threats to their security; threats from the effects of land-based inter-state war or insurgency, terrorism, and piracy and armed robbery at sea. However, this is often not the case in practice and, as history informs us, conventions of international law are

certainly no guarantee of security. Attacks on shipping were strategically 'legitimised' in the world wars of the twentieth century and during the 1980-88 Iran-Iraq war as merchant vessels were used to supply vital war materiel, fuel and food for.

However, in recent times terrorists have attacked ships at sea (in the Gulf of Aden, in the Straits of Hormuz and in the Philippines archipelago), and piracy attacks and armed robbery against merchant vessels remains prevalent in the northern Indian Ocean and to a lesser extent in South-east Asia. Furthermore, within the Indo-Pacific Maritime Realm, SLOCs pass through or close to disputed maritime areas that have precipitated clashes and raise geopolitical tensions, such as the Spratly Islands, and near states that are experiencing conflict and/or insecurity, such as Somalia, Yemen and Iraq.

Conflicts, insecurity, inter-state tensions; geopolitical flashpoints, crime, piracy and threats of terrorism affect the majority of the primary and secondary SPSs in the Indo-Pacific Maritime Realm in differing ways and with varying degrees of intensity. Arguably, the most prominent and important maritime/terrestrial geopolitical features in the context of the maritime conveyance of petroleum are chokepoints, which are also key features of SLOCs/SPSs because of the potential and actual constraints they can impose of the movement of petroleum as tankers move through them. They are a critical feature of global energy security due to the high volume of petroleum transported through them.

Strategic Petroleum Streams (SPS)

Within the Indo-Pacific context there are five strategic petroleum streams:

1. *Westward SPS*: from the Persian Gulf and Arabian Peninsula (PG/AP) towards the Atlantic Basin/Maritime Europe market via the Suez Canal
2. *South-eastward SPS*: from the Persian Gulf and Arabian Peninsula to Southeast Asia via the Malacca Straits
3. *North-eastward SPS*: from Singapore to Northeast Asia and North-western Pacific Rim via the South China Sea
4. *South-westward SPS*: from the Persian Gulf and Arabian Peninsula to the Atlantic Basin/Maritime Europe via Cape Agulhas (Cape of Good Hope); utilised by VLCCs and ULCCs heading to the Gulf of Mexico or in the event of a closure of the Suez Canal or adverse security concerns in the Gulf of Aden or Red Sea

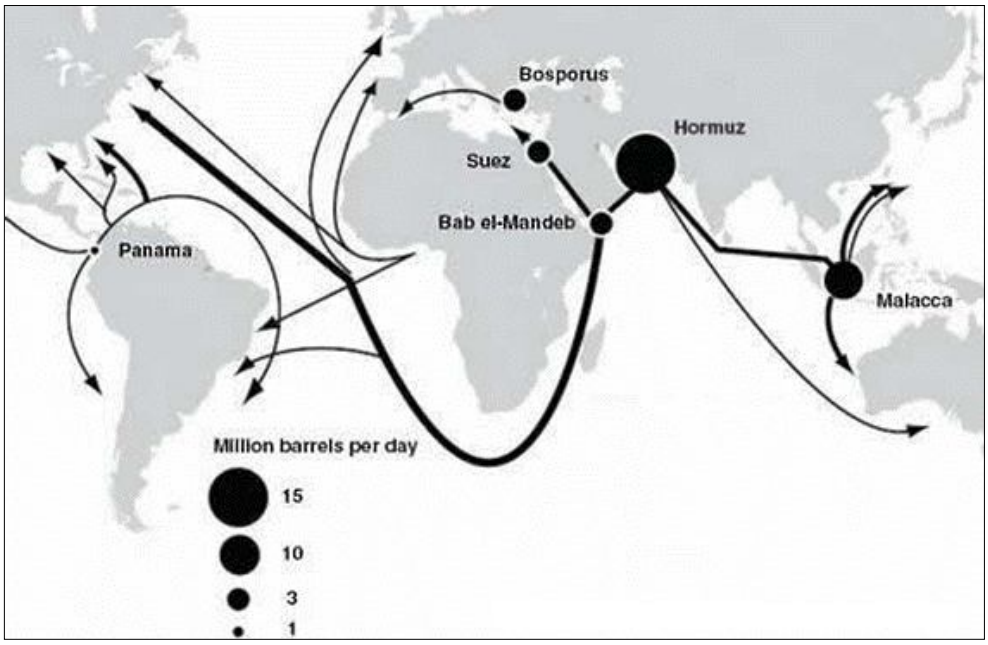
5. *Northern SPS* from western Australian coast to Northeast Asia and the North-western Pacific Rim, via the Lombok Straits, Macassar Strait, Celebes Sea and Sulu Sea and the Philippine archipelago

The tables and maps in Annexes D to H reveal the vital characteristics of each SPS and illustrate the routes. Clearly, these must also be viewed alongside the importance of the relevant chokepoints and the nature and volume of oil, gas and refined products that flow along them as detailed in later sections. The maps also illustrate relevant security and geopolitical concerns - piracy and armed robbery at sea, crisis, insurgency, war, terrorism or territorial disputes - that could impact upon the security of shipping in those waters and thus possibilities for naval and military presence.

6.2.2 Chokepoints

Within the context of the ensuing sections of this chapter that examine the primary oil and LNG supplies from the Persian Gulf, it is vital to appreciate the significance of these chokepoints as integral features of the major SLOCs in the region. The major consuming countries in the Western Hemisphere, in Europe and increasingly in Asia are hugely dependent upon the security of these chokepoints to enable the continuous, free passage of vital stream of crude oil, refined products and distillates and liquefied gases.

Fig 6.3 Major petroleum trading chokepoints



Source: U.S. Government Accountability Office & EIA

According to the U.S. Department of Energy's EIA, the major oil chokepoints in the world are: Bab al Mandeb, the Bosphorus (& Dardanelles), the Malacca Straits, the Panama Canal, the Strait of Hormuz and the Suez Canal (see Fig 6.2).[4] In terms of the sea transportation of petroleum in the Indo-Pacific Maritime Realm, there are four chokepoints that are significant features alongside the SPSs that pass through them: the Suez Canal, Bab al Mandeb, the Straits of Hormuz and the Malacca Straits (see Fig 6.2). A concise description of the major oil chokepoints in the Indo-Pacific Maritime Realm are given at Annex I, which gives details of the following: Adjacent states, adjoining maritime spaces, alternative routes, volumes of crude oil trade per year, the approximate number of transiting tankers per year, oil/gas sources and strategic, geopolitical and security issues. With regards to the volume of crude oil, refined products and LNG conveyed from the Persian Gulf to Europe, the United States and increasingly to Asia, it is the last two that are of particular importance.

Malacca Straits

Aside from the importance of the Malacca Straits to trading states in the Indian Ocean and the western Pacific rim, and of course to the maritime countries in the southern parts of the South China Sea, it is China's reliance upon crude shipments from the Persian Gulf that is increasingly highlighting the strategic value of this chokepoint from a petroleum perspective. [Other east-west trades vital to China are exemplified also by the enormous containerised trade that flows through Malacca]. Indeed, China's reliance on Malacca is perhaps the best example available of the strategic and geopolitical nature of chokepoint importance and security. The strait is approximately 430 nautical miles (nm) long (800 km) and between 170 nm (320 km to 27 nm (50 km) wide. It is 1.35 nm (2.5 km) at its narrowest point) in the Phillips Channel and has a minimum channel depth of 23 metres. Approximately 30% of the world's sea trade and almost 80% of petroleum imports to Japan, South Korea and Taiwan are transported through the straits each year.[5]

Fig 6.4 Malacca Straits

Source: http://apwhod2010.pbworks.com/w/page/26554777/Malacca-Strait

China is now the world's second largest consumer of oil after the U.S. Almost 60% of China's crude oil imports come from the Persian Gulf and this figure could increase to 75% by 2015.[6] Thus any hindrance to the free and secure flow of oil though the straits would have a serious impact upon the country's economic security and could throttle its surging economic growth. It is precisely this expanding economic power that China requires to fuel its increasing geopolitical influence in Asia and expand its military. Some commentators have referred to this as China's 'Malacca Dilemma';[7] the strategic vulnerability of this expanding great power upon the straits for its energy and economic security.

Despite its growing naval reach in the South China Sea and beyond, China's energy security is still vulnerable to security concerns in the straits such as piracy and the threat of terrorism, and is well aware that other regional powers and the U.S. remain responsible for the secure flow of Chinese crude shipments and other trade through the Malacca Straits. As highlighted in the previous chapter, a key result of China's vulnerability in this regard has been to build oil and gas pipelines across Central Asia to partially mitigate against its dependency on tanker conveyed crude from the Persian Gulf.

Strait of Hormuz

The Strait of Hormuz is unquestionably the world's most important chokepoint, and in theory at least, it is the most geopolitically sensitive and vulnerable to potential interference. The waterway is 26 nm (48 km) at its narrowest point widening to some 43 nm (80 km) westwards. However, navigation is limited to the shipping lanes within traffic separation scheme (TSS), which has two 3 km-wide channels - one for inbound vessels (westward) and the other for outbound (eastward) traffic (see Fig 6.5).[8] Vessel movement is thus closely controlled because of the large numbers and sizes of vessels (particularly VLCCs), which makes navigation challenging and vessel separation essential. If an actor wanted to disrupt the passage of shipping in the Strait, the TSS would be the optimum place to do it.

As the table at Annex I reveals, the volume of crude exported through the strait is unmatched and there are no alternative routes should freedom of navigation of VLCCs and other shipping be impeded. Approximately 6.12 billion barrels of crude pass through the straits each year, which equates to on average to some 15 full-laden VLCCs each day.[9] The available pipeline capacity from Saudi Arabia's gulf coast to the Red Sea ports is currently far too small to compensate. This issue is addressed in more detail in a subsequent section. Interestingly, contrary to occasional media misconception during times of elevated geopolitical tension in the Persian Gulf, the secure, free flow of shipping through Hormuz is not that straightforward to disrupt, and even in a major war – the Iran-Iraq War (see later section on the 'Tanker War') - the strait has never been 'blockaded' despite repeated threats from Iran at the time. Nevertheless, the world cannot afford to have continuous flow of crude from the Persian Gulf out to the Indian Ocean compromised in any way.

Fig 6.5 Strait of Hormuz

Source: http://www.willisms.com/archives/2006/04/flashpoint_stra.html

Notwithstanding the above, there are two extant threats to the Strait of Hormuz: a terrorist attack against transiting shipping and another major conflict involving Iran and another Gulf state and/or external powers such as the U.S. Since 9/11 there has been one aborted Al Qaeda plot (conceived by the then head of AQ maritime operations – Abd al-Rahim al-Nashiri) to threaten shipping in the Strait in 2001,[10] and an unsuccessful attack by an Al Qaeda-linked terrorist group, the Abdullah Azzam Brigades, against a Japanese-owned VLCC, the *M.Star*, in July 2010 as she was transiting through the straits.[11]

With regards to the long-standing existential tensions between Iran and the U.S. in particular, the most high-profile recent threat to the strait by Iran was in June 2008 when the commander of Iran's Revolutionary Guard, Ali Mohammed Jafari, during a period of particular tension, stated that if Iran were attacked by Israel or the United States it would close the strait in order to wreak havoc on oil supply to the global market. Vice Admiral Kevin Cosgriff, then commander of the U.S. 5th Fleet, warned that such action would be considered an act of

war[12]. This kind of threat is not uncommon from Iran as a means of geopolitical duelling; however, as will be examined in a later section addressing the impact of the Tanker War, Iran relies on freedom of navigation of the strait for its very economic survival.

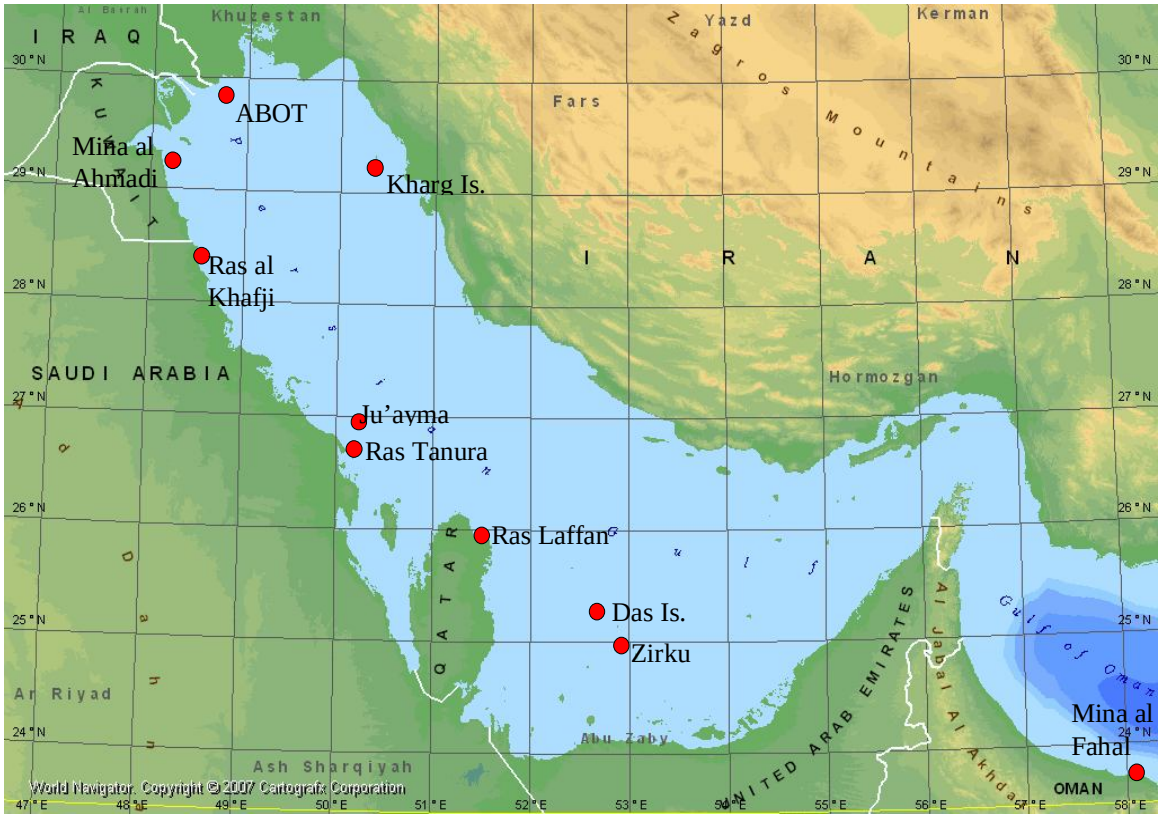
6.3 Critical Oil and LNG Export Terminals in the Persian Gulf and Gulf of Oman

This section examines the crude oil trading dynamics and imperatives from the Persian Gulf and Arabian Peninsula with the primary markets in Asia, and examines the significance of the world's single largest exporting node for LNG – Ras Laffan in Qatar. The production and exporting of crude oil from this maritime space constitutes arguably the most intensively scrutinised and important feature of systemic petroleum conveyance at a global level. In this sense, the trade of these resources is a major factor in determining important features of the petroleum geopolitical ontology of the Indo-Pacific maritime realm.

From the point of view of the economic security of the producer countries in this space and the energy security of the major consuming powers in Asia, in particular China, Japan and India, there is no more important single factor than the unimpeded export of crude oil from Iran, Iraq, Kuwait, Saudi Arabia and the UAE. The table at Annex J lists of all the crude producing countries, associated terminals, and exported volumes from the Persian Gulf and the Arabian Peninsula, and the crude export figures indicate their relative importance.

Ensuing analysis will consider the most important terminals and associated countries in terms of annual export volumes; however, what is immediately apparent from the table above is the large number of terminals in several countries that are involved. With 11 terminals, the UAE has the most, followed in succession by Iran and Saudi Arabia with six each, and then Qatar, Kuwait, Oman, Yemen and lastly, Iraq. However, it is when examining differentials in output that the relative importance of certain terminals becomes clear, the associated importance of the sovereign territorial waters that give access to them, and the relevant significance of the host country as a source of crude.

Fig 6.6 Key petroleum terminals in the Persian Gulf and Gulf of Oman



6.3.1 Saudi Aramco's Ras Tanura and Ju'aymah Terminals

Saudi Aramco's terminals handle more than 3,000 tanker loadings per year. Aramco terminals are located at Ras Tanura and Ju'aymah on the Arabian Gulf coast and at Jiddah, Rabigh, Jaizan, Yanbu' and Duba on the Red Sea coast. However, it is the significant dominance of Ras Tanura and Ju'aymah in terms of loading and export capacity that sets them apart. The two terminals alone account for over 32% of total crude exports by sea from the region, and almost 90% of Saudi Arabia's annual exports of crude oil. This pivotal concentration of export capacity renders these Saudi terminals arguably the two single-most important crude oil export facilities in the world. Between 1999 and 2009, average global consumption of oil stands at approximately 81 million barrels of oil per day, representing an average annual consumption of some 29.57 billion barrels.[13] Of this, Ras Tanura and Ju'aymah alone account for 1.3 billion barrels, or 4.4%.[14]

Fig 6.7 VLCCS loading at Ras Tanura Sea Island 4 offshore terminal

Source: www.saudiembassy.net

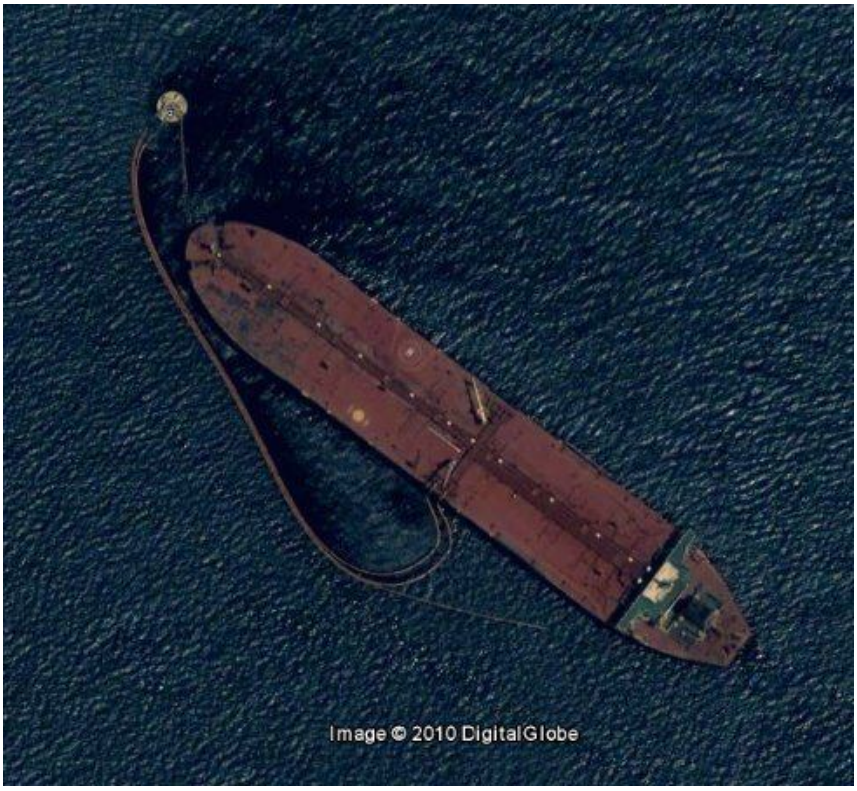
If Saudi Arabia is the cornerstone of oil supplies to the global market due the scale of its daily output, then Ras Tanura and Ju'aymah, the two largest crude terminals in the world, are quite obviously the linchpins of the kingdom's export infrastructure. As much as 80% of the approximately 10 million barrels of oil (average: 1999-2009)[15] produced by Saudi Aramco every day is piped from fields such as Ghawar to the processing facility at Abqaiq, which feeds processed crude to the massive tank farms and refinery at Ras Tanura. The Ju'aymah terminal is also fed from Abqaiq. There are six Single Point Moorings (SPMs) at Al Ju'aymah, which combined have a nominal loading capacity of up to six million barrels per day.[16] VLCCs and ULCCs bound for the major refineries in China, Japan, South Korea, India, Singapore, Europe and the United States load approximately 1.3 billion barrels of oil each year at Ras Tanura and
Ju'aymah.[17]

Fig 6.8 Ras Tanura tank farm & terminals

Source: U.S. Geological Survey (2010 Digital Globe)

These facilities are thus *de facto* the most vital single terminals for the crude oil supply-security for many leading Asian and Western states. Indeed, were the terminals to be put out of commission, the impact upon the global oil market would be severe in the extreme as the pipeline capacity within Saudi Arabia is currently insufficient to divert the terminals' output to the kingdom's primary Red Sea terminal at Yanbu. Currently, the 1,200 km 'Petroline' that links oil sourced from the Ghawar, Abqaiq, and Hawtah fields only has a capacity of 5 million barrels per day (MBD).[18] Furthermore, the terminal at Yanbu does not have sufficient loading capacity nor can it accommodate the necessary VLCC turnaround even if the pipeline capacity was sufficient to redirect the required 179 million barrels per year.

Fig 6.9 Ju'aymah Terminal (VLCC loading at Single Point Mooring)



Source: U.S. Geological Survey (2010 Digital Globe)

The security considerations regarding Ras Tanura and Ju'aymah are clear on two fundamental and inter-related levels. As has been shown above, significance of the annual export capacity of the terminals as proportions of both Saudi and regional export totals, and also as a percentage of annual global oil consumption, is inescapable. This strategic-level appreciation has clear implications for the crude oil supply security (and thus the national energy security) of a multiplicity of dependent states around the world, including major Western powers, the Asian 'Tiger' economies, and the rising Asian major powers – India and China (see *Strategic point-to-point streams of crude oil* section below). This strategic-level appreciation is intrinsically linked, thus, to the operational-level security of the terminals themselves.

Ras Tanura in particular – due to its conspicuous, isolated and vulnerable Sea Island terminal structures, its proximity to the shore-side tank farms on the Ras Tanura peninsula, and its larger output – is a highly attractive terrorist target.[19] It is estimated that 10% of global oil supplies are loaded onto VLCCs at the terminal every day. Furthermore, it has been estimated that a major strike against Abqiaq and Ras Tanura could remove as much as 50% of Saudi Arabia's export capacity.[20] This somewhat alarmist estimation by some commentators is difficult to corroborate; nevertheless, given the undoubted enormous output and handling

capacity of these facilities, the point is made. Given the history of conflict the Persian Gulf region and its status as a shatterbelt, in the event of an inter-state war involving Saudi Arabia, the terminals would also be clearly important strategic targets, in the way Iraq and Iran's major terminals were targeted during the Iran-Iraq War to disrupt oil exports.

Providing comprehensive security for the facilities, both in terms of continuous threat intelligence and sufficient practical security in the form of protective naval patrols and defences, is therefore of paramount importance not only to the kingdom itself but also to key dependent consuming states and the stability of the global oil market. It is in part for this reason that Western-led naval coalitions maintain a continuous present in the Persian Gulf, such as Combined Task Force 152.[21] Notwithstanding the considerable strategic reserves of oil in the U.S., Europe and parts of Asia, the tight supply demand balance of the contemporary petroleum age, means that any prolonged interruption of supply from either or both of these terminals, particularly Ras Tanura, would have considerable repercussions for the oil market and potentially for macro economic stability.

6.3.2 Iranian, Kuwaiti, Omani and UAE Terminals

Kharg Island in Iran, Jebel Dhanna Terminal in the UAE and Kuwait's Mina al Ahmadi constitute the second tier output terminals in the region with a combined export output representing 28.11% of the region's total; almost one third.[22] Though Saudi Arabia's maritime export capacity tends to overshadow that of other producers in the region, it can quickly be seen that even if the total maritime export capacity of Iran, the UAE and Kuwait individually were to be compromised, the effect on dependent countries and the market-volume/price dynamic would be considerable.

Oman's Mina al Fahal terminal is an important facility for geographical reasons. Though Oman's crude output will decline faster in real terms than the other main producers, it is currently the only high-capacity crude terminal in the Arabian Sea located outside of the Straits of Hormuz. [The UAE is currently developing a 1.8 mn b/d, 360 km oil export pipeline from Habshan to Fujairah, which is expected to be completed in 2011.[23] The purpose of the line is to reduce dependence on the Strait of Hormuz in the event shipping security was compromised.] Therefore, alongside the Saudi terminals in the Red Sea, Mina al Fahal and Fujairah would become absolutely vital to regional export capacity in the event access to the Straits of Hormuz was compromised by a crisis.

Lastly, the Al Basra Terminal (ABOT) in Iraq - the country's main maritime export facility, which became the most closely protected terminal in the world following the unsuccessful terrorist strike against both Iraqi terminals by an Al Qaeda in Iraq (AQ-I) cell in April 2004,[24] will become the focus of expanded regional export capacity in the coming years as Iraq begins the gradual process of expanding its daily crude production. It is intended that export capacity from the Iraqi terminals will be significantly boosted in order to accommodate increased production capacity from Iraq's major southern oil fields, specifically the North and South Rumaila, West Qurna and Zubair between 2010 and 2016. As analysed in chapter 4, these terminals will render Basra a major regional petroleum gateway once production has expanded significantly.

Table 6.1 Top ten crude export terminals in Persian Gulf

Country	Terminal	Total Volume Exported (Tonnes) 2006	Total Volume Exported (barrels) 2006	% of Total Exports from the Region
Saudi Arabia	Ras Tanura	95,751,653	698,987,067	17.46
Saudi Arabia	Ju'aymah Terminal	83,045,494	606,232,106	15.15
Iran	Kharg Island	53,630,827	391,505,037	9.78
United Arab Emirates	Jebel Dhanna Terminal	52,750,016	385,075,117	9.62
Kuwait	Mina al Ahmadi	47,765,995	348,691,764	8.71
Oman	Mina al Fahal	31,772,325	231,937,973	5.79
United Arab Emirates	Zirku Island	31,362,273	228,944,593	5.72
United Arab Emirates	Das Island	29,619,240	216,220,452	5.40
Iraq	Al Basra Terminal	21,001,499	153,310,943	3.83
Saudi Arabia	Ras al Khafji	11,315,373	82,602,223	2.06

Source: Lloyd's Marine Intelligence Unit [APEX]

The existence, location and capacities of the largest maritime export facilities in the Persian Gulf and Arabian Peninsula region not only confers geopolitical importance upon the countries concerned (in addition to that generated by the countries' respective reserve bases) but it also ensures that sovereign littoral regions and access waters of this space will have considerable geopolitical and strategic significance for as long as crude oil continues to remain the mainstay of the global energy mix, particularly with regards to transportation fuels. The inescapable significance of these terminals means that all of those states in Asia and elsewhere that rely heavily upon the crude that is exported from them will have continued and increasing interest in both their unimpeded operation and unfettered access to them. Careful analysis of the point-to point streams of crude between the top five terminals and

crude markets in Asia, as shown in the table at Annex K, serves to highlight the significance of this reliance, and forms the basis of assessing the importance of the SPSs and chokepoints that connect source and market.

6.3.3 Strategic Point-to-Point Streams of Oil between the Gulf and Asia

The table in Annex K has been devised to show the volumes of crude transported between specific terminals. The most significant findings are listed below:

- Singapore, the largest Asian refining/export hub, draws crude oil feedstock for its Jurong refinery largely from the two primary Saudi terminals – Ras Tanura and Ju'aymah, from Kuwait's Mina Ahmadi, and from Das Island in the UAE. Though the heaviest reliance is from Saudi Arabia, sources for Singapore's crude are varied.
- The main Japanese refineries at Chiba, Kiire and Yokkaichi draw most heavily from Saudi Arabia, Kharg Island and the UAE.
- The large South Korean terminals at Ulsan, Yosu and Daesan import from a wider spectrum of sources; however, the massive refinery at Onsan sources the vast majority of its crude from Ju'aymah.
- The main Chinese refineries at Ningbo, Mai-Liao and Shuidong source their crude from Saudi Arabia and Iraq, and to a lesser extent from Oman, Kuwait, the UEA and Iraq respectively.
- Lastly, India's largest refinery at Sikka sources most of its crude from Ras Tanura, Ju'aymah and Ras al Khafji in Saudi Arabia, whilst the fast expanding terminal/refinery at Jamnagar in the northwest of the country imported equal quantities from Kuwait's Mina al Ahmadi terminal and the Al Basrah terminal in Iraq.[25]

Overall, the table shows that the top ten recipients – Singapore, Onsan (SK), Ulsan (SK), Chiba (J), Kiire (J), Yosu (SK), Ningbo (Ch), Mai-Liao (Ch), Sikka (I) and Kaohsiung (Tw) – source almost 77% of their crude from the top five export terminals – Ras Tanura, Ju'aymah, Kharg Island, Jebel Dhanna and Mina al Ahmadi.[26] This is a clear indication of not only the reliance of Singapore, South Korea, Japan, China, India and Taiwan upon the unimpeded functionality and security of the terminals themselves, but also in the geopolitics that ensures or threatens the stability and security of the countries in the region and the strategic-level integrity of the vast sea lines of communication that link source and consumer. In fundamental terms, the major industrialised Asian economies have arguably no greater geopolitical interest and priority than these five nodes of supply located within the bounded

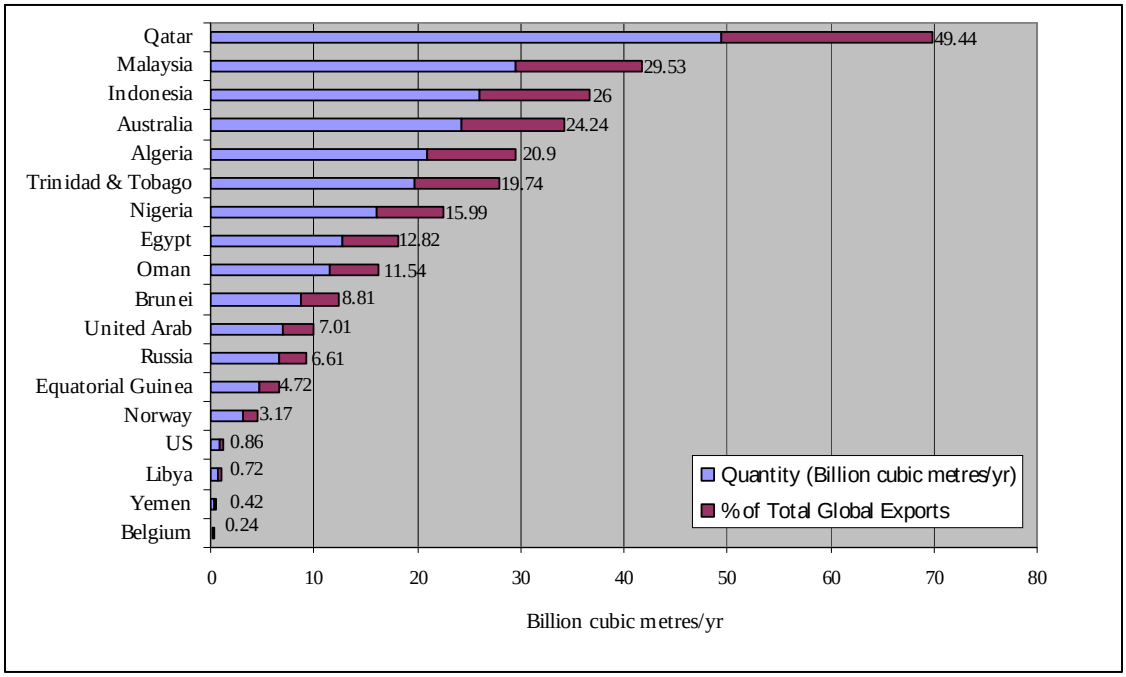
waters of the Persian Gulf and the waters that connect them to their main import/discharge terminals and refineries.

6.3.4 LNG Exports from Qatar: The Significance of Ras Laffan

Liquefied Natural Gas, more commonly referred to as 'LNG', is natural gas that has been cryogenically cooled to -163 °C (-260 °F) in order to condense it into a liquid, which is 1/600th of the volume of gas.[27] In this state it is more practical and cost efficient to transport long distances by sea, where transporting gas by pipeline is not possible or economical due to a lack of pipeline infrastructure or prohibitively long distances between source and market. LNG is conveyed by specialised LNG Carriers, which have cryogenic tanks that keep the cargo at approximately -160°C for the duration of the transit. Once the vessel arrives at its destination, the LNG is pumped ashore to a re-gasification terminal, where heat exchangers convert the liquefied cargo back into its gaseous state before sending it into the national gas pipeline grid from storage tanks.[28]

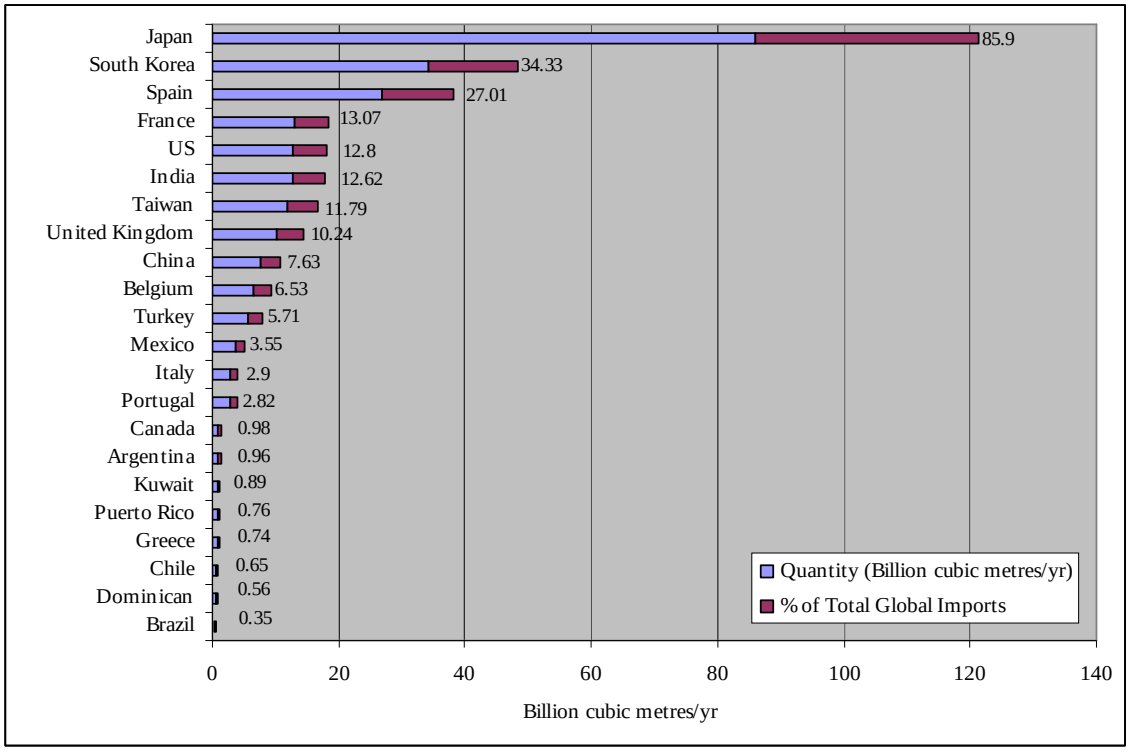
LNG has been produced and shipped by sea since 1964 and the volume and proliferation of shipments has grown steadily since the 1970s, particularly in Asia. The six largest producers in order of magnitude are: Qatar, Malaysia, Indonesia, Australia, Algeria and Trinidad & Tobago (see Fig 6.9.1). The largest markets in order of volumes imported by sea are: Japan, South Korea, Spain, France, the U.S. and India (see Fig 6.9.2).

Fig 6.9.1 Global LNG exports 2010



Source: BP Statistical Review of World Energy 2010 and Cedigaz

Fig 6.9.2 Global LNG imports 2010



Source: BP Statistical Review of World Energy 2010 and Cedigaz

The graphs reveal some key linkages between volumes traded, primary exporting countries and crucial supply lines. The top three importing countries account for just over 60% of global imports, with Japan accounting for almost 36%. Viewed holistically, the volumes of traded gas worldwide are dominated by pipeline conveyance. However, the difference between volumes conveyed by sea has increased as a proportion of the total. Of the total 876.54 billion cubic metres of gas exported in 2010 worldwide, just less than 28% (242.77 billion cubic metres) was transported as LNG by sea.[29]

For many countries, either due to geopolitical and security reasons (such as South Korea), because they are island states (such as Japan and Taiwan), because they are geographically removed from continental pipeline grids (such as Spain and India), or simply through a strategic need to diversify and expand supply (e.g. France, the U.K. and China), LNG is a critical mode of supply. For some, such as Japan and South Korea, it is the only means of gas supply; disruption at any point along the supply chain would have enormous consequences for national energy and economic security given their dependence on gas for electrical power generation. In this way, as for crude oil supplies to the major Asian economies from the Persian Gulf, LNG supplies are almost of equal significance for Japan and South Korea in particular, and their energy-driven diplomatic and trading relationships with suppliers like Qatar are of commensurate importance.

Despite the effects of cyclical global economic contractions, which result in periods of gas demand reduction, the expansion of LNG production and conveyance in the coming decades is forecasted to expand. This expansion will be driven largely by increases in demand from China, India and Western Europe (UK, France, Spain and Belgium). By 2020, Wood Mackenzie, one of the leading energy consultancies, suggests that over 40 countries worldwide could be importing LNG compared to 22 in 2010.[30] The global natural gas market is approximately 60% of the magnitude of the crude oil market (measured on a heat equivalent basis), and is expanding rapidly. The IEA estimates that Liquefaction capacity will expand five-fold by 2030.[31] These figures, whilst not necessarily unreasonable, could be tempered by periods of 'demand destruction' should the economic crisis that began in 2008 be overly prolonged, which would lessen requirement and throttle development of new production centres and transportation fleets. This caveat in place, this analysis will proceed to follow the upward trending model.

The evolution of an 'interdependent global LNG grid'

The figures and trends listed above are evidence of the increasing importance of LNG as a component of the global energy mix. However, it is the geographically-expanding symbiotic relationship between the major producers and consumers linked by production 'LNG trains'[32] that sometimes stretch across vast oceanic distances, the design and building of liquefaction infrastructure, export terminals, specialised ships and re-gasification terminals, and the myriad of NOCs, IOCs and financiers and diplomats have multiplied to form what I have termed an 'interdependent global LNG grid '. Though the volumes involved are nowhere near those for crude oil and product trades, as traded LNG volumes increase so will there be a commensurate increase in the interest in, and importance of, the geopolitics and economics that governs, facilitates and is shaped by this grid.

Stability in the gas source countries must be complemented by the ability of those countries to gain access to patented technologies for infrastructure and vessel development, which is made possible through free trade and robust diplomatic relationships. Gas demand needs to be stable and prevalent within the energy mix of consuming states. SLOCs connecting exporters and importers must be secure and accessible and chokepoints free of conflict and monitored for terrorist and piracy risks. This systemic stability and security is also of critical importance to enable the financing of LNG production and conveyance; particularly given the enormous sums involved to develop complex infrastructure and the long project development times from concept and feasibility study and front-end engineering and design (FEED) through to LNG production and conveyance.

Financiers, in partnership with IOCs and NOCs, must be aware of the geopolitical as well as economic risks involved before large-scale investment can be provided. The forces driving the global expansion of LNG requirement and production and the systemic features that join the supply and consumption parts of the grid can perhaps best be illustrated in the development of what has become the world's single-most strategically important LNG producing node – the Ras Laffan Industrial City in Qatar.

Ras Laffan – the global epicentre of LNG production and export

Ras Laffan Industrial City, inaugurated in February 1997, is situated along the northeast coast of Qatar and covers an area of 106 sq km.[33] The facility's primary purpose is the production, storage and loading of LNG, and to a lesser extent, the production of gas-to-liquid petroleum products using natural gas as feedstock. In March 2007, Qatar solidified its leading role in

world LNG production when *RasGas* completed its fifth LNG production train, giving the country a total of 30.7 MMt (1.5 Tcf) of annual liquefaction capacity, the largest single source in the world. Based on long-standing plans, Ras Laffan reached its full LNG production capacity of 77 MMt/y (3.8 Tcf/y) on 13 December 2010, well ahead of the intended date in 2012.[34]

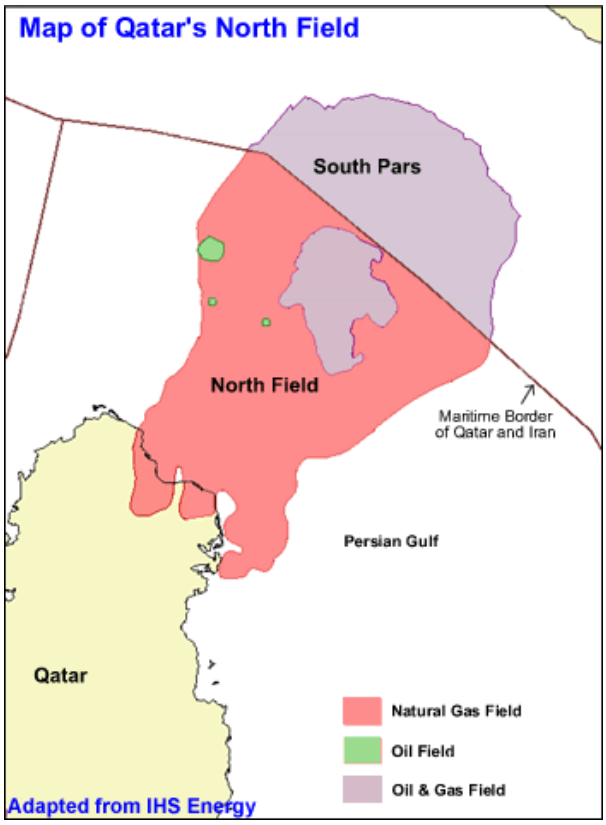
Two main companies are responsible for producing and exporting LNG at Ras Laffan – RasGas and Qatargas. RasGas Company Limited is a Qatari Joint Stock Company established in 2001 by Qatar Petroleum and ExxonMobil, who are 70% and 30% shareholders respectively. The rival company, Qatargas, which pioneered LNG production in Qatar, is another international consortium made up variously of Qatar Petroleum, ExxonMobil, Total, ConocoPhillips, Shell, Mitsui and Marubeni.

This international compilation of partnering NOCs and IOCs coupled with the geographical diversity of market countries is testament to the truly international ontology of Qatar's LNG project, of which interdependence is arguably the prime feature. Furthermore, these kinds of huge IOC/NOC transnational production and transportation schemes would not be possible without sufficient geopolitical stability within the region itself and stable relations between the partnering host countries. From a petroleum geopolitics perspective, Ras Laffan, is the single most important source of LNG on earth, and is set to remain so for some considerable time into the future. Its importance to the energy security of several states in both Asia and increasingly some in the Atlantic Basin is difficult to overstate.

Physically and in terms of location, Ras Laffan's petroleum geopolitical significance is further enhanced due to two main factors – the scale of Qatar's gas supply and the country's position. Qatar's North Dome gas field is part of a larger structure - the South Pars/North Dome gas condensate field, which is shared between Iran and Qatar. The structure is the largest single gas field in the world. South Pars (which is located in Iranian waters) is the northern part of the structure, with the North Dome located to the south in Qatari waters (see map). With reserves in place equivalent to some 360 billion barrels of oil equivalent (BOE), the field is the planet's biggest single hydrocarbon accumulation; larger than the world's largest oil field, Ghawar, in Saudi Arabia. The gas reserve estimates for the Qatari section stand at 900 tcf (25.5 tcm) of recoverable gas, equating to virtually 99% of Qatar's proven reserves and a staggering 14% of the world's total proven gas reserves.[35] The combination of the country's enormous gas reserves and LNG production capacity renders Qatar one of the

world's best examples of an effective (petroleum) national territory, as described in the analytical framework.

Fig 6.9.3 North Field and South Pars gas field



Source: Energy Information Administration, U.S. Dept. of Energy

Aside from the scale of the source gas, Qatar's strategic location in between the major markets in the Atlantic Basin and those in Asia means that Ras Laffan is ideally placed to supply LNG carriers sailing east or west. However, with the exception of India, the most important markets in both hemispheres lie considerable distances from Qatar, linked by SPSs described at the beginning of this chapter, and are on the other side of several vulnerable chokepoints, notably the Strait of Hormuz and the Malacca Straits. The latter chokepoint also leads to the strategic petroleum gateway at Singapore, which is examined in the section that follows.

6.4 Refining, Storage and Re-exporting Hub: Singapore as a Strategic Petroleum Gateway

As the oil extraction and production industry gathered momentum following the Second World War, the crude oil tanker was developed to optimize the long-haul trades between the world's major oil fields and refineries located in high-consumption regions. As demand for distillate products rose in the U.S, Europe and later in parts of Asia following increased oil production from the late 1950s to the mid 1970s, the global trend was to build refineries at sites close to the major markets. The table at Annex L shows that the largest facilities built in Asia were in South Korea, Singapore, and more recently India. Japan developed a vast refining industry comprised of a large number of medium-sized facilities sited throughout the country. Not surprisingly, several very large facilities were also built in the major producing countries – Saudi Arabia, Kuwait and Iran, which served markets in the Middle East, Africa and the Sub-Continent.

As of December 2010, there were 379 product tankers[36] between 1,200 DWT and 180,000 DWT under construction and on order around the world. This constitutes an increase of almost 8% on the live fleet of 4,740 vessels.[37] The progressive increase in the product tanker fleet, particularly the larger variants, has been driven by the increasing emphasis in international trade of refined product and distillates from major refining complexes and those countries in parts of Africa and Asia with limited or no refining capacities. Large product tankers with the capability to convey a wide range of different products function as a 'petroleum lifeline' for some states and very distant refineries. This has been the case for major refineries in Saudi Arabia and Singapore and, increasingly, the export-configured refineries in India. Alongside the expansion in the fleet of product tankers, there are also some interesting developments in the geographical patterns of future growth in distillate refining capacity as shown in table 6.2; the notable expanded capacity in the Middle East and Asia are marked in red.

Table 6.2 New refineries and expanded capacity under construction

Region	2009 Refining Capacity ('000 barrels/day)	2009 % share of global total	No of new refineries	Number of new expansions	Refining capacity expansion ('000 barrels/day)	Refining capacity expansion as % of total
Europe & Eurasia	24,920	27.5	4	1	1,198	9.68%
North America	21,127	23.3	2	5	1,530	12.36%
South & Central America	6,687	7.4	3	0	700	5.66%
Africa	3,263	3.6	7	1	1,420	11.48%
Middle East	7,859	8.7	14	3	4,806	38.84%
Asia-Pacific	26,806	29.6	8	4	2,720	21.98%
Total	90,662	100	38	14	12,374	100%

Source: Petroleum Economist and BP Statistical Review of World Energy 2010

Aside from the leading position held by Asia-Pacific for total refining capacity, what is immediately revealing is that of the total projects currently under construction, 50.32% of this new refining capacity is in Africa and the Middle East. This is clearly illustrative of the geographical shift in the new global refining capacity both toward the main sources of supply in the Persian Gulf and Arabian Peninsula and also toward the regions experiencing long-term refined product consumption growth – in this case Asia.[38] This is very significant for the maritime petroleum product trade sector; specifically because of the domination and expansion of three main refining and distribution hubs within the Indo-Pacific maritime strategic realm – Saudi Arabia, India and Singapore.

The scale of this expansion, and the emphasis on the demand for refined products, has raised the strategic relevance of refining hubs, associated storage volumes and re-distribution patterns of petroleum juxtapose crude oil outlets. Essentially, these major maritime petroleum centres have evolved into energy gateways of inescapable regional importance with concomitant influence upon regional geopolitics and strategic relevance. The optimum means of demonstrating the significance of primary maritime-based refining, storage and re-distribution hubs in this space is to examine in greater detail one of the world's largest and most vital hubs – Singapore.

Strategic Petroleum Gateway

Singapore is arguably the best example in the world of the confluence of petroleum processing, mass oil storage (including distillates and petrochemicals), tanker loading capacity, distribution coverage and ideal geographical location. Simply put, it is the most vital

petroleum hub in South-east Asia, rendering it an ideal example of what I refer to as a 'strategic petroleum gateway'. That said, Singapore is, however, facing increasing competition from new large facilities in the Indo-Pacific Maritime Realm, such as Jamnagar on the north-west coast of India.

A strategic petroleum gateway derives its status from six key factors:

- strategic location at an oceanic trading crossroads (e.g. the Malacca Straits);
- the scale of its VLCC and product tanker discharging and loading terminals;
- massive refining throughput;
- very large oil storage capacity (crude, distillates & petrochemicals);
- the existence of a international financial and petroleum trading market;
- and, a region-wide tanker distribution network for distillates and petrochemicals.

In 2004, the government made clear its plans to maintain and boost its status with storage expansions, and announced studies into the development of evolving the country into an LNG hub to complement its oil processing, trading and distribution capacity. Currently, with over 70 production and storage companies, Jurong Island is now recognised as one of the world's major oil and petrochemical nodes, and the site of one of the world's top three refining centres, after Rotterdam and Houston. Singapore is also the third largest oil trading centre in the world, after New York and London.[39]

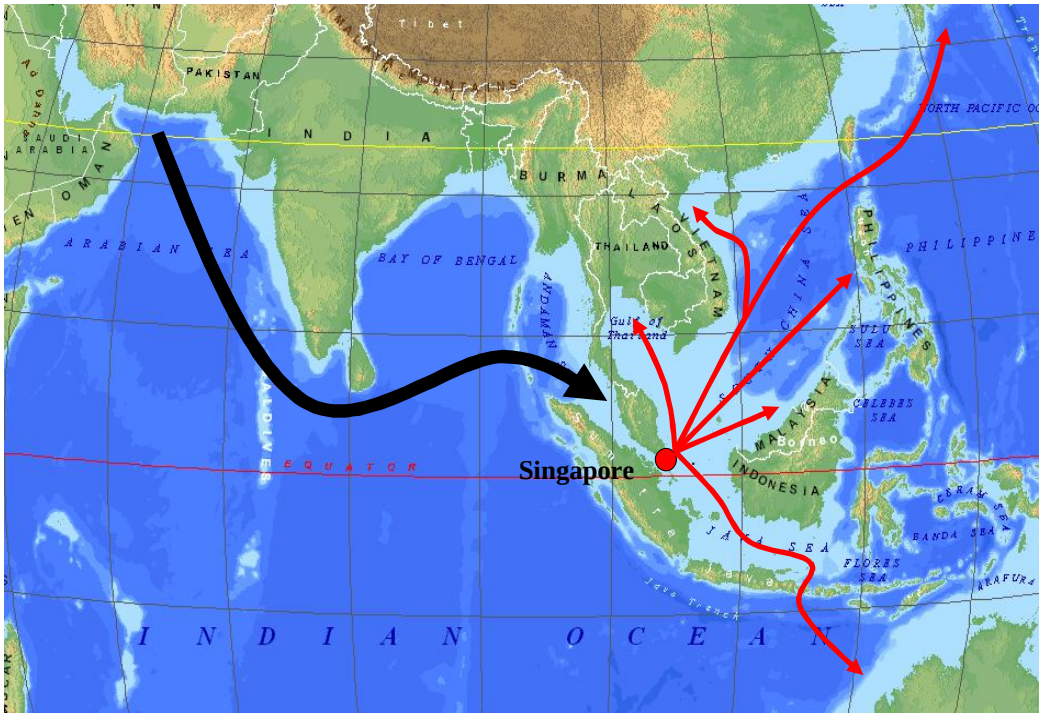
6.4.1 Singapore's Geo-strategic Location

Because of the country's location at the junction of the Indian and Pacific Oceans, amidst the seas that link Australasia with Southeast Asia, and at the narrowest point of the Malacca Straits that divide the vast Indonesian archipelago from the southern tip of the Asian landmass, Singapore is one of the most strategically significant features of the Indo-Pacific maritime realm. The country's geo-economic and geo-strategic significance was shaped in history: in 1819 the British East India Company established a vital trading post on the island, which was used thereafter as a primary trading node along the spice route. Later, Singapore would become one of the most important commercial and military centres of the British Empire, and the nucleus of British geopolitical power in Southeast Asia before it gained independence in 1963.[40] Following independence, the government has used its location to swell its regional geopolitical influence and economic and financial importance, driven by

massive increase in petroleum trade, shipping facilitation, port expansion and financial activity.

Today, Singapore also remains the world's most important single waypoint in the maritime conveyance of crude oil. In 2002, the continuous stream of VLCCs transiting via Singapore from the Indian Ocean to the South China Sea en route to China, Japan and South Korea equated to over 11 million barrels of oil passing through the straits each day (some 32% of total global oil trade). By EIA estimates, this volume could reach as high as 24 million barrels of oil per day (37% of the global oil trade) by 2030.[41] Currently, VLCCs transport up to 80% of China's annual crude imports via the Malacca Straits and Singapore.[42]

Fig 6.9.4 Singapore: Strategic Petroleum Gateway



6.4.2 Oil Imports, Refining, Storage Capacity and Distribution

In 2009, Singapore imported 2,598,000 barrels of crude and products per day and exported 1,552,000 barrels per day, most of which were refined products, indicating the remainder was crude feedstock for the refineries.[43] Singapore has a total crude oil refining through-put capacity of approximately 1.3 million barrels per day (bbl/d). The country's three refineries are: ExxonMobil's Jurong/Pulau Ayer Chawan facility (605,000-bbl/d); Royal Dutch Shell's Pulau Bukom complex (458,000-bbl/d); and, the Singapore Petroleum Company's (SPC) Pulau Merlimau refinery (273,600-bbl/d).[44]

Fig 6.9.5 ExxonMobil's refinery on Jurong Island

Source: http://www.bklynboy.com/jurongisland.html

The vast majority of these imports are refined and re-exported as distillates such as gasoline, diesel, Jet-A, bunker fuel (fuel oil), asphalt, liquid petroleum gas (LPG), lubricating oils, Naptha, gas oil, kerosene and a wide range of petro-chemicals.[45]

Viewed cartographically, the pattern of product and chemical tanker trade conveying the fuels and petrochemical products listed above appears as a series of spokes radiating out from Singapore along SLOCs through much of the Indo-Pacific Maritime Realm to many of the major petroleum-capable ports and terminals in the aforementioned maritime space. Currently, tankers link the Refineries and terminals in Singapore with product and distillate-configured oil discharging terminals in Australia, Bangladesh, Brunei, China, East Africa, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Philippines, South Africa, Sri Lanka, Taiwan, Thailand and Vietnam.[46] Many of these countries, including Australia, are heavily dependent upon Singapore as a source of all grades of distillates and petrochemicals. However, Singapore's petroleum geopolitical reach extends even further than the tanker network's already considerable coverage due to the electronic trading of crude oil and refined products between traders all over Asia that is based in this global financial hub. This extraterritorial 'virtual trading' enables Singapore to also influence those petroleum markets that it is not connected to physically by SLOCs and tankers.

Terminal and Storage

Aside from its considerable refining capacity, Singapore's virtually unparalleled status as the most important petroleum hub in Asia is derived from its deep-water loading and discharging terminals for VLCCs and product tankers, and also from its vast oil storage capacity. The three major oil refineries hold 88 million barrels of combined storage capacity (88% of the country's total); whilst Singapore's independent storage operators have a further 24.4 million barrels of capacity.[47]

Several projects are underway to expand this and ensure its continued dominance in this regard. The most significant is the construction of the new joint Hin Leong/PetroChina *Universal Terminal* on Jurong Island. In November 2007, the 2.3 million cubic metre-capacity Universal Terminal, now acknowledged as the largest commercial oil storage terminal in Asia, received its first test cargoes of fuel oil and distillates. The terminal became fully operational in 2008, and the project is one of several that boosted the country's oil storage capacity by approximately 4 million cubic metres (an additional 67%) at the end of 2008.[48]

Fig 6.9.6 Oil storage facility in Singapore

Source: http://www.hellenicshippingnews.com

6.4.3 Petroleum Trade, Geopolitics and Security

As with the interrelationship governing point-to-point crude oil trade highlighted previously in this chapter, a considerable proportion of Singapore's economy and foreign earnings is generated from its refined exports. This means that it is crucial that the government maintain stable trading and diplomatic relationships with markets in Southeast Asia and Eastern Asia.

This is in part facilitated and shaped by its membership of regional intergovernmental bodies such as The Association of Southeast Asian Nations (ASEAN) and Asia-Pacific Economic Cooperation (APEC) alongside extant bilateral trading agreements.[49] If trading relations were to wane with major markets, such as Indonesia and Malaysia, then other suppliers, such as the fast-growing Indian refiners, could challenge Singapore's market share and erode its earnings.

On a broader canvas, given the volume of both crude oil and products being transported into Singapore and the refined products being transported both back towards countries in the Indian Ocean and to markets in the western Pacific Ocean, including parts of Australia, it is clear that the security of SLOCs that link Singapore with crude sources in the Persian Gulf and also for those that link the City-State with its markets is of vital importance to the government. Singapore helps to ensure the security of this resource supply security through potent diplomatic and military alliances and the impressive reach of its own naval capabilities.[50]

The country's geo-strategic relevance to neighbouring states and distant powers such as China, India and the United States for trade flows and naval deployments, drives the Singaporean government to ensure that its has the ability to shape and instil security in the surrounding region (which is far greater than the country's size would suggest). This latter muscularity is amplified by its strong military link with the U.S., which was formalised in 1990 by the signing of a memorandum of understanding that facilitates U.S. armed forces, aircraft and vessels access to military facilities in Singapore, including the berthing of U.S. Navy strike carriers and other large ships at Changi Naval Base. In April 2010, the two allies concluded their Fourth U.S.-Singapore Strategic Security Policy Dialogue, which reaffirmed the longstanding bilateral defence relationship.[51]

Other key multilateral alliances and cooperative military agreements include the 1971 Five Power Defence Arrangement (FPDA) between Australia, Malaysia, New Zealand, Singapore and the UK,[52] and the 2004 MALSINDO Malacca Straits Coordinated Patrol Agreement. MALSINDO'S primary purpose was to significantly reduce levels of piracy and armed robbery at sea in the Malacca Straits and Singapore Straits, and also to deter any threat of terrorist attacks against shipping in the shipping lines and traffic separation scheme within this vital chokepoint. The project has been particularly effective with regards to significantly reducing incidents of piracy and there have been no maritime terrorist attacks of any kind.[53]

Conclusions and future realities for Singapore and the region

Notwithstanding the country's long held and continued primacy as a strategic petroleum processing node and conveyance gateway, there are some actual and putative developments evolving in the Indian Ocean and Western Pacific realm that will likely alter the pattern of crude and product trade as it concerns Singapore. Aside from the growth in capacity and versatility of the Reliance refinery complex at Jamnagar, competition for markets and trade is maturing in Malaysia (with its Melaka refinery), and Thailand has demonstrated intentions to expand its influence and capability as a refining and distribution hub with the recent completion of its Sri Racha oil centre. The latter facility is still disadvantaged geographically compared to Singapore and also, for the time being, in terms of throughput capacity.

However, Sri Racha, Jamnagar and the new and expanded facilities in Saudi Arabia could benefit tremendously if the planned $20 billion Kra Isthmus Canal is built.[54]

Though it is far from certain that the Kra Isthmus Canal will ever be built, particularly given its likely staggering cost, it is an intriguing possibility that would transform the petroleum trading and geopolitical map in Asia. In effect, the canal constitutes a 'Malacca bypass', which would shorten the passage from the eastern Indian Ocean to the western Pacific Ocean by some 700 nautical miles.[55] In tanker shipping terms, this would mean that VLCCs and product tankers could steam from the Persian Gulf and from the refinery at Jamnagar directly to the massive markets in China, Japan and South Korea without transiting via the Malacca Straits and Singapore. This has several economic, logistical and security implications. A shortened passage saves significantly on time, charter fees and bunker costs. Also, such a bypass could effectively neutralise security concerns in the Straits, such as a surge in piracy attacks, a high-consequence terrorist incident, or blockade in the event of a major war.

Clearly, the possible future development of the canal would have considerable economic implications for Singapore in terms of lost transhipment dues, bunker sales (Singapore is still the world's largest single vessel refuelling point), the possibility of lost refining business, reduced oil storage volumes, and an inimical impact upon locally-based product tanker charters. However, at the time of writing, the project's vast cost, enormous engineering challenges (the Isthmus rises to some 75 metres above sea level in parts, which would necessitate a lock system similar to the one in the Panama Canal), the need for diplomatic and commercial convergence with Malaysia, and uncertainty of the security implications in light of radical Muslim militant activity or a wider insurgency in Thailand's southern reaches, has given the Thai government pause. Singapore will be relying on these geopolitical, financial

and security obstacles to delay or totally stymie development, thereby creating a window for it to consolidate its petroleum gateway status and capacity; a project that is well advanced, as has been shown above.

That Singapore faces challenges from India, Malaysia and others to its position is clear. However, for the present, its unrivalled geographical advantage, expanded oil terminal and storage infrastructure, huge refining capacity, prolific product tanker distribution, a stable and strong government, and its maritime security capabilities are testament to its continued importance in the region. Nevertheless, in order to bolster its future status, in December 2010 it was announced that a consortium headed by Singapore's biggest local oil trader, Hin Leong Trading, one of China's top four national oil companies (likely to be either SinoChem, Sinopec or CNOOC) and a European partner, is seeking to build another 300,000-500,000 barrels per day refinery on Jurong Island. The project represents an investment worth between $6-8 billion. The building of this facility would mean that Singapore would become the world's third largest oil refining and trading hub after Houston and Rotterdam,[56] and the largest in the Indo-Pacific Maritime Realm.

6.5 Oil Export and Tanker Security during Conflict: The 1980 -1988 Tanker War

6.5.1 Overview

The Iran-Iraq War, which lasted from September 1980 to August 1988, started when the Iraqi army invaded Iran as a result of long-standing unresolved border disputes (notably the demarcation of the border along the Shatt al-Arab Waterway), and because of Saddam Hussein's fears of the possibility of an Iranian-influenced insurgency among Iraq's Shia majority, which had long been brutally suppressed by the Baathist regime.[57] From a strategic standpoint, Saddam Hussein hoped and planned for a short war following an un-declared attack that would take advantage of revolutionary chaos and political upheaval in Iran.

The Iraqis made limited territorial gains at the beginning of their campaign and were quickly repelled by determined Iranian counter-offensives. For the Iraqis, thereafter, the war became one of attrition and effective stalemate.[58] By the beginning of 1984, Iraq's leadership realized that it could not achieve a decisive victory over Iran. Essentially, Saddam Hussein needed a cessation of the war that would enable him to secure a ceasefire on as favourable terms as possible[59]. Iraq's only military advantage was its superior air force, so this was the tool that Iraq had as means of achieving its objective. In broad terms, the strategy had three aims:

- To weaken the Iranian economy to the extent that it would be unable to generate the means to wage war and to erode the population's will to continue fighting due to materiel shortages and fatigue. This would be achieved by targeting facilities and shipping connected specifically to Iran's ability to produce and export oil, which was of course its primary means of earnings.[60]
- To create sufficient destructive impact against tankers in the Gulf in order to internationalise the war, and ultimately precipitate U.S. military intervention to pressure Iran into a ceasefire.[61]
- To take some of the pressure off Iraq's ground forces and cities. The former were mired in immobile trench war and suffering human-wave like attacks by massed Iranian infantry, whilst the latter were being bombarded by missile strikes.[62]

The Iraqi strategy to target shipping and Iranian petroleum infrastructure in the Persian Gulf was seen as the most effective way of achieving these objectives, the aggregate effect of

which would be to force the Iranians into agreeing to the UN-sponsored cease-fire (UNSCR 598).[63] This series of events and strategic objectives were the reasons behind the initiation of the Tanker War by Iraq.

The attacks against vessels by both sides throughout the war, which resulted in over 540 attacks, the deaths of some 324 seamen, and the loss of hundreds of millions of dollars in ships and cargo, were the most intense assaults on merchant shipping since the Second World War.[64] Destroying or disrupting the production and means of export of crude oil from the Persian Gulf was the primary focus and means of imposing operational and strategic effect. Consequently (though the broader effects were not really felt by those outside the region for much of the war), given the strategic and geopolitical nature of the commodity in question, it was inevitable that outside powers would eventually become politically and militarily involved in the event the war's effect on the security of tankers was unacceptably prolonged.

Significant phases of the war

The war at sea had three main phases, of which the second two are the most significant:

1. Between January 1981 to end of 1983: Iraqi attacks against vessels bound for northern Iranian ports and coastally-sited petroleum infrastructure, and initial attacks against the primary Iranian oil loading terminal at Kharg Island.[65]
2. January 1984 until February 1987: Significant increase in Iraq's anti-shipping campaign, which eventually provoked the start of Iran's counter-attacks in the Gulf. January 1984 marked the beginning of the actual 'Tanker War'.[66]
3. Between March 1987 and August 1988: This period was characterised by the direct involvement of the allied Western powers and the USSR in the protection of shipping, and the U.S. Navy's reprisal attacks against Iranian naval and Pasadran units in the Gulf.[67]

6.5.2 Geopolitical correlations with the war's prosecution and outcomes

The Tanker War is a compelling case study of the interaction between strategic purpose, geopolitical forces and phenomena, the conduct of military operations, oil and the means of shipping it in a conflict zone. In considering the findings of the war with regards to geo-strategic parameters, geopolitical forces and outcomes, and the export of petroleum by sea, five concluding themes emerge that require answers:

1. What was the strategic logic of each side that governed the decision to prosecute the war at sea?

2. What were the geopolitical features, determinants and parameters of the war at sea?
3. From a military stance, were the attacks against shipping by Iraq and Iran effective in achieving their intended aim by either side?
4. What was the net effect of attacks against shipping and/or oil terminals in reducing the export capacity of either side, in effecting the overall volume of global oil supply, and influencing the price of oil?
5. What was the geo-strategic rationale and outcome of the intervention by external powers?

6.5.3 Strategic Logic

Saddam Hussein initiated the Tanker War because he needed to precipitate two major effects that he hoped would end a war that he knew Iraq could not win. Firstly, that repeated strikes against Iranian petroleum infrastructure and the tankers conveying its oil exports would sufficiently weaken the country's economy to the extent that it could no longer prosecute the war. Secondly, Iraq sought to coerce the major western powers, particularly the U.S., into military engagement with Iranian forces in the Gulf if the latter could be provoked into attacking international shipping serving Iraq's and the West's Gulf Arab allies.[68]

Up and till the spring of 1984, Iran did not retaliate against tankers and other shipping in the Gulf for two reasons: firstly, because there were no Iraqi vessels (or vessels lifting Iraqi crude) to attack (Iranian attacks had effectively destroyed the only Iraqi offshore oil terminals at Basra early in the war); and, secondly because Iran also needed access to the primary north-west/south-east SLOC in the Gulf to export its own oil, and thus had no desire to provoke external military interference, which it knew would be ranged against it and not Iraq. However, eventually the Iranian leadership erroneously calculated that it had a better chance of putting pressure on Iraq to cease its attacks against tankers lifting Iranian oil by attacking the ships of its Arab allies. In so doing, it could compel them to rescind their financial, logistical (pipeline export facilitation) and political support for Baghdad. Its secondary aim was that if sufficient attacks were carried out against international shipping, the international community would force Iraq into a ceasefire in order to safeguard all shipping in the Gulf.

6.5.4 Geographical and Geopolitical Parameters

The geographical characteristics of the Persian Gulf maritime and littoral space are of considerable importance to the geopolitical characteristics that shaped the nature of the conflict and its impact upon the conveyance of petroleum during the war. The extensive

Iranian coastline, which is by far the largest of all the riparian states, dominates the Gulf.[69] It gave Iran's navy and air forces unequalled strategic access to the Gulf's waters and ostensively afforded the country scope of multiple port and terminal access from its own sovereign territorial coastal areas. The latter enabled Iran to use other parts of its coastal and maritime territory to disperse the location of vital oil terminals, storage facilities and military units, when others were under attack. Nevertheless, at the same time, there was more territory for Iran to protect, which also necessitated force dispersal and logistical extension in order to do so.

Geographically, Iran also dominates the key chokepoint at the Strait of Hormuz: its coast and territorial waters bound the northern side of the Straits, whilst its island territories of Qishm, Larak and Hormuz (which abut the narrowest navigable waters) command the western gateway to the Straits. Finally, the islands of Abu Musa, Forur, Sirri and the Tunbs are situated astride the SLOC [SPS] leading to and from the westward approaches to the traffic separation schemes in the Straits. All of this combined to theoretically enable Iran to threaten access to, and passage of, ships within the Straits and the southern reaches of the Gulf.

However, Iran's own dependence on freedom of navigation in the Straits, and the presence of the U.S. Navy, prevented Iran from closing this vital chokepoint, despite repeated threats during the war that it would if provoked.[70] All of the exporting Gulf States and those external major powers reliant on the continuous flow of Gulf crude were well aware of this and remained confident that Iran would not follow through on its threat. For most of the western and northern coastal areas of the Gulf, the water is very shallow, which forces the construction of large crude oil loading terminals in deeper water offshore; vital terminals that are highly vulnerable to enemy attack from seaward and particularly from the air. Such terminals are located in the UAE, Saudi Arabia, Kuwait and Iraq.

Iraq, whilst it does not have the geo-strategic depth of Iran, in terms of extensive sovereign space, coastline and a far larger population base, had advantages in other ways as its land borders with Turkey, Kuwait, Saudi Arabia and Syria enable it to export its oil overland via pipeline. At the beginning of the war, Iraq's only two sea terminals, Al Basrah Oil Terminal (ABOT) and Khawr Al Amaya Oil Terminal (KHAOT), were too badly damaged by Iran and far too vulnerable (due to their proximity to Iranian territorial waters) to be used as a means of exporting crude from Iraq's southern fields.

Iraq suffers from a very small coastline, limited ports, and very restricted access to these ports via the Shatt al Arab Waterway. This renders the use of naval forces highly problematic when fighting a neighbouring state, and essentially neutralised the operational and strategic value of naval forces for Iraq during the war. The net result of the geography, in terms of the export of oil from each country, was that Iraq could (and had to) export overland via pipeline, whilst Iran could only export through the Gulf SLOC. This meant that Iraq needed durable alliances with its Turkish and Arab neighbours, whilst Iran was wholly reliant on continuous access to international waters in the Gulf and the Strait of Hormuz.

A vital geopolitical factor in the region was the existence, location and political alignment of the GCC states. Oman, the United Arab Emirates, Qatar, Bahrain, Saudi Arabia and Kuwait dominate the western coast of the Gulf, but its port and offshore oil terminal infrastructure and shipping were vulnerable due to navigational access limitations imposed by the shallowness of the waters and their proximity to Iran.[71] However, these states had a strong alliance with the United States and other western powers. This afforded them some measure of politico-military protection (though it did not come until the last 17 months of the war), and the territory of some was essential for the basing of foreign military forces, principally naval and air forces. This alliance between the GCC states and Iraq, and between the GCC states and the Western Powers, was of pivotal importance in enabling naval protection of shipping and ultimately in determining the outcome of the war by forcing Iranian capitulation.

6.5.5 Military Effectiveness

Data collected concerning attacks mounted and vessels struck reveals some interesting and surprising results. Between 1981 and 1988, 411 different ships were attacked. However, my research data show that between 20 May 1981 and 20 December 1988, there were 544 records of separate attacks (this is because many ships were stuck more than once and some were attacked several times). Of the ships struck, 58% were tankers and 10% were liquefied petroleum gas (LPG) carriers. Bulk carriers (which from a distance and particularly from the air are very similar in appearance to crude oil tankers) constituted 15.5% of vessels hit, and the remainder made up 13.6%. Some 47 vessels were sunk and 134 declared as constructive total loss (CTL).[72] Of all the tankers attacked, only 23% were sunk or rendered CTL. Generally, the largest loss of life and the most serious destruction occurred when tankers were attacked whilst alongside at oil terminals, particularly at Kharg and Sirri. In terms of total casualties for the war in the Persian Gulf, to these must be added the 290 civilians killed aboard the Iranian airliner shot down and the 37 sailors killed on the *USS Stark*.[73]

Despite the advanced ordnance and means of delivery (most notably the AM-39 Exocet anti-shipping missile and the Mirage F-1 fighter-bombers operated by Iraq) used during the war,[74] and notwithstanding the not insignificant loss of innocent life, neither side managed to achieve the disruptive effect upon the shipping of oil that they hoped for. The war demonstrated the resilience of modern oil tankers to strikes by air-launched missiles and ship-fired weapons. Due to the nature of their tank compartmentalisation and robust construction, tankers are very difficult ships to sink. When this is viewed juxtapose the large number of tankers that operated in the Gulf continuously throughout the war, the net effect of those tankers that were struck, damaged or sunk was very small in terms of the quantity of crude actually prevented from reaching the global market.

Iraqi attacks on Iran's most important export terminal at Kharg Island were often heavy and succeeded in destroying important facilities; however, their air force could not mount sufficiently sustained and precisely-targeted attacks to disable it permanently. Had they done so, this would have significantly reduced Iran's oil export capacity. Though Iran mounted 215 attacks against vessels during the war (39.5% of the total), it only managed to sink 5 and render a further 12 as CTLs.[75] This was due largely because it did not have sufficient air power, comparable to Iraq, to mount an aggressive anti-shipping campaign, and also because of its reliance on the lightly-armed Pasadran vessels that were mostly useful only to harass ships rather than cause any significant disruption to tanker movement.

6.5.6 Impact on Oil Export Capacity of Iran and Iraq, Supply to the Market and Global Oil Prices

A crucial finding of a study of the Iran-Iraq War, and the Tanker War in particular, is that the military actions of the protagonists did not have the strategic effect upon the enemy's oil export capacity that each side hoped for. Moreover, given the glut of oil in the global oil market during much of the 1980s, the geopolitical corollary of the war, with regards to the macro supply and price of oil, was muted.

Table 6.3 Iraq and Iran crude exports (barrels/day)

	1981	1982	1983	1984	1985	1986	1987	1988
Iraq	795,000	816,000	764,000	978,000	1,189,000	1,417,000	1,801,000	2,379,000
Iran	822,000	1,576,000	1,675,000	1,431,000	1,482,000	1,214,000	1,448,000	1,383,000

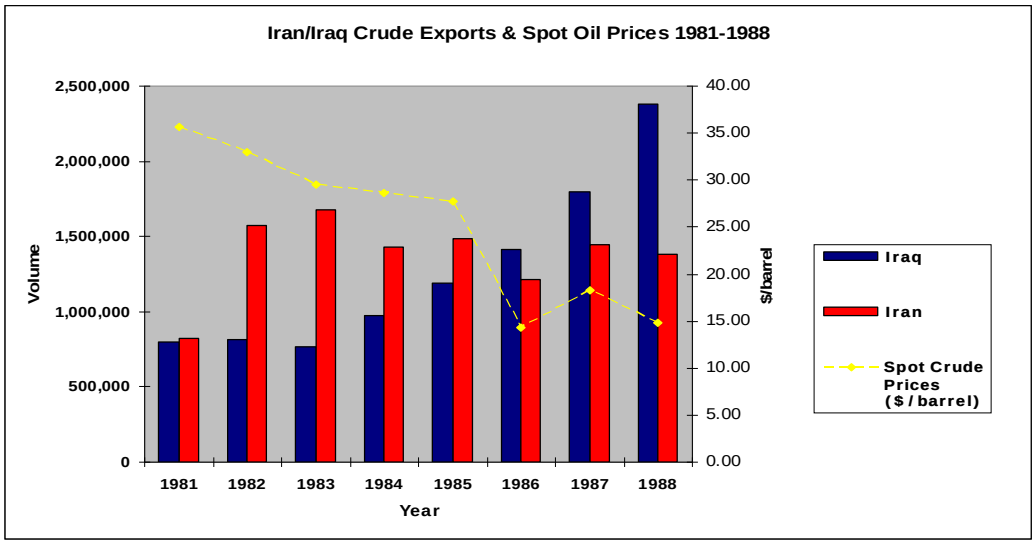
Source: U.S. Energy Information Administration, U.S. DoE

From 1981 to 1988, Iraq managed to export a mean volume of 1,267,375 barrels of oil per day. Aside from a 6.4% fall in exports in 1983 over the previous year, Iraq's export capacity increased steadily from 1984 to 1988, on average by 19.8% per year.[76] At the outset of the war, Iranian attacks on Iraqi offshore terminals put the country's only means of sea export out of action; thereafter, Baghdad was wholly reliant upon overland means of exporting crude, mostly from its northern fields. The initial impact of Syria closing its end of the Iraq-Syria-Lebanon Pipeline (ISLP) in April 1982 was certainly significant in the short term, and was largely responsible for the fall in aggregate export volume through to the end of 1983. However, the expansion in the capacity of the Kirkurk-Ceyhan (Iraq-Turkey) pipeline and the ability to export via the Iraq Pipeline to Saudi Arabia (IPSA) enabled Iraq to increase its oil revenue despite the closure of the ISLP and the inability to use ABOT and KHAOT.[77]

Iran's ability to export crude often fluctuated monthly during any given year, particularly after the end of 1983; however, in aggregate annual terms its export capacity from 1982 was comparatively even. Despite a jump in exports from 1981 to 1982 of 47.8% and a slight increase during 1983, Iranian exports declined during the remainder of the war. Though the Iraqi air force attacked Kharg frequently during the war, which resulted in a brief 40% drop in daily export capacity, the strikes were neither sufficiently thorough nor frequent enough to severely impair the output for any length of time. Indeed, Iranian export capacity fluctuated by a mean of only 10.45% from 1982 to 1988,[78] which considering the considerable increase in tempo of the Iraqi attacks from 1984 is surprisingly modest.

The key factor is that though Iraqi harassment did not result in considerable reductions in Iranian export capacity, the net long-term effect was that Iran could not appreciably increase its exports during the war. The significance of this becomes apparent when seen in the context of oil pricing changes during the war, particularly the considerable drop in spot prices from 1985. As the graph at Fig 6.9.7 shows, the fall in pricing by some 48.5% from 1985 to 1986, just as the war was becoming increasingly intense, meant that Iran's earnings from crude exports were drastically curtailed despite all its efforts to maintain export volume capacity by using the Kharg-Sirri shuttle and by establishing floating storage at Sirri and Larak

Fig 6.9.7 Iran/Iraq crude exports & spot prices 1981-1988



Sources: EIA, U.S. DoE and BP Statistical Review of World Energy 2009

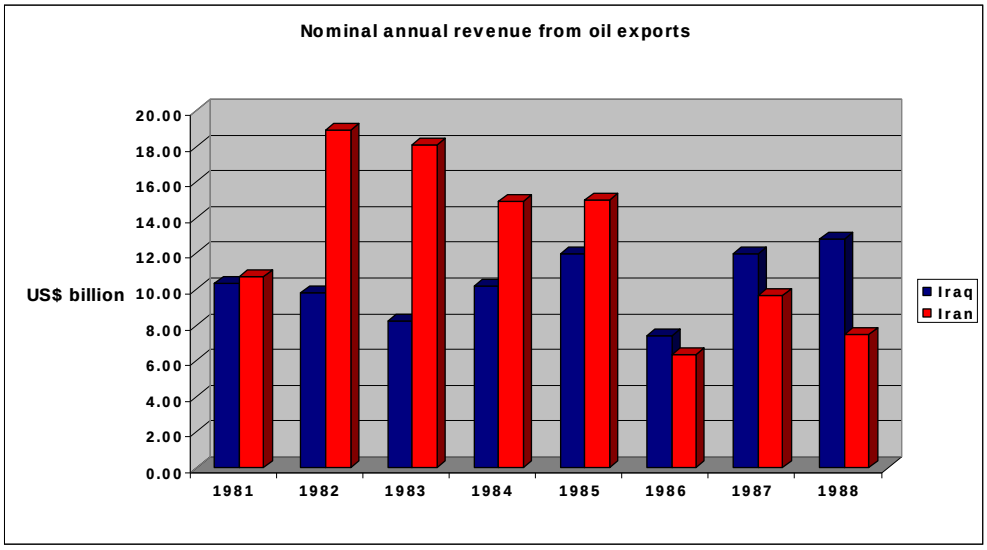
It is also important to note that though Iran managed to increase its net export capacity during 1987 to 1988 over that managed in 1986, Iraq's exports exceeded Iran's every year by increasing margins from 1986 onwards due to its ability to export via pipeline to Turkey and via its GCC allies, principally via Saudi Arabia and Kuwait.

The most powerful means of comparing the effect of the war at sea upon the economies of both sides is derived by comparing earnings from export receipts during the war. Based upon calculations combining changes in export capacity per day and the fluctuating mean spot price of crude taken from Dubai, Brent, Nigerian Forcados and WTI benchmarks, the graph below clearly shows the changes in revenue managed by both sides. At the beginning of the war, the protagonists' earnings are essentially the same. During 1982 and 1983 Iraq's decreases; however, Iran's earnings far outstrip Iraq's by 47.7% and 54.5% respectively (Fig 6.9.6).

In 1984, Iraq's major escalation of its attacks against tankers combined with the drop in spot price[79] starts to take its tolls on Iran's aggregate earnings; however, though Iraq's earnings increase year on year from 1983 to 1985, Iran's greater export capacity ensures that it is still earning between 54.5% and 19.95% more from oil exports than Iraq. Nevertheless, by 1986 the increase Iraq's export potential and the sharp drop in spot prices means that for the remainder of the war Iraq's earnings in total exceed those of Iran's by some 27.3%, almost a third (Fig 6.9.6). The added pressure of external power intervention in 1987 (particularly given that the U.S. directed its military actions specifically at a weakening Iranian military

capability in the Gulf) coupled with Iran's increasing inability to finance the war eventually forced the Khomeini government to sign the ceasefire agreement in August 1988.

Fig 6.9.8 Iran & Iraq oil revenue during the war



Sources: EIA, U.S. DoE and BP Statistical Review of World Energy 2009

Though the evidence indicates that the war at sea certainly had an impact upon each of the protagonists' ability to generate income from oil, this effect was also greatly influenced by the fluctuating spot price of oil. Additionally important to consider was that the war exerted limited impact upon the global oil market supply and price. Throughout most of the war, indeed for much of the 1980s, there was a glut of crude oil in the market.[80] This meant that the differentials in the volumes supplied by both countries had little or no impact upon aggregate supply of oil required by the global market. The oil crises of the 1970s had ensured that the industrial countries of the OECD had greatly reduced their dependence upon oil for power generation, and had simultaneously diversified their supplies of oil outside of OPEC. Moreover, had the war induced any lasting interruptions of supply from either or both of the warring sides, shortfalls could have been made up by other suppliers, particularly from Saudi Arabia, Russia and North Sea. Indeed in 1986, Saudi Arabia was over-producing oil to depress prices in order to 'punish' other producers exceeding their production quotas.[81]

The oversupply in the global market was born out by the continued drop in spot prices from the beginning of the war until its end; by 1988, oil was trading 60% lower than in 1980 (see Table 6.4). In fundamental terms, attacks made by both sides impacted upon their 'oil world' but not upon the wider global market. The plentiful supply in the market, large stockpiles in

the major consuming countries, and the fact that the majority of tankers loading in the Gulf's other major exporters – Saudi Arabia, Kuwait and the UAE – transported their cargoes safely to market, ensured that the impact of attacks against tankers by Iran and Iran had no adverse effect on the wider market. However, had the supply demand balance been tight as it has been the early part of the 21st century, a similar campaign against tankers and loading terminals fought today would likely have considerably greater impact upon supply and particularly upon pricing.

Table 6.4 Spot price of crude oil during the 1980s

	Dubai	Brent	Nigerian Forcados	West Texas Intermediate	Global Mean
1980	35.69	36.83	36.98	37.96	36.87
1981	34.32	35.93	36.18	36.08	35.63
1982	31.80	32.97	33.29	33.65	32.93
1983	28.78	29.55	29.54	30.30	29.54
1984	28.06	28.78	28.14	29.39	28.59
1985	27.53	27.56	27.75	27.98	27.71
1986	13.10	14.43	14.46	15.10	14.27
1987	16.95	18.44	18.39	19.18	18.24
1988	13.27	14.92	15.00	15.97	14.79

Source: BP Statistical Review of World Energy 2009

6.5.7 Military and Geopolitical Effects of External Intervention in the War

The introduction of naval forces from outside powers into the Gulf in spring 1987, to add to the growing diplomatic efforts to end hostilities, resulted in mixed, unexpected and sometimes counter-productive effect. In the first instance, the re-flagging of Kuwaiti tankers and the significant increase in U.S. warships (intended principally to deter an increase in Soviet involvement in the crisis) in the Gulf did not safeguard Kuwaiti shipping or its terminals to the extent that the Reagan administration expected. Indeed, the lack of adequate appreciation by commanders and politicians regarding the exact nature of the threat posed by Iran meant that critical force-components were not deployed. Though the Western European naval presence was far more politically-motivated by the desire to contain the war's potential effect on international shipping and the flow of oil, the deployment of ships to help protect the conveyance of crude from Kuwait, Saudi Arabia, the UAE (and also from Iran) appeared to cause a greatly increased attacking tempo by both sides. Indeed, from 1987 until the end of the war, despite the presence of some 80 foreign warships patrolling the Gulf, the two sides inflicted greater violence than at any other stage of the war.[82]

The presence of significant numbers of foreign warships did restore a measure of confidence among the international shipping community and the insurance market. Though the presence of warships might have been viewed as provocative and arguably inimical to reducing tensions by some, the establishment of escorted convoys lead to 50% discounts in hull insurance rates for escorted tankers.[83] This notwithstanding, despite the presence of foreign navies and the implementation of convoys, intervention did not have the effect of increasing the supply of oil to the market via tankers; it merely served to fortify the impression that supplies were being better protected. Overall, it was the glut in the market ensured that oil traders had plenty of options for supplies from outside of the Gulf.

The arrival of foreign forces to intervene directly in the conflict at sea had been a cornerstone of the Iraqi strategy for enabling it to find a way of ending the war, specifically by using the presence of the U.S. Navy in particular to put increasing, direct pressure on Iran. Once allied forces were committed, this merely served to encourage Iraq to increase its operations working under the tacit assumption that it was free to do so. Though the allies had entered the conflict more or less on the side of the Iraqis, they did not want to facilitate or be seen to condone an Iraqi escalation.

The most important effect of the introduction of U.S. forces into the Gulf was their eventual impact on Iranian behaviour. Without doubt, the direct attacks by U.S. forces on Iranian naval ships and Pasadran units, in tandem with diminishing earnings from its oil exports, began to erode Tehran's will to continue the war. The tragic, accidental shooting down of the Iranian Airbus by the *USS Vincennes* in July 1988 essentially served as a *coup de grâce*, and the decision to sign the ceasefire followed swiftly afterwards.

Many correlations between germane geopolitical features that comprise the theoretical framework and the issues and phenomena examined in the conveyance of oil and gas in the Indo-Pacific Maritime Realm have been assessed in this chapter. The spatial phenomena and environmental parameters that characterise the oceanic canvas, SLOCs/SPSs and chokepoints that petroleum shipping must traverse set the scene for the sections that followed. Explicit in the function and relevance of key oil and LNG terminals in the Persian Gulf, the flow of petroleum to major Asian consumers, and the region's key petroleum gateway, are shaped by geopolitical determinants such as space, distance and time, location inside a shatterbelt, SLOCs and the chokepoints at the Strait of Hormuz and Malacca, effective national territory, petroleum gateways, and even the 'virtual' effect of extraterritoriality in petroleum trading.

As shown above, the Tanker War highlights correlations between terrestrial/maritime geographical configuration, shatterbelts, resource supply security, geopolitical posture and conflict upon the logic of a war that focused on seeking strategic advantage through the disruption of oil export and supply security by sea. Indeed, many of the complexities that characterise the conveyance of petroleum and the security of its supply to market amidst a major inter-state war are shaped by numerous features in *petroleum geopolitics*, a summation of which is presented in the concluding chapter that follows.

Notes

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[73] Lee Allen Zatarain, *Tanker War: America's First Conflict with Iran, 1987-1988* (Havertown, PA: Casemate Books, 2008)
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[75] *Ibid.*, p. 205
[76] U.S. Energy Information Agency & BP Statistical Review of World Energy 2009

[77] Martin S. Navais & E.R. Hooton, *Op. cit.*,
[78] U.S. Energy Information Agency & BP Statistical Review of World Energy 2009
[79] Spot Price: 'The price for a one-time open market transaction (of oil) for immediate delivery of a specific quantity at a specific location where the commodity is purchased "on the spot" at current market rates.' See *Definitions, Sources and Explanatory Notes*, U.S. Energy Information Administration Http://www.eia.doe.gov/dnav/pet/TblDefs/pet_pri_spt_tbldef2.asp
[80] Daniel, Yergin, *The Prize: the Epic Quest for Oil, Money & Power* (London & New York: Free Press, 1991), pp. 758-761
[81] Morgan Downey, *op.cit.*, p. 19
[82] Martin S. Navais & E.R. Hooton, *Op. cit.*, pp.132-164
[83] *Ibid.*

Chapter 7 Conclusion

This thesis has sought to examine the causal interrelationship between three core features of the contemporary petroleum industry – proven oil and gas reserves, exploration and production, and the conveyance of petroleum in its various forms - and geopolitics. The thesis contends that the very nature and processes of these features are inherently geopolitical, and that various elemental features of geopolitical theory and key concepts are central in determining the ontology and process of the international oil business.

After examining a multiple series of case studies and examples from each of the three themes, which include discussions concerning types, quantities and locations of proven oil and gas reserves in the world, several of the most prominent and important production projects in Asia, and a holistic appreciation of both pipeline and sea conveyance of oil, natural gas and refined petroleum products in Eurasia and the Indo-Pacific maritime realm, I have concluded that there are identifiable and logical correlations between specific geopolitical phenomena and the nature of petroleum and the means to produce and distribute it between source and market.

Chapter two was the theoretical framework for the thesis. It was constructed as theoretical and empirical amalgam, or composite; binding deliberately selected features of geopolitical theory and concept with examples of empirical phenomena that shape, and are shaped by, the nature of petroleum reserves, oil and gas upstream activity, and the conveyance of petroleum over land and by sea that are analysed in dedicated chapters. My aim was to create a prism that crystallised a clearer perspective of geopolitics as it relates to central, very practical features of the international petroleum industry; establishing a method of analysis that might be viewed as *Petroleum Geopolitics.*

The framework begins by clarifying my appreciation as to what geopolitics means in the context of this project, based upon definitions and perspectives used by some well-known thinkers such as Parker, Cohen, Agnew, Mackinder, Mahan and Brzezinski. No one thinker provides a definition or perspective that encapsulates all of the areas of petroleum process and activity that I wanted to examine; however, all of these scholars provided items and perspectives that were germane to the study. Indeed, components of the work put forward by Mahan, whose work predated the beginning of the petroleum age, and Mackinder, who was

inspired by Victorian and Edwardian era geopolitics, has contemporary applicability; specifically, with regards to the nature and geopolitical utilisation of terrestrial and maritime space. Thereafter, I broke down the analysis into the following headings: *Spatial Phenomena; Environmental Ontology; Territorial Access; Geopolitical Features; State & Non-state Concepts;* and, *Resource Security & Geopolitics.* From these I established relationships and correlations between petroleum resources, production operations, and means of transportation and factors such as: boundaries, conflict, flashpoints, chokepoints, resource nationalism, resource supply security, shatterbelts, sovereignty, space and transnationalism.

Chapter three – Oil and Gas Reserves – explored two main features: an initial discussion of what it is about petroleum reserves that makes them geopolitical; and secondly, I assessed key examples of the earth's petroleum reserve base to reveal intrinsic connectivity with geopolitical phenomena, including an examination of the significance of frontier reserves and undiscovered petroleum. With regards to the nature of reserves *per se*, I posited initially that oil and gas deposits that were *static* (reserves that had yet to be extracted and processed) do indeed have distinct geopolitical value, but that it is distinct because the value is *latent* until such time as they are extracted and produced, or monetised.

For those reserves that are being produced, I suggested that they can be viewed as geopolitical in nature, or as having geopolitical value, by considering in them the following ways: because of what petroleum is – what it represents; because of where a given deposit is located on the earth; because of what quantity it is estimated to exist in, and whether it is categorised as *proven*, *probable* or *possible*; by considering the geopolitical significance, or status, of oil against that of gas; by recognizing that there is different geopolitical significance for reserves that simply exist (and reserves thought to exist) and reserves that are actually in production - those that have been commoditised.

The second main section argued that there is essentially an 'indispensable reserve base' for the world that was made up of eight countries: Iran, Russia and Saudi Arabia, Canada, Qatar, Iraq, the UAE and Venezuela. The remainder of the chapter discussed some of the more nuanced aspects of geopolitical linkages associated with oil reserves growth among certain OPEC producers, petroleum located in so-called 'frontier' countries and regions in Africa, Asia, Central and South America, North America and the Arctic. Linkages highlighted included the complexity of accessing reserves in a country located in a particularly geopolitically vulnerable and unstable region, the destabilising factor of an estimated reserve

of potentially enormous proportions located in a disputed maritime region; and, the potential for conflict between several states over undiscovered oil and gas reserves in disputed areas of the Arctic Ocean region.

Chapter four – Exploration & Production – was configured to analyse the impact of various facets of geopolitics upon the challenges that confront and characterise specific examples of oil and gas upstream activity in Asia and the Middle East. It was not intended to simply catalogue all of the correlations between exploration and production as an activity and geopolitical phenomena. In this chapter, I wanted to examine the behavioural and planning specifics of IOCs, NOCs and governments in response to, or as reflections of, geopolitical forces and features encountered in mounting and participating in E & P projects either in their own territory, inside foreign lands, or within disputed spaces. To this end, I selected some key examples of recent and ongoing E & P activity in Russia, Iraq, Iran, Kazakhstan, Myanmar and the East China Sea.

Russia is now the world's largest oil producer; however, the manner in which this position has been ensured since the beginning of this century is both reflective of strategic and geopolitical imperatives for the government, whilst simultaneously giving rise to considerable challenges for foreign oil companies trying to maintain their production projects in the country. As oil prices climbed during the first decade of the 21st century, though the Russian government needed the capital investment and technology of foreign oil majors like Shell and BP to help its own state-owned firms such as Gazprom and Rosneft to increase production, it also wanted to recover state control over, and equity share in, reserves and production to ensure it garnered the maximum possible returns from high prices. In the process of this reacquisition, Shell would have to yield control over its Sakhalin 2 LNG project and BP lost control over its stake in the Kovykta gas field. Nevertheless, ironically, the Kremlin's realisation of its need to partner with foreign companies to develop fields like Shtokman in the Arctic was a clear reflection of the complex petroleum geopolitics linking boundary settlements, transnational cooperation, and access to international markets and other E & P opportunities for Gazprom elsewhere in the world.

Iraq is an important case when studying contemporary upstream activity in the Persian Gulf for several reasons: its stated proven oil reserves are the third largest in the world; since 1980 its once considerable oil industry has been deeply effected by a continuous sequence of war, sanctions, invasion and intra-state conflict; it is located in the world's most enduring and

strategically important shatterbelt; and, most recently, the chance to participate in a major programme to boost production at the country's most important oil fields has become one of the most sought-after E & P opportunities for IOCs, NOCs and INOCs in recent times.

Overall, the case study revealed that the importance to the global market of Iraq's reserve base and its production potential is beyond question and is simply too important in the wider strategic calculus of global supplies to be left under-utilised. Once production begins to increase significantly, Iraq could very likely re-shape the region's petroleum geopolitics; not only because of its re-emergence as a major oil producer in the region but also because of the diluting effect this will have on Saudi Arabia's long-standing dominance over OPEC. However, its considerable potential in the upstream sector cannot be fully realised until the security situation on the ground is improved and until comprehensive petroleum legislation is passed by the government to protect not only its own interests but also the legal position of foreign IOCs and NOCs.

Historically, the status and fortunes of Iran's petroleum industry have been shaped by geopolitics to an almost unique degree compared to many other major producing states. Iran is gifted with a massive petroleum endowment and at least the potential to become an even larger producer. Furthermore, is a regional power and is strategically located in such a way that it can impose considerable political influence at the geographical intersection of the Sub-continent, the Caspian, the Caucasus, the Persian Gulf, Central Asia, and the Indian Ocean. However, its continued stand-off with the West, Israel and its Gulf Arab neighbours over its nuclear ambitions, and the belligerence of its harsh autocratic government have ensured the solidity of punishing sanctions that are making urgently sought investment and patented technology from Western IOCs and NOCs virtually impossible to acquire.

This has retarded upstream project plans for Shell, Total and Statoil, amongst others, which has therefore stalled the country's long-term ambitions to expand production in its giant South Pars gas field that would have facilitated the development of an LNG export capacity, and has also frustrated the ability of Western oil firms from participating fully in reconstituting dilapidated infrastructure in some of the country's most important oil fields, such as Azadegan, Agha Jari and Ahwaz. However, on the other hand, many Asian NOCs and INOCs have benefited from the void left by the large U.S. and European majors, and thus companies such as CNPC, Gazprom, Indian Oil Corp, ONGC, Petrobras, Petronas and Sinopec are making inroads in Iran's upstream sectors. Though this can complicate their parent state's

relations with the U.S., they benefit commercially and in terms of energy security as the penetration of these NOCs and INOCs depends and becomes more geographically endemic.

Subsequent case studies in chapter four considered the strident competition between Chinese and Indian NOCs as they seek to gain E & P opportunities in Asia, driven by the surge in the demand for energy needed to fuel their expanding economies. The competition of Chinese and Indian bids to acquire PetroKazakhstan was won by China's CNPC. This success was wholly reflective of China's existing stakes and operations in Kazakhstan's upstream and pipeline sectors, its seemingly limitless financial reserves, and its ability to maximise its clear geopolitical advantage in terms of location, common borders and the ability of the government to give aggressive and sustained diplomatic support to CNPC.

In regards to the two countries' schemes to acquire access to production rights to Myanmar's offshore gas fields, the contest was somewhat more even. Nevertheless, China once again maximised the advantage of its long-standing ties with Myanmar's ruling generals, its capacity to outspend rivals, a common land border to facilitate favourable pipeline routing, and a strategic drive to get increased direct logistical access to the Indian Ocean as well as the resources located within it.

The final study in chapter four examined the currently dormant standoff between China and Japan in the East China Sea over competing claims to the Chunxiao gas field located in EEZ territory claimed by both countries. At one point, the gas field looked to become a flashpoint that might have sparked a military conflict between the two powers. Ironically, though the competing claims were both contested within the legal strictures set forth under UNLCOS, the convention's differing means of delineating EEZ boundaries essentially helped fuel the geopolitical complexity of the case, and resulted in greater ambiguity. The increasingly assertive actions by both sides almost resulted in military action at the peak of the crisis; however, fortunately, both sides managed to de-escalate the situation through constructive diplomacy during 2006 and 2007 that has now resulted in Chinese and Japanese companies jointly developing the field, and turning a classically geopolitical dispute over resources into an unlikely petroleum production sharing agreement.

Chapter five - Pipeline Development in Eurasia - is split into three main sections that, in turn, examine the major powers that have the greatest impact in facilitating the construction and operation of oil and gas pipelines from the Caspian and Central Asia – Russia, the United

States and China. Each of sections explores the vital strategic interests of each power as they relate to ensuring secure supplies of oil and/or gas amidst an analysis of specific pipeline schemes that reflect the complexities and forces explicit in pipeline development and control and the relevant geopolitical phenomena. The Russian study considers the Caspian Pipeline Consortium (or CPC), the U.S. case study centres on the evolution of the Baku-Tbilisi-Ceyhan pipeline (BTC), whilst the final study explores China's Kazakhstan-China Pipeline (KCP) and the newly constructed Central Asian-China gas pipeline (or CACP).

The competition between rival great powers for strategic advantage in the bid to control conveyance of oil and gas towards, and within, their spheres of geopolitical influence has been characterised as the 'New Great Game', a term used by the Pakistani journalist and author Ahmed Rashid in a 1997 article for the Far Eastern Economic Review,[1] but also used by many others, such as the German writer, Lutz Kleveman in his book, *The New Great Game: Blood and Oil in Central Asia.*[2] As defining features of this contest, the planning, development, funding and control of each of the aforementioned pipelines is determined by geopolitical affects such as: boundary demarcation; sovereign territorial control; inter-state cooperation; transnational initiatives between IOCs and NOCs; trade-driven diplomacy among member states of the SCO; and, the strategic posture of contesting major powers. Given the complex challenges of building pipelines that must traverse multiple countries and which require private, state and multilateral financing, it is no surprise that the inevitable tension between the strategic and geopolitical priorities of the championing power and the unavoidable commercial requirements for state and non-state, multi-actor cooperation needed to complete the schemes often conflate to produce many of the most complex and defining features of petroleum geopolitics.

Using key features intrinsic to the process of enabling the export and transportation of crude oil, LNG and refined products within the selected region of the Indo-Pacific maritime realm, chapter six embraced geographical, political, security, trading, diplomatic, commercial and market facets of this process that reveal the geopolitical and strategic nature of this system. The chapter began by identifying the cartographical and geographical parameters of the Indo-Pacific maritime realm; specifically, the geography, politics, security and trade that characterises the critical sea lines of communication (SLOCs) between points of export and consumption and associated chokepoints. Thereafter, the study examined in turn: the geopolitical and strategic issues that are intrinsic to the world's most important crude oil export terminals in the Persian Gulf and the massive crude oil streams to the major Asian

consumers; the strategic and commercial significance of the world's single-most import source of LNG; the nature and impact of a major petroleum gateway, using Singapore as the example; and finally, an analysis of the impact of a war at sea and the security of oil supplies from the Persian Gulf.

The chapter revealed the strategic and commercial significance of sea lines of communication (SLOC) between the most important sources of oil and gas and the world's fastest growing consumers, most notably China and India. For purposes of specificity for the thesis, I re-labelled the most vital SLOCs in the Indo-Pacific realm as *strategic petroleum streams* (SPS), to show the primary maritime oil and gas streams between the most important sources of supply and the largest, and fastest growing consumers, two of which, China and India, are rapidly evolving major powers.

The key geopolitical features along the world's major SLOCs are of course chokepoints. In terms of the sea transportation of petroleum in the Indo-Pacific maritime realm, four are significant - the Suez Canal, Bab al Mandeb, the Straits of Hormuz and the Malacca Straits. The remainder of the chapter concentrates on revealing the interrelationship between geopolitical factors and key export infrastructure in the Persian Gulf for crude and LNG, and arguably the world's best example of a strategically-significant petroleum gateway – Singapore. For such a gateway, the defining issues are: source petroleum volumes; storage and loading capacity; strategic location at the junction between two oceans; vulnerability to security threats and geopolitical volatility; sovereign protection; and, SLOC and chokepoint vulnerability and security.

The closing case study in the chapter focused specifically on the effect of a major interstate war upon the flow of oil exports and the security and safety of export terminals and commercial shipping. The Tanker War stands out as arguably the best and only example of the impact of a modern war and highly-charged regional geopolitical tensions upon the transportation of petroleum by sea. However, the well-known destructiveness of the war between Iran and Iraq did not result in the major disruption of oil supplies from the Persian Gulf exporters that were once feared. Nevertheless, the case study also revealed that if there is a chance that this vital supply could be compromised by a conflict to the extent that it impacts upon the energy security of external major powers, then external intervention is inevitable.

In the case of the Tanker War, the intervention by the U.S. and several major European allies proved essential to ending the war. However, though it is tempting to extrapolate from this conflict to predict the affects of a war in the Gulf in the 21st century, cautionary factors exist that would converge to change the nature and effect of a similar war fought in the short-to-medium term future. Today, the oil supply-demand balance is far tighter than it was in the oil glut era of the 1980s. This important factor is coupled with the spectre of a nuclear-armed Iran, a well-advanced conventional arms build-up in the region, the increasing military presence and power-projection interests of India and China, and most recently in 2011, the destabilising affect of anti-government uprisings across the Middle East.

7.1 Thesis Limitations and Future Study

Any thesis of finite length will have to make choices as to what is to be examined; furthermore, this also ensures focus, particularly in a topic as broad as petroleum and geopolitics. For this reason, I selected only to address three main areas of the industry - reserves, exploration and production and conveyance. For the same reasons given, I also chose to concentrate on certain geographical regions in both terrestrial and maritime contexts.

As mentioned in the introduction, I also opted not to cast back into the numerous, fascinating aspects of the technical, commercial, military and political facets of the history of petroleum, particularly those which occurred during the 20th century. This was a difficult choice as much of the geopolitics of petroleum owes its genesis to its evolution during this era. However, this has been written about extensively in numerous, all-encompassing books on the history of the oil industry, exemplified by Daniel Yergin's Pulitzer prize-wining volume, *The Prize*.[3] Thus, I wanted to orientate the thesis in such a way that blended established norms of geopolitical theory and concept with ongoing industry processes and schemes to give the project a contemporary complexion that perhaps might be considered a more useful contribution to the discourse for having done so.

Due predominantly to the constraints of length, there are several areas that I also did not address specifically: Unconventional oil and gas reserves – such as tar sands, heavy oils and oil shale, deep gas, tight gas, shale gas and coalbed methane – have become an increasingly important reserve source for the industry, particularly for IOCs looking to gain equity stakes in reserves and production potential that is now more problematic to gain in the large conventional oil reserve regions in the Middle East and Russia. Production of these

hydrocarbons is complex and evolving, and because their existence in large quantities in North and South America has geopolitical relevance for the Western Hemisphere, further study of their importance in this regard is warranted.

The issue of the impact of the burning of petroleum-based fuels for transportation and power generation on climate change has been an increasing feature of the discourse on petroleum for many years now. However, climate change, the debate surrounding it, and the activities undertaken by many countries and actors around the world to address it has a geopolitical dimension that is specific and sufficiently sizable on its own as to warrant a distinct study rather than being a subsection of this one. Of particular note is the differing priority of this matter in terms of policy for the U.S, China and India and the EU countries, as well as changing levels of pollution that these activities generate in the evolving major powers in Asia.

Arguably, the most prominent feature of the current discourse concerning oil is the debate surrounding 'peak oil' theory, which was referred to briefly in chapter three. This topic has now become the core of many of the more recent texts on oil by authors such as Matthew Simmonds,[4] Duncan Clarke,[5] Robin Mills,[6] Paul Roberts,[7] David Strahan,[8] Kenneth S. Deffeyes[9] and Richard Heinberg.[10] I identify and concur with the argument put forward by the optimists, such as Clarke and Mills, and as such believe that there is still an abundance of oil and gas yet to be produced. For me, the debate is one of belief in one view or the other, rather than one with core relevance to geopolitics; thus, though it was considered for inclusion, I felt other aspects were more relevant to the purpose of this thesis.

Perhaps the most intriguing aspect of intra causality between petroleum, in particular oil, and the more illusive and implicit aspects of geopolitics is the pricing of oil. Indeed, given an era of instantaneous and virtually endemic information proliferation via the internet, the particular geopolitical nuances of globalisation, concepts of extraterritoriality and the contentions of the erosion of sovereignty, the pervasive influence of the international financial sector and e-commerce, there is an argument that the pricing of oil and gas is not really a function of the more traditionally held or 'tangible' tenets and forms of geopolitics. Nevertheless, as I highlight in the introduction, we often see in the news how a worsening 'geopolitical' situation is impacting on the price of oil. Well, much of this is centred on speculation of how events within, and near to, oil-producing countries will (or could) affect supplies of oil in the short term.

Conversely, it is also true to say that the pricing of oil can have a tangible impact upon the socio-political security and geopolitical status of states that derive the dominant proportion of their national income from crude exports. Saudi Arabia is arguably the best example of such a country given the lack of diversification in its economy. The relationship between pricing and geopolitics in this respect certainly merits greater research, particularly as the advanced industrial economies seek to reduce their dependency on oil as a transportation fuel over the next two decades.

My study suggests that future pricing is much more about speculation of what *might* happen rather than what actually does end up happening. Is this then a form of 'virtual' geopolitics, or in an era where oil producers and in particular oil traders have far more influence over the price of oil due to stockpiling and speculative buying and the impact of contango, has pricing really got much to do with geopolitics at all? After all, terrorist attacks on oil facilities and tankers in the Middle East and even major wars, such as the Iran-Iraq War, tend only to cause shot-lived spikes in pricing. Nevertheless, though I chose not to investigate this issue in the project due to the constraints of size limits, I feel that this area of enquiry – the causal relationship between geopolitical phenomena and the price of petroleum is definitely worthy of further focused study in the future.

A very important part of this work would be greater investigation into the linkages between geopolitics and the behaviour of OPEC, collectively and by its individual member states. I do mention OPEC in chapters three and four with reference to Iraq's reserves and the likely impact of its production expansion programme upon OPEC and its influence within it vis a vis production quotas and Saudi Dominance; however, geopolitical phenomena such as reserve bases, state alliances and strategic objectives and OPEC needs more attention.

Both the history of oil and current issues pertaining to the fortunes of major oil companies, the debates over remaining reserves, petroleum and the industrial and power advancement of emerging major powers, and the whole issue of petroleum and climate change have be written about extensively. Indeed, one would be hard pressed to find any aspect of this extraordinary topic that has not been analysed comprehensively. Nevertheless, as I state in chapter one, it is my contention that an examination of these selected aspects of the industry and geopolitics was warranted and has a useful place in the discourse.

Aside from my recommendation for the merit of further study on the relationship between geopolitics and the pricing of oil and gas, I feel there is also possible scope for some extra work regarding the more intensive exploitation of unconventional reserves, and the inevitable geopolitical effects that will result from the transition from the dominance of oil as our primary fuel for transportation to other means such as fuel cells and electricity, specifically the effects felt in the primary producing areas of the Middle East and Russia. Those states with economies that are dominated by the production and sale of oil in particular will need to consider carefully the regional geopolitical shifts that will occur as oil is eventually superseded by new fuels that can be more endemically sourced - conceivably hydrogen derived from seawater.

Notes

[1] Ahmed Rashid, 'Central Asia: Power Play', in *Far Eastern Economic Review*, 10 April 1997
[2] Lutz Kleveman, *The New Great Game, Blood and Oil in Central Asia* (New York: Atlantic Monthly Press, 2003)
[3] Daniel Yergin, *The Prize: the Epic Quest for Oil, Money & Power* (London & New York: Free Press, 1991)
[4] Matthew R. Simmons, *Twilight in the Desert, The coming Saudi Oil Shock and the World Economy* (Hoboken, NJ: John Wiley & Sons Inc., 2005)
[5] Duncan Clarke, *The Battle for Barrels, Peak Oil Myths & World Oil Futures* (London: Profile Books Ltd., 2007)
[6] Robin M. Mills, *The Myth of the Oil Crisis: Overcoming the Challengers of Depletion, Geopolitics, and Global Warming* (Westport, CT & London: Praeger, 2008)
[7] Paul Roberts, *The End of Oil: On the Edge of a Perilous New World* (Boston & New York: Houghton Mifflin Company, 2004)
[8] David Strahan, *The Last Oil Shock: A Survival Guide to the Imminent Extinction of Petroleum Man* (London: John Murray Publishers, 2007)
[9] Kenneth S. Deffeyes, *Hubbert's Peak: The Impending World Oil Shortage* (Princeton & Oxford: Princeton University Press, 2001)
[10] Richard Heinberg *The Party's Over: Oil, War and the Fate of Industrial Societies* (Gabriola Island, Canada: New Society Publishers, 2003

Annex A Companies competing for TSAs inside Iraq's upstream sector

Region	Country	Company
North America	Canada	Nexen Inc.
	United States	Anadarko Petroleum Corp.
		Chevron
		ConocoPhilips
		ExxonMobil
		Hess Corp.
		Marathon International Petroleum Ltd.
		Occidental Petroleum Corp.
Europe	Denmark	Maersk
	France	Total
	Germany	Wintershall BASF Group
	Italy	Edison International SPA
		Eni
	Netherlands	Royal Dutch Shell* (Netherlands/UK)
	Norway	StatoilHydro ASA
	Russia	JSC Gazprom Neft
		Lukoil
	Spain	Repsol YPF SA
	United Kingdom	BG International
		BP Group PLC
		Premier Oil PLC
		Royal Dutch Shell* (Netherlands/UK)
Australasia	China	CNOOC Ltd.
		CNPC Ltd.
		Sinochem International Co. Ltd.
		Sinopec Shanghai Petrochemical co. Ltd.
	India	ONGC Videsh
	Indonesia	Pertamina
	Japan	Inpex Holdings Inc.
		Japex
		Mitsubishi Corp.
		Nippon Oil Corp.
	Malaysia	Petronas Gas BHD
	South Korea	Korea Gas Corp.
	Australia	BHP Billiton Ltd.
		Woodside Petroleum Ltd.

Source: Wall Street Journal Digital Network – MarketWatch.com
http://www.marketwatch.com/news/story/iraq-oil-ministry-says-

Annex B Important E & P projects involving foreign companies in Iran

Project/Field	Companies	Investment	Output Goal
Anaran block – Azar field (oil)	StatoilHydro (Norway)	NOC withdrew from project in August 2008	
Azadegan (oil)	Inpex (Japan) 10% stake	$200 million	260,000 bpd
Balal (oil)	Total (France) & Bow Valley (Canada)	$300 million	40,000 bpd
Caspian Sea oil exploration	GVA Consultants (Sweden)	$225 million	-
Darkhovin (oil)	ENI (Italy)	$1 billion	160,000 bpd
Doroud (oil)	Total (France) & ENI (Italy)	$1 billion	205,000 bpd
Gamsar block (oil)	Sinopec (China)	$80 billion+	Oil: 1.2 million bpd Gas: 5 billion cu ft/day
Golshan & Ferdows (gas)	SKS Ventures (Malaysia)	$20 billion	100 million cu ft/day
Masjid-e-Soleyman (oil)	Sheer Energy (Canada)	$80 million	25,000 bpd
North Pars (gas)	CNOOC (China)	$16 billion (inc. gas purchases)	3.6 billion cu ft/day
Soroush & Nowruz (oil)	Royal Dutch/Shell (UK/Netherlands)	$800 million	190,000 bpd
South Pars – Phase 13 & 14 (gas) [Deal in flux]	Royal Dutch/Shell (UK/ Netherlands & Repsol (Spain)	$10 billion	8.1 million tons of LNG per year
South Pars – Phase 2 & 3	Total (France), Gazprom (Russia) & Petronas (Malaysia)	$2 billion	2 billion cu ft/day
South Pars – Phase 22, 23 & 24	Turkish Petroleum company (TPAO)	$3-4 billion	2 billion cu ft/day
South Pars – Phase 4 & 5 (gas)	ENI (Italy)	$1.9 billion	2 billion cu ft/day
South Pars – Phase 6, 7, & 8 (gas)	StatoilHydro (Norway)	$2.65 billion	3 billion cu ft/day
South Pars – Phase 9 & 10 (gas)	LG (South Korea)	$1.6 billion	2 billion cu ft/day
Yadavaran (oil) [Deal also includes gas purchase for 30 years	Sinopec (China & ONGC (India)	$70 billion	300,000 bpd

Source: CRS Report for Congress, Wikipedia and IOC/NOC websites

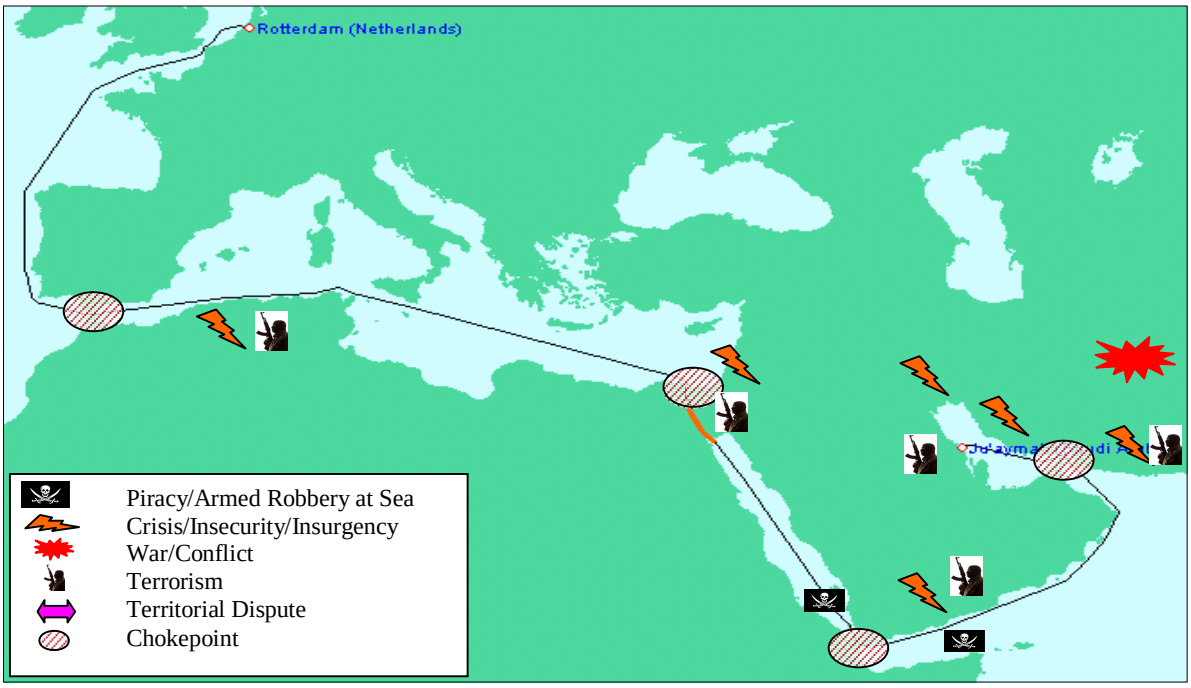
Annex C NOC and IOC Global E & P Footprints

Country	Company	E & P Project locations
China	CNOOC Ltd.	Australia, Equatorial Guinea, Indonesia, Iraq, Kenya, Nigeria
	China National Petroleum Corporation (CNPC)	Algeria, Azerbaijan, Canada, Chad, Ecuador, Equatorial Guinea, Indonesia, Iran, Iraq, Kazakhstan, Libya, Mauritania, Mongolia, Myanmar, Niger, Nigeria, Oman, Peru, Russia, Sudan, Syria, Thailand, Tunisia, Turkmenistan, Uzbekistan, Venezuela
	China Petroleum and Chemical Corporation (Sinopec)	Angola, Canada, Cuba, Ethiopia, Gabon, Iran, Iraq, Russia, Sudan
India	Oil India Ltd (OIL)	East Timor, Gabon, Iran, Libya, Nigeria, Sudan, Yemen
	Indian Oil Corporation (IOC)	Gabon, Iran, Libya, Nigeria, Yemen
	ONGC Videsh	Brazil, Colombia, Cuba, Egypt, Iran, Iraq, Libya, Myanmar, Nigeria, Qatar, Russia, Sudan, Syria, Vietnam
Japan	AOC Holdings Inc.	Egypt, Iraq, Kuwait, Norwegian Sea, South China Sea
	Cosmo Oil	Qatar, United Arab Emirates (Abu Dhabi)
	Idemitsu Kosan Co. Ltd.	Cambodia, Norway, Thailand, United Kingdom, Vietnam
	Inpex Holdings Inc.	Australia, Azerbaijan, Brazil, Canada, China, Indonesia, Iran, Iraq, Kazakhstan, Myanmar, Russia, Timor Sea, United Arab Emirates (Abu Dhabi)
	Japan Petroleum Exploration Co. (Japex)	Canada, China, Indonesia, Iran, Iraq, Libya, Russia, United States
	Mitsubishi Corporation	Angola, Australia, Brunei, Gabon, Indonesia, Iraq, Libya, Malaysia, Oman, Russia, Tunisia, United Kingdom, United States
	Mitsui	Australia, Equatorial Guinea, Oman, Qatar, Russia, Thailand, United Arab Emirates (Abu Dhabi), United States
	Nippon Oil Corp.	Australia, Canada, Indonesia, Iraq, Libya, Malaysia, Myanmar, Papua New Guinea, United Kingdom, United States, Vietnam
	Teikoku Oil	Algeria, Congo (DR), Egypt, Libya, Malaysia, Mexico, Venezuela, Vietnam

Sources: EIA, IEA, Petroleum Economist and company websites

Annex D Westward SPS

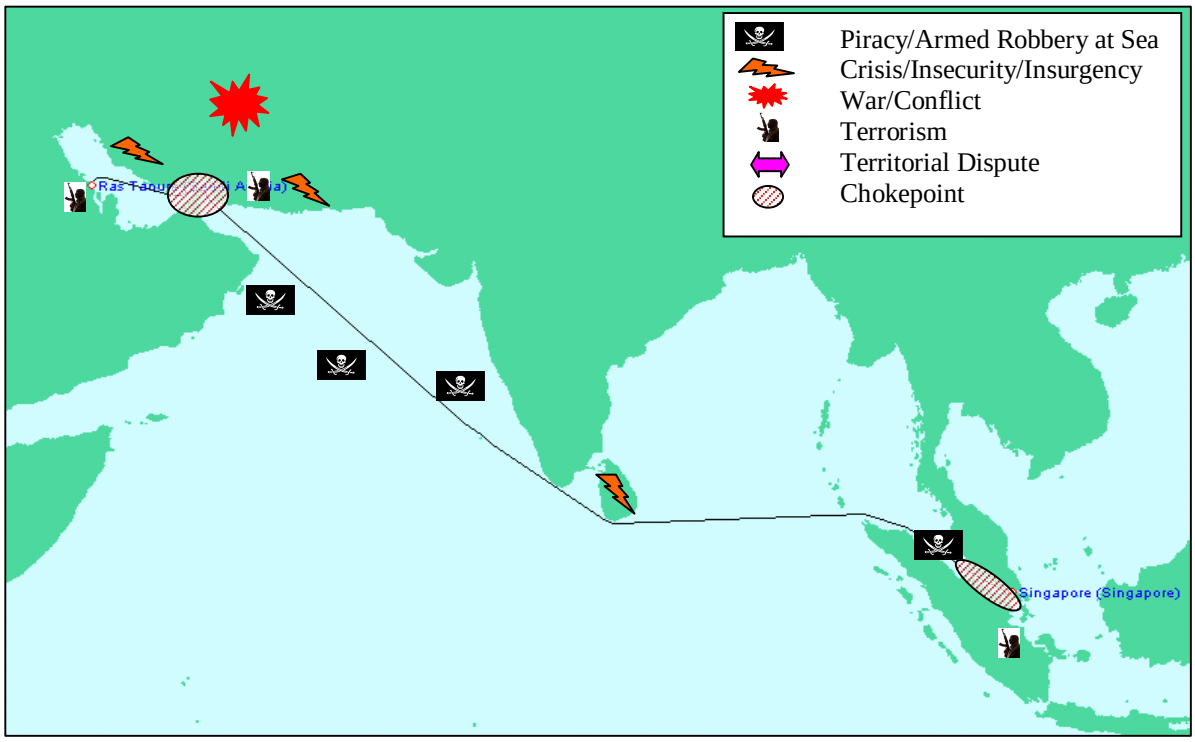
Westward Strategic Petroleum Stream (SPS) / Sea Line of Communication			
Approx. Distance	Sea Areas / Littorals traversed	Chokepoints	Geopolitical Factors/Security Issues
6,500 nm (from Ju'aymah to Rotterdam)	Persian Gulf; Gulf of Oman; Arabian Sea; Gulf of Aden; Red Sea; Sinai; [Mediterranean Sea; Algerian coast, Northeastern Atlantic]	Strait of Hormuz; Bab al Mandeb; Suez Canal; Strait of Gibraltar; [Dover Strait]	Persian Gulf tensions; Yemeni insecurity (AQAP presence, secessionist south & Houthis insurgency); Piracy; potential maritime terrorism (BAM, Yemen & Suez Canal); Insecurity in Sinai (Bedoin & Palestinian militants); Arab-Israeli tensions



Source: BP Distance Tables

Annex E South-eastward SPS

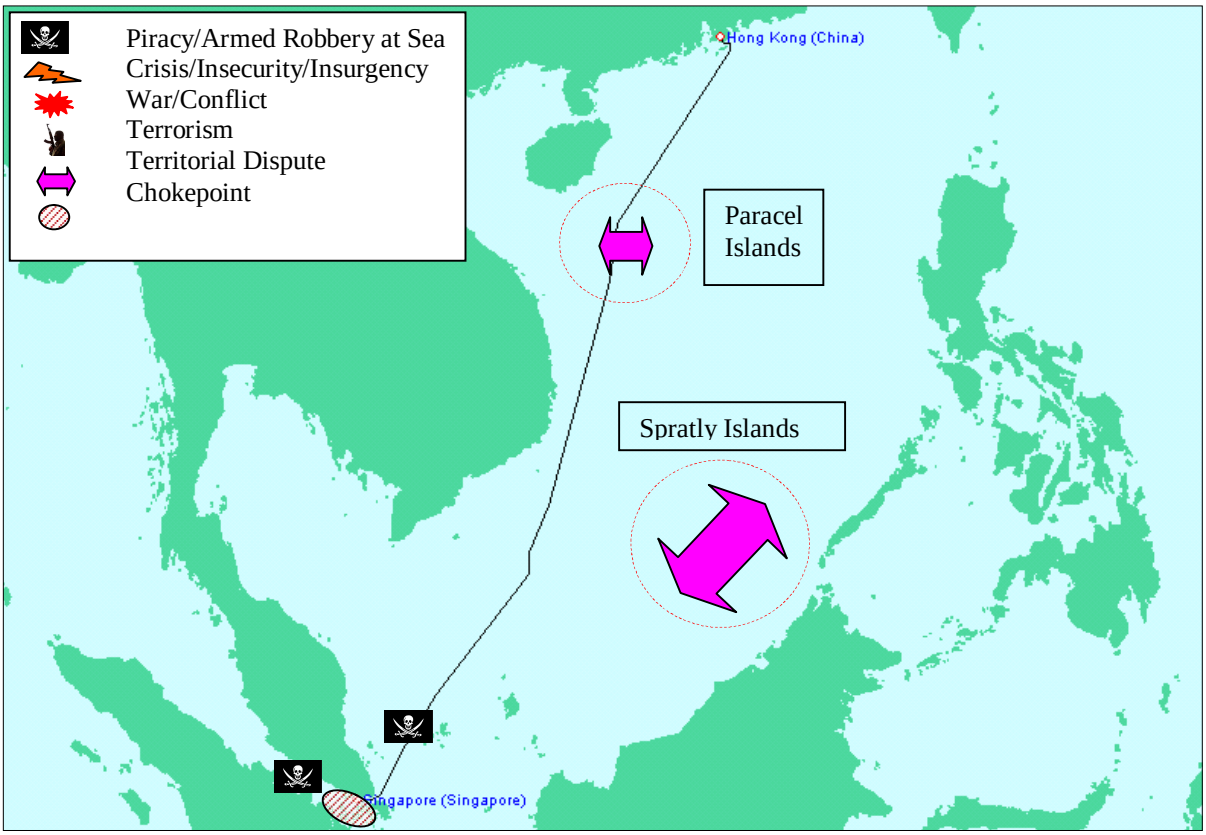
South-eastward Strategic Petroleum Stream (SPS) / Sea Line of Communication			
Approx. Distance	Sea Areas / Littorals traversed	Chokepoints	Geopolitical Factors/Security Issues
3,750 nm (Ras Tanura to Singapore)	Persian Gulf; Gulf of Oman; Arabian Sea; Sri Lanka; Nikobar Islands; Sumatra; Malacca Striats; Singapore (Straits	Strait of Hormuz; Malacca Straits (Singapore Straits/Philips Cannel)	Persian Gulf tensions; terrorism; insecurity in Pakistan; piracy (Arabian Sea); Sri Lankan insecurity; piracy & armed robbery at sea (Malacca Straits & Indonesia)



Source: BP Distance Tables

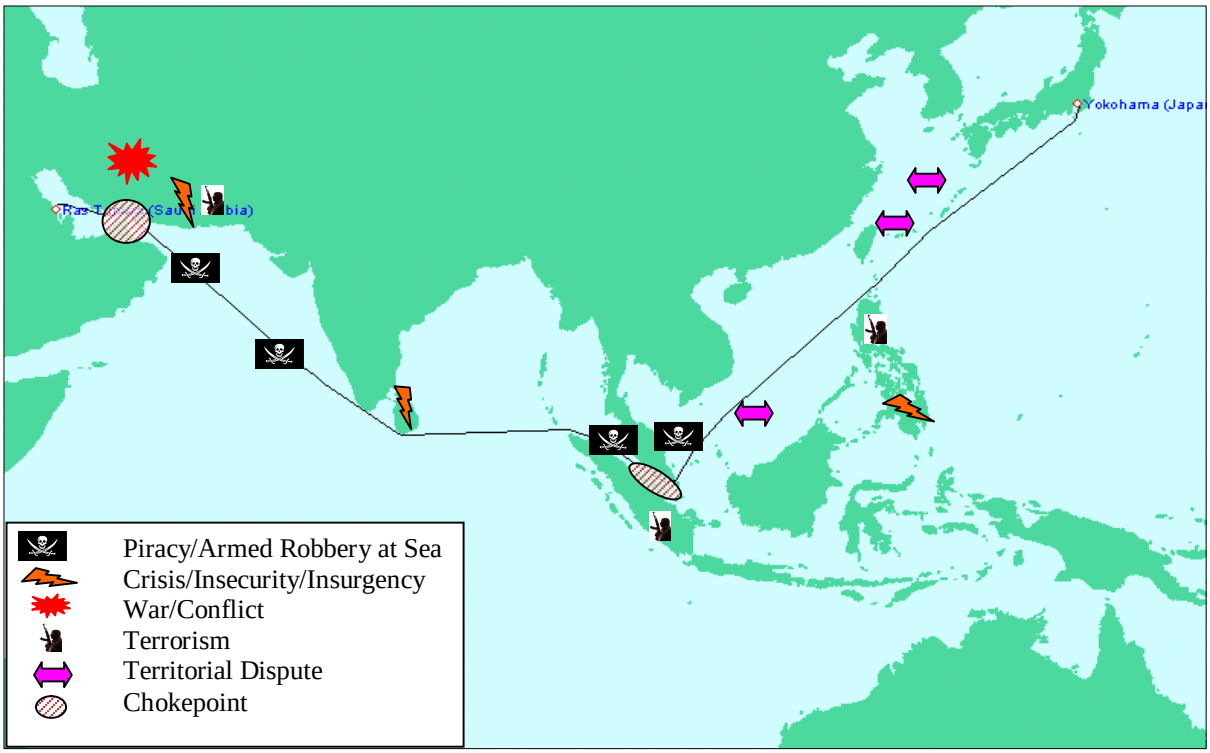
Annex F North-eastward SPS

North-eastward Strategic Petroleum Stream (SPS) / Sea Line of Communication			
Approx. Distance	Sea Areas / Littorals traversed	Chokepoints	Geopolitical Factors/Security Issues
1,500 nm (Singapore to Hong); 3,000 nm (Singapore to Tokyo)	Singapore Strait/Philips Channel; Kepulauan Anambas Islands; Spratley Islands; Paracel Islands; Luzon Strait; Ryuku Islands	Malacca Straits (Singapore Straits/Philips Cannel)	Piracy & armed robbery at sea (Malacca Straits & Indonesia); geopolitical tensions over Spratley Islands; China-Taiwan tensions; territorial disputes (East China Sea gas fields & Senkaku Islands); Chinese assertiveness in South China Sea



Source: BP Distance Tables

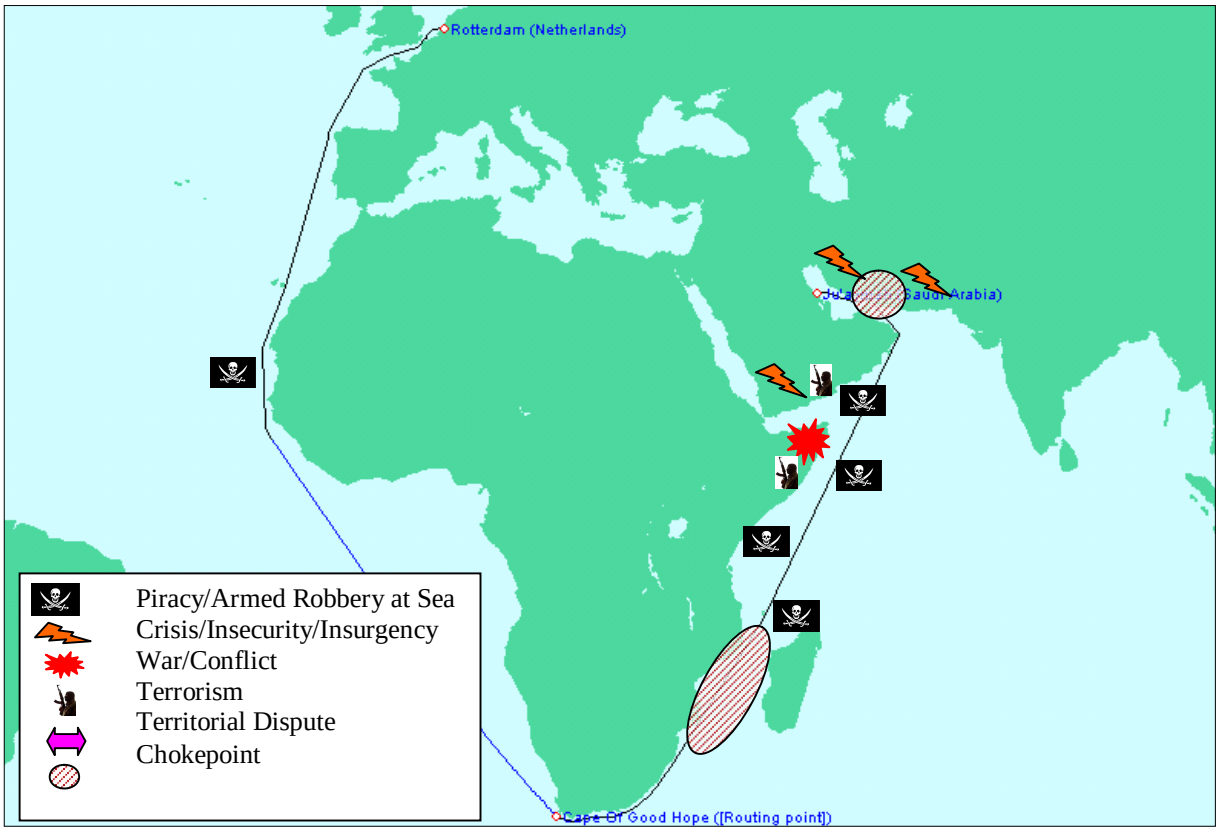
Combined South-eastward & North-eastward SPS



Source: BP Distance Tables

Annex G South-westward SPS

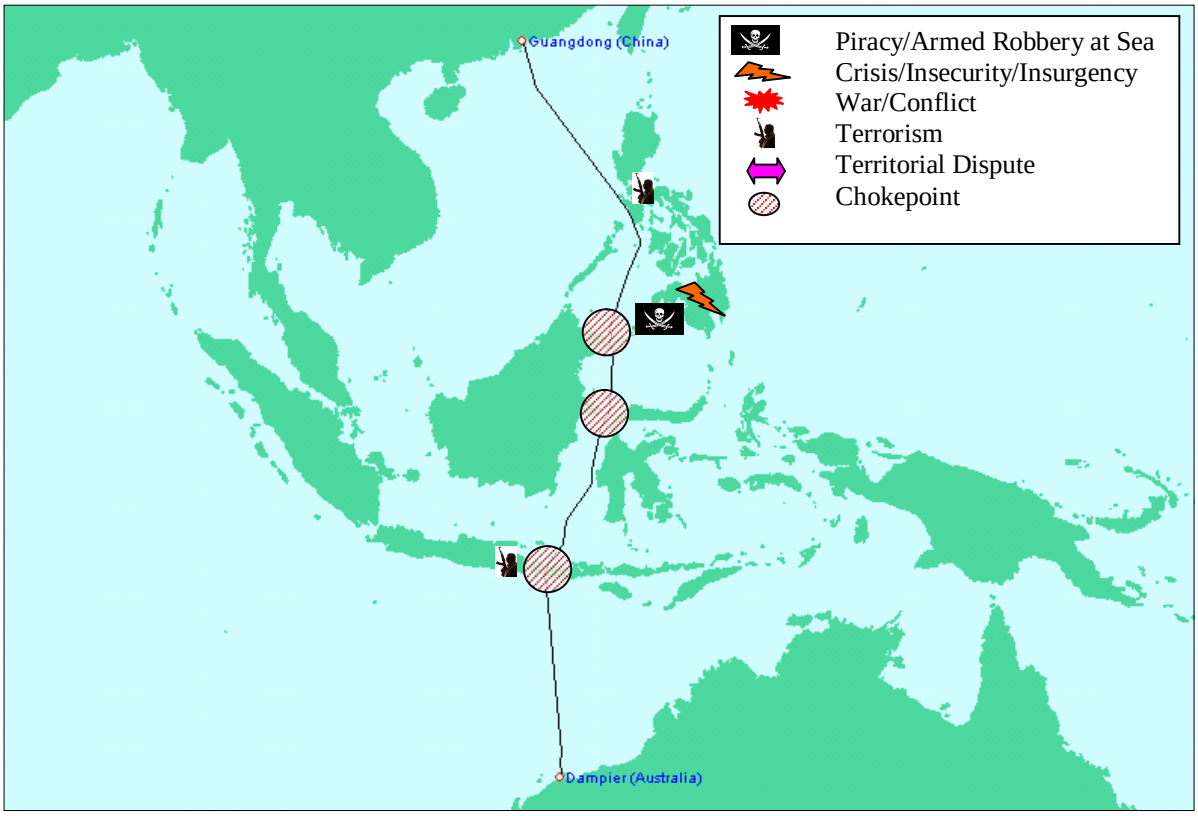
South-westward Strategic Petroleum Stream (SPS) / Sea Line of Communication			
Approx. Distance	Sea Areas / Littorals traversed	Chokepoints	Geopolitical Factors/Security Issues
11,250 nm (Juaymah to Rotterdam)	Persian Gulf; Gulf of Oman; Arabian Sea; Indian Ocean; Somali Basin; East African coast; Mozmabique; South Africa; South Atlantic; West African coast; Canary Islands; Spanish coast; English Channel	Striat of Hormuz; Mozambique Channel; [Dover Strait]	Persian Gulf tensions; piracy (Arabian Sea, Indian Ocean, Somali Basin, East Africa, Mozambique Channel); Somalia – failed state/civil conflict/terrorism



Source: BP Distance Tables

Annex H Northward SPS

Northern Strategic Petroleum Stream (SPS) / Sea Line of Communication			
Approx. Distance	Sea Areas / Littorals traversed	Major Chokepoints	Geopolitical Factors/Security Issues
2,800 nm (Dampier to Guangdong)	North-western Australia; Indonesia; Java Sea; Macassar Strait; Celebes Sea; Sulu Sea; Philippines; South China Sea; China	Lombok Strait	Piracy & armed robbery at sea; insecurity in southern Philippines (Mindanao); Chinese assertiveness in South China Sea



Source: BP Distance Tables

Annex I Major chokepoints in Indo-Pacific Maritime Realm

Choke-point	Adjacent States	Adjoining maritime spaces	Alternative Routes	Volume of crude oil per year	Approx. number of tankers per year	Oil/Gas Source	Strategic/Geopolitical/ Security Issues
Suez Canal	Egypt	Indian and Atlantic Oceans (via the Red Sea & Mediterra nean Sea)	Additional 6,000 nm transit via Cape Agulhas for tankers; some oil can be diverted through Sumed Pipeline	Approx. 1.64 billion barrels (223,738,063 metric tonnes)	1,398 (av. crude oil tanker size in global fleet is 160,000 DWT)	Persian Gulf and Arabian Peninsula producing countries	Potential maritime terrorism; Insecurity in Sinai (Bedoin & Palestinian militants); Arab-Israeli tensions; Iranian interference; primary route for US and EU warship deployment to Indian Ocean
Bab el Mandeb	Yemen and Djibouti	Red Sea and the Arabian Sea (leads from/to the Suez Canal)	Additional 6,000 nm transit via Cape Agulhas	Approx. 1.2 billion (164,324,693 metric tonnes)	1,027 (av. crude oil tanker size in global fleet is 160,000 DWT)	Persian Gulf and Arabian Peninsula producing countries	Yemeni insecurity (AQAP presence, secessionist south & Houthis insurgency); Piracy; potential maritime terrorist attacks; Coalition use of Djibouti as fwd operating base
Strait of Hormuz	Iran and Oman	Persian Gulf and Gulf of Oman (Arabain Sea)	No alternative for tankers; some oil can be diverted via Petroline from Abqaiq to Yanbu on Red Sea	Approx. 6.12 billion barels (834,924,966 metric tonnes)	5,218 (av. crude oil tanker size in global fleet is 160,000 DWT)	Persian Gulf and Arabian Peninsula producing countries	Persian Gulf tensions (Iraq & Iran); terrorist attacks; insecurity in Pakistan; v. large US military presence; vulnerable GCC states allied to West; inc. Chinese & Indian strategic interests
Malacca Straits	Malaysia, Singapore and Indonesia	Indian Ocean and Pacific Ocean (via Andaman Sea & South China Sea	VLCCs & ULCCs must re-route via Lombok Strait; smaller ships can transit via nearer Sunda Strait	Approx. 5.5 billion barrels (750,341,064 metric tonnes)	4,690 (av. crude oil tanker size in global fleet is 160,000 DWT)	Persian Gulf and Arabian Peninsula producing countries	Piracy & armed robbery at sea; sizable US naval interests/presence; fluctuating Singapore-Indonesia tensions; increasing Chinese influence in south part of South China Sea; threat of terrorism; MALSINDO patrols

Source: US DoE & Lloyd's List Intelligence

Annex J Persian Gulf & Arabian Peninsula terminals and volumes per year

Country	Crude Oil Export Terminal	Total Volume Exported (Tonnes)
Iran	Kharg Is.	53,630,827
	Asaluyeh Term.	3,797,498
	Sirri Is.	2,667,666
	Soroosh Term.	2,090,000
	Bandar Mahshahr	1,360,000
	Lavan Is.	1,055,000
Iraq	Al Basra Term.	21,001,499
	Khor al Amaya Terminal	878,000
Kuwait	Mina al Ahmadi	47,765,995
	Mina Saud	5,849,665
	Kuwait (unspecified)	2,020,000
	Mina Abdulla	515,000
	Shuaiba	160,000
Oman	Mina al Fahal	31,772,325
	Qalhat Term.	135,000
	Salalah	100,000
Qatar	Halul Island Term.	10,777,661
	Mesaieed	10,137,373
	Al Shaheen Term.	9,104,824
	Ras Laffan	8,695,826
	Al Rayyan Term.	970,833
Saudi Arabia	Ras Tanura	95,751,653
	Juaymah Term.	83,045,494
	Ras al Khafji*	11,315,373
	Yanbu	7,473,000
	Jeddah	565,000
	Jubail	350,000
United Arab Emirates	Jebel Dhanna Term.	52,750,016
	Zirku Is.	31,362,273
	Das Is.	29,619,240
	Fateh Term.	5,566,831
	Mubarras Term.	1,192,500
	Jebel Ali	634,666
	Mina Saqr	535,833
	Ruwais	477,500
	Mubarek Term.	286,666
	Fujairah Anch.	260,000
Yemen	Hamriyah Term.	126,666
	Ash Shihr Term.	7,380,166
	Ras Isa Term.	3,343,000

Source: Lloyd's Marine Intelligence Unit [APEX]

Annex K Terminal to terminal crude movements between Persian Gulf/Arabian Peninsula and Asia

Source >>	Saudi Arabia	Saudi Arabia	Iran	UAE	Kuwait	Oman	UAE	UAE	Iraq	Saudi Arabia	
	Ras Tanura	Juaymah Terminal	Kharg Island	Jebel Dhanna Term.	Mina al Ahmadi	Mina al Fahal	Zirku Island	Das Island	Al Basra Terminal	Ras al Khafji	Total
Singapore	9,574,999	3,947,499	1,480,000	3,131,831	6,590,000	1,242,500		2,720,498	1,105,000		29,792,327
Onsan	2,679,500	22,474,500									25,154,000
Ulsan	1,589,000	1,747,333	2,207,500	2,309,332	7,105,333	2,532,333	4,440,998		1,648,333		23,580,162
Chiba	6,384,832	3,573,500	2,142,666	4,955,165		1,553,333	1,470,999	2,975,832			23,056,327
Kiire	5,714,000	2,510,000	2,837,500	1,855,000	3,104,333		1,440,000	2,983,166			20,443,999
Yosu	3,073,165			5,364,704		2,478,997	3,164,539	3,140,998			17,222,403
Ningbo	1,832,500	3,455,000	7,928,000			3,082,500					16,298,000
Mai-Liao	2,032,000	4,583,833	1,251,000		3,767,000	1,437,500	1,284,500		1,744,000		16,099,833
Sikka	5,392,500	3,643,000	1,542,500	1,041,500						2,960,000	14,579,500
Kaohsiung	4,144,000	1,341,000	2,842,500		2,610,500		1,925,000			1,276,500	14,139,500
Kawasaki	3,046,666	1,243,333	1,590,000	6,512,496						1,131,666	13,524,161
Yokkaichi	3,673,333	2,867,500	2,770,000	1,521,666							10,832,499
Mizushima	5,492,499	2,471,666	1,720,832				1,029,166				10,714,163
Daesan			4,821,664	2,657,165			2,313,497				9,792,326
Jamnagar Term.					4,657,333				4,378,500		9,035,833
Map Ta Phut	1,155,833			2,887,499		3,559,998	1,195,832				8,799,162
Mumbai	3,950,000				2,516,833				1,481,000		7,947,833
Shuidong	1,179,000	1,901,500	2,705,500			1,393,333					7,179,333
Pulau Bukom	4,180,000	2,000,000									6,180,000
Sakai	1,229,998	1,019,999					1,700,832				3,950,829
TOTAL	66,323,825	58,779,663	35,839,662	32,236,358	30,351,332	17,280,494	19,965,363	11,820,494	10,356,833	5,368,166	

Source: Lloyd's List Intelligence [APEX]

Annex L Existing Large-Capacity Refining Infrastructure in Asia

Refinery (Operators/Owners)	Country	Nominal Refining Capacity
SK Energy Co., Ltd.	South Korea	840,000
Reliance Industries I Jamnagar**	India	661,000
GS Caltex South Korea	South Korea	650,000
ExxonMobil Singapore	Singapore*	605,000
Reliance Industries II Jamnagar (under construction)**	India	580,000
Ras Tanura Refinery (Saudi Aramco)	Saudi Arabia	525,000
S-Oil South Korea	South Korea	520,000
Mina Al-Ahmadi Refinery (KNPC)	Kuwait	470,000
Shell Eastern Singapore	Singapore*	458,000
Mailiao Refinery	Taiwan	450,000
Abadan Refinery Iran (NIOC)	Iran	450,000
Aramco/Exxon Yanbu' Refinery (Saudi Aramco/ExxonMobil)	Saudi Arabia	400,000
Rabigh Refinery (Saudi Aramco)	Saudi Arabia	400,000
Cilacap Refinery (Pertamina)	Indonesia	348,000
Negishi Yokahama Refinery (Nippon Oil Corporation (NOC))	Japan	340,000
Kawasaki Refinery (TonenGeneral Sekiyu/ExxonMobil)	Japan	335,000

* If the SRC Jurong Island Refinery in Singapore, with its 285,000 barrels per day capacity is added to its larger cousins – Shell Eastern and ExxonMobil Singapore – the country's total refining capacity is 1,348,000 barrels per day (see specific section on Singapore).
**Upon completion, the Reliance I & Reliance II facilities will constitute the world's largest refinery at a single site, with an aggregate capacity of 1,241,000 barrels per day

Sources: Oil company websites

Annex M Proven oil reserves (including unconventional)

Rank	Country	Continent	Proven Oil Reserves	% of Global Total
1	Saudi Arabia	Asia	264,100,000,000	18.52%
2	Canada	North America	178,100,000,000	12.49%
3	Iran	Asia	150,310,000,000	10.54%
4	Iraq	Asia	143,100,000,000	10.03%
5	Kuwait	Asia	101,500,000,000	7.12%
6	Venezuela	South America	98,590,000,000	6.91%
7	United Arab Emirates	Asia	97,800,000,000	6.86%
8	Russia	Asia	79,000,000,000	5.54%
9	Libya	Africa	46,000,000,000	3.23%
10	Nigeria	Africa	36,220,000,000	2.54%
11	Kazakhstan	Asia	30,000,000,000	2.10%
12	Qatar	Asia	27,190,000,000	1.91%
13	United States	North America	21,320,000,000	1.49%
14	China	Asia	15,700,000,000	1.10%
15	Algeria	Africa	15,150,000,000	1.06%
16	Angola	Africa	13,500,000,000	0.95%
17	Mexico	North America	13,350,000,000	0.94%
18	Brazil	South America	12,620,000,000	0.88%
19	Azerbaijan	Asia	7,000,000,000	0.49%
20	Sudan	Africa	6,800,000,000	0.48%
21	Norway	Europe	6,680,000,000	0.47%
22	India	Asia	5,625,000,000	0.39%
23	Oman	Asia	4,978,000,000	0.35%
24	Vietnam	Asia	4,700,000,000	0.33%
25	Egypt	Africa	4,400,000,000	0.31%
26	Indonesia	Asia	3,850,000,000	0.27%
27	Ecuador	South America	3,640,000,000	0.26%
28	United Kingdom	Europe	3,410,000,000	0.24%
29	Yemen	Asia	3,300,000,000	0.23%
30	Malaysia	Asia	3,000,000,000	0.21%

Source: CIA World Factbook 2010

Annex N Proven Natural Gas Reserves

Rank	Country	Continent	Proven Natural Gas Reserves	% of Global Total
1	Russia	Asia	43,300,000,000,000	23.25%
2	Iran	Asia	33,100,000,000,000	17.77%
3	Qatar	Asia	25,260,000,000,000	13.56%
4	Turkmenistan	Asia	7,940,000,000,000	4.26%
5	Saudi Arabia	Asia	7,319,000,000,000	3.93%
6	United States	North America	6,731,000,000,000	3.61%
7	United Arab Emirates	Asia	6,071,000,000,000	3.26%
8	Nigeria	Africa	5,215,000,000,000	2.80%
9	Venezuela	South America	4,840,000,000,000	2.60%
10	Algeria	Africa	4,502,000,000,000	2.42%
11	Iraq	Asia	3,170,000,000,000	1.70%
12	Indonesia	Asia	3,001,000,000,000	1.61%
13	China	Asia	2,460,000,000,000	1.32%
14	Kazakhstan	Asia	2,407,000,000,000	1.29%
15	Malaysia	Asia	2,350,000,000,000	1.26%
16	Norway	Europe	2,313,000,000,000	1.24%
17	Azerbaijan	Asia	2,000,000,000,000	1.07%
18	Uzbekistan	Asia	1,841,000,000,000	0.99%
19	Kuwait	Asia	1,794,000,000,000	0.96%
20	Egypt	Africa	1,656,000,000,000	0.89%
21	Canada	North America	1,640,000,000,000	0.88%
22	Libya	Africa	1,540,000,000,000	0.83%
23	Netherlands	Europe	1,346,000,000,000	0.72%
24	Ukraine	Europe	1,104,000,000,000	0.59%
25	India	Asia	1,075,000,000,000	0.58%
26	Pakistan	Asia	885,300,000,000	0.48%
27	Australia	Australia	849,500,000,000	0.46%
28	Oman	Asia	849,500,000,000	0.46%
29	Bolivia	South America	750,400,000,000	0.40%
30	Romania	Europe	630,000,000,000	0.34%
31	Vietnam	Asia	610,000,000,000	0.33%
32	Hungary	Europe	600,000,000,000	0.32%
33	Trinidad and Tobago	South America	531,500,000,000	0.29%
34	Yemen	Asia	478,500,000,000	0.26%
35	Argentina	South America	441,700,000,000	0.24%
36	Brunei	Asia	390,800,000,000	0.21%
37	Mexico	North America	372,700,000,000	0.20%
38	Brazil	South America	365,000,000,000	0.20%
39	United Kingdom	Europe	342,900,000,000	0.18%
40	Peru	South America	335,300,000,000	0.18%

Source: CIA World Factbook 2010

Annex O OPEC country proven reserves: 1980 to 2010

Year	Iran	Iraq	Kuwait	Saudi Arabia	UAE
1980	58.3	30.0	67.9	168.0	30.4
1981	57.0	32.0	67.7	167.9	32.2
1982	56.1	***59.0***	67.2	165.5	32.4
1983	55.3	65.0	67.0	168.8	32.3
1984	58.9	65.0	***92.7***	171.7	32.5
1985	59.0	65.0	92.5	171.5	33.0
1986	***92.9***	72.0	94.5	169.7	***97.2***
1987	92.9	***100.0***	94.5	169.6	98.1
1988	92.9	100.0	94.5	***255.0***	98.1
1989	92.9	100.0	97.1	260.1	98.1
1990	92.9	100.0	97.0	260.3	98.1
1991	92.9	100.0	96.5	260.9	98.1
1992	92.9	100.0	96.5	261.2	98.1
1993	92.9	100.0	96.5	261.4	98.1
1994	94.3	100.0	96.5	261.4	98.1
1995	93.7	100.0	96.5	261.5	98.1
1996	92.6	***112.0***	96.5	261.4	97.8
1997	92.6	112.5	96.5	261.5	97.8
1998	93.7	112.5	96.5	261.5	97.8
1999	93.1	112.5	96.5	262.8	97.8
2000	99.5	112.5	96.5	262.8	97.8
2001	99.1	115.0	96.5	262.7	97.8
2002	***130.7***	115.0	96.5	262.8	97.8
2003	133.3	115.0	99.0	262.7	97.8
2004	132.7	115.0	101.5	264.3	97.8
2005	137.5	115.0	101.5	264.2	97.8
2006	138.4	115.0	101.5	264.3	97.8
2007	138.2	115.0	101.5	264.2	97.8
2008	137.6	115.0	101.5	264.1	97.8
2009	137.6	115.0	101.5	264.6	97.8
2010	***150.3***	***143.1***	101.5	264.6	97.8

Source: BP Statistical Review of World Energy, June 2010

*Figures marked in red indicate sizable, unverified increases

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