CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES
NSP 1 - PSN 1

Oil and Security

IMPLICATIONS FOR THE FUTURE

By/par

Lieutenant-Colonel A.D. Meinzinger

15 May 2009

ABSTRACT

This paper addresses a new and emerging theory of security related to the Malthusian idea that scarcity of oil can set the conditions for conflict. The non-renewable resource of oil has attracted a great deal of attention by scholars and security advocates because of the degree to which its increasing scarcity is fostering insecurity around the globe. The world is expected to face an 'energy crunch' in terms of the anticipated imbalance in the supply and demand for world oil, and there are a host of security implications associated with this reality. In this paper it will be demonstrated that the anticipated supply and demand imbalance of oil has the very real potential to create elevated levels of instability, insecurity and conflict globally, due to a host of related security concerns. To address these security realities, many states are pursuing energy security policies to ensure that they have either secure access to oil or an ability to transport oil through the complex oil distribution network. The central argument of this paper proposes that, in order to reduce the propensity for conflict, global powers, working through international organizations, must devise policies and strategies through a more coordinated and cooperative approach to this strategic resource. Collective energy security concepts and approaches must be established. Canada is uniquely positioned to play a leadership role in advocating such an approach given its abundance of oil resources, relationship with the U.S. and influence on the international stage.

> That conflict over oil will erupt in the years ahead is almost a foregone conclusion. Just how much violence, at what levels of intensity, and at which locations, cannot be determined.[1]

INTRODUCTION

Contemporary security assessments highlight countless new and evolving complexities for the current global security landscape, which are multi-facetted and interconnected. This diverse and complicated security landscape presents challenges to both military and non-military players across inter-state, intra-state and transnational boundaries.[2] Not only has this new security landscape presented many challenges for 21st century nation states, it has also served to broaden the conception and scope of security, deepening the field of study while exposing it to much greater scrutiny.[3] Since the end of the Cold War, scholars and academics have taken a much more inclusive approach to defining security issues. This is reflected in the development of the ideas of human security where much greater emphasis is placed on the security of individuals within nation states. This more holistic approach to security has served to stretch the bounds of the security field, thereby providing security policy-makers greater depth of understanding and appreciation of the more complex global environment.

This paper addresses one such example of a new and emerging theory of security related to the Malthusian idea that scarcity of resources can set the conditions for conflict. While Thomas Malthus' theory focussed on the relationship between population and food

---

[1] Michael T. Klare, *Resource Wars* (New York: Metropolitan Books, 2001), 29.
[2] Michael E. Brown "New Global Dangers," Brown, Michael. "New Global Dangers." in *Leashing the Dogs of War: Conflict Management in a Divided World*, ed. Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 39-52 (Washington: United States Institute of Peace Press, 2007), 45.
[3] Nils Petter Gleditsch "Environmental Change, Security, and Conflict," in *Leashing the Dogs of War: Conflict Management in a Divided World*, ed. by Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 177-196 (Washington D.C: United States Institute of Peace Press, 2007), 177.

supply, Neo-Malthusian scholars have expanded this idea to address a broader range of resources.[4] It was highlighted in the opening quote that the non-renewable resource of oil has attracted a great deal of attention by scholars and security advocates because of the degree to which its increasing scarcity is fostering insecurity around the globe. The world is expected to face an "energy crunch" in terms of the anticipated imbalance in the supply and demand for world oil. As a result, there are a host of security implications associated with this reality as the propensity for both rent seeking by producers and assured access and supply by consumers is increased. This latter reality is re-shaping geo-political relationships as emerging powers scramble to secure resources as an element of their respective vital national interests and a component of indigenous energy security policies. It is possible to assume that, in the future, a state's ability to keep its economy functioning and have influence in the world may be more strongly correlated to its ability to "insulate its economy from oil shocks" than to its military strength.[5]

It is evident that traditional concerns over oil were viewed through the geopolitical lens of global security interactions between producer and consumer states. Today, energy security must be viewed in a much broader context for reasons such as the multiple opportunities afforded to terrorist action across the entire industry network from production, to transport and consumption. The capturing of an oil super tanker by Somali pirates off the eastern coast of Africa in 2008 exemplifies both the vulnerability of the current offshore distribution channels and the emerging nature of global asymmetric threats.[6] Attacks against Canadian gas pipelines in the same year are equally troubling.[7]

---

[4] *Ibid*., 178.
[5] Nader Elhefnawy, "The Impending Oil Shock," *Survival* 50, no. 2 (April-May 2008): 55.
[6] This brazen attack in October 2008 has been followed by continued acts of piracy resulting in increased levels of anti-piracy measures by the international community.

Greater concern must also be directed to the level of instability existing in certain key producing areas of the world today, as localized conflict between an array of state and non-state actors has the potential to disrupt the flow of oil within the international distribution system. The row between Russia and the Ukraine in January 2009 over gas payments and the concomitant impact on the European Union's flow of gas is another example of how energy will continue to play a larger role within the global commons.[8]

In this paper it will be demonstrated that the anticipated supply and demand imbalance of oil has the very real potential to create elevated levels of instability, insecurity and conflict globally, due to a host of related security concerns. The potential for these conditions to be aggravated may be caused by nations scrambling to secure access to energy resources in order to meet future needs or from intra-state violence. This possibility has been considered one of the "most alarming prospects"[9] in today's geo-political arena. The finite nature of oil as a non-renewable resource means that, to avoid potential "new oil wars",[10] the global community must come together in order to establish greater coordination and trust. The central argument of this paper proposes that, in order to reduce the propensity for conflict, global powers, working through international organizations, must devise policies and strategies through a more coordinated and cooperative approach to this strategic resource. Collective energy

---

[7] Three separate explosions were detonated against EnCana gas pipelines in British Columbia in October 2008.

[8] CBC News On-line, "EU demands speedy end to Russia-Ukraine gas spat," 6 January 2009, http://www.cbc.ca/mobile/text/story_news-world html?/ept/html/story/2009/01/06/gazprom-cuts.html; Internet; accessed 15 March 2009.

[9] James Russell, "The Militarization of Energy Security," Speech delivered to the Energy Forum: "The Global Energy Market: Comprehensive Strategies to Meet Geopolitical and Financial Risks," at the James A. Baker Institute for Public Policy, Rice University, May 21, 2008. http://www rice.edu/energy/publications/eventpres/21may08globalenergymkt/Russell_Militarization%20Talk.pdf; Internet; accessed 3 January 2009.

[10] Mary Kaldor, Terry Lynn Karl and Yahia Said, *Oil Wars* (London: Pluto Press, 2007), 4.

security concepts and approaches must be established. If consuming nations such as the United States (U.S.), China, India and others can combine to use their monopsonistic influence over supplier nations, it is expected that a more integrated approach to global energy security policy can be established.[11] This will require greater international security coordination, common pursuit of alternate energy sources and more collaboration. If achieved, the pending energy crunch may well serve to strengthen relations between global energy players.

By virtue of the evolving oil market and current global landscape, energy security must be viewed in a more encompassing fashion to include embedding energy security approaches into the larger relationships and interdependencies of nations.[12] If a greater understanding and recognition of the needs of the broader international community is fostered, a more effective level of mutual interdependence can be established. We should then see a diminishment in the re-emergence of "petro-diplomacy"[13], wherein national ownership of energy resources is used to leverage foreign policy and other objectives. Canada is uniquely positioned to play a leadership role in advocating such an approach given its abundance of oil resources, relationship with the U.S. and influence on the international stage.

As a relatively new field within security literature, Section 1 of the research paper will serve to highlight the pertinent theory that exists in describing how depletable resources, such as oil, can contribute to global insecurity. In order to situate this review,

---

[11] Amy Myers Jaffe, "The United States and the International Energy Barrier," in *A Strategy for American Power: Energy, Climate and National* Security, ed. Sharon Burke and Christine Parthemore, 77-96 (Washington: Center for a New American Security, June 2008), 85.

[12] Daniel Yergin, "Foreign Policy and National Security Implications of oil Dependence," Statement of Daniel Yergin Chairman, Cambridge Energy Research Associates to the Committee on Foreign Affairs US House of Representatives, 22 March 2007, 2.

[13] See Department of Foreign Affairs Industry and Trade (DFAIT) web-site. http://www.international.gc.ca/enviro/energy-energie/energy_security-securite_energitique.aspx?lang=eng.

two brief examples from the 20th century that exemplify how securing access to oil contributed to the pattern of conflict during World War II will be proffered. The remainder of Section 1 will highlight the salient elements from the current body of security literature, which speaks to how resource scarcity can contribute to conflict. Section 1 will conclude with a review of the definition of energy security. Given the lack of consensus with respect to this field, a workable definition will be proposed that encapsulates the many determinant variables in this assessment and places the concept within an international versus domestic framework. In order to situate the nature and scope of the future security challenges brought about by a global energy crunch, Section 2 will outline the current economic reality with respect to oil as a strategic resource. This assessment will outline an overview of the supply and demand aspects of oil within the global marketplace to include an appreciation for the considerations and debates surrounding the "Peak Oil" theory. Structural elements within the industry will be highlighted as a backdrop to better understanding the main stake-holders within the industry and some of the current industry characteristics. This snapshot of the economic reality of oil endeavours to disentangle the various drivers that will influence the future security environment. Mindful of the rapidly evolving geopolitical connections associated with both the scramble to secure oil resources by consumers and the relatively unstable nature of producer states, Section 3 will highlight the specific security issues that will require close management moving forward into the 21st century. The last section of this paper will articulate a number of policy initiatives that must be considered in order to manage more effectively the growing security risks and tensions that will arise as oil

scarcity grows. At the end of the day, future conflict and instability will be minimized only by adopting collaborative and collective approaches to the many issues at hand.

SECTION 1 – THE THEORY OF OIL AS A SOURCE OF CONFLICT

Oil has held a mythical status globally since it was uncovered well over one hundred years ago. Not surprisingly, as a resource of strategic importance, access to this key element, like other sources of energy and minerals, is fundamental to a nation's strength and prosperity. Viewing this issue through the lens of a realist, it is evident that access to oil is critical to guaranteeing that national power is maximized. Energy security in general and oil security specifically are thus of fundamental strategic importance to nation states, given that "no single strategic resource rivals the centrality of oil to ceaselessly running the capitalist mode of production".[14]

As underscored within contemporary 'systems thinking' literature, it is essential that one use historical context as an aid in unravelling and defining strategies for managing future challenges. If one is to gain a better understanding of the relevance of oil to global security, one need only consider the specific actions of select World War II protagonist countries to appreciate the criticality of the resource.

It was not until the British decided to convert their warships from coal to oil propulsion in 1912 that oil became viewed as a central input into military power.[15] This decision was a watershed moment for the British, who, after having decided to transform the propulsion methods of their warships, needed to secure rights to vast oil reserves within the Middle East. This effort was accomplished through the securing of access

[14] Okbazghi Yohannes, "America's New Frontier: Oil in the Gulf of Guinea," *The Black Scholar* 33, no.2 (2003): 2.
[15] Michael T. Klare, Resource *Wars*…, 29-30.

rights through a purchase of majority position in the Anglo-Persian Oil Company.[16] Henceforth, the government became responsible for ensuring the security of this energy source. With the introduction of combat vehicles such as the tank, aircraft and other logistical vehicles towards the end of the World War I, all requiring gasoline to operate, the relevance of oil as a strategic commodity gained prominence within military strategic planning circles.[17] As oil becomes crucial to the entire military capacity of a nation, it follows that, being denied access to oil was a key planning factor during the latter part of World War I as a means of dislocating the enemy in battle. It was the early lessons of World War I which would shape the strategic thinking of oil as a central element in a number of the battles of World War II.

During World War II, Hitler remained focussed on either securing access to oil reserves or denying the allies access to oil through his U-boat campaign. In 1941, Hitler's efforts during Operation Barbarossa were directed an attack against the Soviet Union with three million troops.[18] His strategic objective was seizing oil fields at Baku (later renamed Azerbaijan).[19] While Hitler coveted these oil supplies, his operation led to an over-stretching of the German army as they faced a stubborn Soviet opponent, resulting in his eventual defeat. Earlier in the war, oil also played a significant role in the actions of both the Japanese and Americans. In order to ensure access to oil, Japan undertook detailed planning efforts to attack the East Indies in order to reduce Japanese vulnerability related to a lack of domestic oil to fuel their war effort. The U.S. moved its fleet to Pearl Harbour out of concern over anticipated Japanese intentions to move against

[16] *Ibid*., 30.
[17] Lita Epstein, C.D. Jaco and Julianne C. Iwerson-Neimann, *The Complete Idiots Guide to the Politics of Oil* (New York: Alpha Books, 2003), 142.
[18] *Ibid*., 144.
[19] Michael T. Klare, *Resource Wars*…, 31.

oil interests in the East Indies. On December 7th, 1941, the Japanese executed a surprise attack on Pearl Harbour in order to destroy the U.S. naval assets positioned within the harbour. Their objective was to remove U.S. capabilities to counter their move against the East Indies. While horrifically devastating for the U.S. in terms of loss of life and naval capability, the sudden and surprise attack drew the Americans squarely into WW II. Later U.S. naval efforts were directed at picketing mainland Japan and starving them of precious oil resources. The lesson related to the fundamental importance of oil access was solidly ingrained in those nations dependant on foreign sources. This global recognition initiated U.S. post war influence peddling and the "oil for protection agreement"[20] in the Middle East region to deter possible Soviet access.[21]

The brief examples from WW I and WW II serve to inform present day decision-makers as to the importance of oil as a strategic commodity, considering its linkages to national power in fuelling military and economic might. Pundits of U.S. foreign policy and military engagement in the Middle East often cite the underlying objective of maintaining a grasp on oil reserves as the cornerstone element to engagement. The historical examples cited also reinforce a nation's willingness to expend and risk blood and treasure to secure access to this essential commodity as a necessary means to achieving a military and political end-state. It was from these lessons that were born the musings as to how oil, as a depletable resource, may be more directly linked to conflict and war. Can conflict be the direct result of oil? The remainder of Section 1 will seek to unravel these theoretical musings that attempt to uncover the various cause and effect relationships in play.

[20] Michael T. Klare, *Blood and Oil* (New York: Metropolitan Books, 2004), xiii.
[21] Michael T. Klare, *Resource Wars*…, 31.

A very broad and rich body of literature exists within which many authors have attempted to draw inferences and theories as to how resource scarcity has contributed to contemporary conflicts. These theories have been largely developed over the latter part of the 20th century and have contributed to the ever-growing body of security literature. Episodes of inter-state conflict having diminished, much of this recent analysis has focussed on developed and developing nations where conditions have resulted in higher levels of intra-state conflict. Much of the early theorizing as to how resources may lead to conflicts was derived from the early writings of Thomas Malthus who proposed a theory that an accelerating population would outstrip the global food supply which only grows at a linear rate.[22] This notion of how resource scarcity can contribute to global frictions has been broadened under the umbrella of the Neo-Malthusians to include a much wider view of resources such as water and strategic resources. One such Neo-Malthusian writer of acclaim is Thomas Homer-Dixon and he has outlined a theory of conflict, dubbed the "green war", which relates to how environmental scarcity leads to conflict.[23]

In simple terms, Homer-Dixon theorized that a growing scarcity of resources leads to conflict, a reality that is more probable in poorer countries that are less able to manage the consequences of scarcities.[24] He outlines three interesting facets of environmental scarcity in his analysis, namely "supply-induced scarcity" brought about by a depletion of a resource, "demand-induced scarcity" brought about by population growth and an associated elevation in global requirements and "structural scarcity" which

[22] Nils Petter Gleditsch, *Environmental Change, Security, and Conflict*…, 178.
[23] Francis Stewart and Graham Brown, "Motivations for Conflict: Groups and Individuals," in *Leashing the Dogs of War: Conflict Management in a Divided World*, ed. Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 219-244 (Washington D.C., United States Institute of Peace Press, 2007), 227.
[24] Thomas Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," *International Security*, 16, no. 2 (Fall 1991): 76.

addresses the uneven distribution of a resource between global players.[25] While roundly criticized, the theories and ideas of Homer-Dixon have served as the foundational background for the study of oil as a contributor to both state and internal conflict.[26]

Michael Klare has added a great deal to the discussions of oil and conflict, authoring two acclaimed books on the subject. Attributed with coining the term "resource wars" in his first book, he argues that given a growing global population, demand for key resources is becoming "insatiable".[27] He notes that rapid industrialization is also elevating the per capita demand for resources. What makes this reality problematic is the associated supply depletion of some of the key resources under demand (e.g. oil, water, land and minerals) and the market's inability to adjust to these depletions.[28] He predicts oil is the global resource of greatest concern. As prices for scarce commodities inevitably rise, resources may be seized, leading to conflict and criminal activity. In his analysis Klare outlines a third concern relating to the potential frictions that will arise in situations where depletable supplies are either contested or shared between countries. He refers to this conflict accelerant as "proliferation of ownership contests".[29] In Klare's view, it is the combination of politics, supply and demand consideration and geography, which are the key factors that are at play in determining the propensity for future conflict over oil.

Kaldor et al. in a recent examination of six specific conflicts, argue that oil can not only lead to conflict at the inter-state level due to geopolitical factors within consuming states pursuing national interest agendas, but that oil can also lead to internal

---

[25] Thomas Homer-Dixon, *Environment, Scarcity, and Violence* (New Jersey: Princeton University Press, 2001), 48.
[26] See Nils Petter Gleditsch, "Armed Conflict and the Environment: A Critique of the Literature," *Journal of Peace Research* 35, no. 3 (May 1998):381-400.
[27] Michael T. Klare, *Resource Wars*…, 15.
[28] *Ibid*., 20.
[29] *Ibid*., 23.

dynamics related to greed of both government and non-state actors.[30] They highlight as well the idea of the "petro-state dynamic", which sees an over-dependence on oil revenues leading to internal tensions because ineffective incentives exist for the equitable distribution of oil rents within society. Countries such as Russia and Venezuela serve as good examples of this notion.

In examining internal conflict, other authors, such as Collier, have concluded that singularly resource rich countries that derive a large percentage of gross domestic product (GDP) from a commodity such as oil are more prone to conflict.[31] Consequently, oil may be viewed by some as a curse that leads to a "witches brew for internal political violence".[32] Some have suggested that the oil curse in developing countries is akin to 'Dutch disease', which denotes that large exporting of a given commodity can drive up exchange rates and therefore induce a deleterious effect on the other elements of the economy. This is, however, only a portion of the reality. The oil curse also institutionalizes inefficiency and diminishes investment in other areas.[33] Burrows provides concrete example of this phenomenon, indicating in his study that thirty-four less developed countries (LDCs) earn more than 30% of GDP from energy exports.[34] In order to contextualize the resource curse reality, Collier outlines a series of factors that must be considered when viewing countries through the prism of resource abundance.

---

[30] Mary Kaldor, Terry Lynn Karl and Yahia Said, *Oil Wars*…, 20.
[31] Paul Collier, "Economic Causes of Conflict and Their Implications for Policy," in *Leashing the Dogs of War: Conflict Management in a Divided World*, ed. Chester A. Crocker, Fen Osler Hampson, and Pamela Aall, 197-218 (Washington: United States Institute of Peace Press, 2007): 201.
[32] Michael Mihalka, "Is the Sky Falling? Energy Security and Transnational Terrorism," *Strategic Insights* July 2008, Centre for Contemporary Conflict. http://www.ccc nps.navy.mil/si/2008/Jul/mihalkaJul08.pdf; Internet; accessed 3 January 2009.
[33] Mathew Burrows and Gregory F. Treverton, "A Strategic View of Energy Futures," *Survival* 49, no. 3 (Autumn 2007): 84. For in depth research into the energy resource curse see Samuel R. Schubert, "Being rich in energy resources – a blessing or a curse," Directorate-General for External Policies of the Union, European Government, 31 Jan 2007, http://mpra.ub.uni-muenchen.de/10108/; Internet; accessed 3 January 2009.
[34] *Ibid*., 84.

These include history of conflict, political structures and religious diversity.[35] The discussion generated by Collier's work has lead to a broad debate as to what degree resource rich countries will negatively affect global security conditions. Since developed nations are better able to manage resource scarcities as a consequence of wealth and more mature governance structures, much attention has been paid to the "new oil wars"[36] that have occurred around the globe within developing nations. This effort aims to inform policy-makers as to what point intervention may be beneficial when conditions appear headed towards conflict and are linked to the ideas underpinning the United Nations 'Right to Protect' protocol.[37]

While the theoretical discussion within the literature covers the spectrum of conflict from inter-state to intra-state, it is evident that the various perspectives do assist policy-makers in better understanding some of the cause and effect linkages at play. This is perhaps the most important lesson that can be drawn from the theoretical ideas that underpin many of the stated concepts and conflict models, given that they assist policy-makers in better understanding how oil can lead or contribute to insecurity.

ENERGY SECURITY

> …the subject now needs to be rethought, for what has been the paradigm of energy security for the past three decades is too limited and must be expanded to include many new factors. Moreover, it must be recognized that energy security does not stand by itself but is lodged in the larger relations among nations and how they interact with one another.[38]

---

[35] Paul Collier, *Economic Causes of Conflict and Their Implications for Policy*…, 201.
[36] Mary Kaldor, Terry Lynn Karl and Yahia Said. *Oil Wars*…, 4.
[37] Right to Protect is linked to international humanitarian intervention into another state when the rights of citizens are threatened. See the International Commission on Intervention and State Sovereignty official web-site. http://www.iciss.ca/menu-en.asp.
[38] Daniel Yergin, "Ensuring Energy Security," *Foreign Affairs* 85, no.2 (March/April 2006): 69.

Taking into consideration the aforementioned theoretical development on how oil may serve as an accelerant for conflict, the term 'energy security' has gained much more prominence within both governmental and academic policy circles around the world. Recent tensions between the European Union and Russia over gas supplies serve as a case in point. There is, however, very little consensus within the literature as to a commonly accepted definition of energy security. As highlighted in the quote above by Daniel Yergin, there is a need to capture the broader elements and principles that constitute energy security. Over the last fifty years, the definition has evolved because of changes in the nature of the global oil market and geopolitical circumstances. Consequently, definitions of energy security have captured a host of elements and concepts within the security realm. Establishing an internationally agreed upon definition of energy security is an essential first step towards better outlining the key considerations at play of both producer and consumer nations. A clear definition can then serve as a unifying concept towards progressing to a more secure and stable international environment through cooperation and collaboration.

Earlier definitions of energy security focussed on aspects of military preparedness which considered the need to stockpile oil reserves to fuel primarily naval capabilities as described previously.[39] By the late 1950s, with oil prices declining, energy security measures within the U.S. were undertaken to limit the level of imports.[40] These protectionist trade measures were put in place to ensure producing nations could maximize the benefits derived from domestically produced or domestically owned energy

[39] Douglas R. Bohi and Michale A. Toman, *The Economics of Energy Security*, (Boston: Kluwer Academic Publishers, 1996), 3.
[40] *Ibid*., 3.

sources by maintaining a solid return to producers.[41] These measures remained in place until the oil embargo imposed by the Organization of Petroleum Export Countries (OPEC) in 1973, when energy security within the west became synonymous with policies which sought to reduce dependence and vulnerabilities on global oil sources. The call within the U.S. was for investments in alternative fuel sources while also implementing the famous 'double nickel' (60 miles per hour to 55 miles per hour) speed limit to lessen overall domestic consumption. The articulation of the Carter doctrine in January 1980 was the first official U.S. energy security policy, emblematic of the concerns of the day.

> Let our position be absolutely clear: An attempt by an outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force.[42]

When the memory of the OPEC embargo faded, energy security took on more of an economic reality for western nations, who were focussed on oil prices and concerns over temporary supply disruptions. The discussions around energy security were more about price stability as an input into overall economic activity and development. This was an essential consideration as the West struggled to pull their economies out of recession.[43] Thus economic welfare became the central element within energy security discussions. In fact, this focus led to the creation of the Strategic Petroleum Reserve (SPR) as a buffer against supply disruptions and related price increases. More recently, energy security has been re-framed to re-introduce concerns over dependency or

---

[41] Amy Myer Jaffe and Ronald Soligo, "Militarization of Energy – Geopolitical Threats to the World Energy System," James A. Baker III Institute for Public Policy Rice University, Working Paper Series: The Global Energy Market: Strategies to Meet Geopolitical and Financial Risk, May 2008, 39. http://www rice.edu/energy/publications/WorkingPapers/IEEJMilitarization.pdf; Internet; accessed 3 January 2009.

[42] Michael T. Klare "Energy Security." in *Security Studies*, ed. Paul D. Williams, 483-496 (London: Routledge Press, 2008), 487.

[43] Douglas R. Bohi and Michale A. Toman, *The Economics of Energy Security*…, 2.

vulnerability on foreign sources of oil because of the nature and instability surrounding the majority of world oil suppliers. The dependence is seen to hamstring foreign policy makers who must cow-tow to producers due to over-riding energy security concerns. With the rise in terrorism since 9/11, energy security has also been understood to include the multitude of physical security elements that are required to provide physical protection from attack or vandalism around the globe and ensure the safe transport of oil supplies by sea.

Upon reviewing the various themes and ideas encapsulated within the definitions, it becomes clear that energy security appears to be an evolutionary concept and is not a 'one size fits all' proposition. If energy security is in the eye of the beholder, it would seem appropriate to frame the definition based upon producer and consumer status, since these two realities are reflective of the international market. Thus, from a consumer perspective, issues of assured and safe supply of sufficient energy at reasonable prices would appear key considerations in constituting a definition of energy security. This notion implies unhindered delivery of energy.[44] A producer's focus is related to physical security aspects of indigenous supplies along with ensuring an adequate return on trade. Consumers are focussed on assuring security of demand and producers on security of supply, both aspects that will be considered in Section 3.[45] However, one must also ensure a contextual overlay is considered when comparing nations grouped as either a producer or consumer. This overlay must consider geographic location, historical pre-disposition and experiences, proportion of exposure to international markets, alliances and military strength. These geo-strategic factors will also drive security realities for a

[44] Michael T. Klare, *Energy Security*…, 485.
[45] Daniel Yergin, *Ensuring Energy Security*…, 71.

given nation. For instance, energy security for China must consider their required departure from an entrenched perspective of ensuring self-sufficiency – a reality beyond their reach given their rapid economic ascension. The EU, however, as a consumer is more fixed on reducing their collective dependency on gas resources from Russia through greater diversification, a reality that was once again reinforced during the most recent episode of conflict between Russia and the Ukraine.

In a recent attempt to postulate a workable energy security definition from the perspective of a global consumer and producer, Klare offers the following simple definition: "the assured delivery of adequate supplies of affordable energy to meet a state's vital requirements, even in times of international crisis or conflict."[46] From this definition, one can begin to deduce a number of fundamental elements of a state's energy security policy. These elements would include unhindered transportation of energy (e.g. protection, redundancy of transportation nodes, infrastructure networks, secure lines of communication), diversification of energy sources and energy options, minimized dependencies and vulnerabilities, foreign policy linkages and military dimension of security.[47] Recent literature is also placing emphasis on sustainable energy security, which addresses the need to ensure the externalities relating to the environment and conservation are considered.

The nuances of energy security then, will depend largely on the geopolitical, economic, social, environmental and trade-related circumstance of the country in question. Virtually all nations must ensure that they have access to energy while importing nations have additional concerns related to the above notions and elements.

[46] Michael T. Klare, *Energy Security*…, 484.
[47] *Ibid*., 485.

Canada's perspective seems to be in harmony with this idea. The Department of Foreign Affairs has outlined "how each actor defines its own energy security, the precise components and the policy challenges it faces depends to a large degree on the actor's position in the energy supply chain."[48]

Why then has energy security become such a topical area for discussion and gained such salience? First, it is acknowledged that all forms of energy, including oil specifically, are central to human society. The more developed a nation is, the greater will be the demand for energy to heat buildings, procure food, power transportation, factories and militaries and support continued industrialization. As Senator Lugar remarked, "oil is just not another commodity, it occupies a position of singular importance in the American economy and way of life".[49] In a monograph report following the OPEC crisis of 1973, the Stockholm International Peace Research Institute referred to "energy as the basic requirement for all human activity".[50] With the expectation that oil, as a non-renewable commodity, will eventually decline, and that continued industrialization will yield greater global demands for oil, consuming nations are logically inclined to adapt policies to ensure access to sources of energy.

Other dimensions have also served to elevate the focus on energy security of late. Daniel Yergin has argued that the dynamics of the market involving tighter supplies and volatile prices, make it imperative to renew the focus on energy security. In his testimony to Congress, Yergin avers that "the paradigm of energy security for the past three decades

---

[48] See DFAIT web-page. http://www.international.gc.ca/enviro/energy-energie/energy_security-securite_energitique.aspx?lang=eng.
[49] Richard Lugar, "High Costs of Crude: The New Currency of Foreign Policy," Opening Statement to U.S. Senate Foreign Relations Committee by Chairman, 16 November 2005. http://lugar.senate.gov/press/record.cfm?id=248836; Internet; accessed, 30 March 2009.
[50] Stockholm International Peace Research Institute (SIPRI), *Oil and Security* (New York: Humanities Press, 1974), 11.

is too limited and must be expanded to include many new factors…. recognized that energy security does not stand by itself but is lodged in the larger relations among nations and how they interact with one another." In other words, energy security cannot be separated from our relations with other countries. He specifies that energy security is of greater importance in today's climate of elevated concerns over terrorism, instability of market suppliers, geopolitical rivalries and the scramble for oil. The growing recognition that environmental security is linked to the insatiable appetite for fossil fuels also must be linked to energy security. Klare concludes that energy security is paramount today due to the anticipated decline in production, the shift in production patterns and the threats posed by terrorism. These elements will be highlighted within the following sections.

SECTION 2 – THE ECONOMICS OF OIL

In order to situate the nature and scope of the future security challenges brought about by a global energy crunch, this section will outline the current economic reality with respect to oil as a strategic resource. To provide a deeper understanding of the pressures that are being brought to bear because of the dwindling supply of oil, key market variables and theories related to the supply and demand patterns of oil will be outlined. This will include an overview of the principal global producers and consumers since an appreciation for the key producers and consumers of oil, both currently and into the future, is essential in order to project and define some of the related geopolitical security relationships and trends that are sure to come to the fore over the coming decades.

The structural elements of the oil industry will be examined, as it is these elements taken together that contribute to the imperfect nature of the oil market and that influence world prices. Section 2 will also examine additional characteristics of the oil market to include the impacts of recent volatility within the marketplace. As will be argued, both the propensity for reaching producer limits and the unpredictability of world prices, which have fallen by more than $100 per barrel since highs in the summer of 2008, will serve to impact risk management decisions of industry players. Moran and Russell believe that it is the potential failure of the free market regulation that may encourage consumer nations to militarize energy security through a number of possible means such as seizing territory or withholding supplies.[51] It will be shown that the indicators of market failure may be reflected in the global markets inability to provide stable and predictable prices. This observation is critical to the policy recommendations of Section 4.

SUPPLY AND DEMAND EQUALS PRICE

The study of the economics of oil is widespread, multi-dimensional and complex. Oil is now seen as a financial commodity which trades on the global futures market, so investment firms around the globe have an incentive to analyze the myriad of variables and factors that affect both the supply and demand for oil in hopes of predicting future prices and earning money through arbitrage. These efforts seek to disentangle the market variables at play in order to predict the movement of oil prices as a means of forecasting broader economic activity. As with the majority of commodities, economic theory

[51] Danial Moran and James A. Russell, "The Militarization of Energy Security," *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict.
http://www.ccc.nps navy mil/si/2008/Feb/moranFeb08.asp; Internet; accessed 3 January 2009.

suggests that supply and demand forces serve as regulating elements in the determination of world prices.

Figure 1 – World Oil prices

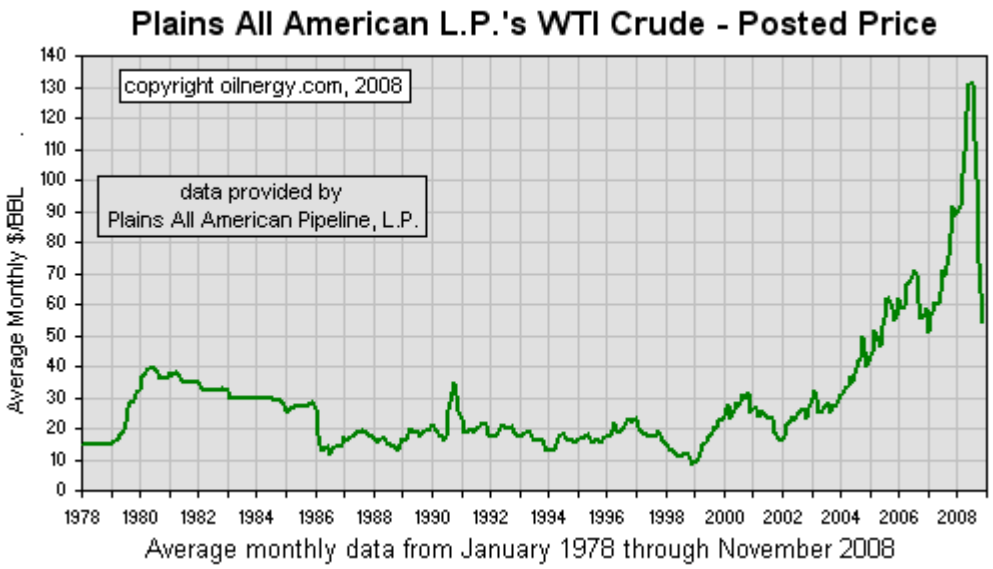


Figure 1 above outlines how world prices for oil have trended in various directions over the last decades. A number of events have driven the significant changes in world prices from the oil embargo of 1973 (not depicted) to lesser events in the 1990s. More recently, however, the world has experienced an unprecedented crash in world oil prices, where prices have fallen about sixty-seven percent in less than a six-month period.[52] Cohen stated aptly that there is simply "no historical analogue"[53] for this rapid decline in prices.

In a purely competitive market scenario, economic theory suggests that the allocation of goods is efficient, as the intersection of the supply and demand curve for a particular product generates market equilibrium. In the case of oil as a non-renewable

[52] Dave Cohen, "The Price is not Right," Peak Watch - Energy Bulletin, 17 December 2008. http://peakwatch.typepad.com/peak_watch/2008/12/the-price-is-not-right.html; Internet; accessed 5 February 2009.
[53] *Ibid*.

resource, it is essential to investigate the supply and demand components of the market as the principal determinants to world prices. In theory, ably predicting these two elements should make forecasting the future price of oil less challenging.

SUPPLY OF OIL

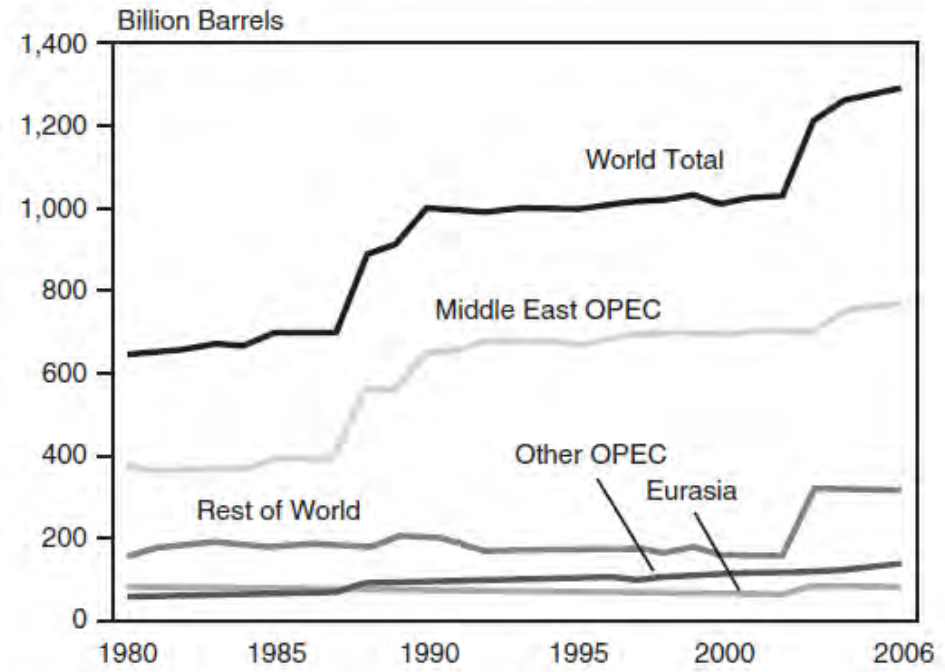
The global supply of oil can be viewed from two perspectives. The first relates to the level of reserves that are currently captured as an aggregate of exploration successes. The second perspective of global supply pertains to the daily production capacity. These two elements are examined below.

Conventional oil reserves are commonly referred to as 'in-place' resources. In order to be classified as reserves, the resource must meet four specific criteria. It must be discovered, recoverable, commercially viable and remain in the ground.[54] Oil reserves may be classified as possible, probable or proven, depending upon the probability of the resource being economically recoverable.[55] Proven reserves are considered to have a 90% chance of recovery while possible reserves only a 10% chance. Probable reserves are considered to have a 50% chance of recovery.[56] As commodity price and technology will determine how economic a given well or reservoir may be, statements as to global reserves must be examined with some caution. Figure 2 below demonstrates that current estimates of global proven reserves are approximately 1.3 trillion barrels of oil. This implies a 40 year supply of oil if projected demand estimates are correct.[57] The latest U.S. Geological Survey, published in 2000, indicates a level of reserves of over 3 trillion

[54] Stockholm International Peace Research Institute, *Oil and Security* (New York: Humanities Press, 1974), 67.
[55] Nader Elhefnawy, *The Impending Oil Shock*…, 37.
[56] *Ibid*., 37.
[57] International Energy Agency Official Web-site, World Energy Outlook 2008. See Key Graphs – Change in Oil Demand by region in the Reference Scenario, 2007-2030. http://www.worldenergyoutlook.org/; Internet; accessed 3 January 2009.

barrels of oil when lesser probable reserves are considered.[58] At an average consumption rate of 100-120 million barrels per day (MPD), the most optimistic reserve estimates imply a 90-year supply of oil. Adding unconventional oil reserves from sources such as the Canadian tar-sands may add another 90 years of oil supply.

Figure 2 – World Conventional Oil Reserves



Reprinted from DOE/EIA, International Energy Outlook 2006, 27.

From a structural perspective, it is critical to underscore the inherent unreliability of these estimates. While many western producers must comply with regulatory frameworks in articulating known resources, there is far greater latitude for either OPEC or African nations to over-state reserve levels owing to the relatively limited oversight of exploration successes.[59] In the case of OPEC, an elaborate formula determines quota

[58] United States, United States Geological Survey Official web-site. http://pubs.usgs.gov/dds/dds-060/ESpt4.html#Table; Internet; accessed 30 March 2009.

[59] See Daniel Yergin, "Using Energy as a Weapon," Statement of Daniel Yergin Chairman, Cambridge Energy Research Associates to the Committee on House Government Reform Subcommittee on Energy Policy, Natural Resources And Regulatory Affairs, May 16, 2006.

levels, which can lead to over-stating reserves, resulting in reserve totals being viewed with a large degree of scepticism.[60]

In terms of measuring the daily supply of oil to the market in order to meet short-term demand, one must consider the current global production capacity. In accordance with the Peak oil theory, originally espoused by Shell Oil geologist Marion Hubbert in 1956, oil well production increases rapidly in a bell-shaped curve, attains a peak at approximately the point where half of the oil has been extracted and then drops off quickly.[61] His model was used to predict with reasonable accuracy the peak in American oil production.[62] The aggregation of world oil production, therefore, yields a similar bell-shaped curve assessment of world productive capacity. This theory is based on the reality that global oil resources are finite and that much of current global oil production is being drawn from mature and aging oil fields that will eventually encounter significant declines in output. Hubbert notes that future production will have to come from remaining fields, which will need to be developed at much greater costs and are likely to be less efficient than the current fields under production. The latest information provided in the 2008 World Energy Outlook (WEO) confirms Hubbert's theory. The report indicates decline rates in oil fields increasing from 6.7% to 8.6 % per year by 2030 as production shifts to smaller oil fields with more pronounced decline rates.[63]

Hubbert's ideas received little attention until the late 1990s when two reputable geologists, Colin Campbell and Jean Laherrère, declared that increased consumption of oil was outpacing new reserve discoveries, which was leading to a peak of production by

[60] Michael T. Klare, *Resource Wars*…, 41.
[61] Amy Myers Jaffe and Ronald Soligo, *Militarization of Energy – Geopolitical Threats to the World Energy System*…, 9.
[62] Tom Whipple, "Peak Oil," *Bulletin of the Atomic Scientists* 64, no. 5 (Nov/Dec 2008): 34.
[63] International Energy Agency Official Web-site, *World Energy Outlook 2008*.

the turn of the century.[64] Since the ringing of that alarm bell, a debate has raged within academia and the oil industry ever since as to when and if a production peak is forthcoming over the short-term.[65] Some analysts have argued that the moment is upon us while others more optimistically suggest production will not peak for many decades. There is a remarkable dearth of literature with respect to Peak oil theory and a lack of clarity as to what the peak level for oil will be in terms of BPD. Until recently, the International Energy Agency (IEA), indicated world oil production would peak in approximately the 2030 timeframe.[66] Lately, amidst the meltdown in global oil prices, updated analysis by the IEA suggests world oil production will now peak in the 2020 timeframe.[67] Astoundingly, this latest projection represents a ten-year adjustment from the 2030 timeframe articulated only one month earlier.[68] The primary reasons for this altered analysis is related to the precipitous decline in both world oil price stability and in oil-field investment brought about by a collapse within the global credit market. The dislocation of the credit market has resulted in many previously planned investments in key supplier regions being cancelled or delayed indefinitely.[69] The large drop in oil prices has also caused previously assessed investments to no longer meet viability criteria. This point is best exemplified by referring to a recent survey of 200 oil companies which sought to determine their break-even cost per barrel of new production. The results indicate an increase from $18 per barrel in 1999 to $62 per barrel today.[70]

---

[64] Colin J. Campbell and Jean H. Laherrère, "The End of Cheap Oil." *Scientific America* (March 1998): 78.
[65] Tom Whipple, *Peak Oil*…, 35.
[66] International Energy Agency Official Web-site, *World Energy Outlook 2008*.
[67] Terry Macalister and George Monibiot, "Global oil supply will peak in 2020, says energy agency," The Guardian On-line, 15 December 2008. http://www.guardian.co.uk/business/2008/dec/15/global-oil-supply-peak-2020-prediction: Internet: accessed 5 February 2009.
[68] *Ibid*.
[69] *Ibid*.
[70] Dave Cohen, *The Price is not Right*.

Consequently, IEA has dramatically reduced global production projections to account for the decline in industry investment brought about by untenable capital investment opportunities. They have acknowledged the continued drawdown in easily accessible oil reserves at the expense of bringing on new sources of oil through exploration and investment. This current low price market reality will likely lead to consolidation within the oil industry as companies seek to establish better economies of scale to lower new production costs. An example of this is the buy-out of Petro-Canada by Suncor in Spring 2009.[71] This reality is also leading to greater international manoeuvring by consumer nations such as China who have capitalized on market conditions to exploit long-term purchase agreements in a scramble to secure a larger chunk of the dwindling supply of oil.

DEMAND FOR OIL

The second key micro-economic variable within the oil market is the demand for the commodity. In large measure, world demand for oil has increased steadily as economic development brought about by global industrialization has increased. Oil remains the pre-eminent source of global energy due to its flexible usage. It is required to meet electrical power generation needs, transportation and heating. Transportation demand is by far the largest element of global oil demand. As outlined at Figure 3, world demand analysis indicates that, in the absence of a fundamental change to current consumption patterns, world demand for oil will increase significantly over the coming

[71] CBC News Online, "Suncor, Petro-Canada Announce Merger," 23 March 2009. http://www.cbc.ca/money/story/2009/03/23/suncor-petro-canada-merge.html; Internet ; accessed 22 April 2009.

decades from a current consumption rate of 86 MBD to 104 MBD by 2030.[72] This projection is down from a recent figure of 116 MBD established in 2006. [73] In order to meet future demand projections and account for declining oil fields, a staggering 64 MBD of additional capacity, or six times the current Saudi Arabian production, must be brought on stream to meet future needs.[74] In order to portray the significance of current daily consumption levels, one simply needs to imagine a 1 mile square pool, 17 ft deep.[75] This represents the volume of daily oil consumption. Demand can also be quantified as equating to a consumption rate of 1000 barrels per second of non-renewable oil.

Figure 3 – World Oil Demand[76]

Table 3.1: **World Primary Oil Demand*** (million barrels per day)

	1980	2004	2005	2010	2015	2030	2005-2030**
OECD	**41.9**	**47.5**	**47.7**	**49.8**	**52.4**	**55.1**	**0.6%**
North America	21.0	24.8	24.9	26.3	28.2	30.8	0.9%
United States	*17.4*	*20.5*	*20.6*	*21.6*	*23.1*	*25.0*	*0.8%*
Canada	*2.1*	*2.3*	*2.3*	*2.5*	*2.6*	*2.8*	*0.8%*
Mexico	*1.4*	*2.0*	*2.1*	*2.2*	*2.4*	*3.1*	*1.6%*
Europe	14.7	14.5	14.4	14.9	15.4	15.4	0.2%
Pacific	6.2	8.2	8.3	8.6	8.8	8.9	0.3%
Transition economies	**8.9**	**4.3**	**4.3**	**4.7**	**5.0**	**5.7**	**1.1%**
Russia	n.a.	2.5	2.5	2.7	2.9	3.2	1.0%
Developing countries	**11.4**	**27.2**	**28.0**	**33.0**	**37.9**	**51.3**	**2.5%**
Developing Asia	4.4	14.2	14.6	17.7	20.6	29.7	2.9%
China	*1.9*	*6.5*	*6.6*	*8.4*	*10.0*	*15.3*	*3.4%*
India	*0.7*	*2.6*	*2.6*	*3.2*	*3.7*	*5.4*	*3.0%*
Indonesia	*0.4*	*1.3*	*1.3*	*1.4*	*1.5*	*2.3*	*2.4%*
Middle East	2.0	5.5	5.8	7.1	8.1	9.7	2.0%
Africa	1.4	2.6	2.7	3.1	3.5	4.9	2.4%
North Africa	*0.5*	*1.3*	*1.4*	*1.6*	*1.8*	*2.5*	*2.4%*
Latin America	3.5	4.8	4.9	5.1	5.6	7.0	1.5%
Brazil	*1.4*	*2.1*	*2.1*	*2.3*	*2.7*	*3.5*	*2.0%*
Int. marine bunkers	**2.2**	**3.6**	**3.6**	**3.8**	**3.9**	**4.3**	**0.6%**
World	**64.4**	**82.5**	**83.6**	**91.3**	**99.3**	**116.3**	**1.3%**
European Union	*n.a.*	*13.5*	*13.5*	*13.9*	*14.3*	*14.1*	*0.2%*

* Includes stock changes. ** Average annual growth rate.
n.a.: not available.

[72] International Energy Agency Official Web-site, *World Energy Outlook 2008*.
[73] United States, United States Joint Forces Command, *The Joint Operation Environment 2008 – Challenges and Implication for the Future Joint Force*. 25 November, 2008, 16. http://www.jfcom.mil/newslink/storyarchive/2008/pa121008.html; Internet; accessed 5 February 2009.
[74] International Energy Agency Official Web-site, *World Energy Outlook 2008*.
[75] Gregory J. Lengyel, "Department of Defense Energy Strategy – Teaching an old dog new tricks," Walker Paper #10 (Alabama: Air University Press, January 2008), 9.
[76] Graph from International Energy Agency Official Web-site, *World Energy Outlook 2006*, 86.

A large percentage of future demand growth will be a result of continued development and economic growth of nations such as China and India, who account for over 50% of future demand requirements. The most recent Joint Operational Environment assessment predicts world demand may outstrip world supply by 10 MBD by 2015.[77] The longevity of the current global recession will be a key determinant in extrapolating forward as to when exactly demand may begin to outstrip daily available supply. Both the severity and duration of the current global economic crisis are certain to provide some level of reprieve and may push the 2015 target timeline further into the future. Notwithstanding the current global slow-down in economic activity, on the demand side of the oil market it is anticipated that future demand pressures on a dwindling supply of reserves will lead invariably to tightening, pressures and turbulence in the oil market. In the medium term (2015 and beyond), the economics of the energy industry will surely lead to dramatic price increases, generating numerous macro-economic impacts globally. Any short-term or prolonged disruptions to the supply of oil will also serve to exacerbate these impacts.

Given the importance of oil prices to a multitude of investment decisions around the globe, a number of theorists have proposed long-term concepts relating to the market price for oil. One of the earliest such theories was purported by Harold Hotelling in 1931. In a seminal paper titled "*The Economics of Exhaustible Resources*", he argued that the price for oil should rise over time at a rate equivalent to the interest rate, as supplies of this non-renewable resource decrease, causing the inherent value of remaining oil to

[77] United States, *The Joint Operation Environment 2008 – Challenges and Implication for the Future Joint Force*…, 16.

increase.[78] According to his theory, the "in the ground value" of resource reserves should increase over time. Consumers can expect to pay an ever-increasing scarcity rent for oil into the future. Hotelling argued that producers are rational individuals who would produce oil if future oil prices were going to lag interest rates. In this case, producers have an incentive to maximize production and then place the proceeds of sales into a bank to earn the going rate. If producers assessed that prices would increase at a rate in excess of the market interest rate, then there is a disincentive to produce.

Noting that oil production occurs at a relatively sustained and regular rate, the theory indicates that the price for oil should move in relation to the interest rate. While this model appears sound from an economic theory perspective, reality has not proved it to be accurate. For instance, world oil prices have not reflected a predictable trend line in accordance with the tenets of the Hotelling pricing model. The model has been criticized on a number of other fronts. First, it is argued that future oil stocks are not known[79] and that the model fails to consider the introduction of alternate sources of substitutes.[80] Others have pointed out that the model fails to consider the rate of technological change and its influence on exploration and production costs. Through innovation, it is believed that producers should see marginal costs of production decline over time.[81] While the recent decline of oil prices suggests the theory is limited in its application, Hotelling's theory can be credited with commodity reserves being ascribed a value, a central element in today's industry market capitalization.

---

[78] Harold, Hotelling, "The Economics of Exhaustible Resources," *The Journal of Political Economy* 39, no.2 (April 1931): 141.
[79] Dave Cohen, "The Extraction of Exhaustible Resources," The Oil Drum, 4 January 2006. http://www.theoildrum.com/story/2006/1/2/19364/13876; Internet; Accessed 7 February 2009.
[80] Robert Stammers, "Oil As An Asset: Hotelling's Theory On Price," Investopedia, 13 October, 2008. http://www.investopedia.com/articles/financial-theory/08/hotelling-theory-price-oil.asp; Internet; Accessed 7 February 2009.
[81] *Ibid*.

In a more sobering assessment of future oil prices, Taylor and Van Doren have argued, "future direction of oil prices is unknown and unknowable".[82] They foresee that both the demand and supply elements of oil are inelastic over the short-term. Prices are therefore subject to myriad elements such as "weather patterns, labor relations, gross domestic product (GDP) reports, demographic trends, civil unrest and technological change in all sorts of disparate economic sectors".[83] Citing work undertaken by Professor Vaclav Smil of the University of Manitoba, Taylor and Doren conclude that predicting future oil prices is problematic at best. In an exhaustive analysis of energy forecasts by "academics, corporations, consultants, trade associations, government agencies" over the last 100 years, there has been "a manifest record of failure" and that one would require a "time machine" if one wished to accurately predict future prices.[84]

STRUCTURAL ASPECTS OF OIL MARKET

The global market for oil is unique in that the industry is represented by two international organizations that exist to further the interests of their respective constituencies. Both of these organizations were formed in the early 1960s as a means to leverage their respective buying/selling positions and have undergone very little transformation since inception. The Organization for Economic Development and Cooperation (OEDC) was formed in 1961 between western nations to ensure the free flow of oil globally.[85] To coordinate policy alignment between member states, the IEA

[82] Jerry Taylor and Peter Van Doren, "Random Oil," Forbes Magazine On-line, 4 September, 2008. http://www forbes.com/2008/09/04/oil-prices-forecast-oped-cx_jt_pv0904taylorvandoren.html; Internet; accessed 7 February 2009.
[83] *Ibid*.
[84] *Ibid*.
[85] Organization for Economic Cooperation and Development Official Web-site, http://www.oecd.org/pages/0,3417,en_36734052_36734103_1_1_1_1_1,00.html; Internet; accessed 7 February 2009.

was established in 1974 as an agency of the OEDC. The IEA endeavours to coordinate methods for the member nations to "reduce dependence on oil through energy conservation, development of alternative energy sources and energy research and development."[86] The IEA also attempts to act as the coordinating body between producer and consumer nations in order to ensure a stable trading environment, while also creating plans to insulate nations against supply shocks brought about by disruptions in the flow of oil. Measures put in place following the OPEC oil embargo remain in place today to ensure crisis management capability. At the end of July 2008, IEA countries held 4 billion barrels in reserve stocks equating to 150 days of net imports.[87]

The Organization of Petroleum Exporting Countries (OPEC) was established in 1960 with intent to manage and control oil production in such a way that a satisfactory world price for oil was maintained.[88] This oil cartel has grown from an initial group of five to a membership of twelve oil producers. The cartel attempts to regulate world oil prices through an elaborate quota system. The current mission of the cartel is:

> to coordinate and unify the petroleum policies of Member Countries and ensure the stabilization of oil markets in order to secure an efficient, economic and regular supply of petroleum to consumers, a steady income to producers and a fair return on capital to those investing in the petroleum industry.[89]

While it has proved challenging to enforce OPEC quotas within the oil cartel, OPEC has achieved success in regulating production since its inception. The relationship between OPEC and OEDC has been strained over the years due to allegations by OEDC

[86] International Energy Agency Official Web-site, About IEA. http://www.iea.org/; Internet; accessed 7 February 2009.
[87] International Energy Agency Official Web-site, "IEA Response System for Oil Supply Emergencies," December 2008, 7. http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1912; Internet; accessed 7 February 2009.
[88] Organization of the Petroleum Exporting Countries Official Web-site, http://www.opec.org/home/; Internet; accessed 7 February 2009.
[89] *Ibid*.

of unfair practices. In 1973, OPEC elected to use its producer power, cutting off oil supplies to the U.S. in retaliation for the American support of Israel in the Yom Kippur War. This embargo caused domestic fuel prices in the U.S. to quadruple and served as a watershed moment in terms of how oil may threaten a nation's well-being.[90] More recently, OPEC has threatened to reduce supply if there are no policies in place that favour alternate energy sources.[91] While the sharpness of the 1973 memory has faded, it instilled in the psyche of western nations, and in particular the U.S., the need to protect vital interests against producers using oil as a weapon. It convinced nations that they must reduce external dependence on oil. Sadly, actions have been slow to develop in addressing this reality. Any future efforts to coordinate a more balanced and secure market will require the support of OPEC.

The last structural aspect of the international oil industry worthy of highlighting relates to the increasing trend towards state controlled producers along with the anticipated growing importance of Middle East producers as the future central suppliers of oil. At present, state controlled oil enterprises control 80% of proven global oil reserves.[92] Private companies who produced about 40% of production in 2007 will see their share decline in the future.[93] As highlighted previously, in order to meet future oil demand, it is essential that oil companies continue to invest in exploration and development activities to ensure that newer fields are commissioned to meet future demands. Traditionally, this was not a concern within the oil industry as private companies reacted to the incentives provided via the market. Today, however, with the

[90] Tom Whipple, *Peak Oil…*, 34.
[91] Amy Myers Jaffe and Ronald Soligo, *Militarization of Energy – Geopolitical Threats to the World Energy System…*, 8.
[92] International Energy Agency Official Web-site, *World Energy Outlook 2008*.
[93] *Ibid*.

industry characterized by National Oil Companies (NOCs), the levels of investment are insufficient to maintain longer-term production. In response to higher oil prices over the last number of years, some governments have taken greater control over state oil companies, leading to a significant structural alteration to the oil market.[94] With NOCs in ascendency, this reality has introduced a significant imperfection into the global oil market. For instance, these NOCs are not necessarily as responsive to world requirements for a short-term burst in oil supply, choosing instead to limit supplies at times to maintain prices at a high level. As a $25 increase in oil prices reduces U.S. real income by 1%, it is evident that artificially high prices can impede economic growth in western nations.[95] By maintaining a higher price oil regime, some NOCs seek to accrue U.S. dollars, as these provide them with greater influence and leverage in global capital markets.

While NOCs may be slow to redress demand pressures in the market, as mentioned above, they are also considered inefficient in investing in capital and development activities. They are often slow to respond to market opportunities as compared with privately run corporations who remain accountable to shareholders. It is for this reason that some argue that the future energy crunch has more to do with geopolitics than geology.[96] Jaffe and Soligno point out that in order to meet future demand projections, the majority of future production will need to come from countries such as Saudi Arabia, Iran and Iraq along with other NOC sources. The OPEC will need to elevate production by 10-20 MPD in order to meet this demand.[97] Jaffe and Soligno

[94] *Ibid*.
[95] David Victor, "National Security Consequences of U.S. Oil Dependency," Council of Foreign Relations, Independent Task Force Report No. 58, 2006, 19.
[96] Amy Myers Jaffe and Ronald Soligo, *Militarization of Energy – Geopolitical Threats to the World Energy System*…, 9.
[97] *Ibid*.

note that the majority of reserves are held by NOCs. Unfortunately, many of these countries are exposed to civil unrest, corruption, inefficiency and competing demands for distribution of oil rents, so great concern exists as to whether these suppliers will be able to meet future production needs. Until NOCs appreciate that oilfield decline is the key determinant of investment needs, it is evident that a future supply shortage will materialize. In accordance with the latest World Energy Survey, the IEA estimates $6.3 trillion is required to fund investments for exploration, refining and shipping from 2007-2030.[98]

Investment in infrastructure such as refineries and exploration capabilities is even more pressing today that previously. Changes in environmental standards within many states mean that refineries must now meet more stringent sulphur emission standards, thus requiring major retrofits to current installations.[99] Added to this, many current oil refineries are incapable of processing heavier oil that is being sourced in much greater quantities. Ultimately, infrastructure investment is key to future supply capacity. In Michael Klare's latest book titled *Blood and Oil*, he closely examines the production capacity of the non Middle East producers. Referring to these states as the "Alternative Eight"[100], he notes that five of these countries have experienced civil war and ethnic conflict while the other three have witnessed political instability and disorder. In each example, he demonstrates how the distortion effect of oil rents within these countries has contributed to conflict and unrest. Investment in oil exploration and infrastructure within the nations is impacted. Thus, as a greater portion of world production is derived from

[98] International Energy Agency Official Web-site, *World Energy Outlook 2008.*
[99] David Victor, *National Security Consequences of U.S. Oil Dependency*…, 15.
[100] Michael T. Klare, *Blood and Oil*…, 126.

NOCs, the imperfection in future production certainty, due to the instability of producing states, is increased dramatically.

PRICE VOLATILITY AND SUPPLY BOTTLENECKS

Two other key structural elements of fundamental importance within the oil market relate to the recent volatility in oil prices and the greater possibility of short-term supply shortages due to growing demand.

Volatility in commodity prices is fundamentally reshaping the worldview as to what level of rationality may be brought to bear in predicting the future oil market. The unprecedented decline in oil prices in latter half of 2008 was not an event predicted by any oil prognosticators. In the face of this decline, OPEC has made statements that $75 per barrel is preferred, requiring an almost fifty percent increase in prices from current spring 2009 levels. The new reality of volatile prices has already impacted the risk assessment of global producers as they re-calibrate their risk-return models to account for the heightened levels of unpredictability. Referring to the point made previously, the propensity of both NOCs and western oil companies to make large investments in oil exploration or infrastructure has been greatly reduced as confidence in market prices is brought into greater incoherence.[101] This new reality is bringing into question whether oil is continuing to reflect the characteristic of "revision to the mean". This economic theory implies that, although there will be short-term changes to the market; a degree of predictability exists as to the general trend of market prices.[102] Further, during the recent

[101] Mathew Burrows and Gregory F. Treverton, "A Strategic View of Energy Futures," *Survival* 49, no. 3 (Autumn 2007): 80.
[102] James Russell, "The Militarization of Energy Security," Speech delivered to the Energy Forum: "The Global Energy Market: Comprehensive Strategies to Meet Geopolitical and Financial Risks," at the James A. Baker Institute for Public Policy, Rice University, May 21, 2008.

period of high prices, Russell argued that the oil market was no longer adhering to the "two iron laws of the marketplace".[103] He notes that rising prices have not reduced demand and stimulated greater supplies, and that there is no apparent revision of prices to historic norms. These two aberrations suggest that the market is no longer functioning properly, creating a world of haves and have-nots. He postulates that as countries realize the failure of the market mechanism, a greater impetus exists to use military force to control their destiny.

While short-term supply shortages are less of a concern during the current global recession, the first half of 2008 foreshadowed what is to become a certain reality once global demand resumes following the current economic cycle. Traditionally, global suppliers have been capable of ramping up production over the short-term to meet the demands of the world market. This was evident during the Gulf War in the early 1990s when producers were able to off-set the loss in Iraqi production without much difficulty thereby ensuring world oil prices would remain relatively stable. However, given the current production climate where investments in development and production have declined, a return to the early 2008 market reality would once again place the market under stress. As Luft indicated, "the oil market today resembles a car without shock absorbers: the tiniest bump on the road can send a passenger to the ceiling."[104] As supply flexibility diminishes, rapid price increase will be the only market method to re-establish price equilibrium. Yergin refers to the tightening of supplies as placing the world at an

---

http://www rice.edu/energy/publications/eventpres/21may08globalenergymkt/Russell_Militarization%20Talk.pdf; Internet; accessed 3 January 2009.

[103] *Ibid.*

[104] Gal Luft, "Dependence on Middle East energy and its impact on global security," Prepared by the Institute for the Analysis of Global Security.
http://www.iags.org/luft_dependence_on_middle_east_energy.pdf; Internet; accessed 31 Mar 2009, 7.

"historic juncture". He goes on to point out that "it is on that relatively narrow band of ``spare capacity`` that so much of the drama in world oil markets is playing out."[105]

SECTION 3 - SECURITY IMPLICATIONS

> Global dependence on oil is rapidly eroding U.S. power and influence because oil is a strategic commodity largely controlled by regressive governments and a cartel that raises prices and multiplies the rents that flow to oil producers. The rents have enriched and emboldened Iran, enabled President Vladimir Putin to undermine Russia's democracy, entrenched regressive autocrats in Africa, forestalled action against genocide in Sudan, and facilitated Venezuela's campaign against free trade in the Americas. Most gravely, oil consumers are in effect financing both sides of the war on terror.[106]
>
> The most important difference between North Korea and Iraq is that economically we just had no choice in Iraq. The country swims on a sea of oil.[107]

Mindful of the rapidly evolving geopolitical connections associated with both the scramble to secure oil resources by consumers and the relatively unstable nature of producer states, this section will highlight the specific security issues that will require close management moving forward into the 21st century. It will open with an overview of the current threats facing the global oil industry that have been brought about largely by religiously motivated terrorist networks and economically motivated pirates. Next, given the growing scarcity of oil, it will be argued that producing nations stand to benefit at the expense of consuming nations.[108] Some authors have framed this reality in labelling respective nations as "big winners" or "big losers".[109] Because oil is critical to industrial activity, it is hypothesized that the producing nations will gain greater advantage and influence internationally, effectively bringing about new geopolitical alignment and

---

[105] Daniel Yergin, *Using Energy as a Weapon.*
[106] John Deutch and James R. Schlesinger, "National Security Consequences of U.S. Oil Dependency," Council on Foreign Relations, Independent Task Force Report No. 58, 2006: 60.
[107] Mary Kaldor, Terry Lynn Karl and Yahia Said. *Oil Wars* (London: Pluto Press, 2007), 1
[108] Nader Elhefnawy, *The Impending Oil Shock*…, 43.
[109] Mathew Burrows and Gregory F. Treverton, *A Strategic View of Energy Futures*…, 79.

pressures between nations. As energy security becomes more prominent moving forward, these pressures will intensify and most certainly lead to security implications between producers and exporters. In order to highlight this reality, this section will consider the current geopolitical linkages associated with the American and Chinese interests in Africa as a growing producer of oil. Fundamental to this overview will be the understanding of the massive flow of capital that is occurring internationally in support of global oil trade. Section 3 will also outline the security impacts related to nations desiring to pursue alternate energy related to nuclear energy.

SECURITY CONCERNS

Security concerns over the approaching energy crunch due to a dwindling oil supply have been well articulated for years by both government agencies and civilian think tanks. In a 2003 look ahead by the Conflict Studies Research Centre, oil consumption growth was well articulated with stated concerns over the expected shifts in supplier-consumer relationships involving China's growing connection with the Middle East and other lesser producers. Concerns over the stability of the oil distribution network were also outlined.[110] In the most recent U.S. Joint Operational Environment assessment of the contemporary challenges facing the U.S., the issue of global energy is outlined as one of the key security challenges facing America. Painting a bleak picture with respect to future energy sources, this report underscores the limited investments being made in exploration and production and foreshadows the tensions that will arise between global

[110] C.J. Dick, *The Future of Conflict: Looking Out to 2020*, Report prepared for the Conflict Studies Research Centre. (Surrey: United Kingdom, April 2003), 8.

powers stating that, "the implications for future conflict are ominous".[111] The report calls for massive investment by the developed world into capital investment to ensure that production and refining capacity increase in order to smooth out the tension.

INTERNATIONAL OIL NETWORK

Prior to outlining a number of current vulnerabilities facing the global oil system, it is essential that one have a clear understanding of both the magnitude of inter-connections that make-up this international distribution system and the future focus. Within the U.S. context, there are more than "150 refineries, 4,000 offshore platforms, 160,000 miles of oil pipelines, and numerous facilities to handle 15 million barrels of oil a day of imports and exports".[112] This complex network is in place to ensure the movement of crude oil from regions of production to processing refineries. Crude oil from the Middle East will have traveled by tanker more than 16,000 kilometers prior to arriving in the U.S.. This "logistical ballet" is fundamental to the smooth functioning of the oil market.[113] Furthermore, these transportation linkages are tied to other critical infrastructure elements such as "power plants, airports, and military installations."[114]

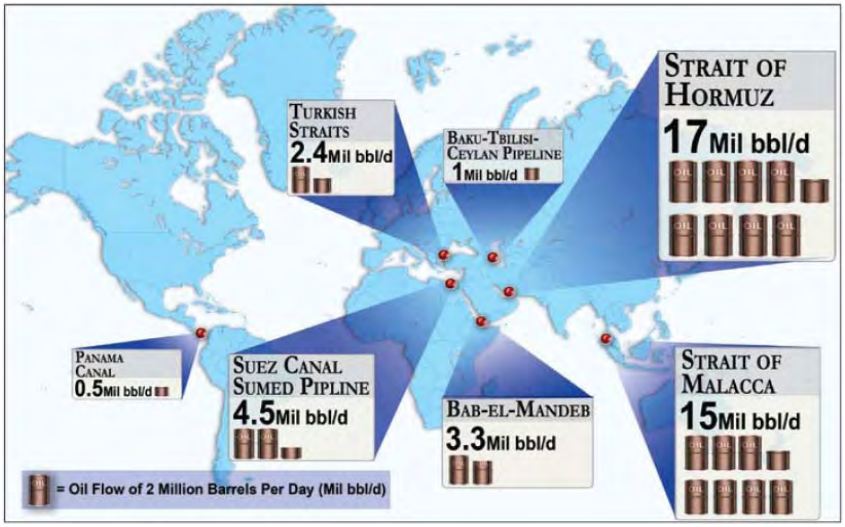
From a broader international perspective, though figures are not readily available, it is evident that there exists many times the amount of U.S. infrastructure in place to facilitate the movement of oil from point of extraction to ultimate user consumption. This infrastructure is located in some of the most remote areas of the globe and includes such equipment as pumping stations, power generators, pipelines, storage facilities, offshore

[111] United States, *The Joint Operation Environment 2008 – Challenges and Implication for the Future Joint Force*…, 16.
[112] Daniel Yergin, *Ensuring Energy Security*…, 78.
[113] Cheryl Trench, *How Pipelines Make the Oil Market Work – Their Networks, Operation and Regulation,* Memorandum Prepared for the Association of Oil Pipe Lines and the American Petroleum Institute's Pipeline Committee (New York: Allegro Energy Group, December 2001), 1.
[114] Gregory J. Lengyel, *Department of Defense Energy Strategy – Teaching an old dog new tricks*…, 21.

platforms, refinery complexes, super-tankers and trucks. At any given moment in time, tens of millions of barrels of oil are moving through the oil distribution network. Yergin has estimated that on any given day, approximately 40 million barrels of oil are moving within oil tankers, a number that is forecast to increase to 67 million barrels by 2020.[115]

Thus, by virtue of the expansive nature of the oil distribution network, there are myriad points of vulnerability across the system brought about by the location of the network or the significant convergence of resources within specific elements of the chain (e.g. within super-tankers or at major oil refinery stations). An additional critical security consideration within the system is the nature of the various choke points in shipping. Chart 1 below shows that over 30 MBD transit through two of the main transportation choke points, namely the straits of Hormuz and Malacca. Should these key areas be closed, secondary routing options would need to be implemented to include movement of oil via yet to be constructed pipelines. Until a workable alternative is in place, the overall distribution system presents a level of risk for the entire oil industry.

Chart 1 – World Oil Choke Points[116]



[115] Daniel Yergin, *Ensuring Energy Security*…, 79.
[116] United States, *The Joint Operation Environment 2008 – Challenges and Implication for the Future Joint Force*…, 18.

THREAT OF TERRORISM

The oil industry has a mature and robust approach to ensuring operational security and infrastructure security from such events as hurricanes and floods. However, the industry is less prepared to deal with the new threat to the oil distribution chain posed by terrorism. In part, this is the result of a fragile global energy infrastructure system that was built over 50 years ago and which was never designed to thwart 21st century terrorists and computer hackers.[117] Sensitivities to the threat of terrorism against energy systems have been in place for many years. In 1982, FEMA noted that, "covert paramilitary or nonmilitary attacks on key infrastructure are so cheap, safe and deniable that they prove a fatally attractive instrument of surrogate warfare."[118] Today, Steinhäusler has shown that the nature of the contemporary security threat is one that is complex and multi-dimensional. Security breaches may originate from company employees, "organized crime, pressure groups, cyber hackers, national and international terrorists."[119] These agents have a multitude of targets to choose from within the overall oil distribution system to include attacking networks, individuals, refineries and pipelines.[120] As the current global war on terrorism (GWOT) continues, it is important to highlight the particular security threat that terrorism plays, because of its potential to create havoc within the global oil industry. The GWOT is as much about injustices as it is about ridding the global commons of threats to the oil supply, especially as the U.S. struggles to expand access to foreign oil. It is for this reason that pundits have stated that

---

[117] Gregory J. Lengyel, *Department of Defense Energy Strategy – Teaching an old dog new tricks…*, 28.
[118] Stephen J. Randall, *United States Foreign Oil Policy Since World War I: For Profits and Security* 2nd ed. (Montreal & Kingston: McGill-Queen's University Press, 2005), 316.
[119] Friedrich Steinhäusler, James A. Russell and Danial Moran, "Introduction: Special Edition on Energy Security," *Strategic Insights*, 7, no. 1 (February 2008) Centre for Contemporary Conflict. [journal on-line]; available from http://www.ccc.nps navy mil/si/2008/Feb/introFeb08.asp; Internet; accessed 31 March 2009.
[120] *Ibid*.

the GWOT and the search for oil will remain "connected for the indefinite future."[121] In the summer of 2008, when oil prices were at their zenith, experts estimated that a "security premium" of as much as $30-40 had been built into the price of oil, a result of unrest in the world's oil producing regions.[122] Other writers have hypothesized that the fear premium brought about by terrorism is $10 per barrel.[123] Although these figures can be easily debated, they do help to illustrate the one aspect of the cost externality related to current terrorist efforts.

Yergin highlights that, in order to ensure energy security, the "awesome task" of securing the entire energy chain and infrastructure is essential.[124] Concern over attacks on oil industry infrastructure is real, reflected in both the number of attacks and warnings over the last several years. Al Qaeda leadership has encouraged its followers "to concentrate their campaigns on the Muslims' stolen oil" and "not allow the thieves ruling [Muslim] countries to control this oil".[125] It is also well known that Bin Laden has urged the Muslim world to seek self-sufficiency and hold oil as an instrument of power for a future Islamic state.[126] Moran and Russell have described how terrorist groups have undertaken a staggering 330 attacks against oil and gas infrastructure during the 1990-2005.[127] A more recent review of attacks on Iraqi pipelines from June 2003 to March

---

[121] Michael T Klare, "Oil Moves the War Machine," *The Progressive* (June 2002): 19.
[122] National Security Network Official Web-site. "Energy Security is National Security," 26 January 2009. http://www.nsnetwork.org/node/1199; Internet; accessed 31 March 2009.
[123] Gal Luft, "Pipeline Sabotage is Terrorist Weapon of Choice," *Energy Security,* Prepared by the Institute for the Analysis of Global Security (28 March 2005) [journal on-line]; available from http://www.iags.org/n0328051 htm; Internet; accessed 31 March 2009, 42.
[124] Daniel Yergin, *Ensuring Energy Security*…, 78.
[125] Gregory J. Lengyel, *Department of Defense Energy Strategy – Teaching an old dog new tricks*…, 20.
[126] Christopher Blanchard, "Al Qaeda: Statements and Evolving Ideology," Report Prepared for the Members and Committees of Congress (Washington: Congressional Research Service, 9 July 2007), 15.
[127] Daniel Moran and James A. Russell. "The Militarization of Energy Security," *Strategic Insights*, 7, no. 1 (February 2008) Centre for Contemporary Conflict. [journal on-line]; available from http://www.ccc.nps navy mil/si/2008/Feb/moranFeb08.asp; Internet; accessed 3 January 2009.

2008 reveals a confounding 469 terrorist attacks[128] which have resulted in $10 billion worth of damage.[129] While the majority of these attacks have taken place in Iraq, Russia, Columbia, Ecuador, Philippines, Turkey, Pakistan and Algeria, a number of recent occurrences are extremely concerning due to their proximity to major pipeline networks and refineries.

While a major attack on U.S. energy facilities has yet to materialize, it was widely reported that Al Qaeda had called for attacks on the Trans Alaska Pipeline system, which is responsible for delivering 17% of U.S. domestic production. More disconcerting was the brazen efforts to attack the Saudi Arabian refinery located in Abqaiq in February 2006. While the assault was largely foiled, news of the event caused the market price for oil to increase by $2 per barrel overnight. Following the foiled effort, a closer analysis was carried by security professionals who have hypothesized that a successful moderate to severe attack on this facility could reduce daily refining from one to 6.8 MPD for a duration of two months following the assault.[130] Tuft points out that continued attacks on Iraqi pipelines have resulted in reducing available oil by one million BPD. By his account, this additional supply would have lowered the unit cost by $10-15 per barrel, translating into a $40-60 billion savings to the U.S. and reducing commensurately the transfer of wealth to producing nations who may be somewhat responsible for funding the violence in the first place (e.g. Saudi Arabia). Altogether, it is believed that Al Qaeda

---

[128] See Institute for the Analysis of Global Security Official web-site, Iraq Pipeline watch. http://www.iags.org/iraqpipelinewatch.htm; Internet; accessed 31 March 2009.
[129] Gal Luft, *Pipeline Sabotage is Terrorist Weapon of Choice*…, 43.
[130] Michael Mihalka and David Anderson, "Is the Sky Falling? Energy Security and Transnational Terrorism," *Strategic Insights* 7, no. 3 (July 2008) Centre for Contemporary Conflict [journal on-line]; available from http://www.ccc nps.navy.mil/si/2008/Jul/mihalkaJul08.pdf; Internet; accessed 31 March 2009.

is following a "damage hypothesis" line of operation when it comes to oil, attempting to make operations too costly for the U.S. in the Middle East.[131]

In a detailed analysis of ten possible terrorist attack scenarios, Steinhäusler et al. provide an excellent overview of the potential threats that the current industry must consider in their security planning. For instance, they note that, of all the various targets within the distribution network, offshore oil platforms are considered as extremely high value targets for determined terrorists.[132] They surmise that a number of possible methods of attack could include an explosive laden small aircraft, underwater divers or high-speed boats. Their analysis indicates that a 1000kt TNT attack could destroy one of the pillars of the platform structure, resulting in potential catastrophic failure of the platform.[133] The authors conclude that, as oil becomes more vital as a scarce resource, the probability of more complex and bolder attacks will increase.[134] Perhaps the recent arrest of numerous terrorists in Saudi Arabia in April 2007 underscores how probable a large-scale future attack may be. In a chilling remainder of 9/11, these terrorists had recently completed flight training and were intending to crash planes into Saudi Arabian oil facilities.[135]

The consequence of a heightened threat to industrial infrastructure has been that massive amounts of additional security measures have been brought into force. In terms of pipelines alone, this has included adding system redundancy lines, and state of the art

---

[131] *Ibid*.
[132] Friedrich Steinhäusler, P. Furthner, W. Heidegger, S. Rydell, and L. Zaitseva, "Security Risks to the Oil and Gas Industry: Terrorist Capabilities," *Strategic Insight.* 7, no. 1 (February 2008) Centre for Contemporary Conflict [journal on-line]; available from http://www.ccc.nps navy mil/si/2008/Feb/steinhauslerFeb08.asp; Internet; accessed 31 March 2009.
[133] *Ibid*.
[134] *Ibid*.
[135] Royal Embassy of Saudi Arabia, "Saudi Security Forces Foil Major Terrorist Plots," Washington D.C.: 27 April 2007. http://www.saudiembassy net/2007News/News/NewsDetail.asp?cIndex=7103; Internet; accessed 31 March 2009.

surveillance systems, deploying roving ground and aerial patrols and hardening pipeline software systems from cyber attack.[136] Luft has suggested that many new measures may need to be implemented, including burying pipelines or applying a carbon fiber wrap that counters explosions. He points that, in Iraq, out that 14,000 security guards are tasked to patrol the current inventory of pipelines.[137] Considering the number of attacks to date, it is evident that this is not enough. As more and more pipelines are built in and around Asia, the opportunities provided to terrorists will continue to grow. With jihadists motivated to inflict massive damage to the west's economy, attacks are sure to continue and the security and terrorist premium will continue to grow.

THREAT OF PIRACY

A related concern to that of the terrorist action along the distribution network involves acts of piracy against marine going vessels. While not as pernicious a threat as the ubiquitous terrorist actions in Iraq, the concern for the safe transit of cargo ships reached a high-point during a successful attack and commandeering of a supertanker off the coast of Somalia in December 2008.[138] A number of aspects to this act of piracy are disconcerting for both consumers and global suppliers of oil. First, the attack occurred almost 450km off-shore, well outside the traditional areas of concern. Second, there is increasing concern over the new tactics being displayed by pirates involving the use of larger mother ships laden with speed boats.[139] Lastly, the nature of the target indicates

[136] Gal Luft, *Pipeline Sabotage is Terrorist Weapon of Choice*…, 44.
[137] *Ibid*., 42.
[138] CBC News Online, "Somali Pirates Free Saudi Supertanker," 9 January 2009, http://www.cbc.ca/world/story/2009/01/09/supertanker html; Internet; accessed 31 March 2009.
[139] Dave Schuler, "More on the Threat of Piracy to the Oil Trade," Outside the Beltway, 18 November 2008 [blog on-line]; available from http://www.outsidethebeltway.com/archives/more_on_the_threat_of_piracy_to_the_oil_trade/; Internet; accessed 31 March 2009.

that the appetite and desire for action has grown significantly, with pirates being better armed and displaying a greater willingness to kill for bounty. Statistics from the International Maritime Bureau (IMB) Piracy Reporting Centre (PRC) indicate that piracy activity increased 11% in 2008 as compared to the previous year.[140] The greatest increase in activity was in the area of the Gulf of Aden (111 incidents) and the east coast of Somalia.[141] This increased threat is raising risk premium rates and forcing some carriers to take alternate transit routes to avoid exposing their assets to the threat. Similar concerns abound in the coastal region of Nigeria where numerous acts of piracy were undertaken in 2008.

NUCLEAR PROLIFERATION AND INFRASTRUCTURE CONCERNS

With the realization that oil supplies will come under greater demand over the coming decades, the call for additional nuclear energy facilities has been made by many energy advocates.[142] As one of the cleanest forms of energy on the planet, there is tremendous logic with this position given present concerns over elevations in Green House Gas (GHG) emissions and the deleterious impacts on the environment. However, the calls for additional nuclear capacity have failed to consider the attendant security implications of a broadened nuclear energy base.[143] These concerns relate to the aspect of nuclear proliferation and the added exposure to terrorist actions by non-state actors.

---

[140] International Chamber of Commerce Commercial Crime Services Official web-site, "IMB Reports Unprecedented Rise in Maritime Hijackings," 16 January 2009, available from http://www.icc-ccs.org/index.php?option=com_content&view=article&id=332:imb-reports-unprecedented-rise-in-maritime-hijackings&catid=60:news&Itemid=51; Internet; accessed 31 March 2009.
[141] *Ibid*.
[142] Nader, Elhefnawy, "The Next Wave of Nuclear Proliferation," *Parameters* (August 2008): 36.
[143] *Ibid*., 36.

At the moment, there are approximately 443 nuclear reactors in operation around the world, producing 2.6 trillion kilowatt-hours of electricity.[144] Within the U.S., due to recent policy streamlining and incentives, it is estimated that 30 permits have been submitted to the nuclear reactor commission for approval. It is also estimated that an additional 150 reactor sites are being planned globally with approximately 12 already entering the construction phase.[145] Of the reactor sites under planning, more than half are located in Asia, 44 in Europe and seven in the Middle East.[146] Six countries involved in the design and build phase have no experience in operating nuclear power facilities.[147] Other non-nuclear countries that have expressed an interest in nuclear development include Belarus, Libya, Jordan, Nigeria, Qatar, Saudi Arabia, Syria, Thailand and Turkey.[148]

In order to keep pace with expected global economic development and the desire to off-set oil dependence, it is surmised that twice the current number of nuclear reactors would be required to maintain the current share of energy contribution by 2050.[149] Other estimates indicate the possibility of bringing thousands of reactors on-line by the middle of the 21st century should greater conversion towards nuclear energy occur.[150] The implication of a shift in this direction would be to see a move away from what is now a very concentrated distribution of nuclear reactors to a more dispersed reality. As reported recently in the Washington Post, at least 40 developing nations (including those already

[144] Mary Beth Nikitin, Anthony Andrews and Mark Holt, *Managing the Nuclear Fuel Cycle: Policy Implications of Expanding Global Access to Nuclear Power*, Report Prepared for the Members and Committees of Congress (Washington: Congressional Research Service, 3 September 2008), 9.
[145] *Ibid*., see summary page.
[146] *Ibid*., 9.
[147] *Ibid*., 9. These countries are Egypt, Indonesia, Iran, Israel, Malaysia, and Vietnam.
[148] *Ibid*., 9.
[149] Nader Elhefnawy, "The Next Wave of Nuclear Proliferation," *Parameters* (August 2008): 37.
[150] *Ibid*., 37.

mentioned) have expressed an interest in commencing nuclear energy programs.[151] Clearly, a move towards a more diverse distribution of nuclear reactor sites across the developed and developing world creates security concerns from a global perspective.

Imagine a world with several times the number of reactors operating across the globe! This creates concerns with respect to the elevated levels of fissile material and technology exposure that could contribute to the development of nuclear weapons. The challenge of deterring uranium enrichment is immense. The current approach by the international community to address proliferation concerns has been to discourage nations from creating national fuel enrichment and reprocessing capabilities and to purchase via the nuclear energy group. Elhefnawy's argument is that the current market dynamics have supported this position by virtue of the cost disincentive in place for nations to enrich and reprocess nuclear fuel.[152] However, if economies of scale were to increase four to five fold, it is plausible to assume that a greater number of nations would elect to shoulder the cost of this activity. The resulting demands on international monitoring regimes would only grow, as concerns over nuclear proliferation naturally increase with a heightened probability of commercial uranium enrichment and reprocessing technologies being subverted for military purposes.[153]

Elhefnawy points out that the "nuclearization" of one state "can induce a chain reaction across a region."[154] This was clearly the case in terms of India's and Pakistan's reactions to China. He concludes that the international community must attempt to

---

[151] Joby Warrick, "Spread of Nuclear Capability is Feared," The Washington Post On-line. 12 May 2008, http://www.washingtonpost.com/wp-dyn/content/article/2008/05/11/AR2008051102212 html; Internet; accessed 1 April 2009.
[152] Nader Elhefnawy, *The Next Wave of Nuclear Proliferation*…, 40.
[153] Mary Beth Nikitin, Anthony Andrews and Mark Holt, *Managing the Nuclear Fuel Cycle: Policy Implications of Expanding Global Access to Nuclear Power*…, 2.
[154] Nader Elhefnawy, *The Next Wave of Nuclear Proliferation*…, 42.

dissuade an increase in levels of nuclear production until such time as it is essential, and when the next generation proliferation proof reactors are available.[155]

With an expanded constellation of nuclear facilities around the globe located within or close to unstable regimes, the aspect of vulnerability to terrorist attack is also a significant security concern. Since 9/11, the U.S. has completed numerous examinations of the security of their current nuclear facilities. These assessments have resulted in alterations to the design of facilities to ensure that possible breaches to the reactor are reduced and spent fuel stock-piles are better protected from air attack. Discussions continue with respect to building grid iron suspension structures to protect facilities from air attack. Facilities are now also forced to undergo 'force on force' exercises to ensure readiness against a ground assault. Should reactors proliferate internationally, it is unlikely that similar security measures would be put in place, thereby creating risks that present significant social externalities.

ELEVATED GEOPOLITICAL THREATS

> What strikes me about all this that we are seeing the emergence of a new world power configuration in which the possession of energy and other key resources is the principal indicator of national strength, rather than the possession of military arsenals, as was the case in the Cold War era and in prior centuries.[156]

As discussed in Section 2, the current international oil market is made up of haves and have-nots. Those who are net exporters of oil are considered nations with influence while those who are net importers are dependant on the regulated international system. Naturally, as internal circumstances change (e.g. depleted fields, economic development,

---

[155] *Ibid*., 45.

[156] Barry Zellen, "Viewpoint: Resource Wars: Energy, Resource Conflict, and the Emerging World Order – An interview with Michael T. Klare," *Strategic Insights* 7, no. 1 Centre for Contemporary Conflict (February 2008) [journal on-line]; available from http://www.ccc.nps navy mil/si/2008/Feb/klareFeb08.asp; Internet; accessed 31 March 2009.

and introduction of alternate energy technologies) the level of influence and dependence changes over time. In the absence of collective behavior mechanisms and incentives, it is the objective of each nation's government to maximize individual positions within this framework. Thus, the consequence of the shifting nature of the future oil market is that geopolitical realities will be driven by the clear delineation between supplier and producer states. Tensions are most likely to develop between these entities or between market consumers who are seeking to secure individual resources to meet national requirement at the expense of competitors. Yergin, noting the inevitability of geopolitical rivalries, has characterized this concern as a 'scramble' for supplies to fuel economic growth.[157]

Nowhere is economic growth anticipated to increase more than in China. As an expanding country undergoing programmed development, China has experienced tremendous growth rates over the last number of years.[158] While GDP growth projections for 2009 have been recently reduced slightly to eight per cent by central agencies, China's economy has been sustaining an average growth rate of nearly nine percent, fuelling an insatiable demand for strategic resources such as oil.[159] Thus, in order to ensure economic prosperity and strength as a key element of national power, countries such as China and the U.S. will continue to pursue access to oil as "no single strategic resource rivals the centrality of oil to ceaselessly running the capitalist mode of production".[160] The potential for a clash in interests is therefore evident. Current engagement in Africa by both countries exemplifies one of the many possible flash-

[157] Daniel Yergin, *Ensuring Energy Security*…, 69.
[158] Xin Zhiming, "The Economy to bottom out," *China Daily: Economic Outlook 2009* 5 March 2009, 4.
[159] Bao Daozu, "Wen: We can achieve 8% growth," *China Daily* 6 March 2009, 1.
[160] Okbazghi Yohannes, "America's New Frontier: Oil in the Gulf of Guinea," *The Black Scholar* 33, no.2 (2003): 2.

points. One must note the significance of the recent stand-up of an additional combatant command, United States Africa Command (AFRICOM), and the Chinese elevated diplomacy and broad economic engagement in Africa. These occurrences provide ample context for analysts to highlight the growing geopolitical tensions developing around the globe, and are but a few of the many examples where the potential for foreign policy friction may come about.

While the newly minted AFRICOM got off to a rocky start, the criticisms that abound seem related more to the U.S. desire to secure access to oil than to the bringing about of stability and development on that continent.[161] In view of the instability that surrounds the transport of oil from the Middle East and along the pirate rich east coast of Africa, the abundant oil resources from west coast Africa offer an excellent risk mitigation strategy for the Americans. It is forecast that the U.S. may be capable of securing twenty-five per cent of its imports from Nigeria by 2015, a supply stock that is physically closer to the U.S. than supplies from Saudi Arabia.[162] The Gulf of Guinea production area is, thus, a central element within the American long-term oil diversification strategy.

Geopolitical tensions and scepticism have also been levied towards U.S. intentions in Africa under the mandate of AFRICOM, due to perceived patterns of behaviour. The establishment of influence, power and control have occurred previously in the Middle East and, more recently, the Caspian Sea region. Critics of AFRICOM, who suggest oil is at the heart of the new command structure, opine that American stated

[161] See for example - Diana B. Putnam. "Combating African Questions about the Legitimacy of AFRICOM," (Pennsylvania: U.S. Army War College, 2008), 5.
[162] George Jedrzey Frynas and Manuel Paulo, "A New Scramble for African Oil? Historical, Political, and Business Perspectives," *African Affairs* 106, 423 (2007), 242. Lauren Ploch, *Africa Command: U.S. Strategic Interests and the Role of the U.S. Military in Africa*, 13.

interests in these regions were soon buttressed by military aid, assistance, arms sales and eventual American basing in the region.[163] While it appears the U.S. government is content to allow the AFRICOM headquarters to remain in Germany for the time being, the U.S. government continues to funnel aid and arms to Nigeria and Angola to assist in stability building.[164] Allegedly, other African oil producing nations are recipients of "sophisticated counter-insurgency" capabilities.[165] Naturally, other major oil consuming nations, such as China, are cognizant of the elevated American in-roads into the different regions.

China has now recognized its critical need to secure access to world oil supplies. Over the last decade, a deepening interdependency across a broad range of economic and political fronts has been established as the Chinese continue to "translate power into influence via effective diplomacy."[166] Trade between China and Africa has increased thirty-six fold to $73 billion as of 2007.[167] They have also exercised myriad bilateral engagements with African nations, electing to engage with no 'political strings' attached, and pursue "commercial diplomacy" instead.[168] They have been responsible for retiring a large number of national debts and have recently hosted an African summit which was attended by almost 50 African leaders.[169] Like the Americans, they continue to utilize soft-power methodologies to curry influence, and position themselves to meet interests

---

[163] Michael Klare and Daniel Volman, "The African 'Oil Rush' and US National Security," *Third World Quarterly* 27, no.4 (2006): 616.
[164] *Ibid*., 617.
[165] *Ibid*., 617.
[166] Ellen L. Frost, James J. Przystup and Phillip C. Saunders, "China's Rising Influence in Asia: Implications for U.S. Policy," *Strategic Forum* No. 231 (April 2008): 1.
[167] United States Africa Command, "Policy Statement: China in Africa: Implications for U.S. Policy," 4 June 2008. http://www.africom mil/getArticle.asp?art=1786; Internet; accessed 31 March 2009.
[168] Ellen L. Frost, James J. Przystup and Phillip C. Saunders, *China's Rising Influence in Asia: Implications for U.S. Policy*…, 4.
[169] BBC News Online, "Summit shows China's Africa clout," 6 November 2006. http://news.bbc.co.uk/2/hi/business/6120500.stm; Internet; accessed on 31 March 2009.

related to strategic resources. It is noteworthy that, through their non-interference foreign policy ideal, they have positioned themselves as the largest economic footprint in Sudan, a key oil producing country.[170] Of course, this has frustrated a large majority of the international community.

In light of both the Chinese and American cloaked foray into Africa in order to build influence, it has been hypothesized that geopolitical relations driven by oil are leading to a "proxy economic Cold War."[171] It is noteworthy that other analysts seem less concerned with this developing dynamic over the short-term.[172] Jaffe and Soligno, for instance, attempt to debunk the entire notion of linking geopolitical tensions and conflict to oil. They cite the lack of conflict surrounding the U.S. activities in the Caspian Sea area as an example of how competition for oil does not necessarily generate tension and conflict.[173] They point out that China has not responded to U.S. military presence in the area. Further, they argue that Chinese engagement with the Sudanese government has not led the U.S. to isolate or threaten the Chinese.[174] They claim that the potential of a large oil consumer invading a weaker supplier for oil control is also a flawed idea. They suggest that the U.S. led invasion into Iraq was based upon an other "more complex set of motivations" and did not see the U.S. take over control of Iraqi oil.[175] It will be difficult to find manifest expressions or direct causal relationships between competing consumers of the existence of a tense "new scramble" for global oil. Realist theory, however, would

---

[170] Sean McFate, U.S. Africa Command: A New Strategic Paradigm? *Military Review* (Jan-Feb 2008): 14. At present, China owns 13 of the top 15 businesses in Sudan.
[171] *Ibid*., 13.
[172] United States Africa Command, "Policy Statement: China in Africa: Implications for U.S. Policy," 4 June 2008. http://www.africom mil/getArticle.asp?art=1786; Internet; accessed 31 March 2009.
[173] Amy Jaffe Myers and Ronald Soligo, "Militarization of Energy – Geopolitical Threats to the World Energy System," James A. Baker III Institute for Public Policy Rice University, Working Paper Series: The Global Energy Market: Strategies to Meet Geopolitical and Financial Risk, May 2008, 15.
[174] *Ibid*., 16.
[175] *Ibid*., 17.

suggest that this is undoubtedly the case.[176] Even Jaffe and Soligno acknowledge that future supply pressures may lead to conflict, although they view this reality as low, given the increasing economic interdependencies between rising powers.

SECTION 4 – FUTURE POLICY CONCEPTS

As has been argued, both the nature of the oil market and the various security related factors at play present a case for action for the international community. The objective of this last section is to propose a number of policy initiatives that must be considered as central to managing more effectively the growing security risks and geopolitical tensions that are sure to arise as oil scarcity continues and states become increasingly fixed on individual energy security calculations. Future instability will be minimized only through adopting collaborative and collective approaches to the many complex issues at hand. To quote Elhefnawy, "the impending oil shock is too complex for any nation to fully address on its own".[177] Thus, a series of initiatives are outlined that must be acted upon in order to elevate the likelihood that the international community can choose a path that is not riddled with insecurity and violence. The initiatives outlined below intersect the global and domestic domain and include greater collaboration internationally through new organizational structures, continued efforts to pursue alternate energy sources, re-vitalizing the Strategic Petroleum Resource (SPR) and adjustments to market mechanisms. This section will include mention as to how the Canadian government can play a role in this endeavour given this country's unique geo-strategic position and large oil sands reserves.

[176] George Jedrzey Frynas and Manuel Paulo, "A New Scramble for African Oil? Historical, Political, and Business Perspectives," *African Affairs* 106, 423 (2007): 231.
[177] Nader Elhefnawy, *The Impending Oil Shock*, 58.

For the last number of months discussions with respect to energy security seem to have converged with concerns over the environment. Thomas Friedman's recent book titled *Hot, Flat, and Crowded*, is an example of neo-Malthusian concerns related to a growing middle class and the world's insatiable appetite for energy.[178] Stanislaw has characterized this attitude being brought about as "a sea change in global environmental awareness."[179] In some respects, the linking of energy and environmental security is fortuitous as environmental worries related to both widespread pollution and greenhouse gas emissions have secured a large constituent of concern. This allows the issue of growing energy consumption to be viewed through a lens fixed on sustainability. For instance, there is wide acceptance that elevating the use of dirty coal cannot be a long-term strategy to manage a dwindling oil supply. The convergence of energy and environmental security has also stimulated large-scale investments in clean energy research and technology. While it is beyond the scope of this paper to address the gamut of environmental externalities and inter-connections related to energy security policy, it is important that the reader be aware of these natural linkages.

INTERNATIONAL STRUCTURES

Before the international community can break the grid-lock that continues to develop with respect to nations pursuing independent energy security strategies, a greater degree of international cooperation is essential. This collaboration must be brought about in order to establish an atmosphere of trust such that more viable long term options can be conceived. If one views energy security as a public good, it follows that governments

[178] See Thomas L. Friedman, *Hot, Flat, and Crowded* (New York: Farra, Strauss and Giroux, 2008).
[179] Joseph A. Stanislaw, *Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence*, Report prepared for Deloitte Touche. (2008), 7. Available from http://www.deloitte.com/dtt/whitepaper/0,1017,cid%253D223990,00.html; Internet; accessed 31 March 2009.

should be obliged to put in place optimal policies that ensure maximum benefits accrue to their nation. On the other hand, if one views energy security as a global public good, a different paradigm of thought is required, one that necessitates strong international leadership and greater international coordination to generate more Pareto efficient global outcomes.[180] This will require international will and improved organizational structures to ensure that a framework for dialogue and cooperation is created.

As a result of the growing awareness of oil market interdependencies, many analysts have called for international action. Jaffe proposes that consumer nations must band together to establish greater cooperation, arguing that this will increase their influence over OPEC by having a stronger "monopsony wedge".[181] She suggests that nations, such as the U.S. and China, must find ways to build a coalition to increase bargaining power over producers who are becoming more nationalistic in perspective.[182] She calls for a "high-level" dialogue between these nations under the leadership of the IEA.[183] She notes that most of the current dialogue is at the "technical" level and must be elevated to the high-level political sphere to ensure priorities are clear and efforts are harmonized into more active foreign policy efforts. Jaffe suggests that in order to "jumpstart more proactive and on-going policy coordination and new energy initiatives between the two countries," discussions must be conducted at the Vice President or senior diplomat level.[184] Thus, in Jaffe's view, strengthening the bilateral engagement of the U.S. and China will lead to harmonized policies that will result in greater leverage

[180] See D. Arce, "Leadership and the aggregation of international collective action," *Oxford Economic Papers* 53, no. 1 (2001): 114-137.
[181] Amy Myers Jaffe, "The United States and the International Energy Barrier," in *A Strategy for American Power: Energy, Climate and National Security*, ed. Sharon Burke and Christine Parthemore, 77-96 (Washington: Center for a New American Security, June 2008), 85.
[182] *Ibid*., 85.
[183] *Ibid*., 85.
[184] *Ibid*., 86.

that can be used in dealing with producer nations and governments. By proposing a bilateral engagement approach, other consuming countries will be induced to enter into similar discussions moving forward. By entering into greater international bi-lateral dialogue and collaboration, lead nations, such as the U.S., will be required to consider the perspective and national interests of the other party in fully "understanding what energy security means for them."[185]

Acknowledging the tensions between consumers and producers, Stanislaw highlights that the international community will be forced to better collaborate as that is a prerequisite for political stability, suggesting that a more multi-lateral approach is essential.[186] In a comprehensive assessment of future geopolitical trends Stanislaw argues:

> To prevail over a scramble, then at its heart will have to be the notion of mutual Interdependence - wherein producer and consumer nations come to understand that they need each other equally. Today's scramble for resources could set the stage for a new market balance from an old economic reality—supply seeds demand and demand seeds supply.[187]

Noting the growing tension between countries as a consequence of the on-going scramble for energy, Stanislaw emphasizes that a more orderly international structure is critical to the future of the international community. As compared to the current chaotic 'scramble' approach, he postulated a "blueprints" strategy, noting, "the challenge and the opportunity are to create understanding out of the current misunderstanding and to make mutual interdependence work."[188]

---

[185] Daniel Yergin, *Ensuring Energy Security*…, 77.
[186] Joseph A. Stanislaw, *Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence*…, 1.
[187] *Ibid*., 4.
[188] *Ibid*., 4.

New organizational structures are required in order to create greater international collaborative mechanisms to ensure that a more secure energy framework is developed. At the moment, two of the world's fastest growing oil consumers, namely China and India, are not members within the IEA.[189] If consuming nations can be led to appreciate the importance of leverage, then a new IEA like structure is required, one that is more inclusive and properly mandated for the 21st century. In these times of elevated importance of energy security, this 'Consumers Group' could use the clout provided by a common strategy to influence and negotiate with OPEC and other oil producing countries. High-level meetings must be at the deputy Head of State level to ensure that the efforts of the group are successful and that mutual interdependence and deeper engagements are established. Such an approach would allow for smaller nations to form blocks, giving assurance that their voices and concerns would be well articulated.

Some writers have called for bolder initiatives that seek the transformation of OPEC and OECD into an international body of producers and consumers. Focusing primarily on the challenges within petro-states, Kaldor calls for a new international energy regime that is reflective of the interests of all stake-holders including consumers, producers, governments and NGOs.[190] Arguing that future oil related instability and conflict is stimulated by both external stakeholders and internal corruption, Kaldor suggests that a new multi-lateral energy organization could find ways to prevent conflict while promoting democracy and protecting human rights. The efforts of a multi-national energy association could, therefore, ensure that Thomas Friedman's first law of petro-politics is averted, namely that "the price of oil and the pace of freedom always move in

[189] Daniel Yergin, *Ensuring Energy Security*…, 78.
[190] Mary Kaldor, Terry Lynn Karl and Yahia Said, *Oil Wars*…, 277.

opposite directions in authoritarian countries highly dependent on oil and gas for their GDP."[191] The challenges with instituting such an approach are many, given the diversity of interests at play. However, if achieved, instability in areas like the Sudan may be reduced if countries such as China can be convinced that economic engagement in Sudanese oil trade is not in the interests of the global community at large. Thus, it is likely that the challenge with this approach may be in ensuring that the foreign policy decisions of individual nations do not undercut the efforts of the collective.[192]

With the establishment of greater international cooperation under modernized organizational mechanisms, a number of fundamental policy issues related to energy security could be addressed. The first of these policy issues relates to the establishment of an energy security initiative (ESI) to ensure the safe flow of the world's energy resources from the point of extraction to the international market.[193] As outlined within Section 3, the entire oil transportation and infrastructure network is at risk from terrorist attack and, to a more limited extent, from acts of piracy. To date, there is no collective security regime which addresses this threat. Rather, security is provided in an ad-hoc manner by governments, private industry and international task forces. Consequently, a sub-optimal security level is being delivered due to inefficiencies brought about by barriers to information, capability and cost sharing. Hamon and Dupuy believe that an ESI modeled after the Proliferation Security Initiative would yield greater international

[191] Gal Luft, *Dependence on Middle East energy and its impact on global security*…, 4.
[192] Consensus building is an international challenge. For instance, the challenges associated with achieving consensus during the prolonged World Trade Organization's Doha round is evident. However, this must not deter decision-makers from seeking international collaboration on energy, given its central importance to the international community.
[193] Hamon, David W. and Arnold C. Dupuy, "Security of Energy: The Conflict after Next?" *Strategic Insights* 7, no. 1 (February 2008) Centre for Contemporary Conflict [journal on-line]; available from http://www.ccc.nps navy mil/si/2008/Feb/hamonFeb08.asp; Internet; accessed 3 January 2009.

coordination and security.[194] While they indicate NATO might provide the overseeing of such a system, it would be implemented more effectively under the aegis of the combined producer/consumer framework alluded to earlier.

INTERNATIONAL RESERVES

A second area of policy coordination that would benefit from better collaboration between nations is the functioning of the SPR. The establishment of oil reserves was a key component of the agreement signed under the OECD. Specifically, the IEA is mandated to oversee the strategic oil reserve process as a component of the strategy to ensure the free flow of oil to member nations during periods of disruption. During times of emergency brought about by natural disaster or conflict, member nations are called upon to coordinate actions. They are expected to hold 90 days of imports in order to cushion the effects of external shocks to the system.[195] As of 2006, IEA reported that 41 billion barrels of oil were currently being held, translating into 122 days of supply.[196] Strategic reserves have proved their worth during periods of international crisis. For instance, they helped to manage the peak supply shortages related to Hurricane Katrina (1.5 MPD), the Iraq war (2.3 MPD), the Iraq invasion of Kuwait (4.3 MPD) and the Iranian Revolution (5.6 MPD).[197]

While a highly effective mechanism for "limiting the effects of the crises that periodically convulse the world oil market",[198] the SPR faces challenges due to the IEA's

---

[194] *Ibid*.
[195] International Energy Agency, "Oil Supply Security." 2007. http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1981; Internet; accessed 31 March 2009, 11.
[196] *Ibid*., 11.
[197] *Ibid*., 19 see Fig 1.2.
[198] David Victor and Sarah Eskreis-Winkler, "In the Tank: Making the Most of Strategic Oil Reserves," *Foreign Affairs* 87, no. 4 (Jul/Aug 2008): xx.

limited powers to enforce policy. First, the actual days of spare supply have been trending downwards over the last two decades, thereby reducing the shock absorber capacity of the SPR.[199] This is due in part to the limited authority the IEA has over member states. Further, while China and India are building SPRs, their absence from the IEA limits the degree of coordination possible. Consequently, during times of international crisis, these countries are able to free-ride on the additional oil supply that is being released by IEA member nations. Aiming for greater international cooperation and inclusiveness should generate better management of the SPR around the globe.

ALTERNATE SOURCES OF ENERGY

The pursuit of alternate technologies is a corner-stone element of limiting dependency on oil as it becomes a scarcer commodity. In fact, one is hard pressed to find any consuming nation's energy security policy that does not make mention of alternate energy sources as a fundamental component of future energy planning. Both President Obama and Prime Minister Harper have declared the importance of developing enhanced technologies that exploit renewable energy possibilities for the future. The options, which seem endless, include hydrogen, photovoltaic, wind, solar, ethanol, biomass, tidal and geothermal technologies.[200] President Obama has placed a priority on advancing biofuel technology that can lead to the production of synthetic fuels from feedstock. The wide-spread application of electric vehicles to replace modes of transportation using fossil fuel will also greatly reduce overall oil consumption as battery technology is improved. In order to advance these and other technologies, research and development is required.

[199] International Energy Agency, *Oil Supply Security*…, 26 see Fig 1.8.
[200] Nader Elhefnawy, "Toward a Long-Range Energy Security Policy," *Parameters* (Spring 2006): 110.

The importance of alternate sources of energy to future energy security dynamics means that greater collaboration between oil dependant nations may serve to create economies of scale in research and development efforts. Individual nations have proven capable of unilaterally acting as 'first-movers' in developing and introducing energy technologies as was the case with Holland's efforts to transform themselves into a wind super-power. Possibly, pooling capital and intellectual resources could combine to establish a number of key technological break-throughs that go beyond what may be achieved by one single nation. A higher amount of venture capital funding is already starting to flow within private industry.[201] Supplementing this investment with government incentives that promote enhanced technology sharing and development is an essential element of international energy security efforts. As such, private organizations like the International Energy Foundation must be strengthened so that they can continue to promote greater international knowledge sharing and developments.[202]

NEW OIL PRICE REGIME

Recognizing the primacy of price as a regulator of market activity, it is proposed that a more collaborative and integrated association of producers and consumers may present the opportunity to discuss de-linking oil from the current speculative trading market. While no doubt a highly contentious proposal, it is assessed that a departure from the Smithsonian market force paradigm in favour of a regulated fixed price mechanism would generate greater international stability.

---

[201] Joseph A. Stanislaw, *Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence*…, 5, 15-16. In 2007, "clean-tech" companies saw 50 percent year over year increase in venture capital investment to $2.2 billion.

[202] International Energy Foundation, Official Web-site. http://www.ief-energy.org/; Internet; accessed 31 March 2009.

This paper has accentuated that recent volatility in oil prices has created market distortions that have gravely impacted investment decision cycles of both private and national oil companies. Delayed investments to bring on-stream additional production capacity will invariably impact the market when world demand increases and world production peaks earlier than expected. Knowing the importance of unconventional oil development (e.g. tar sands) to overall world supply, it is essential this source of oil be developed in a relatively predictable and consistent manner to ensure that a balanced source of oil is produced. Oil dependant exporters have also seen budget planning capacities greatly reduced resulting in widespread internal impacts and externalities. Similarly, elevated oil prices, as were experienced during the first half of 2008, create varied challenges for both developed and developing nations. One example would show how developed nations see a greater imbalance in trade arrangements as larger amounts of domestic currency flow to world producers, and cause an upward pressure on prices for goods. A high price regime places a significant burden upon import dependant developing nations who are less able to fund the full spectrum of development projects. While producing nations earn windfalls in revenue, high prices act as an incentive for consuming nations to invest more aggressively into alternate energy options and more rapidly reduce foreign oil dependency. This paper has presented a case that suggests that this reality can also lead to both internal and international conflict.

In light of these two extremes, it seems plausible that establishing a mid range flexible fixed price for oil could serve to mitigate the pressures on the market. As indicated previously, this price regime may help to reduce conflict accelerants that are brought about by the exchange of this commodity. It may also allow for the social cost

capturing of impacts related to environmental degradation and impact. While it is beyond the scope of this paper to address the many angularities to this proposal, it would only be through a new combined producers-consumers group that such a dialogue could be undertaken. Realistically, this proposal could only be considered for implementation during a low oil price regime as it is difficult to conceive of OPEC conceding price concessions without significant monopsony pressure.

In lieu of a fixed international price mechanism, Friedman has recommended the U.S. display leadership by establishing a "floor price" for oil for two reasons.[203] First, as per the fixed price model suggested previously, this would provide some degree of price certainty to the market. However, he views this price certainty from the perspective of alternative energy investors, entrepreneurs and companies who would find returns on clean energy investments more challenging in a low oil price environment. Secondly, if prices fall below the established floor, Friedman recommends that the government add a tax to re-establish the floor minimum. This tax revenue would ensure behaviour is shaped towards cleaner energy options while providing government revenue for the further subsidizing of renewable energy efforts.

ROLE OF CANADA

The last area of consideration within this Section relates to the policy role for Canada. Occupying a unique geopolitical space within the international community, Canada as a "global energy super-power" has the potential to be more engaged in bringing about elevated dialogue. As of now, the federal government does not appear to

[203] Thomas L. Friedman, *Hot, Flat, and Crowded* (New York: Farra, Strauss and Giroux, 2008), 254. He makes this recommendation when oil is over $100 per barrel.

have been compelled to articulate a wide-ranging energy policy due to the nature of our status as an energy exporter and to our close energy relationship with the U.S., solidified under the North American Free Trade Agreement (NAFTA). In effect, NAFTA assures the U.S. that energy exports from Canada will flow to them. The fundamental question for Canada is to decide what role it wishes to play within the international community beyond continental engagement. The Parklands Institute lays out the challenge for government as follows:

> As Canadians, we need to decide what kind of an energy future we want: whether we should continue down the path of being an energy satellite of the U.S. empire, and in the process jeopardize our own energy security; or whether we should exercise more sovereignty and independence by developing a long-range policy that meets Canada's energy needs while promoting an energy future that is not dependent on oil.[204]

The Parklands Institute calls upon government to halt development of the tar sands and Mackenzie Delta pipeline until such time as a thorough assessment of social costs are outlined. In the meantime, they argue for much higher royalties and subsidies must be put in place in Canada to off-set the societal costs. The report also calls for a National Energy Policy that articulates a mandate for the National Energy Board and specifies a framework for energy reserves, alternate energy strategies, price-setting domestically and seeking an exemption from the NAFTA related energy clause.[205] While the report is extremely nationalistic in tone, it does underscore the fact that Canada lacks a coherent strategy with respect to energy in general and oil specifically. To contrast the Canadian approach to energy policy, it is instructive to consider President Obama's recent energy policy declarations, in which he makes energy a center-piece element of his

[204] Hugh McCullum, *Fuelling Fortress America: A Report on the Athabasca Tar Sands and U.S. Demands for Canadian Energy* (Ottawa: The Polaris Institute, the Canadian Centre for Policy Alternatives and the Parkland Institute in Alberta, 19 February 2007), 10.
[205] *Ibid*., 6.

nascent administration. In fact, he made this a point of discussion during his first official visit to Canada.[206] Even his predecessor, President Bush, recognizing the fundamental importance of energy, put in place an energy policy during his second week as President.[207]

In November 2005, Canada established an energy secretariat within the Department of Foreign Affairs to coordinate international energy issues. The current government has also established an Environment and Energy Security cabinet committee to address policy development. To date, government has not issued a comprehensive strategy pertaining to energy security/energy policy. Instead, Natural Resources Canada, as the lead federal department for domestic energy policy, has outlined a broad set of principles and over-arching agreements. While guidelines are established, the policy lacks an element of vision and priority which could serve to elevate Canada's contribution to the current global energy circumstance. Analyzing the series of Speeches from the Throne from 1983 to 2007, Lavoie notes the spurious absence and aversion to the word oil from speeches:

> …it is hard to believe that the word 'oil' has not appeared in a Speech from the Throne since 1983…This must be the result of deliberate avoidance of energy issues by both the Liberal and Conservative parties.[208]

Lavoie outlines that there are a number of reasons for the absence of a high profile oil/energy policy in Canada. For the most, he notes that the federal government has regulated the energy sector through indirect measures and horizontal governance

---

[206] CBC News On-line, "PM, Obama talk trade, Afghanistan, pledge 'clean energy dialogue,'" 19 February 2009. http://www.cbc.ca/canada/story/2009/02/19/obama-visit html; Internet; accessed 23 April 2009.
[207] Pierre Lavoie, "Asleep at the Wheel: Canada Needs an Oil and Gas Policy," (Toronto: Canadian Forces College National Security Studies Program Paper, May 2007), 21.
[208] *Ibid*., 9.

structures which run the risk of creating chaos instead of coherence.[209] However, his analysis of previous Canadian and U.S. energy policies indicates that they can be effective in attaining their desired objectives. As such, it would seem the Canadian government has an obligation to articulate the unique goals and objectives of a long term energy policy that better positions the country for the future. The lack of a unique Canadian vision was re-affirmed when Canada's Environment Minister recently declared that "Canada's environmental and energy policy will be inextricably linked to that of the new Obama administration," indicating that they are "virtually identical".[210] While it is understood that Canada and the U.S. should share common ground on many continental energy issues, it seems odd that they would be identical given the unique circumstances of each nation. While not exhaustive, some of the key questions that Canada ought to address within a more tailored policy should include answers to the following fundamental questions:

1. Will government allow another phase of hyper development of the tar sands when prices increase given GHG concerns?

2. How will development of Arctic energy sources proceed?

3. What role will Canada play in investing in alternate energy technological development and investment in Canada? How will this be subsidized?

4. What level of foreign ownership will Canada allow within the energy sector?

---

[209] *Ibid*., 19.

[210] Richard Blackwell, "Canadian, U.S. energy policies to be inextricably linked: Prentice," Theglobeandmail on-line, 20 January 2009, http://www.theglobeandmail.com/servlet/Page/document/v5/content/subscribe?user_URL=http://www.theglobeandmail.com%2Fservlet%2Fstory%2FRTGAM.20090120.wprentice0120%2FBNStory%2Fenergy%2F&ord=23528834&brand=theglobeandmail&force_login=true; Internet; accessed 3 April 2009.

5. What leadership role will Canada play in bringing about greater international cooperation beyond current deliberations within the North American Energy Working Group (NAEWG)?

The objective of this section of the paper was to argue that greater international coordination is essential in order to navigate the many challenges brought about by a dwindling energy supply. As a middle power with a solid reputation internationally, Canada is uniquely positioned to advocate for many of the proposals outlined previously. Canada has a host of avenues through which to propose such ideas including, for instance, the NAEWG, G20, IEA, UN and NATO. Discussions with respect to energy security abound and Canada should leverage some of its international reputation to promote international dialogue and policy development more actively.

CONCLUSION

The aim of this research paper has been to present an overview of how the non-renewable resource of oil is a contributing factor to global insecurity. This is a relatively new field of study within security literature, and the neo-Malthusian notion that scarcity of resources is correlated to conflict has captured the attention of security analysts, governments and international organizations. History has shown us the importance of oil as a strategic resource during the various campaigns of WW I and WW II, in its role of fuelling key military and economic elements of national power. The literature that has germinated following Homer-Dixon's seminal writings has delved into a wide array of areas in a broad attempt to uncover causality and linkages between oil and instability that can help explain post WW II realities both from an inter-state and intra-state perspective. These investigations have helped inform both international and government decision-

makers as to some of the signals of conflict and have lead to a great deal of attention to the establishment of national energy security policies.

Section 2 of this paper has provided a broad view of the economic aspects of the oil market in order to situate the discussion as to the future security challenges brought about by a dwindling oil reality. As a commodity traded on the international market, fundamental understanding of how world oil prices are established requires an appreciation for the supply and demand determinants underpinning the market. From a supply perspective, various theories exist as to establishing when the supply of conventional oil to the market may begin to drop off. Peak Oil theory espouses that, once past this upper-end of production, supply to the market will decline reasonably rapidly due to the challenging requirements in locating and producing more expensive and less productive oil fields. Nonetheless, with the addition of non-conventional reserves (e.g. tar sands), world supply equates to about ninety years at current consumption rates. It is evident that continued pressures are expected on the demand side, as large consuming nations, such as China and India, continue to develop. While the current economic crisis has dampened demand increases, it is expected that world demand will run up against world daily supply limits over the coming decades, resulting in upward pressure on oil prices. Structural aspects of the oil market related to the nature of the role of OPEC and OECD along with the inefficient decision-making of NOCs are also essential considerations when viewing the overall oil market. These aspects can combine to have a deleterious impact on the market's ability to cope with supply bottle-necks that were more apparent leading up to the most recent global recession.

Section 3 of this paper unravelled a series of contemporary security concerns tied to the current oil market. The current attention being paid to energy security is due in part to the unpredictability within the oil market itself but also to the nature of the threats of terrorism and piracy. Both of these non-state actors have a multitude of targets from which to choose from as a consequence of the massive infrastructure and distribution system that characterizes the industry. Statistics relating to both acts of terrorism and piracy, along with statements of the foiling of attacks, are deeply troubling and have injected a fear premium into the oil market. The current problem of choke-points and bottle-necks in the overall oil distribution network, such as the Straits of Hormuz and Malaca, is a significant vulnerability for nations. Nations look to alternate sources of energy in lieu of oil, and the demand for nuclear power stations is on the rise. The attendant challenge associated with a wider array of facilities in terms of vital point protection and nuclear proliferation is an additional security aspect that must be addressed. Lastly, in order to highlight one of the many geopolitical dimensions related to the interaction between import and export dependant countries, the activities of China and the U.S. were discussed in terms of their interests in Africa. As two growing consumers of international oil, it is evident that they are pursuing independent strategies and interests in building influence within the African continent. In the absence of dialogue and coordination, it is plausible that the efforts of one may serve to under-cut the interests of the other, leading to elevated tension and friction.

When one considers potential geopolitical pressures and numerous existing security threats that are sure to grow in the future as the “energy crunch” becomes a reality, it follows that a heightened level of international cooperation and collaboration is

required in order to both manage extant challenges and to establish mechanisms for reducing potential flash-points.

> …either we are going to rise to the level of leadership, innovation, and collaboration that is required, or everybody is going to lose – big. Just coasting along and doing the same old things is not an option any longer. We need a whole new approach.[211]

Thomas Friedman implores in the above quote that this collaboration is essential for the future of civilization. In light of this reality, a host of policy initiatives must be debated and must lead to concrete action within a modernized industry governance framework, reflective of a reformed consumer-producer structure. These issues must include modernizing the SPR membership, considering greater market price regulation and advancing alternate energy technologies. A recent U.S. report on international energy cooperation indicates that "the nature of the forums can limit their impact" due to their "restricted membership, consensus-based agendas and decisions, and voluntary participation. They generally focus on noncontroversial issues such as energy efficiency and technology."[212] These comments strengthen the case for action.

> International cooperation to enhance energy security is no longer a pressing political issue, now that energy markets have slackened and the immediate risk of supply disruptions and price shocks has subsided. Nevertheless, the potential for future crises remains…Despite the advantages of making advance preparations in a more relaxed environment, little headway has been achieved in modifying International Energy Agency (IEA) agreement in the ways that will make the institution more effective in combating supply disruption. Although there is broad agreement that a cooperative response to an energy crisis can have substantial benefits… the IEA agreement is widely regarded as an ineffective instrument for securing benefits of cooperation. Yet, there is little momentum for improving the situation.[213]

---

[211] Thomas L. Friedman, *Hot, Flat, and Crowded*…, 6.
[212] United States Government Accountability Office, "International Energy: International Forums Contribute to Energy Cooperation within Restraints," Report to the Chairman, Committee on International Relations, House of Representatives. Washington: GAO-07-170, December 2006, Inside Cover.
[213] Bohi, Douglas R., Michale A. Toman, "International Cooperation for Energy Security," *Annual Review of Energy*. 11, (November 1986): 187.

One cannot help but shudder in reading the arguments of Bohi and Toman above made more than twenty years ago. In reading these words, it becomes evident that little has been accomplished with respect to enhancing global cooperative mechanisms over the last number of decades. These concerns were vitally important twenty-five years ago, and it is now even more crucial that they be acted upon to ensure global security. Canada must play a leadership role in addressing the energy challenges of the 21st century. While a common North American integrated energy policy may suffice, it is essential that the Canadian government play a more active role in bringing about broad changes within the international community. Canada is an energy 'super-power' with an abundance of international influence. This country could well synergize the necessary international will to put in place long-lasting policy measures to help alleviate the geo-political pressures that will abound in the absence of a large-scale shift away from global oil dependence. This will not be an easy challenge. Only strong and committed leadership can overcome the challenges of bringing about greater international collaboration. We can ill afford to wait another twenty years to take broad based action otherwise we are sure to face future insecurity as the reality of oil scarcity continues to impact on global peace and prosperity.

Draft Bibliography

Arce, D. "Leadership and the aggregation of international collective action." *Oxford Economic Papers* 53, no. 1 (2001): 114-137.

BBC News Online. "Summit shows China's Africa clout." 6 November 2006. http://news.bbc.co.uk/2/hi/business/6120500.stm; Internet; accessed 31 March 2009.

Barnes, Joe and Amy Myers Jaffe. "The Persian Gulf and the Geopolitics of Oil." *Survival* 48, no. 1 (Spring 2006): 143-161.

Blackwell, Richard. "Canadian, U.S. energy policies to be inextricably linked: Prentice." Theglobeandmail on-line, 20 January 2009. http://www.theglobeandmail.com/servlet/Page/document/v5/content/subscribe?user_URL=http://www.theglobeandmail.com%2Fservlet%2Fstory%2FRTGAM.20090120.wprentice0120%2FBNStory%2Fenergy%2F&ord=23528834&brand=theglobeandmail&force_login=true; Internet; accessed 3 April 2009.

Blanchard, Christopher. "Al Qaeda: Statements and Evolving Ideology." Report Prepared for the Members and Committees of Congress. Washington: Congressional Research Service, 9 July 2007.

Bohi, Douglas R., Michale A. Toman. *The Economics of Energy Security*. Boston: Kluwer Academic Publishers, 1996.

Bohi, Douglas R., Michale A. Toman. "International Cooperation for Energy Security." *Annual Review of Energy*. 11, (November 1986): 187-207.

Bromeley, Simon. *American Hegemony and World Oil: The Industry, the State System and the World Economy*. Pennsylvania: Pennsylvania State University Press, 1991.

Brown, Michael. "New Global Dangers." In *Leashing the Dogs of War: Conflict Management in a Divided World*, edited by Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 39-52. Washington D.C., United States Institute of Peace Press, 2007.

Burrows, Mathew, and Gregory F. Treverton. "A Strategic View of Energy Futures." *Survival* 49, no. 3 (Autumn 2007): 79-90

Campbell, Colin J. and Jean H. Laherrère. "The End of Cheap Oil." *Scientific America* (March 1998): 78-83.

Canadian Electricity Association. "Providing Reliable Energy in a Time of Constraints: A North American Concern." April 2008. http://www.canelect.ca/en/News2008/CEA_NorthEnergyPaper_VInternet_27mars.pdf; Internet; accessed 3 January 2009.

CBC News On-line. “Somali Pirates Free Saudi Supertanker.” 9 January 2009. http://www.cbc.ca/world/story/2009/01/09/supertanker.html; Internet; accessed 31 March 2009.

CBC News On-line. “EU demands speedy end to Russia-Ukraine gas spat.” 6 January 2009, http://www.cbc.ca/mobile/text/story_news-world.html?/ept/html/story/2009/01/06/gazprom-cuts.html; Internet; accessed 15 March 2009.

CBC News On-line. “PM, Obama talk trade, Afghanistan, pledge ‘clean energy dialogue.’” 19 February 2009. http://www.cbc.ca/canada/story/2009/02/19/obama-visit.html; Internet; accessed 23 April 2009.

Cohen, Dave. “The Price is not Right.” Peak Watch - Energy Bulletin, 17 December, 2008. http://peakwatch.typepad.com/peak_watch/2008/12/the-price-is-not-right.html; Internet; accessed 5 February 2009.

Cohen Dave. “The Extraction of Exhaustible Resources.” The Oil Drum, 4 January 2006. http://www.theoildrum.com/story/2006/1/2/19364/13876; Internet; accessed 7 February 2009.

Collier, Paul. “Economic Causes of Conflict and Their Implications for Policy.” in *Leashing the Dogs of War: Conflict Management in a Divided World*, edited by Chester A. Crocker, Fen Osler Hampson, and Pamela Aall, 197-217. Washington, DC: United States Institute of Peace Press, 2007.

Daozu, Bao. “Wen: We can achieve 8% growth.” *China Daily*, 6 March 2009.

DeCloet, Derek. “Shaking the foundations.” *The Globe and Mail*, 2 February 2008: B.4.

Deutch, John. and James R. Schlesinger. “National Security Consequences of U.S. Oil Dependency.” Council on Foreign Relations, Independent Task Force Report No. 58, 2006.

Dick, C.J. *The Future of Conflict: Looking Out to 2020*. Report prepared for the Conflict Studies Research Centre. Surrey: United Kingdom, April 2003.

Elhefnawy, Nader. “The Impending Oil Shock.” *Survival* 50, no. 2 (April-May 2008): 37-66.

Elhefnawy, Nader. “The Next Wave of Nuclear Proliferation.” *Parameters* (August 2008): 36-47.

Elhefnawy, Nader. “Toward a Long-Range Energy Security Policy.” *Parameters* (Spring 2006): 101-114.

Epstein, Lita, C.D. Jaco and Julianne C. Iwerson-Neimann. *The Complete Idiots Guide to the Politics of Oil.* New York: Alpha Books, 2003.

Fergusson, Ian. *United States-Canada Trade and Economic Relationship: Prospects and Challenges*. CRS Report for Congress, 10 May 2008. Washington, D.C: Congressional Review Services, 2008.

Friedman, Thomas L. *Hot, Flat, and Crowded*. New York: Farra, Strauss and Giroux, 2008.

Frost, Ellen L., James J. Przystup and Phillip C. Saunders. “China’s Rising Influence in Asia: Implications for U.S. Policy.” *Strategic Forum* No. 231 (April 2008): 1-8.

Frynas Jedrzej George and Manuel Paulo. “A New Scramble for African Oil? Historical, Political, and Business Perspectives.” *African Affairs* 106, 423 (2007): 229-251.

Gleditsch, Nils Petter. “Environmental Change, Security, and Conflict.” In *Leashing the Dogs of War: Conflict Management in a Divided World*, edited by Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 177-196. Washington: United States Institute of Peace Press, 2007.

Gleditsch, Nils Petter. “Armed Conflict and the Environment: A Critique of the Literature.” *Journal of Peace Research* 35, no. 3 (May 1998): 381-400.

Hamon, David W. and Arnold C. Dupuy. “Security of Energy: The Conflict after Next?” *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Feb/hamonFeb08.asp; Internet; accessed 3 January 2009.

Hester, Annette, and Jennifer Welsh. “Superpower? Oil could make Stephen Harper a superhero.” *The Globe and Mail*, 2 February 2008: F.4.

Homer-Dixon, Thomas. *Environment, Scarcity, and Violence*. New Jersey: Princeton University Press, 2001.

Homer-Dixon, Thomas. “On the Threshold: Environmental Changes as Causes of Acute Conflict.” *International Security*, 16, no. 2 (Fall 1991): 76 -116.

Hotelling, Harold. “The Economics of Exhaustible Resources.” *The Journal of Political Economy* 39, no.2 (April 1931): 137-175.

Huang, Yanzhong and Sheng Ding. “Dragon’s Underbelly: An Analysis of China’s Soft Power.” *EAST ASIA* 23, no.4 (Winter 2006): 22-44.

Hughes, Larry. “Energy Security in Nova Scotia.” Canadian Centre for Policy Alternatives, June 2007. http://www.policyalternatives.ca/documents/Nova_Scotia_Pubs/2007/ccpa_ns_energy_security.pdf; Internet; accessed 3 January 2009.

Hurst, Cindy. “China’s Oil Rush in Africa.” Institute for the Analysis of Global Security, July 2006. http://fmso.leavenworth.army.mil/documents/chinainafrica.pdf; Internet; accessed 3 January 2009.

Hurst, Cindy. “China’s Global Quest for Energy.” Institute for the Analysis of Global Security, January 2007. http://fmso.leavenworth.army.mil/documents/chinasquest0107.pdf; Internet; accessed 3 January 2009.

International Chamber of Commerce Commercial Crime Services Official web-site. “IMB Reports Unprecedented Rise in Maritime Hijackings.” 16 January 2009. Available from http://www.icc-ccs.org/index.php?option=com_content&view=article&id=332:imb-reports-unprecedented-rise-in-maritime-hijackings&catid=60:news&Itemid=51; Internet; accessed 31 March 2009.

International Energy Agency Official Web-site. World Energy Outlook 2008. http://www.worldenergyoutlook.org/; Internet; accessed 3 January 2009.

International Energy Agency Official Web-site. About IEA. http://www.iea.org/; Internet; accessed 7 February 2009.

International Energy Agency. “IEA Response System for Oil Supply Emergencies.” December 2008. http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1912; Internet; accessed 7 February 2009.

International Energy Agency. “Oil Supply Security.” 2007. http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1981; Internet; accessed 31 March 2009.

International Energy Foundation. Official Web-site. http://www.ief-energy.org/; Internet; accessed 31 March 2009.

Jaffe, Amy Myers. “The United States and the International Energy Barrier.” In *A Strategy for American Power: Energy, Climate and National* Security, edited by Sharon Burke and Christine Parthemore, 77-96. Washington: Center for a New American Security, June 2008.

Jaffe, Amy Myers, Michael T. Klare and Nader Elhefnawy. “The Impending Oil Shock: An Exchange.” *Survival 50* no. 4 (August-September 2008): 61-82.

Jaffe, Amy Myers and Ronald Soligo. “Militarization of Energy – Geopolitical Threats to the World Energy System.” James A. Baker III Institute for Public Policy Rice University, Working Paper Series: The Global Energy Market: Strategies to Meet Geopolitical and Financial Risk, May 2008. http://www.rice.edu/energy/publications/WorkingPapers/IEEJMilitarization.pdf; Internet; accessed 3 January 2009.

Jakobson, Linda and Zha Daojiong. “China and the Worldwide Search for Oil Security.” *Asia-Pacific Review* 13, No. 2 (2006): 60-73.

Jiang, Wenran. “China’s Global Quest for Energy Security.” *Canadian Foreign Policy* 13, no. 2 (2006): 105-131

Johnston, Corey S. “Transnational Pipelines and Naval Expansion: Examining China’s Oil Insecurities in the Indian Ocean.” Master’s thesis, Naval Postgraduate School, June 2008.

Kaldor, Mary, Terry Lynn Karl and Yahia Said. *Oil Wars*. London: Pluto Press, 2007.

Klare, Michael, and Daniel Volman. “The African ‘Oil Rush’ and US National Security.” *Third World Quarterly* 27, no.4 (2006): 609-628.

Klare, Michael T. “Oil, Iraq, and American foreign policy: The continuing salience of the Carter doctrine.” *International Journal* 62, no. 1 (Winter 2006/2007): 31-42.

Klare, Michael T. *Resource Wars*. New York: Metropolitan Books, 2001.

Klare, Michael T. *Blood and Oil*. New York: Metropolitan Books, 2004.

Klare, Michael T. “Obama’s Energy Challenge.” The Nation, 10 November 2008. http://www.thenation.com/doc/20081124/klare; Internet; accessed 15 December 2008.

Klare, Michael T. “Energy Security.” In *Security Studies*, edited by Paul D. Williams, 483-496. London: Routledge Press, 2008.

Klare, Michael T. “Oil Moves the War Machine.” *The Progressive* (June 2002): 18-19.

Lai, Hongyi Harry. “China’s Oil Diplomacy: is it a global security threat?” *Third World Quarterly* 28, no. 3 (2007): 519-537.

Lavoie, Pierre. “Asleep at the Wheel: Canada Needs an Oil and Gas Policy.” Toronto: Canadian Forces College National Security Studies Program Paper, May 2007.

Lengyel, Gregory J. “Department of Defense Energy Strategy – Teaching an old dog new tricks.” Walker Paper #10. Alabama: Air University Press, January 2008.

Luft, Gal. “Pipeline Sabotage is Terrorist Weapon of Choice.” *Energy Security.* Prepared by the Institute for the Analysis of Global Security. (28 March 2005). Journal on-line; available from http://www.iags.org/n0328051.htm; Internet; accessed 31 March 2009.

Luft, Gal. “Dependence on Middle East energy and its impact on global security.” Prepared by the Institute for the Analysis of Global Security. http://www.iags.org/luft_dependence_on_middle_east_energy.pdf; Internet; accessed 31 Mar 2009.

Lugar, Richard. “High Costs of Crude: The New Currency of Foreign Policy.” Opening Statement to U.S. Senate Foreign Relations Committee by Chairman, 16 November 2005. 16, 2005. http://lugar.senate.gov/press/record.cfm?id=248836; Internet; accessed, 30 March 2009.

Macalister, Terry and George Monibiot. “Global oil supply will peak in 2020, says energy agency.” The Guardian On-line, 15 December 2008. http://www.guardian.co.uk/business/2008/dec/15/global-oil-supply-peak-2020-prediction: Internet: accessed 5 February 2009.

McCullum, Hugh. *Fuelling Fortress America: A Report on the Athabasca Tar Sands and U.S. Demands for Canadian Energy*. Ottawa: The Polaris Institute, the Canadian Centre for Policy Alternatives and the Parkland Institute in Alberta, 19 February 2007.

McFate, Sean. “US Africa Command: Next Step Or Next Stumble?” *African Affairs* 107, no. 426 (Jan 2008): 111-120.

Mihalka, Michael and David Anderson. “Is the Sky Falling? Energy Security and Transnational Terrorism.” *Strategic Insights*. 7, no. 3 (July 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Jul/mihalkaJul08.pdf; Internet; accessed 31 March 2009.

Moran, Daniel and James A. Russell. “The Militarization of Energy Security.” *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Feb/moranFeb08.asp; Internet; accessed 3 January 2009.

National Security Network Official Web-site. “Energy Security is National Security.” 26 January 2009. http://www.nsnetwork.org/node/1199; Internet; accessed 31 March 2009.

Nichol, Jim. *Armenia, Azerbaijan, and Georgia: Political Developments and Implications for U.S. Interests*. CRS Report for Congress, 24 September 2008. Washington, D.C: Congressional Review Services, 2008.

Nikitin, Mary Beth, Anthony Andrews and Mark Holt. *Managing the Nuclear Fuel Cycle: Policy Implications of Expanding Global Access to Nuclear Power*. Report Prepared for the Members and Committees of Congress. Washington: Congressional Research Service, 3 September 2008.

Organization for Economic Cooperation and Development Official Web-site. http://www.oecd.org/pages/0,3417,en_36734052_36734103_1_1_1_1_1,00.html; Internet; accessed 7 February 2009.

Organization of the Petroleum Exporting Countries Official Web-site. http://www.opec.org/home/; Internet; accessed 7 February 2009.

Randall. Stephen J. *United States Foreign Oil Policy Since World War I: For Profits and Security*. 2nd ed. Montreal & Kingston: McGill-Queen’s University Press, 2005.

Reguly, Eric. “What’s so wrong with making it to the petroleum big leagues?” *The Globe and Mail*, 2 February 2008: F.5.

Ross, Michael L. “Oil, Drugs, and Diamonds: The Varying Roles of Natural Resources in Civil War.” in *The Political Economy of Armed Conflict: Beyond Greed and Grievance*, edited by Karen Ballentine and Jake Sherman, 47-70. Boulder: Lynne Rienner Publishers, 2003.

Royal Embassy of Saudi Arabia. “Saudi Security Forces Foil Major Terrorist Plots.” Washington D.C.: 27 April 2007. http://www.saudiembassy.net/2007News/News/NewsDetail.asp?cIndex=7103; Internet; accessed 31 March 2009.

Runge, C. Ford, and Benjamin Senauer. “How Biofuels Could Starve the Poor.” *Foreign Affairs* 86, no. 3 (May/June 2007): 41-53.

Russell, James. “The Militarization of Energy Security.” Speech delivered to the Energy Forum: "The Global Energy Market: Comprehensive Strategies to Meet Geopolitical and Financial Risks," at the James A. Baker Institute for Public Policy, Rice University, May 21, 2008. http://www.rice.edu/energy/publications/eventpres/21may08globalenergymkt/Russell_Militarization%20Talk.pdf; Internet; accessed 3 January 2009.

Schubert, Samuel R. "Revisiting the Oil Curse: Are Oil Rich Nations Really Doomed to Autocracy and Inequality?" Webster University, Institute for Human and Social Studies, National Defence Academy, AT, 1 Aug 2006. http://ideas.repec.org/p/pra/mprapa/10109.html; Internet; accessed 3 January 2009.

Schubert, Samuel R. "Being rich in energy resources – a blessing or a curse." Directorate-General for External Policies of the Union, European Government, 31 Jan 2007. http://mpra.ub.uni-muenchen.de/10108/; Internet; accessed 3 January 2009.

Schuler, Dave. "More on the Threat of Piracy to the Oil Trade." Outside the Beltway, 18 November 2008. Blog on-line; available from http://www.outsidethebeltway.com/archives/more_on_the_threat_of_piracy_to_the_oil_trade/; Internet; accessed 31 March 2009.

Sissine, Fred. Energy Independence and Security Act of 2007: A Summary of Major Provisions. CRS Report for Congress, 21 December 2007. Washington, D.C: Congressional Review Services, 2007.

Stammers, Robert. "Oil As An Asset: Hotelling's Theory On Price." Investopedia, 13 October, 2008. http://www.investopedia.com/articles/financial-theory/08/hotelling-theory-price-oil.asp; Internet; acessed 7 February 2009.

Stanislaw, Joseph A. *Power Play: Resource Nationalism, the Global Scramble for Energy, and the Need for Mutual Interdependence*. Report prepared for Deloitte Touche. 2008. Available from http://www.deloitte.com/dtt/whitepaper/0,1017,cid%253D223990,00.html; Internet; accessed 31 March 2009.

Steinhäusler, Friedrich, James A. Russell and Daniel Moran. "Introduction: Special Edition on Energy Security." *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Feb/introFeb08.asp; Internet; accessed 31 March 2009.

Steinhäusler, Friedrich, P. Furthner, W. Heidegger, S. Rydell, and L. Zaitseva. "Security Risks to the Oil and Gas Industry: Terrorist Capabilities." *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Feb/steinhauslerFeb08.asp; Internet; accessed 31 March 2009.

Stewart, Francis and Graham Brown. "Motivations for Conflict: Groups and Individuals." In *Leashing the Dogs of War: Conflict Management in a Divided World*, edited by Chester A. Crocker, Fen Osler Hampson and Pamela Aall, 219-244.Washington D.C., United States Institute of Peace Press, 2007.

Stockholm International Peace Research Institute (SIPRI). *Oil and Security*. New York: Humanities Press, 1974.

Taylor, Jerry and Peter Van Doren. "Random Oil." Forbes Magazine On-line, 4 September, 2008. http://www.forbes.com/2008/09/04/oil-prices-forecast-oped-cx_jt_pv0904taylorvandoren.html; Internet; accessed 7 February 2009.

Thompson, David, Gordon Laxer, and Diana Gibson. *Toward an Energy Security Strategy for Canada*. Discussion Paper prepared by Parkland Institute. Edmonton: University of Alberta, December, 2005.

Trench, Cheryl. "*How Pipelines Make the Oil Market Work – Their Networks, Operation and Regulation*." Memorandum Prepared for the Association of Oil Pipe Lines and the American Petroleum Institute's Pipeline Committee. New York: Allegro Energy Group, December 2001.

Tubb, Rita. "Energy Industry Observer Makes a Case for Interdependence." *Pipeline and Gas Journal* (August 2008): 38-42.

United States Africa Command. "Policy Statement: China in Africa: Implications for U.S. Policy." 4 June 2008. http://www.africom.mil/getArticle.asp?art=1786; Internet; accessed 31 March 2009.

United States Africa Command. "Policy Statement: China in Africa: Implications for U.S. Policy." 4 June 2008. http://www.africom.mil/getArticle.asp?art=1786; Internet; accessed 31 March 2009.

United States Government Accountability Office. "International Energy: International Forums Contribute to Energy Cooperation within Restraints." Report to the Chairman, Committee on International Relations, House of Representatives. Washington: GAO-07-170, December 2006.

United States. United States Joint Forces Command. *The Joint Operation Environment 2008 – Challenges and Implication for the Future Joint Force*. 25 November, 2008. http://www.jfcom.mil/newslink/storyarchive/2008/pa121008.html; Internet; accessed 5 February 2009.

United States. United States Geological Survey Official web-site. http://pubs.usgs.gov/dds/dds-060/ESpt4.html#Table; Internet; accessed 30 March 2009.

United States. Hearing Before the Committee on Foreign Affairs House of Representatives One Hundred Tenth Congress - Second Session. *Rising Oil prices, Declining National Security.* Washington, DC: U.S. Government Printing Office, 2008.

Victor, David. "National Security Consequences of U.S. Oil Dependency." Council of Foreign Relations, Independent Task Force Report No. 58, 2006.

Victor, David and Sarah Eskreis-Winkler. “In the Tank: Making the Most of Strategic Oil Reserves.” *Foreign Affairs* 87, no. 4 (Jul/Aug 2008): 70-83.

Volman, Daniel. “Oil, Arms and Violence in Africa.” African Security Research Project, Washington, D.C., February 2003.

Warrick, Joby. “Spread of Nuclear Capability is Feared.” The Washington Post On-line. 12 May 2008. http://www.washingtonpost.com/wp-dyn/content/article/2008/05/11/AR2008051102212.html; Internet: accessed 1 April 2009.

Whipple, Tom. “Peak Oil.” *Bulletin of the Atomic Scientists* 64, no 5 (Nov/Dec 2008): 34-41.

Woehrel Stephen. *Russian Energy Policy toward Neighboring Countries*. CRS Report for Congress, 27 November 2007. Washington, D.C: Congressional Review Services, 2007.

Yohannes, Okbazghi. “America’s New Frontier: Oil in the Gulf of Guinea.” *The Black Scholar* 33, no.2 (2003): 2-21

Yergin, Daniel. “Ensuring Energy Security.” *Foreign Affairs* 85, no.2 (March/April 2006): 69-82.

Yergin, Daniel. “Using Energy as a Weapon.” Statement of Daniel Yergin Chairman, Cambridge Energy Research Associates to the Committee on House Government Reform Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs, May 16, 2006.

Yergin, Daniel. “Foreign Policy and National Security Implications of oil Dependence.” Statement of Daniel Yergin Chairman, Cambridge Energy Research Associates to the Committee on Foreign Affairs US House of Representatives, 22 March 2007.

Zellen, Barry. “Viewpoint: Cold Front Rising - As Climate Change Thins Polar Ice, a New Race for Arctic Resources Begins.” *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/people/zellen.asp; Internet; accessed 3 January 2009.

Zellen, Barry. “Viewpoint: Resource Wars: Energy, Resource Conflict, and the Emerging World Order – An interview with Michael T. Klare.” *Strategic Insights* 7, no. 1 (February 2008). Centre for Contemporary Conflict. Journal on-line; available from http://www.ccc.nps.navy.mil/si/2008/Feb/klareFeb08.asp; Internet; accessed 31 March 2009.

Zhiming, Xin. “The Economy to bottom out.” *China Daily: Economic Outlook 2009*. 5 March 2009.