



The Energy Security Impact of Oil Nationalization

Alternate Futures Scenarios for the Global Futures Forum

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Abstract

This Technical Memorandum details scenarios developed for the Global Futures Forum Workshop — Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities that occurred in Washington, D.C., February 26-27, 2009. The scenarios outlined in this Technical Memorandum pertain to the potential impact of the nationalization of oil in a world that is inadequately supplied. They were developed using a quadrilateral projection process and model.

Résumé

Le présent document technique décrit les scénarios élaborés en vue de l'atelier « Global Futures Forum Workshop » ayant pour thème « les conséquences mondiales sur le plan de la sécurité environnementale et énergétique des perspectives possibles dans le secteur pétrolier : les risques et les possibilités » (« Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities »), qui a lieu à Washington, D.C., en février 2009. Ces scénarios portent sur les conséquences possibles de la nationalisation de la production de pétrole dans un monde où l'offre est insuffisante. Ils ont été élaborés d'après une méthode et un modèle de prévision quadrilatéraux.

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Executive summary

The Energy Security Impact of Oil Nationalization: Alternate Futures Scenarios for the Global Futures Forum

Peter F. Johnston; DRDC CORA TM 2009-047; Defence R&D Canada – CORA; October 2009.

Introduction or background: This Technical Memorandum was produced to outline possible energy security futures resulting from the nationalization of oil production in a world that has inadequate supply. The timeframe for these scenarios is ten years in the future. This research was conducted at the request of the Global Futures Forum (GFF) and presented by the author at the GFF workshop, Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities that occurred in Washington, DC, February 26-27, 2009. The methodology used to develop the models is explained within the Technical Memorandum and used a quadrilateral projection model.

Results: For developing the scenarios, the focal issue is represented in the following question: *What impact might nationalization of oil reserves and industry assets have on global security in 2019?*

Nationalization of oil affects oil supply — in 2007 Nationalized Oil Companies (NOCs) controlled over 75 percent of global proven oil reserves and accounted for 77 percent of total world oil production. Its impact is also felt in the realm of geopolitics since it can lead to competition for scarce resources between states, facilitate the funding of terrorists or insurgents, contribute to destabilizing regional arms races, influence intra-state conflict, and sustain antagonistic political agendas. As this Technical Memorandum will demonstrate, nationalization of oil assets can have a destabilizing effect at the local, regional, and global level.

In the ten-year timeframe of these scenarios, it is possible that the propensity of states to nationalize oil resources may increase as will their use of this strategic resource as a political weapon to influence the behaviour of import dependent consumer states. This behaviour can be expected to increase tensions between states regarding oil supply and potentially lead to arms acquisitions aimed at safeguarding oil supply chains. It is possible that inter-state conflict could occur as a result, wholly or partially due to tensions over oil supply. The degree to which states and private sector industry develop technologies and adopt practices that will reduce or eliminate their dependence on oil for economic activity, particularly in the transportation sector, will significantly influence the potential for conflict related to oil supply in the future.

Four scenarios were developed for this Memorandum using a quadrant projection model. The model axes comprise the key drivers of the scenario sets; the propensity of nationalized oil states to use the oil weapon and the rate at which states transition from an oil-based economy to alternative forms of energy. The scenarios include the *Conflicted World*, *Crisis Management*, *Smooth Sailing*, and *Muddling Along*. The *Conflicted World* scenario is characterized at its extremes by a high propensity amongst countries that operate NOCs to use their oil exports as a strategic weapon. It is also a world that has not witnessed significant efforts to transition to alternate forms of energy for most economic activity. The *Crisis Management* world, like the

Conflicted World, is characterized at its extremes by a high propensity amongst countries that operate NOCs to use their oil exports as a strategic weapon. However, it is a world that has benefited by widespread energy transitions that have greatly reduced the use of oil to power transportation and much economic activity. Oil use has largely shifted away from transportation and is more focused on the petrochemical industry. This transition is unlikely to be complete within a ten-year timeframe so it should be assumed that it is ongoing. The *Smooth Sailing* scenario is most desirable from the perspective of energy security, economic activity, political development, and global stability. It is characterized by extensive efforts to transition away from oil-based economic activity, particularly with regards to transportation. There is also a significant reduction in the use of the oil weapon by nationalized states. The *Muddling Along* world is also more positive in some respects compared to *Conflicted World* and *Crisis Management*. This is primarily because states with nationalized oil industries do not resort to wielding the oil weapon frequently. While there will not be significant movement away from oil as the primary transportation energy source, it is possible that more efficient oil use and increased stockpiling might dissuade the nationalized states from disrupting supply for political objectives. It is possible that better relations between consumer and supplier states will also account for the reduced use of the oil weapon. Regime change leading to more stability in key supplier states may also account for the reduced level of disruption.

In addition to the storylines for each scenario, indicators were also developed and are contained within the text of the Technical Memorandum.

In a world lacking adequate oil supply, such as the one that forms the basis of this workshop, nationalization of oil assets will have the potential to reduce energy security, slow economic growth, and feed intra- and inter-state tensions — possibly to the point of armed conflict. Yet, there are options that might reduce the impact of, or avoid entirely, these negative outcomes. Key amongst these will be the degree to which industry and states can insulate their activities and societies from susceptibility to oil supply interruptions. There are a variety of steps that can be taken such as diversifying supply options, increasing strategic reserves, and even embarking upon a transition away from a heavy dependence on oil for their transportation activities, particularly with regard to economic functions. Reducing the negative impact of a supply interruption will, in turn, reduce the perceived benefit that nationalized states will gain by wielding the oil weapon. This may reduce the frequency of interruptions in the future.

In terms of the methodology used to prepare this Memorandum, it is evident that it is better suited to facilitated workshops with a community of experts to better populate the factors, the scenario sets, the implications, and the indicators. The benefit of the quadrant approach is increased with input from a variety of contributors whose expertise is cross-functional in nature. A collective session should form the basis of future workshops focused on energy futures.

Future plans: The workshop at which this research was presented was the first of three planned sessions. It is possible that the scenario set contained in this Technical Memorandum may be developed further and might influence the final outcome of the GFF workshop series (detailed in Annex A).

Sommaire

The Energy Security Impact of Oil Nationalization: Alternate Futures Scenarios for the Global Futures Forum

Peter F. Johnston; DRDC CORA TM 2009-047; R & D pour la défense Canada – CORA; Octobre 2009.

Introduction ou contexte: Le présent document technique a été produit dans le but d'illustrer les scénarios futurs possibles en matière de sécurité énergétique découlant de la nationalisation de la production de pétrole dans un monde où l'offre est insuffisante. Ces scénarios s'étendent sur une période de dix ans dans l'avenir. Les recherches ont été réalisées à la demande du Global Futures Forum (GFF) et ont été présentées par l'auteur lors de l'atelier du GFF ayant pour thème « les conséquences mondiales sur le plan de la sécurité environnementale et énergétique des perspectives possibles dans le secteur pétrolier : les risques et les possibilités », atelier qui a eu lieu à Washington, D.C., en février 2009. Les scénarios ont été élaborés d'après une méthode et un modèle de prévision quadrilatéraux.

Résultats: Voici la question centrale qui a servi de base à l'élaboration des scénarios : *Quelles conséquences la nationalisation des réserves de pétrole et des actifs de l'industrie pourrait-elle avoir sur la sécurité à l'échelle mondiale en 2019?*

La nationalisation de la production de pétrole a des répercussions sur l'offre de pétrole. En 2007, les sociétés pétrolières nationales contrôlaient plus de 75 % des réserves prouvées de pétrole du monde et étaient responsables de 77 % de la production mondiale totale de pétrole. La nationalisation a également des incidences sur la scène géopolitique, car elle peut amener les États à se faire concurrence pour les ressources limitées, faciliter le financement des terroristes ou des insurgés, contribuer à la déstabilisation dans le cadre des courses aux armements régionales, influencer sur les conflits au sein des États et soutenir des programmes politiques antagonistes. Comme le démontre le présent document, la nationalisation des actifs de l'industrie pétrolière peut avoir un effet déstabilisant à l'échelle locale, régionale et mondiale.

Durant la période de dix ans sur laquelle portent les scénarios, il se peut que les États deviennent plus enclins à nationaliser leurs ressources pétrolières et à se servir de cette ressource stratégique comme arme politique pour influencer le comportement des pays consommateurs tributaires des importations. On peut s'attendre à ce qu'une telle approche augmente les tensions entre les États en ce qui concerne l'approvisionnement en pétrole et pousse éventuellement les pays à acquérir des armes en vue de protéger les chaînes d'approvisionnement en pétrole. Il est possible aussi que des conflits surgissent entre les pays, uniquement ou partiellement en raison des tensions associées à l'approvisionnement en pétrole. La mesure dans laquelle les États et le secteur privé parviendront à développer des technologies et à adopter des pratiques qui permettront de réduire ou d'éliminer leur dépendance au pétrole pour l'activité économique, particulièrement dans le secteur des transports, sera un facteur déterminant de l'émergence possible de conflits liés à l'approvisionnement en pétrole dans l'avenir.

Quatre scénarios ont été élaborés pour la présente recherche à l'aide d'un modèle de prévision à quadrants. Les axes du modèle correspondent aux facteurs déterminants des scénarios, soit la

propension des États ayant nationalisé leur production de pétrole à utiliser l'arme pétrolière et la vitesse à laquelle les États passent d'une économie axée sur le pétrole à une économie axée sur d'autres formes d'énergie. Les scénarios sont les suivants : « **un monde en conflit** », « **la gestion de crise** », « **tout va comme sur des roulettes** » et « **se tirer d'affaire** ». Dans le scénario « **un monde en conflit** », on constate, à l'extrême, une forte propension chez les pays qui exploitent des sociétés pétrolières nationales à se servir de leurs exportations de pétrole comme arme stratégique. Ce scénario fait également état d'un monde où peu d'efforts ont été déployés pour passer à d'autres formes d'énergie dans la plupart des branches de l'activité économique. Dans le scénario « **la gestion de crise** », la situation à l'extrême du modèle est la même que dans le scénario « **un monde en crise** », à savoir que les pays qui exploitent des sociétés pétrolières nationales sont fortement enclins à se servir de leurs exportations de pétrole comme arme stratégique. Toutefois, le monde présenté dans ce scénario a connu d'importantes transitions sur le plan énergétique, lesquelles ont grandement réduit l'utilisation du pétrole comme carburant dans le secteur des transports et comme moteur d'une grande part de l'activité économique. Le pétrole y est beaucoup moins utilisé pour les transports. Son utilisation est plutôt réservée à l'industrie pétrochimique. Comme cette transition prendra probablement plus de dix ans, on doit supposer qu'elle est continue. Le scénario « **tout va comme sur des roulettes** » est le plus souhaitable dans l'optique de la sécurité énergétique, de l'activité économique, de l'évolution politique et de la stabilité à l'échelle mondiale. Ce scénario se caractérise par le déploiement de vastes efforts pour transformer graduellement l'activité économique de manière à ce qu'elle ne soit plus axée sur le pétrole, particulièrement dans le domaine des transports. Ce scénario présente également une diminution notable de l'utilisation de l'arme pétrolière par les pays qui ont nationalisé leur production. Le scénario intitulé « **se tirer d'affaire** » est également plus positif à certains égards que les scénarios « **un monde en conflit** » et « **la gestion de crise** », et ce, essentiellement parce qu'il présente un monde où les pays qui ont nationalisé leur production de pétrole ne brandissent pas souvent l'arme pétrolière. Bien qu'il n'y ait pas de remplacement à grande échelle du pétrole comme source première d'énergie pour les transports, il est possible qu'une meilleure utilisation du pétrole et que la constitution accrue de réserves dissuadent les pays ayant nationalisé leur production d'interrompre l'approvisionnement à des fins politiques. L'amélioration des relations entre les pays consommateurs et les pays fournisseurs pourrait également limiter le recours à l'arme pétrolière. Les changements de régime donnant lieu à une plus grande stabilité au sein des principaux pays fournisseurs pourraient également réduire les perturbations.

Outre les schémas des scénarios, des indicateurs ont été élaborés et intégrés dans le texte du document.

Dans un monde où l'offre de pétrole est insuffisante, comme dans celui sur lequel repose l'atelier du GFF, la nationalisation des actifs de l'industrie pétrolière a le potentiel de réduire la sécurité énergétique, de ralentir la croissance économique et d'alimenter les tensions intérieures et celles entre les pays, peut-être même jusqu'au point de déclencher un conflit armé. Pourtant, il est possible de réduire ces effets négatifs, voire de les éliminer complètement. L'élément névralgique sera la mesure dans laquelle l'industrie et les pays peuvent rendre leurs activités et leurs sociétés moins vulnérables aux interruptions de l'approvisionnement en pétrole. Diverses mesures peuvent être prises, comme la diversification des options en matière d'approvisionnement, l'augmentation des réserves stratégiques et l'affranchissement de la forte dépendance au pétrole pour les activités de transport, particulièrement en ce qui concerne les fonctions économiques. La réduction des incidences négatives d'une interruption de l'approvisionnement réduira, à son tour, les avantages

que les pays ayant nationalisé la production de pétrole croient pouvoir obtenir s'ils brandissent l'arme pétrolière. La fréquence des interruptions pourrait ainsi diminuer dans l'avenir.

Perspectives: L'atelier au cours duquel cette recherche a été présentée était le premier d'une série de trois. Il est possible que les scénarios contenus dans ce document soient élaborés plus à fond et puissent influencer sur le résultat final de la série d'ateliers du GFF (voir détails à l'annexe A).

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1 Introduction

The energy security impact of oil nationalization has garnered much attention amongst politicians, policy analysts, economists, energy companies, and other interested observers in recent years. Nationalization of oil is the process by which states de-privatize oil development operations or exploit previously undeveloped resources via a state controlled oil company. Oil export restrictions are often associated with nationalization. In the context of this workshop — “a world in which global oil supply is unable within the next ten years to keep pace with global demand” — oil nationalization has the potential to be a devastatingly potent geopolitical weapon. In order to consider how nationalization might influence security in the future, it is useful to analyze the problem through an alternate futures methodology. This paper will highlight the energy security impact of oil nationalization, identify variables that influence the political effectiveness of oil nationalization, outline four energy security scenarios, and suggest options to reduce the potential negative impact of oil nationalization.

2 Methodology

A quadrant projection model¹ was used in order to devise the scenario set for this paper. This method was chosen because it is less bounded by current thinking than linear projection techniques and thus can facilitate unbiased development of scenarios. The quadrant model used for this paper was developed as follows:

1. Identify the focal issue;
2. Describe the contemporary experience to determine current factors;
3. Determine future factors;
4. Rank the factors to determine the two most critical uncertainties;
5. Define the scenarios and determine their stories;
6. Determine the implications; and
7. Determine the indicators.

¹ The methodology followed in this paper is derived of a model described in: Peter Schwartz, *The Art of the Long View*. (Doubleday: New York, 1996). The model is detailed in the appendix, pp. 241-248. While Schwartz uses an 8 steps model, I have shortened mine to 7 steps by combining scenario definition and determining their stories in step 5. I consider this modification valid in that it does not remove any meaning from the scenarios yet shortened the process and documentation.

3 The Focal Issue

Determination of a focal issue is crucial for successful scenario development. The issue helps to maintain the purpose of the process and determine the factors that form the critical uncertainties. For this paper, the focal issue is represented in the following question: *What impact might nationalization of oil reserves and industry assets have on global security in 2019?* The date 2019 was chosen since the aim of the workshop was to explore “the consequences of a world in which global oil supply is unable within the next 10 years to keep pace with global demand.”²

For the purposes of this paper, “security” is defined as the condition of a state being free from threat against its sovereign territory, its institutions, its critical infrastructure, its economic interests, and that of its citizens. This broader understanding of security was chosen, rather than energy security alone, because nationalization of energy assets affects more than just energy security as explained in the following section. Energy security can be defined narrowly as the condition of having sufficient, affordable, reliable, and safe energy resources to conduct the economic, political, security, social, health, and welfare activities necessary for the functioning of a state.

² The workshop instruction paper is attached as Annex A.

4 Contemporary Experience and Current Factors

To understand how oil nationalization might impact security in the future, it is vital to recognize how it has done so to the present. This understanding facilitates the development of the factors pertinent to nationalization's security impact. Nationalization of oil affects oil supply although its impact is also felt in the realm of geopolitics since it can lead to competition for scarce resources between states, facilitate the funding of terrorists or insurgents, contribute to destabilizing regional arms races, influence intra-state conflict, and sustain antagonistic political agendas. As this paper will demonstrate, nationalization of oil assets can have a destabilizing effect at the local, regional, and global level. Understanding these trends will help to appreciate how nationalization of oil might influence future security.

In order to appreciate the level of influence that Nationalized Oil Companies (NOCs) exert over the global oil market it is necessary to understand their market share. Annex B provides a list of countries that have nationalized their domestic and overseas oil company operations. This list is not exhaustive but does include those countries that contributed one percent or more of daily oil production in 2007. As indicated in the annex, total global proven reserves of oil, including Canada's oil sands, totalled 1.39 Trillion barrels in 2007. Over 75 percent of these reserves were nationalized.³

As noted, not all nationalized countries were included in Annex B since it was intended to provide a broad understanding of the scope of the challenge. The reality is that the production ratio between free market International Oil Companies (IOCs) and NOCs has virtually reversed since the 1970s. In 1972, the last year before the first major OPEC driven oil shock, IOCs produced approximately 93 percent of global crude oil whereas NOCs produced roughly 7 percent. In 2007, IOCs accounted for approximately 23 percent of daily production against roughly 77 percent for NOCs.⁴ This trend may continue since much of the IOC production has occurred in non-nationalized regions, such as the United States, where fields are generally older and closer to depletion. Moreover, recent history has witnessed more nationalization such as those undertaken by the Venezuelan or Ecuadorian governments.

Nationalization of oil then does have a negative impact on the market and on the profitability of IOCs by limiting their access to reserves. Moreover, many of the reserves controlled by NOCs are located in places where oil is more easily, and thus cheaply, extracted such as the Middle East. This leaves more challenging and less profitable reserves for the IOCs. These companies generally run much more efficiently than NOCs and would possibly increase the global crude supply if they could access reserves held by NOCs.⁵ Currently, the major oil development opportunities are in the Middle East, Russia, Venezuela, and the Canadian oil sands. Of these

³ The data used in this figure was taken from *BP Statistical Review of World Energy*, June 2008.

⁴ Alex Forbes, "Scramble for Assets Goes Global," *Petroleum Economist*, Issue 3, 2008, p. 6.

⁵ Stacy L. Eller, Peter Hartley, and Kenneth B. Medlock III, "Empirical Evidence on the Operational Efficiency of National Oil Companies," The James A. Baker III Institute for Public Policy and Japan Petroleum Energy Center Policy Report, March 2007, Accessed at http://www.rice.edu/energy/publications/docs/NOCs/Papers/NOC_Empirical.pdf. See also: Robert Pirog, "The Role of National Oil Companies in the International Oil Market," *CRS Report for Congress*. RL34137 (Washington, D.C.: Library of Congress, Congressional Research Service, August 21, 2007), p. 10.

only Canada offers largely unfettered access and a low-risk political environment. Although, there are risks associated with the controversies stemming from the environmental impact of oil sands developments. The stable political situation in Canada has helped spur investment in oil sands development — US\$90 billion of projects are currently planned by the major IOCs. However, the returns are lower than those of conventional oil projects since converting the oil sand to crude requires a substantial amount of water and energy.⁶ Thus, IOCs are struggling to compete in a market saturated by NOCs.

The impact of dwindling opportunity for IOC investment opportunities on global oil supply is compounded by business decisions undertaken by the companies themselves in some instances. There has been a trend toward mergers and acquisitions of publically traded oil and gas companies in recent years. Consequently, the reserves held by IOCs have come under increasingly centralized control. In 1990, five largest companies controlled 60 percent of IOC reserves. By 2005 they controlled 84 percent. These companies have been slow to invest in new production in light of generally high oil prices. Consequently, it may be the case that IOC production will decline somewhat in the near- to mid-term due to these business decisions, possibly leading to a situation where NOCs will control even more of the global production.⁷

Nationalization of oil reserves and facilities can have serious consequences including oil market and economic distortions, the politicization/militarization of oil security, and the use of oil revenue in destabilizing ways. However, not all nationalizations have these negative consequences. When the countries that nationalize their assets are legitimate liberal democracies with transparent revenue generation streams — including effective taxation regimes — and observe international diplomatic and trade norms then the impact of oil nationalization on energy security is similar to that of free market oil company operations. Norway, with its state-owned Statoil is a case in point. Yet, as Annex B indicates, the bulk of nationalized oil operations occur in non-democratic states where transparency regarding government revenues and industry is lacking. Moreover, as will be detailed below, some of these states have demonstrated used oil exports as a political weapon in the past and are likely to do so in the future.

Oil market distortions can result from deficiencies in operations by nationalized companies. This is because the diversion of revenue from the oil and gas companies to government coffers reduces reinvestment in infrastructure and, over time, can lead to production declines that can further crimp global supply.⁸ Mexico is a case in point. Mexican crude output began to decrease from its peak of 3.824 million barrels per day in 2004 and has continued to suffer an annual decline.⁹ Some analysts predict that Mexico will become a net importer of oil within the current decade. The Mexican government taxes Pemex, the national oil company, at slightly more than 60 percent of its gross revenue. Consequently, in the absence of foreign investment that is currently forbidden by the Mexican constitution, Pemex must rely on government borrowing to develop infrastructure and maintain operations. This has led to a deterioration of infrastructure that has significantly reduced productivity. Granted, Mexican reserves are believed to be declining as

⁶ Erin Anderssen, Shawn McCarthy, and Eric Reguly, “An Empire from a Tub of Goo,” *The Globe and Mail*. January 26, 2008.

⁷ Amy Myers Jaffe and Ronald Soligo. “Energy security: The Russian connection,” *Energy Security and Global Politics – The militarization of resource management*, ed. by Daniel Moran and James A. Russell. (London: Routledge, 2009) pp. 119-120.

⁸ “The Changing Role of National Oil Companies in International Energy Markets,” *Baker Institute Policy Report* No. 35, March 2007, p. 2.

⁹ *BP Statistical Review of World Energy*, June 2008. p. 8.

well, although a major reason for the decline in output is inadequate investment on infrastructure.¹⁰

Aside from these negative oil market implications, nationalized oil operations can lead to domestic economic distortions. Some countries that nationalize their oil industry lack economic diversity thus they are subject to the variations in oil prices to a greater degree than countries whose economies are more diverse. These states can suffer from the so-called “resource curse” characterized by susceptibility to boom and bust cycles; inflation of the value of the state currency that increases the challenge of developing non-resource related industries because imports become comparatively cheaper;¹¹ and the generation of resource revenue streams that can feed a culture of greed and corruption because of the lack of transparency in many of these countries. Under these conditions, many citizens lack economic opportunities and become dissatisfied with their governments, potentially to the extent that political unrest, sometimes violent, results.¹² The seemingly intractable violence in the Niger Delta serves as a stark example of the harm the resource curse can exact on a country.

In addition to the economic distortion experienced by some states with nationalized energy industries, some scholars suggest that the process of democratization can be prevented or distorted in these rentier states.¹³ They attribute this to the cycle of greed and corruption that characterize several resource rich states whose extractive industry developed prior to their contemporary political institutions. When the order of development occurs in this manner, it is often the case that the ruling elite rely on resource revenue instead of developing a functional taxation system that derives revenue for the general population to fund government programs, policy, and operations. In the absence of this system, the normal social contract between a government and the governed does not develop. Factions within the society who might oppose the government are placated through lavish expenditures, paid for through resource rent, or subjugated by the security apparatus of the state. These two transactions, in turn, necessitate more expenditure of the resource wealth. Since an extensive taxation system does not exist and since the general population does not relate to its government as they might were they taxed, the bureaucracy never develops effectively. Indeed, the bureaucracy becomes a key interface in the climate of greed and corruption facilitated by the need to pay for support rather than earn it through effective governance. Once entrenched, this political culture of greed and corruption is difficult to uproot so the prospects for positive change are meagre.

Another significant impact of nationalized oil operations speaks to why some states nationalize these resources in the first place. Aside from the obvious revenue advantages and Nationalistic urges to gain control of resources from foreign companies, control of strategically vital energy resources affords some states political leverage over consumer countries by means of the “oil weapon” in order to influence the behaviour, or possibly inflict economic damage on consumer

¹⁰ “U.S.-Latin America Relations: A New Direction for a New Reality,” *Council on Foreign Relations Independent Task Force Report* No. 60, 2008. pp. 49-50.

¹¹ Christine Ebrahim-zadeh, “Back to Basics — Dutch Disease: Too much wealth managed unwisely ,” *Finance and Development*, March 2003, Vol. 40, No. 1, accessed at <http://www.imf.org>.

¹² Indra de Soysa, “The Resource Curse: Are Civil Wars Driven by Rapacity or Paucity?” *Greed and Grievance – Economic Agendas in Civil Wars* (London: Lynne Rienner Publishers, 2000) pp. 113-135.

¹³ Terry Karl, “Democracy over a Barrel: Oil, Regime Change and War,” Center for the Study of Democracy Paper 08-07, 2008, pp. 4-7.

states. There are contemporary examples of this such as Russia's cessation of oil supplies to the Czech Republic on the day that Prague signed a deal with the US to accept a radar installation on Czech territory as part of the European Ballistic Missile Defense system.¹⁴ Consumer states often lack the ability to quickly change sources of oil supply due to the nature of contracts, the difficulty in shifting refinery capacities to handle different crudes, and, in periods of short supply, the dearth of spare global capacity to replace interrupted petroleum shipments. Yet, exporting states can also suffer from their own use of the oil weapons since they often depend on the revenue they obtain from their oil sales. If they cannot find new buyers, they must have other sources of revenue or can only afford to disrupt their exports for short periods of time.

Historically, the decision to nationalize oil assets has often been linked to price trends. In sustained periods of high prices, such as the episode that just ended with the onset of the global economic downturn, states tend to nationalize resource based industries more frequently. This is because profits are higher during these periods so even though NOCs tend to operate less effectively, they are still profitable. When prices drop for a sustained period governments that have nationalized resource industries open up their endowments to non-nationalized companies. This is because the NOCs often lack the efficiency and technical expertise to extract and process oil profitably at lower prices. Technical deficiencies are also influential when the oil reserves are not easily extracted or processed. When these conditions exist, NOCs often invite IOCs in as partners under favourable terms in order to benefit from their technical expertise.¹⁵ However, this is a risky undertaking for the IOCs since the host country periodically cancels contractual arrangements once projects have commenced and renegotiate to give their state-owned companies a majority share in the operations. This has occurred recently in Russia where Shell, Total, BP, and other international companies have lost their controlling shares of operations in a variety of Russian fields including Shtokman, Sakhalin I, Sakhalin II, and Kovytko.¹⁶ Similar contractual duplicity has occurred in Venezuela where the government has cancelled contracts with foreign companies and given PDVSA a controlling interest in several projects. Companies that refused to accept the dictated terms, ExxonMobil and ConocoPhillips, abandoned their properties in Venezuela while Total, BP, Statoil, and Chevron accepted new terms that raised PDVSA's share in their projects from approximately 40 percent to a controlling interest of 78 percent.¹⁷ Contemporary oil operations are shifting from technically simple operations to more complex ones because most of the world's easily extracted oil reserves are already claimed leaving only the more challenging ones undeveloped.

Consumer states do have some options to reduce the impact of the use of the oil weapon. The development of strategic petroleum reserves provides some protection against short periods of supply disruption. Indeed, the impetus for creating the International Energy Agency (IEA), with its strategic reserves prerequisite for membership, was the 1973 OPEC oil embargo. Another option is to diversify oil suppliers in order to reduce dependencies on particular sources. In the supply-limited world of this scenario set, this option will be difficult. Switching to alternative sources of energy or reducing consumption through changing habits are also options. Development of new technology and techniques to increase the output of existing oil fields or to extract crude from more challenging reserves can also help to overcome the potential negative

¹⁴ "Czech Republic: Russia's Revenge," *Stratfor*, July 14, 2008, accessed at <http://www.stratfor.com>. Also see Andrew Kramer, "Czechs See Oil Flow Fall and Suspect Russian Ire on Missile System," *The New York Times*, July 12, 2008; Judy Dempsey, "Russia further cuts its oil deliveries to Czech Republic," *International Herald Tribune*, July 30, 2008.

¹⁵ Marshall I. Goldman, *Petrostate: Putin, Power, and the New Russia* (New York: Oxford University Press, 2008) pp. 71-72.

¹⁶ *Ibid.*, pp. 128-133.

¹⁷ Pirog, "The Role of National Oil Companies in the International Oil Market," p. 1.

energy security impacts of the oil weapon. However, since oil is a finite resource even with technological advances supply will eventually be extremely scarce. Consequently, with limited options, it is possible that competition between states or blocks of states for access to oil supply will increase and could become violent during the coming decade.

In addition to the challenges noted above, oil revenue can be used in destabilizing ways by states with NOCs. Often the countries that choose to nationalize their resource industries are not transparent in their use of the revenue. In some cases, these countries spend oil revenues to embark upon extensive armaments programs that can lead to regional arms races.

Venezuela under President Hugo Chavez provides a clear example of this destabilizing activity. It has been widely reported in recent years that Venezuelan expenditures on arms has been far in excess of any amount necessary to safeguard the country. President Chavez spent approximately US\$4 billion on a variety of arms purchases during 2005 and 2006, leading all other Latin American countries and topping even Pakistan and Iran during this period. A small portion of this spending went toward the purchase of 100,000 Kalashnikov assault rifles along with the rights to manufacture more of these weapons and their ammunition in Venezuela. Some critics of the purchases point out that Chavez did not consult with the National Assembly and indeed has been providing arms not only for the Venezuelan military but also his partisan civilian reserve suggesting that these measures might protect Chavez should he lose the support of the military.¹⁸ Some other countries in Latin America are alarmed with Venezuela's program and consider it to be destabilizing for the region. Brazil, for example, increased its defence spending from US\$1.1 billion in 2007 to US\$2.5 billion in 2008 in part due to its concerns over President Chavez's military purchases.¹⁹ Given that Venezuela's nationalized oil company, PDVSA, provides a very large share of government revenue, 37.8 percent in 2007,²⁰ these acquisitions could not be so ambitious without the capital generated by the oil industry.

It seems that Venezuela's neighbours have good reason to be concerned about the arms expenditures in light of the 2008 revelation that President Chavez was linked, by captured computer files on a rebel leader's laptop, to a program providing arms, training, and advice to the Revolutionary Armed Forces of Columbia (FARC) and its effort to overthrow the democratically elected government.²¹ Other reports suggest that President Chavez permits FARC, and Columbia's other leftist guerrilla group, the *Ejército de Liberación Nacional* (National Liberation Army—ELN) operate within Venezuela. This has created several problems for Venezuelans since FARC and the ELN fund their operations through the lucrative cocaine trade, by ransoming hostages, selling weapons, and other destabilizing acts. At times, Chavez has openly lauded FARC in the National Assembly and is alleged to consider FARC and ELN as allies against a feared US invasion of Venezuela through Columbia. It is telling that during the decade of his presidency, the rate of kidnappings in Venezuela has increased tenfold.²² Again, Chavez utilizes

¹⁸ Simon Romero, "Venezuela arms spending highest in Latin America," *The New York Times*, February 25, 2007.

¹⁹ Leandro Prada, "Venezuela's Planned Arms Purchases Leave Neighbours Unsettled," *CNSNews.com*, November 7, 2007, accessed at <http://www.globalsecurity.org>.

²⁰ "Global Market Brief: The Perils of PDVSA," *Stratfor*, June 12, 2008, <http://www.stratfor.com>.

²¹ Frank Bajak, "New documents tie top Venezuelan officials to rebels," *Associated Press*, May 11, 2008.

²² José De Cordoba, "Chavez Lets Columbia Rebels Wield Power Inside Venezuela," *The Wall Street Journal*, November 25, 2008.

oil revenue to fund, in part, activities such as supporting FARC and ELN. This support destabilizes Columbia and Venezuela itself. Moreover, the drug trade carried out by FARC and ELN through Venezuela reduces security further afield.

Drugs are not the only destabilizing export transiting through Venezuela. Venezuela has also been identified as a major supplier of illicit small arms that fuel instability throughout the Caribbean region. Jamaica and Trinidad and Tobago in particular have suffered from the inflow of arms, many of which originate in Venezuela. As Martin Joseph, Trinidad and Tobago's National Security Minister pointed out, "[t]hese weapons are used to protect contraband goods, intimidate users and competitors, protect turf, coerce recruits into gangs, to maintain discipline within these gangs and to execute those who threaten to curtail the lifeline of the trade."²³ Clearly there is a link between the illegal drug trade and illegal arms trade and both are facilitated by the Chavez regime. Venezuela's use of oil revenue clearly reduces security amongst its neighbouring states by supporting criminal activity and violence that frequently fuels corruption and undermines democratic institutions along with general law and order.

Venezuela is not alone in its use of oil revenue to export instability. Money generated from oil and gas operations has funded radical jihadist movements and has armed insurgencies throughout the world. For example, the Islamic Courts Union in Somalia reportedly received shipments of arms and supplies from nationalized oil producing states helping it to fight the Somali Transitional Federal Government. Iran, Libya, Saudi Arabia, and Yemen were amongst the countries noted, along with Hezbollah who are supported by Iran.²⁴ Iran's support for Hezbollah exemplifies another destabilizing action that is supported by oil revenue. Hezbollah is not the only terrorist group supported by Tehran, nor is Iran the only nationalized oil producer that offers these groups assistance. Amongst terrorist organizations that receive support from oil producing countries are al Qaeda, Hezbollah, Hamas, the Palestine Islamic Jihad, the Popular Front for the Liberation of Palestine – General Command, the Popular Front for the Liberation of Palestine, FARC, ELN, Euskadi Ta Askatasuna (ETA). The main oil producing states identified as providing support for these groups include Iran, Sudan, Syria,²⁵ and, as noted above, Venezuela. Clearly, access to oil revenue streams combined with the limited or non-existent transparency enjoyed by rulers of many nationalized oil states facilitates this subversive behaviour.

²³ Peter Richards, "Caribbean: High-Tech Systems Trace Influx of Illegal Weapons," *Inter-Press Service News Agency*, May 21, 2009.

²⁴ United Nations Monitoring Group on Somalia, "Report of the Monitoring Group on Somalia pursuant to Security Council Resolution 1676 (2006)," April 2006, pp. 10-33.

²⁵ US Department of State, *Country Reports on Terrorism 2008*, April 30, 2009, accessed at <http://www.state.gov/s/ct/rls/crt/2008/122436.htm>.

5 Future Factors

Looking forward within the ten-year timeframe of the workshop a significant factor is the anticipated consumption patterns in the future. The underlying construct of this workshop is that global oil supply will be unable to meet demand in ten years. This suggests that oil prices and consequently the costs of all products and transportation that rely on oil or refined products, will be high. These high prices would be primarily attributable to the global paucity of oil. This will have consequences for global economic activity and thus, the stability of some states particularly those that experience a decrease in GDP per inhabitant impinging upon their ability to acquire adequate sustenance and economic opportunity.²⁶

A further consequence of this high energy cost and low supply world is the increased potential for conflict between states or groups of states seeking to safeguard their energy security. Some states may augment their ability to project military force in order to protect their oil supply corridors. This could lead to arms races and increased tensions in some parts of the world.

Another influential factor will be the propensity of states to nationalize their oil industries and whether they will opt to use their resource as a political tool or treat it as a fungible resource. Since oil will be in high demand and low supply, it seems likely that the proclivity of states to nationalize their oil industries will increase in the future. States that do so might also be more tempted to wield the oil weapon. This could potentially lead to major economic crises and even to armed conflict in extreme cases.

An additional factor that will influence energy security in the future is the degree to which states act, either unilaterally, or multilaterally, to transition their economies from oil based — especially the ground transportation sector — to non-oil based ones. According to the International Energy Agency (IEA) the percentage of oil consumed by the transportation sector globally has been steadily increasing from 45.5 percent in 1973 to 60.5 percent in 2006.²⁷ In rough order of magnitude the rate of increase 0.45 percent per year during this 33 year period. If this rate remains constant, the total percentage of oil consumed for transportation will be more than 65 percent in ten years. While increasing the efficiency of existing oil consuming technology might seem another option, it will not have a positive long-term effect as a transition from oil would. The illusory benefit of efficiency on consumption was exposed by British economist William Stanley Jevons who, in 1866, developed the idea now known as Jevons' paradox which points out that when the use of a resource becomes more efficient its cost decreases leading to increased consumption.²⁸ Clearly adoption of alternative energy sources for transportation could have a significant positive influence on energy security going forward.

²⁶ Nicholas Sambanis, "Using Case Studies to Expand the Theory of Civil War," *CPR Working Papers*, Paper No. 5 (Washington, D.C.: The World Bank, May 2003). pp. 19-23, accessed at http://www.forecastingprinciples.com/files/pdf/Using_Case_Studies.pdf.

²⁷ *Key World Energy Statistics 2008*. International Energy Agency, 2008, p.33, accessed at http://www.iea.org/textbase/nppdf/free/2008/key_stats_2008.pdf.

²⁸ John Michael Greer, "Net Energy and Jevons' Paradox," *Energy Bulletin*, April 2, 2008, accessed at <http://www.energybulletin.net/node/42331#>.

6 Critical Uncertainties

Considering the factors noted in the preceding two sections it is necessary to determine the two most influential to the focal issue: What impact might nationalization of oil reserves and industry assets have on global security in 2019? The factors examined above can be summarized as follows:

- Democratic state ownership of NOC;
- Non-democratic state ownership of NOC;
- Efficiency of NOC;
- Technical expertise of NOCs in light of more challenging extraction conditions;
- Control of reserves by NOCs;
- Economic, political, and social stability (the resource curse and rent-seeking activities) in countries operating NOCs;
- Propensity to use oil exports as a political weapon;
- Use of oil revenues to fund arms races and export instability;
- Degree of market dominance by NOCs;
- Adequacy of oil supply;
- Ability of states to reduce impact of oil supply interruptions (including such measures as strategic petroleum reserves or alternate suppliers); and
- Rate of transition from the oil-based economy.

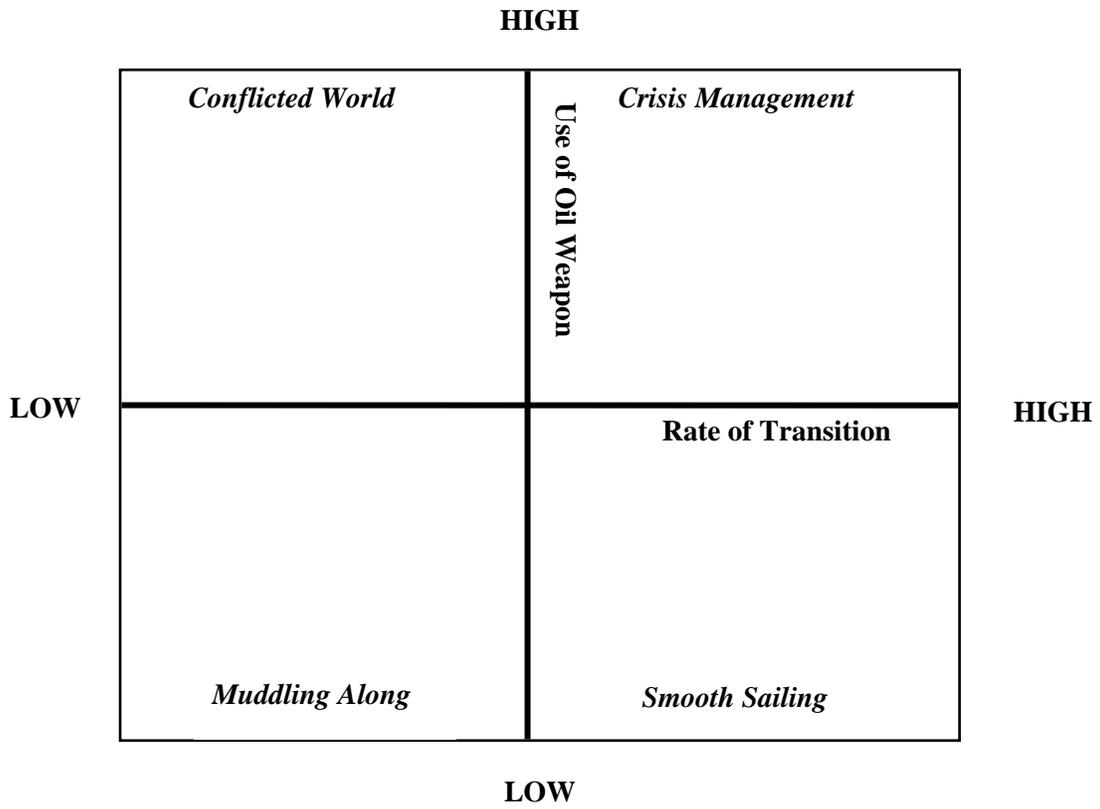
In reviewing these factors, it seems that the most influential are the propensity of states to use oil exports as a political weapon and the rate of the transition from the oil-based economy. Simply stated, if countries controlling NOCs do not resort to using the oil weapon then the supply impact will be nugatory. Rate of transition from an oil-based economy is also crucial since reducing or eliminating the need to import oil to fuel economic activity reduces or eliminates the utility of the oil weapon and thus increases energy security.

In ranking the influence of these factors, the relative market dominance of NOCs versus IOCs could be considered equally relevant to the propensity of states to use oil as a political weapon. Indeed, the same logic argues for both factors, that is, if the market were to be dominated by IOCs, then the percentage of supply that could be used as a political weapon would be greatly reduced. Although, in light of the finite resource base, even if IOCs dominate the markets there will be supply shortages in the future due to dwindling reserves and also business decisions undertaken by these companies. Were the dominance factor used instead of the propensity factor, it is likely that the scenarios would be similar. However, another issue is that the oil market is currently dominated by NOCs, at least in terms of control of reserves, so using this factor as an axis might be less informative than the oil weapon factor. For the purposes of this particular scenario set, it is assumed that the degree of oil market control exerted by NOCs is equal to or superior to that which exists today. In addition to the subjective consideration of the factors, I devised a simple ranking matrix, Annex C, and rank-scored the factors. This exercise yielded the same results as the narrative outlined in this section. The two critical uncertainties chosen are:

- Propensity to use oil exports as a political weapon; and
- Rate of transition from the oil-based economy.

These critical uncertainties form the axes of the scenario matrix and provide the underlying logic to the alternate futures scenarios.

7 The Scenario Quadrant



8 The Scenarios

8.1 The Conflicted World

The *Conflicted World* scenario is characterized at its extremes by a high propensity amongst countries that operate NOCs to use their oil exports as a strategic weapon. It is also a world that has not witnessed significant efforts to transition to alternate forms of energy for most economic activity.

From an economic perspective, this future is most challenging. Given the inadequacy of supply and the inability to generate GDP without it, oil prices would be very high in this scenario. The energy cost to generate GDP would be high as a consequence. Global annual economic growth rates seem likely to be low or negative in this scenario since the costs to produce and transport goods and services would be high. The pace of innovation and change in this scenario is slowest in comparison to the other possible worlds since resources are devoted to maintaining the status quo, securing access to oil, and as a result little is left over for investment in technological research and development.

The energy security situation of this quadrant would be the most unstable since oil supply would endure periodic interruptions yet states are least prepared to manage the consequences. Use of the oil weapon by states would not be the only interruption to supply unfortunately. It is likely that in this world terrorist or insurgent groups might strike at oil and other energy infrastructure more frequently than in other scenarios since the ability of states to withstand interruptions would be reduced thus the impact of successful attacks would be intensified in comparison to scenarios less dependent on oil to sustain economic activity. Moreover, these terrorists might have access to more resources from those states that support terrorist groups and have nationalized their oil assets given that the price of oil and resulting revenue these countries generate would be high.

The risk of inter-state conflict is high in this scenario since countries are hard-pressed to meet the energy needs of their economies. Moreover, tensions are higher since some of the nationalized states continue to use their substantial oil revenue to fund arms programs. These states, already demonstrating no qualms about denying the economic lifeblood to adversaries, would likely be willing to resort to armed force to achieve their strategic aims if the situation seemed promising. In this world, oil consumer states dependant on imports would also have extensive military power projection capacities since they would feel compelled to defend their access to oil more frequently than in other scenarios. However, the ability of states to sustain these military capacities over time might decline given the low or negative GDP growth in this scenario. This economic difficulty would force very hard choices for many governments.

8.2 The Crisis Management World

The *Crisis Management* world, like the *Conflicted World*, is characterized at its extremes by a high propensity amongst countries that operate NOCs to use their oil exports as a strategic weapon. However, it is a world that has benefited by widespread energy transitions that have greatly reduced the use of oil to power transportation and much economic activity. Oil use has largely shifted away from transportation and is more focused on the petrochemical industry. This transition is unlikely to be complete within a ten-year timeframe so it should be assumed that it is ongoing.

The economic situation in this scenario is slightly improved over *Conflicted World*, yet it is still a challenging future. Since reliance on oil for transportation has been greatly reduced, the economy is less susceptible to the oil weapon. So, economic growth is likely to be modest in this potential future. Yet, the periodic use of the oil weapon creates market uncertainty and has a negative impact on economic growth. The petrochemical sector will likely face high oil costs that would impinge on its profitability and drive up prices for its goods. At the same time, given the efforts to transition from the oil based economy, it is likely that states would be spending more money on research and development thus the rate of technological advances would be more robust in the *Crisis Management* world.

The energy security situation of this quadrant would also be slightly improved since oil forms a smaller portion of the energy supply picture. Its main use is in petro-chemical development and production. Still, oil supply would endure periodic interruptions although most states will be better prepared to manage the consequences. Since there would be less fear of energy supply interruptions it is possible that the terrorist or insurgent proclivity to strike at oil infrastructure would be less than in the *Conflicted World* scenario. Since demand for oil would still be high in this scenario, prices will also be high. Hence, state sponsors of terrorist and insurgent groups with access to funds from nationalized oil operations might still play a major financing role.

The risk of inter-state conflict is moderate in this scenario. Some of the nationalized states continue to use their substantial oil revenue to fund arms programs and support terrorist and insurgent groups. These states remain willing to use the oil weapon to achieve their strategic objectives although the impact is muted because oil is less crucial for transportation. In some cases, it may be possible that these states, sensing their declining power base derived of their oil endowment might engage in aggressive behaviour while they still have the resources to do so. Although, it seems unlikely that many of these states will engage in this type of behaviour given the costs it would entail. In this world states dependant on oil imports might be more moderate in their military expenditures since their reliance on oil is not for transportation, rather it is for petrochemicals. While this is a vital industry, oil-supply interruptions are of lesser consequence since transportation, and therefore most economic activity, is no longer extensively dependent on oil.

8.3 Smooth Sailing

The *Smooth Sailing* scenario is most desirable from the perspective of energy security, economic activity, political development, and global stability. It is characterized by extensive efforts to transition away from oil-based economic activity, particularly with regards to transportation. There is also a significant reduction in the use of the oil weapon by nationalized states.

The economic situation in *Smooth Sailing* is defined by positive growth primarily because the world has overcome its dependence on oil as the primary energy source for ground transportation and economic activity. Significant amounts of money would be invested in research and development globally so innovation would be a characteristic of this future. Much of this innovation would be aimed at furthering the transition from oil to other forms of energy. It is possible that this future would be the most environmentally friendly given the more pronounced effort to move away from the oil age. This opens opportunities for greener energy sources to prevail.

Energy security can be expected to be more stable in this future given the shift, albeit ongoing, away from dependence on oil for transportation and much economic activity. To facilitate this shift, alternative energy forms will be used to a much greater degree thereby reducing the impact of oil supply disruptions. Some industries will remain dependant on oil, the petrochemical industry in particular, but societies will not suffer nearly as much from oil supply shortages as they would if they were more dependant on oil for transportation. At the same time, the decreased frequency of the use of the oil weapon will help to keep energy related tensions low.

Given the lower energy-related tensions in this scenario, the risk of inter-state war related to energy security will be very low. Since the nationalizing states are wielding the oil weapon to a much lower degree, disputes over oil will be virtually non-existent. Moreover, given the reduced oil-supply concerns, terrorist or insurgent groups will gain less by attacking oil infrastructure so these types of attacks will occur less in this scenario. Intra-state war in states that rely heavily on oil revenue may be more common in this scenario as GDP declines. These conflicts will tend to be localized and likely will not have an impact beyond their immediate regions.

8.4 Muddling Along

The *Muddling Along* world is also more positive in some respects compared to *Conflicted World* and *Crisis Management*. This is primarily because states with nationalized oil industries do not resort to wielding the oil weapon frequently. While there will not be significant movement away from oil as the primary transportation energy source, it is possible that more efficient oil use and increased stockpiling might dissuade the nationalized states from disrupting supply for political objectives. It is possible that better relations between consumer and supplier states will also account for the reduced use of the oil weapon. Regime change leading to more stability in key supplier states may also account for the reduced level of disruption.

The economic situation in *Muddling Along* is less robust than in *Smooth Sailing* primarily because the world is still very dependent on oil for its economic activity in a period where supply is inadequate to meet demand. So, oil prices will be extremely high leading to a trickle down effect throughout the global economy. Consequently, productivity growth will be low in this scenario. Money spent on research and development will also be low in this scenario given the “business as usual” approach. Consequently, technological innovation will not be influential in this future.

Energy security will be less secure than in *Smooth Sailing* given the continued close link between economic activity and oil supply and in light of the inadequacy of supply. The failure to develop alternative forms of energy to a significant degree will leave countries dependant on oil imports vulnerable to supply disruptions. However, since there will be less resort to the use of the oil weapon by supplier states, there will be fewer disruptions. Still, energy security will be a more pressing issue for governments in this future than in *Smooth Sailing*.

Given the reduced energy security in this scenario, tensions between states over energy issues will be present. However, in light of the more cooperative arrangements between supplier and consumer states, these tensions are not likely to evolve into inter-state conflicts. Arms races aimed at safeguarding oil supply are not likely to characterize this world given the more cooperative environment. Since oil supply interruptions will be more detrimental to global economic prosperity, it is likely that terrorist and insurgent groups will target oil infrastructure frequently. They will get “bigger bang for the buck” in this scenario. The risk of intra-state conflict is moderate in this scenario because there will be fewer economic opportunities so in

some parts of the world there will be cohorts who feel they have nothing to lose and may resorting to armed conflict to seek change.

9 Implications

At this stage in the scenario process, an assessment of the scenarios allows for a better understanding of how decisions made in the short-term might impact the future security situation. In this model, steps taken that might speed up the transition from an oil-based economy will greatly improve the future security situation. By reducing or ending the dependence on oil to drive economic activity, the impact of the oil weapon is diminished. This, in turn, would reduce tensions between states with regard to oil supply and potentially lower the risk of inter-state conflict attributable to this issue.

Another implication of these scenarios is that steps taken to moderate the behaviour of those states that nationalize their oil industries will also improve security. Influencing these states to reduce their use of the oil weapon will help to reduce tensions in the future. Diplomatic, economic, political, and legal proceedings can help to maintain positive relations with nationalized states and demonstrate to them that supply interruptions are not in their best interest. This may reduce the likelihood that they will make use of the oil weapon. For the purposes of this scenario development processes, I will not develop this thought further. This is an area that warrants further consideration and research.

10 Indicators

Another valuable output from the scenario development process is the indicators that can be derived from the scenario stories themselves. Determining the lead indicators from each story will enable warning, which, once delivered, will allow policy makers to gain a sense of how the world is unfolding and favour timely decisions while enabling the development of contingency plans, as opposed to taking a reactive approach to policy development,. Some indicators, by no means an exhaustive list, from the scenarios in this set are as follows:

Conflicted World

- Increased radicalization of governments in major oil producing states;
- Increased incidents of contractual violations on the part of these governments such as retro-active royalties changes that harm the developers bottom-line or effectively nationalizing operations by changing the interests in joint developments to the favour of the NOC;
- Increased use of or threatened use of the oil weapon;
- Frequent supply interruptions during periods of international crisis due to unusual or unexplained circumstances;
- Frequent terrorist/insurgent attacks on oil infrastructure;
- Destabilizing arms programs undertaken by governments that have nationalized their oil industry;
- Wealthy states dependent on oil imports develop and maintain extensive military projection capabilities in order to safeguard their oil transit corridors;
- Inability to engage industry and governments in meaningful steps towards an energy transition aimed at reducing oil dependence;
- Sustained high oil prices due to inadequate supply;
- Frequent need to use strategic oil reserves to meet supply shortages; and
- Inability to adequately stock strategic reserves.

Crisis Management

- Increased radicalization of governments in major oil producing states;
- Increased incidents of contractual violations on the part of these governments such as retro-active royalties changes that harm the developers bottom-line or effectively nationalizing operations by changing the interests in joint developments to the favour of the NOC;
- Increased use of or threatened use of the oil weapon;
- Frequent supply interruptions during periods of international crisis due to unusual or unexplained circumstances;
- Frequent terrorist/insurgent attacks on oil infrastructure;
- Significant expenditures on arms programs on the part of some nationalized states, yet less on the part of developed states since they do not need to protect oil transit corridors to safeguard economic activity;
- High level of political violence and regime change in some nationalized states since their economic situation will be less robust than in some other scenarios;
- Robust development of technologies designed to transition from oil dependency;

- Moderate spending on R&D to support technological transitions;
- Moderate global economic productivity growth; and
- Maintenance of strategic oil reserves within developed states – although they are less “strategic” given the reduced requirement for transportation.

Smooth Sailing

- More moderate political behaviour on the part of nationalized states;
- Increasing transparency and democratization globally;
- More cooperative supply contracts and observance of the terms of joint-venture oil developments between IOCs and NOCs;
- Few threats to interrupt oil supplies;
- Reduced spending on arms globally;
- Reduced level of terrorists/insurgent strikes aimed at oil infrastructure;
- Robust global economic productivity growth;
- Few incidences of inter-state conflicts;
- Possible intra-state conflicts in oil-dependant states;
- Substantial investment in research and development of new technology aimed at speeding the transition from oil-based economy and in other areas; and
- Maintenance of strategic oil reserves within developed states.

Muddling Along

- More moderate political behaviour on the part of nationalized states;
- Increasing transparency and democratization globally;
- More cooperative supply contracts and observance of the terms of joint-venture oil developments between IOCs and NOCs;
- Few threats to interrupt oil supplies;
- Reduced spending on arms globally;
- Reduced level of terrorists/insurgent strikes aimed at oil infrastructure;
- Slight global economic productivity growth – stunted due to oil dependence;
- Low level of research and development or technological change;
- Strategic petroleum reserves are maintained although with greater difficulty than in ***Smooth Sailing*** and ***Crisis Management***.

11 Conclusion

In a world lacking adequate oil supply, such as the one that forms the basis of this workshop, nationalization of oil assets will have the potential to reduce energy security, slow economic growth, and feed intra- and inter-state tensions — possibly to the point of armed conflict. Yet, there are options that might reduce the impact of, or avoid entirely, these negative outcomes. Key amongst these will be the degree to which industry and states can insulate their activities and societies from susceptibility to oil supply interruptions. There are a variety of steps that can be taken such as diversifying supply options, increasing strategic reserves, and even embarking upon a transition away from a heavy dependence on oil for their transportation activities, particularly with regard to economic functions. Reducing the negative impact of a supply interruption will, in turn, reduce the perceived benefit that nationalized states will gain by wielding the oil weapon. This may reduce the frequency of interruptions in the future.

In terms of the methodology used to prepare this paper, it is evident that it is better suited to facilitated workshops with a community of experts to better populate the factors, the scenario sets, the implications, and the indicators. The benefit of the quadrant approach is increased with input from a variety of contributors whose expertise is cross-functional in nature. A collective session should form the basis of future workshops focused on energy futures. One shortfall of this method is that it does not visually indicate linkages between factors as a Morphological Analysis or other more visually oriented model might do.

Annex A Global Futures Forum Workshop Instruction



Global Futures Forum

Strategic Foresight and Warning Community of Interest

Energy/Oil and Environment Security Foresight Project

Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities

Workshop 1 - February 26-27, 2009, Washington DC, US

Concept

This Energy and Environmental Security Foresight Workshop will kick off a multinational collaborative foresight project on the consequences of a world in which global oil supply is unable within the next 10 years to keep pace with global demand. A variety of complex factors could bring about this world, including but not limited to:

- an early peaking of global oil supply
- massive disruption of oil supply chains due to conflict, terrorism and/or environmental disaster
- resumption of robust global economic growth

Objective

The project will explore the implications of a world in which sustained shortages of oil could potentially provoke major economic turmoil, and result in significant political, military, and social upheaval. Such conditions would also have a major impact on pressing policy decisions about climate change and other environmental issues.

The project will not attempt to forecast the future but rather to develop a range of warning scenarios through a series of collaborative workshops and out of the various contributions to them.

The scenarios will highlight the consequences of a potential transformation of the global oil market in the context of uncertain environmental conditions, in order to help policymakers anticipate risks to security, broadly conceived, as well as the potential benefits of action including multinational cooperation and prior mitigation.

The first of the series of workshops, co-sponsored by the Energy and Environmental Security Directorate in the United States Department of Energy's Office of Intelligence and Counter-Intelligence and US State Department's Bureau of Intelligence and Research, will start with a presentation by member-states (contributors) of foresight papers on topics of their choice aiming at covering the range of issues involved. Collaborative work will evolve from those initial contributions as well as from presentations by a few selected non-governmental experts. A very few member-states (participants) will actively participate however without contribution through specialist analysts or specific expertise.

This project could be the prelude to an emerging GFF Community of Interest on Energy and Environment Security.

Project History

This project was initially launched at the GFF General meeting in Vancouver in April 2008, with a presentation by Professor Robert Hirsch, “Consequences of Global Oil Demand Outstripping Supply: Towards a GFF Foresight Project” (available on the GFF website). This presentation was well-attended and member-states registered their interest for active contribution to and participation in the project. Notably, five among them participated in a follow-on luncheon in Vancouver where they solidified their commitment to the project.

Presentation Parameters

Project contributors will prepare papers assessing a specific aspect of the demand outstripping supply world designed for presentation to a senior audience.

To allow for coverage of as many aspects as possible, it would be desirable to have only one contribution per specific subject. This will be done on a “first come, first serve” basis.

Contributors are encouraged, should they desire, to bring to the workshop one (or more) of their analysts who specialize in those issues as well as trusted experts.

General guidelines for papers and presentations:

- Length of papers should be appropriate for the topic but no more than 10 double-spaced pages
- Presentations, in whatever format desired, should be between 20 and 30 minutes but no more than 30 minutes
- As much as possible should incorporate:
 - An identification of drivers/factors/variables/conditions, which influence the specific aspect dealt with by the contributor
 - A description of 2-3 plausible alternative outcomes/directions for each factor
 - A description of the linkages between drivers/variables
- Should specify the methodology used, from a classical future-oriented analysis to more elaborate futures or long-range forecasting methodology (quantitative methodologies do not seem appropriate here)
- Results of scenario exercises on this theme previously done by a member may also be used for the workshop
- Prepared in English

Deadline: Contributors need to commit to a specific topic by **January 23, 2009**. Topics and abstracts should be either posted on the GFF website and/or sent to Helene Lavoix at helenelavoix@orange.fr.

Potential Topics

Topics with detailed abstracts already chosen by initial contributors (to be confirmed) – see website for more details

- Energy supply dependence and political consequences: the case of Russia and Eastern Europe (could be enlarged to impacts on Europe and elsewhere, including on energy markets)
- Peak Oil – not focused on when, but an examination of the impact of declining production on global or regional stability (The three possible slopes for Peak oil (plateau, slow decline steep decline) could be envisioned).
- Resource Nationalism – as promised by Chavez and others, the use of oil as political or economic leverage, against both neighbors and major consumers.
- Changes in the energy market with a focus on a new awareness by producers of the strategic power of oil, consequences for dependent countries to look for alternative solutions, consequences

on the market structure itself (changes in the proportion of International Oil Companies (IOCs) and National Oil Companies (NOCs) and the effect on resource availability and price) and on the need to address environmental concerns

Other topics to be addressed could include but are not limited to:

- Global energy/oil demand
- Global energy/oil supply
- Global energy “logistics” and environmental changes
- Implications of peak oil for environmental impacts (e.g. coal versus green solutions)
- Access and Availability – With most new oil discovered in politically (or technically) challenging areas, how does this shape the global energy market and what are the consequences? How will the decreasing diversity of oil suppliers in the future likely affect importers’ energy security? Could there be armed conflict over oil reserves?
- Prices – Implications of the end of cyclic oil price fluctuations and/or high price volatility; given the short-term price inelasticity of oil, how high could prices potentially go before the market breaks down and what would be the economic consequences for oil importing and oil exporting nations?
- Oil Market Dynamics – As the free market shrinks, who sets the rules for how the global energy system functions?
- Transfer of wealth, volatility of prices and domestic and international impacts;
- What are the potential consequences of such a world for social stability, for radicalization, for governments and States, their efficiency and more broadly their legitimacy?
- Possible energy strategies to replace oil
- Emergence of Alternative Energy Sources, intended and unintended first, second and third effects on the overall system
- Various possible environmental scenarios with impact on oil/energy system
- Knock-on effects to food security, health security, economic security, water security, etc.

Timeline and series of workshops

Workshop 1 - February 26-27, 2009, Washington DC, US

Sponsored by the Energy and Environmental Security Directorate in the United States Department of Energy’s Office of Intelligence and Counter-Intelligence

The workshop is intended to be a working meeting of contributors (and their teams). A few member-states participants (i.e., attendees who are not contributing a paper) will be included, as well as a few more experts on specific topics.

Day 1 will focus on sharing the assessments completed by the participants, and Day 2 will focus on the scenario construction process.

Objective of Workshop 1

- A first identification of factors/drivers/variables out of the papers presented;
- A first description of 2-3 plausible alternative outcomes/directions for each factor;
- A first specification of the linkages between those factors/variables;
- Identification of areas where further expertise is potentially needed
- If possible and if time allows, a first outline of potential scenarios;

By January 23, 2009

Contributors and participants (initial and new) confirm their commitment to participation as well as their topic and, if possible, the team they will bring to the workshop.

Tentative planning for workshops 2 and 3

Work in between workshops 1 and 2: further driver and variable identification, possible outcomes and experts

If need be, the objective of this phase will be to complete the initial identification and analysis of the most important factors which will shape the character of the future global energy system in the context of uncertain environmental conditions and environmental constraints on policy choices.

Starting with the **initial** factors and linkages identified during workshop 1, contributors and participants will leverage the diversity of multinational expertise both within and without governments to identify, if need be, further deep underpinning drivers, factors, variables, connections and interdependencies, as well as potential emerging properties and systemic dynamics and constraints.

Workshop 2

The work done between workshops 1 and 2 will be first presented then used to complete and revisit the results obtained during workshop 1, as the futures, outcomes or directions of one factor are dependent upon the futures, outcomes/directions of the others. Notably, incompatible outcomes will be eliminated.

The collaborative work of the workshop will thus consist in bringing together factors/variables and finalizing the systemic concept map.

Workshop 3: Scenario Development

The workshop will be exclusively dedicated to work, no paper will be presented. It shall start from the results achieved at the end of workshop 2. It will aim at presenting a range of most plausible scenarios as well as most unlikely, highest impact scenarios.

Annex B Nationalized Countries and Oil Production²⁹

Country*	2007 Percent Share of World Production	Proven Reserves 2007 (Billion Barrels)	Percent Share of Global Proved Reserves***	Reserves to Production (R/P) Ratio ^{^^} (Years)
Algeria	2.2%	12.3	1.0%	16.8
Brazil	2.3%	12.6	1.0%	18.9
China**	4.8%	15.5	1.3%	11.3
India	1.0%	5.5	0.4%	18.7
Indonesia	1.2%	4.4	0.4%	12.4
Iran	5.4%	138.4	11.2%	86.2
Iraq	2.7%	115.0	9.3%	Not Available
Kuwait	3.3%	101.5	8.2%	Not Available
Libya	2.2%	41.5	3.3%	61.5
Mexico	4.4%	12.2	1.0%	9.6
Nigeria	2.9%	36.2	2.9%	42.1
Norway	3.0%	8.2	0.7%	8.8
Qatar	1.4%	27.4	2.2%	62.8
Russia	12.6%	79.6	6.4%	21.8
Saudia Arabia	12.6%	264.2	21.3%	69.5
United Arab Emirates	3.5%	97.8	7.9%	91.9
Venezuela	3.4%	87.0	7.0%	91.3
Total	68.9%	1,053.3	85.5% [^]	
World		1,237.9***		

This data should be considered as approximations only. Reserve figures are constantly upgraded due to depletion, discovery, new technology, and are also guarded state secrets in some countries.

* Countries selected include those that own NOCs and/or insist that nationally owned companies control 51% or more of joint developments on their territory. Only those countries that accounted for 1.0% or higher of 2007 production are listed.

**Note that this only represents the total of China's domestic production and reserves and does not account for its overseas operations. E.g. China controls the Sudanese oil industry. Sudan accounted for 0.6% of global production in 2007. NOCs from other countries, such as Indonesia and India, also have overseas operations that are not necessarily reflected in their production or reserve figures.

*** Excludes Canadian Oil Sands from World Total. Canadian Oil Sands reserves were listed as 152.2 Billion Barrels. If this amount is added to the world proven reserve total for 2007, it increases to 1,390.1 Billion Barrels. This results in a downward adjustment of the percentage total of reserves held by nationalized states to 75.8%.

^The figure of 85.5% is the sum of the percentages in the column. If the total proven reserves from the previous column is divided by the world total proven reserves listed on the table, the actual percentage is 85.1%. Compared against the world total proven reserves including Canadian Oil Sands, the percentage of world proven reserves controlled by nationalized states is 75.8% as indicated in the previous note.

²⁹ The data used in this figure was taken from *BP Statistical Review of World Energy*. June 2008.

^^ The R/P ratio indicates the number of years of production remaining assuming that annual production rates will remain constant and that no new proven reserves will be found.

Annex C Factors Scoring Table

FACTORS	Impact on Oil Supply	Economic Impact	Domestic Political Impact for NOC state	Potential for Armed Conflict	Total
Factors affected by NOCs	1-5; 1 positive, 5 negative ³⁰	1-5; 1 positive, 5 negative	1-5; 1 positive, 5 negative	1-5; 1 low, 5 high	
Democratic state owning NOC	1	2	1	1	5
Non-Democratic state owning NOC	4	4	4	3	15
Efficiency of NOC	4	4	4	2	14
Technical expertise of NOCs in light of more challenging extraction needs	4	4	4	1	13
Control of reserves by NOCs	4	4	1	3	12
Economic, political, and social stability (the resource curse) in countries operating NOCs	3	4	4	3	14
Propensity to use oil exports as a political weapon	5	4	4	3	16
Use of oil revenues to fund arms races and export instability	2	4	4	4	14
Degree of market dominance by NOCs	4	4	3	3	14
Adequacy of oil supply	5	5	2	3	15
Mitigation Factors	1-5; 1 negative, 5 positive	1-5; 1 negative, 5 positive	1-5; 1 negative, 5 positive	1-5; 1 high, 5 low	
States able to reduce impact of oil supply interruptions	3	4	4	4	15
Rate of transition from the oil-based economy (Scoring based on fast rate)	4	5	4	4	17

³⁰ The words “positive” and “negative” are used from the perspective of the consumer of oil and also from the perspective of overall global energy security, as opposed to the perspective of NOC states. From the perspective of an NOC state for example, the use of the oil weapon can be a positive thing, whereas for the global market and global energy security, it is not.

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List of symbols/abbreviations/acronyms/initialisms

DND	Department of National Defence
DRDC	Defence Research & Development Canada
DRDKIM	Director Research and Development Knowledge and Information Management
ELN	National Liberation Army
FARC	Revolutionary Armed Forces of Columbia
IEA	International Energy Agency
IOC	International Oil Company
NOC	Nationalized Oil Company
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
R&D	Research & Development

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This Technical Memorandum details scenarios developed for the Global Futures Forum Workshop — Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities that occurred in Washington, D.C., February 26-27, 2009. The scenarios outlined in this Technical Memorandum pertain to the potential impact of the nationalization of oil in a world that is inadequately supplied. They were developed using a quadrilateral projection process and model.

Le présent document technique décrit les scénarios élaborés en vue de l'atelier « Global Futures Forum Workshop » ayant pour thème « les conséquences mondiales sur le plan de la sécurité environnementale et énergétique des perspectives possibles dans le secteur pétrolier : les risques et les possibilités » (« Global Energy and Environmental Security Consequences of Possible Oil Futures: Risks and Opportunities »), qui a lieu à Washington, D.C., en février 2009. Ces scénarios portent sur les conséquences possibles de la nationalisation de la production de pétrole dans un monde où l'offre est insuffisante. Ils ont été élaborés d'après une méthode et un modèle de prévision quadrilatéraux.

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Canada; Czech Republic; Ecuador; Global Futures Forum; International Oil Companies; Nationalized Oil Companies; Oil Sands; OPEC; Russia; Venezuela

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