



# Oil and Terrorism

## *Al Qaeda's Threat*

Peter Johnston  
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**Defence R&D Canada**  
**Centre for Operational Research & Analysis**



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## **Defence R&D Canada – CORA**

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## **Abstract**

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This Technical Memorandum discusses the nature and extent of the terrorist threat against the petroleum industry. It specifically focuses on al Qaeda's efforts and stated intent to strike at energy infrastructure in the Middle East and in other parts of the world, including Canada, Mexico, and Venezuela. Additionally, it highlights economic costs of petro-terrorism and vulnerabilities to oil infrastructure, and suggests possible options for governments and industry to reduce the risks posed by terrorists.

## **Résumé**

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Le présent document technique traite de la nature et de l'ampleur de la menace terroriste qui pèse sur l'industrie pétrolière. Il porte plus particulièrement sur l'intention déclarée du réseau Al-Qaïda d'attaquer l'infrastructure énergétique au Moyen-Orient et ailleurs dans le monde, y compris le Canada, le Mexique et le Venezuela, ainsi que sur les efforts que ce réseau déploie à cette fin. En outre, il fait ressortir les coûts économiques du « pétro-terrorisme » de même que les vulnérabilités de l'infrastructure pétrolière et présente aux gouvernements et à l'industrie des options possibles pour réduire les risques que représentent les terroristes.

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# Executive summary

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## Oil and Terrorism: Al Qaeda's Threat

**Peter F. Johnston; DRDC CORA TM 2008-012; Defence R&D Canada – CORA; April 2008.**

**Introduction or background:** This Technical Memorandum discusses the nature and extent of the terrorist threat against the petroleum industry. It specifically focuses on al Qaeda's efforts and stated intent to strike at energy infrastructure in the Middle East and in other parts of the world, including Canada, Mexico, and Venezuela. Additionally, it highlights economic costs of petro-terrorism and vulnerabilities to oil infrastructure, and suggests possible options for governments and industry to reduce the risks posed by terrorists.

**Results:** Contemporary global oil markets are constrained by a narrow margin between available oil supply and growing demand. The tight supply situation is such that minor disruptions can have a negative impact on the global economy and lead to heightened concerns about energy security by world leaders and their populations. Terrorist attacks on oil infrastructure exacerbate this condition. Al Qaeda is aware of this situation and has adapted its strategy accordingly.

As early as 1996, al Qaeda leader Osama bin Laden declared his desire to destroy the economies of the United States and other Western countries as a tactic to force them to leave the Middle East. Initially, bin Laden advocated only attacks on Western employees of the industry within the Middle East. However, in 2004, the list of acceptable targets was expanded to include infrastructure in the Persian Gulf region. Al Qaeda and sympathetic terrorist groups inspired by it have carried out attacks on oil industry personnel, infrastructure, and shipping in the region. To date, these attacks have reduced the amount of crude available to the markets slightly but have not yet brought down Western economies, and al Qaeda has not been successful in destroying or crippling a major facility in Saudi Arabia such as the Abqaiq refinery. However, it is important to remember that al Qaeda has demonstrated a capacity to correct mistakes and repeat successes from previous operations. This suggests that the organization will improve upon its previous efforts to attack oil and gas infrastructure, with potentially devastating effect, in the future. In 2007, al Qaeda again broadened the target list to include all oil infrastructure that supplies the United States, including elements located in Canada, Mexico, and Venezuela. If it is able to achieve such objectives in the future, al Qaeda will wreak considerable damage on the global economy.

While al Qaeda and other terrorist organizations have not yet severely limited global oil supply, they have been able to drive oil prices up slightly. Estimates suggest that the cost per barrel of the "terror premium" lies between US\$2 and US\$10 per barrel. The increased costs covers expenses such as enhanced security, repairs to facilities, and fear-related trading price increases. At current global oil consumption levels this premium results in between US\$61.32 and US\$306.6 billion in added oil costs.

The energy industry is a rich target environment for terrorists. Vulnerabilities include pipelines, refining and storage facilities, shipping chokepoints, and loading facilities among others. Given the integrated nature of many energy markets, this infrastructure crosses international borders and

other political jurisdictions further complicating protective measures. Pipelines are perhaps the easiest targets to hit given their length and thus exposure in areas difficult to monitor. However, pipelines are relatively easy to fix or reroute, and, therefore, an attack at a concentrated high value target, such as a major refinery or a significant oil transit chokepoint, would yield a much higher return for terrorists. Given the narrow margin between supply and demand it seems likely that al Qaeda, other sympathetic jihadist or insurgent groups might attempt to destroy such a high impact target.

There are some measures that governments and the industry can take to reduce the potential for a successful terrorist strike. These include auditing existing infrastructure to determine areas of vulnerability and to enhance security accordingly. Focused intelligence efforts and sharing of information and assessments among like-minded states and organizations can also help reduce the potential for a successful strike. Coordinating and rehearsing emergency response to a catastrophic strike will also help to reduce the impact of an attack. Hardening targets can also help to reduce the likelihood of an attack or reduce its impact. Building pipelines underground, such as the Baku-Tbilisi-Ceyhan Pipeline, is one method of doing this. Increasing the security of information pertaining to energy infrastructure vulnerabilities would make it more difficult for terrorist groups to select targets and plan operations. Finally, measures that encourage the substitution of oil for alternative energy sources will reduce the potential impact of an attack.

In light of the tightness on global oil markets, the strategic impact of a successful attack on oil and gas infrastructure is significant. Transnational terrorist groups, especially al Qaeda, are aware of this situation and have been attempting to take advantage of it. Al Qaeda recognizes that oil is the lifeblood of these economies and therefore should be targeted. It has backed up these assertions with attacks on personnel and infrastructure in several oil producing states. This suggests that the level of threat of terrorist attack on major oil and gas infrastructure, including pipelines, will remain at its current level or grow so long as oil markets remain tight. It is for these reasons that many industry analysts have advocated implementing protective measures to forestall a strike and, should such efforts fail, to minimize the consequences. Continued attacks on oil and gas infrastructure seem likely and the possibility of a successful strike on a major facility exists. If this occurs, the impact on the global economy could be dire.

# Sommaire

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## Oil and Terrorism: Al Qaeda's Threat

**Peter F. Johnston; DRDC CORA TM 2008-012; R & D pour la défense Canada – CORA; Avril 2008.**

**Introduction ou contexte :** Le présent document technique traite de la nature et de l'ampleur de la menace terroriste qui pèse sur l'industrie pétrolière. Il porte plus particulièrement sur l'intention déclarée du réseau Al-Qaïda d'attaquer l'infrastructure énergétique au Moyen-Orient et ailleurs dans le monde, y compris le Canada, le Mexique et le Venezuela, ainsi que sur les efforts que ce réseau déploie à cette fin. En outre, il fait ressortir les coûts économiques du « pétro-terrorisme » de même que les vulnérabilités de l'infrastructure pétrolière et présente aux gouvernements et à l'industrie des options possibles pour réduire les risques que représentent les terroristes.

**Résultats :** Aujourd'hui, les marchés pétroliers mondiaux sont aux prises avec le mince écart qui existe entre la quantité de pétrole disponible et la demande croissante. L'offre est à ce point précaire que de faibles perturbations pourraient se répercuter négativement sur l'économie mondiale et aggraver l'inquiétude des dirigeants mondiaux et de leurs populations à l'égard de la sécurité énergétique. Les attaques terroristes contre des infrastructures pétrolières empiront cette situation. Le réseau Al-Qaïda en est conscient et a adapté sa stratégie en conséquence.

Dès 1996, Oussama ben Laden, le chef d'Al-Qaïda, a annoncé son intention de détruire l'économie des États-Unis et d'autres pays occidentaux dans le but de forcer ces derniers à quitter le Moyen-Orient. Au départ, ben Laden ne préconisait que des attentats contre les employés occidentaux de l'industrie qui se trouvaient au Moyen-Orient. En 2004, cependant, la liste des cibles acceptables a été allongée pour inclure les infrastructures de la région du golfe Persique. Al-Qaïda et des groupes terroristes sympathisants, inspirés par cette liste, ont lancé des attaques contre le personnel, l'infrastructure et les expéditions de l'industrie pétrolière dans la région. À ce jour, ces attaques ont légèrement réduit la quantité de brut disponible sur les marchés, mais elles n'ont pas réussi à provoquer l'effondrement des économies occidentales, et Al-Qaïda n'est pas parvenu à détruire ou à paralyser une installation de premier plan en Arabie saoudite, comme la raffinerie d'Abqaiq. Toutefois, il est important de se rappeler qu'Al-Qaïda a démontré sa capacité à apprendre de ses erreurs et à répéter les bons coups de ses opérations antérieures, ce qui permet de penser que, dans l'avenir, cette organisation tirera parti de ses activités précédentes pour mieux attaquer les infrastructures pétrolières et gazières. Les conséquences de telles attaques pourraient être désastreuses. En 2007, Al-Qaïda a de nouveau allongé sa liste de cibles afin d'inclure toutes les infrastructures pétrolières qui approvisionnent les États-Unis, dont certaines se trouvent au Canada, au Mexique et au Venezuela. S'il atteint de tels objectifs dans l'avenir, Al-Qaïda fera d'énormes ravages dans l'économie mondiale.

Al-Qaïda et d'autres organisations terroristes ne sont pas encore parvenus à réduire de façon considérable la quantité de pétrole disponible à l'échelle mondiale, mais ils ont réussi à provoquer une légère hausse du prix du pétrole. Selon certaines estimations, le coût de la « prime contre le terrorisme » ferait augmenter le prix du baril de pétrole de 2 à 10 \$US. Cette hausse est attribuable à l'amélioration de la sécurité, aux réparations des installations et à l'augmentation des

cours du pétrole liée à la peur d'attentats terroristes. Au niveau actuel de consommation de pétrole à l'échelle mondiale, cette prime entraîne des coûts additionnels qui se situent entre 61,32 et 306,6 milliards de dollars américains.

Pour les terroristes, l'industrie de l'énergie constitue un milieu riche en cibles. Au nombre des vulnérabilités, on compte les pipelines, les raffineries, les installations de stockage, les points d'étranglement lors de l'expédition et les installations de chargement. En raison de l'intégration de nombreux marchés de l'énergie, ces infrastructures traversent des frontières internationales et autres unités administratives, ce qui complique davantage la mise en œuvre de mesures de protection. Les pipelines sont sans doute les cibles les plus faciles à atteindre, parce qu'ils se déploient sur de grandes distances et deviennent ainsi vulnérables dans les régions difficiles à surveiller. Toutefois, il est relativement facile de les réparer ou d'en changer le tracé, c'est pourquoi les terroristes ont beaucoup plus avantage à attaquer une cible extrêmement importante et concentrée en un endroit, comme le sont une grande raffinerie et un point d'étranglement sensible lors de l'expédition. Compte tenu du mince écart qui existe entre l'offre et la demande de pétrole, il semble probable qu'Al-Qaïda et d'autres groupes du Jihad ou groupes d'insurgés sympathisants tentent de détruire une telle cible dont la destruction aurait d'énormes répercussions.

Les gouvernements et l'industrie peuvent prendre certaines mesures afin de réduire la possibilité d'une attaque terroriste réussie. Ils peuvent notamment vérifier l'infrastructure pétrolière afin de déterminer les vulnérabilités et augmenter la sécurité en conséquence. Des activités de renseignement concertées et la mise en commun d'information et de résultats d'évaluation entre pays et organisations ayant des vues similaires peuvent également aider à réduire les possibilités d'attaques réussies. La coordination et la pratique de mesures d'intervention d'urgence en réponse à une attaque catastrophique permettent aussi d'atténuer les effets d'une attaque. On peut également rendre plus difficile l'atteinte des cibles, par exemple en construisant des pipelines souterrains tels que le pipeline de Baku-Tbilisi-Ceyhan, ce qui réduit la probabilité d'une attaque et l'importance de ses répercussions. Le renforcement de la sécurité des renseignements relatifs aux vulnérabilités de l'infrastructure énergétique rendrait le choix d'une cible et la planification des opérations plus difficiles pour les groupes terroristes. Enfin, l'adoption de mesures qui encouragent le remplacement du pétrole par des sources d'énergie renouvelable diminuerait les effets potentiels d'une attaque.

En raison de l'offre limitée sur les marchés pétroliers mondiaux, les conséquences stratégiques d'une attaque réussie sur les infrastructures pétrolières et gazières seraient considérables. Les groupes terroristes transnationaux, en particulier Al-Qaïda, sont conscients de cette situation et ont tenté d'en tirer profit. Al-Qaïda sait que le pétrole est une ressource essentielle aux économies qu'il vise. Les attaques qu'il a menées contre des employés et des infrastructures de l'industrie pétrolière dans plusieurs pays producteurs de pétrole corroborent ces affirmations. Il est donc permis de penser que la menace d'une attaque terroriste contre d'importantes infrastructures pétrolières et gazières, y compris contre des pipelines, restera à son niveau actuel ou augmentera tant que l'offre de pétrole sur les marchés sera limitée. Pour toutes ces raisons, de nombreux analystes de l'industrie ont préconisé la mise en œuvre de mesures de protection en vue de déjouer les attaques et, en cas d'échec, d'en atténuer les conséquences. La poursuite des attaques contre les infrastructures pétrolières et gazières semble probable et la possibilité existe qu'une attaque contre une importante installation soit menée à bien. Dans un tel cas, l'incidence sur l'économie mondiale pourrait être désastreuse.

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# 1 Introduction

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Energy security has gained increasing attention of world leaders in recent years as sustained consumption growth threatens to outstrip the capacity of the oil supply chain to adequately fuel the global economy. The tight margin between demand and supply has created a condition where even minor supply disruptions create global economic and political tensions and drive up prices. Global terrorists have taken advantage of this condition by attacking valuable energy infrastructure in order to further their goals. Al Qaeda, in particular, has proclaimed its intention of destroying the economy of the U.S. and its Western partners and allies, and has identified attacks on the oil industry as a means to achieve this goal.

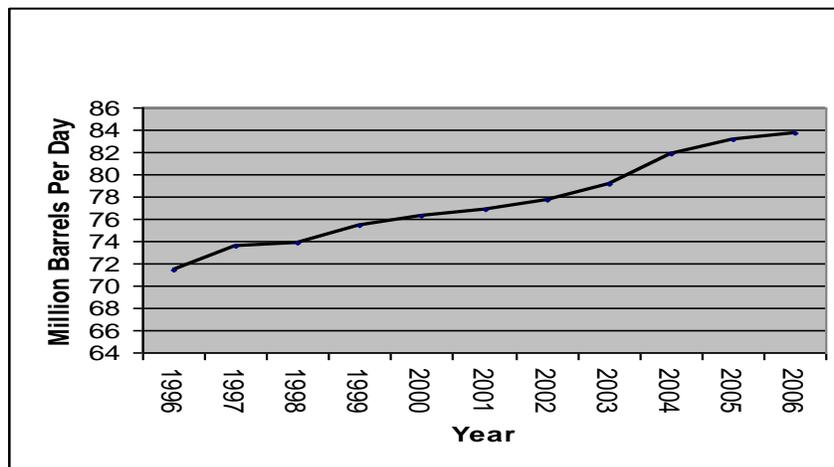
This Technical Memorandum discusses the nature and extent of the terrorist threat against the petroleum industry. It specifically focuses on al Qaeda's efforts and stated intent to strike at energy infrastructure in the Middle East and in other parts of the world, including Canada, Mexico, and Venezuela. Additionally, it highlights economic costs of petro-terrorism and vulnerabilities to oil infrastructure, and suggests possible options for governments and industry to reduce the risks posed by terrorists.

## 2 Background

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The gap between oil supply and demand has narrowed in part because of growing consumption worldwide. Figure 1 highlights the growing consumption to 2005. It is expected that the positive growth slope will continue into the future. Much of this growth is attributed to the developing economies in Asia, especially India and China. Both of these countries are witnessing the development of large middle and upper class cohorts whose consumer activities might continue to drive oil consumption rates higher.

Figure 1: Global Oil Consumption<sup>1</sup>



Oil demand growth by itself would not be problematic except, as displayed in Figure 2, refinery throughput and capacity<sup>2</sup> have not increased significantly during the last decade limiting the ability to manage increased demand. Sustained high prices have, nevertheless, encouraged oil companies to increase refinery investment recently. However, new plant takes several years to become productive,<sup>3</sup> so it remains to be seen if the level of investment will satisfy demand for refined products in the near-term and beyond. If demand increases higher than anticipated, the planned refinery growth may prove inadequate.

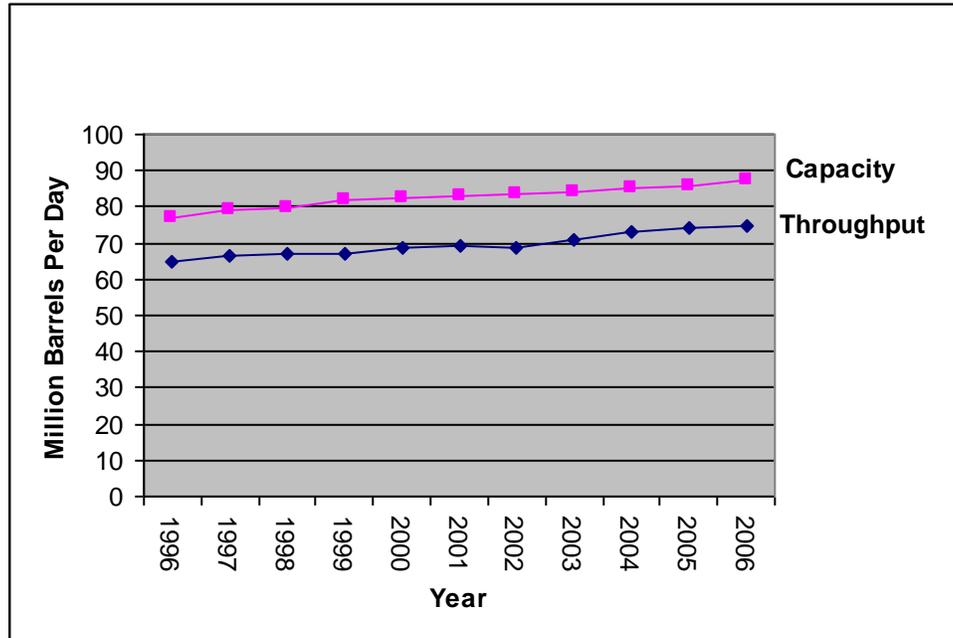
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<sup>1</sup> Adapted from *BP Statistical Review of World Energy 2007*, p. 11.

<sup>2</sup> Throughput refers to the amount of crude that enters the primary distillation unit of refineries. Capacity refers to the total amount of crude that could be refined. Refineries do not operate to 100% capacity as a rule since maintenance must be conducted.

<sup>3</sup> "Medium-Term Oil Market Report," International Energy Agency, July 2006.

Figure 2: Refinery Capacity and Throughput<sup>4</sup>



Another supply-side challenge has been the end of so-called “easy oil.” The readily accessible and exploitable fields, such as those found in Saudi Arabia and other parts of the Persian Gulf region, are generally believed to have been discovered. Most are held by states that have nationalized oil and gas operations, limiting access for international independent oil companies.<sup>5</sup> The loss of access to “easy oil” is not all negative however. It has encouraged the development of innovative technology that has rendered reserves once considered uneconomic suddenly viable. The Canadian oil sands are a case in point. Likewise, deep-water reserves have become increasingly profitable in recent years. Such developments do increase supply, however at higher cost and often increased risk due to technological or logistical challenges that are not experienced with more accessible reserves.<sup>6</sup> Moreover, as ecological and climate change concerns garner more attention within policy making circles, new oil developments in the West might be slowed, in spite of the new technology.

<sup>4</sup> Adapted from *BP Statistical Review of World Energy 2007*, p. 18.

<sup>5</sup> “The Changing Role of National Oil Companies in International Energy Markets,” *Baker Institute Policy Report*, No. 35, March 2007, p. 2.

<sup>6</sup> “State Building,” *Petroleum Economist* (online at <http://www.petroleum-economist.com/>), June 2007.

Table 1: Oil Exports - 2006<sup>7</sup>

<b>Region</b>	<b>Daily Exports (Million Barrels)</b>
North America	5.7
South and Central America	3.7
Europe	2.2
Former Soviet Union	7.2
Middle East	20.2
North Africa	3.2
West Africa	4.7
Asia Pacific	4.3
Rest of the World	1.4

Oil supply security is also influenced by political stability. As Table 1 indicates, most of the oil that arrives on the market today comes from politically unstable areas particularly the Middle East, the Former Soviet Union,<sup>8</sup> Africa, Central and South America. Supplies from these areas can be subject to periodic disruption caused by political turmoil, criminal activity, armed conflict, and terrorism. In times when the market has been better supplied, these disruptions did not create major problems for states that rely on oil and gas imports because it was easier to find alternate suppliers. In today's energy stressed world however, even minor political disturbances that have the potential to create supply interruptions are a cause for concern.

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<sup>7</sup> Adapted from *BP Statistical Review of World Energy 2007*, p. 20.

<sup>8</sup> Former Soviet Union in this context refers to Russia, Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan. While Russia is not "politically unstable," the situation is less secure in the other states. Moreover, Russia has demonstrated a willingness to disrupt its own gas exports for political purposes so might do the same for oil exports.

### 3 Al Qaeda Attacks on the Oil Industry

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Complicating this general energy security situation is the al Qaeda-led jihad against the West. A central objective in Osama bin Laden's war against Western interests is to severely damage the economies of the US and its allies, in order to force them to leave the Middle East as a precursor for the creation of the regional and then global caliphate. This was one of the main motivations behind the attack on the World Trade Center. In Bin Laden's 1996 declaration of war against the West he advocated targets that did not disrupt the economies or social structure of Islamic countries. Specifically, he excluded oil infrastructure in the Middle East as a legitimate target, arguing that the wealth it generates would be essential to fund the pan-Islamic super state that he hoped to create.<sup>9</sup> His edict limited attacks to personnel, primarily Westerners, working in the oil industry in the Middle East. As highlighted below, several attacks against Western employees of oil and gas companies in the Persian Gulf region occurred; either inspired by or directed by bin Laden.

Significantly, the prohibition on destroying energy infrastructure in the Muslim world did not apply to infrastructure used to transport oil to the West. Consequently, al Qaeda developed the capacity to target shipping. The most prominent oil-related attack of this type occurred on October 6, 2002, off the coast of Yemen when the French oil tanker, MV Limburg was successfully bombed. This assault crippled the tanker that was carrying 400,000 barrels of crude oil and killed one crew member.<sup>10</sup> Al Qaeda issued the following statement after the attack:

We congratulate our Islamic nation for heroic and brave jihadi operations that were undertaken by its justified mujihadeen sons in Yemen against the crusader oil tanker.... By hitting the oil tanker in Yemen, the mujihadeen hit the secret line, the provision line and the feeding to the artery of the life of the crusader's nation. They reminded the enemies of the heaviness of the blood bill and the enormity of losses, that they will pay a high price for the continuation of their aggression on our nation and their plunder of our goods and our wealth.<sup>11</sup>

This statement reaffirmed the jihad-inspired legitimacy of attacks on oil destined for Western markets and on its transportation infrastructure. It also clearly articulated al Qaeda's notion that Western use of oil from the Middle East is a form of plunder by the West.

Despite its general proscription on attacks against oil and gas infrastructure in the Muslim world, al Qaeda has attacked these targets in Iraq. The reasons for this inconsistency are unclear. It seems likely that one explanation is the presence of the U.S. and Western troops in that country, while another is perhaps due to the limited control exerted by bin Laden over al Qaeda in Iraq. According to the Institute for the Analysis of Global Security website, between June 12, 2003 and July 23, 2007 there were 461 attacks on oil and gas refineries, pipelines, other petroleum infrastructure, and industry workers. This was approximately two attacks per week during this period. While not all of these incidents are necessarily the work of al Qaeda in Iraq, it seems

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<sup>9</sup> Daveed Gartenstein-Ross, "Al Qaeda's Oil Weapon," *The Weekly Standard*, October 3, 2005.

<sup>10</sup> Alan Philps, "Al-Qa'eda 'behind attack on oil tanker'," *Daily Telegraph* (London), October 7, 2002.

<sup>11</sup> Akiva J. Lorenz, "Al Qaeda's Maritime Threat," Intelligence and Terrorism Information Center at the Israel Intelligence Heritage and Commemoration Center, May 3, 2007. p. 19.

likely that its pronouncements have inspired those attacks that they did not carry out. The economic impact of these acts, outlined below, is significant. More alarming still, is the experience gained through these attacks. Al Qaeda has demonstrated a capacity to learn from its previous operational experiences thus, it is probable that lessons learned from its attacks against oil and gas infrastructure in Iraq will influence the planning and conduct of similar strikes in other countries. Indeed, the successful attack on the USS Cole in 2000 was preceded by a failed effort earlier against the USS The Sullivan's. The al Qaeda cell learned from the errors it committed in its first attempt and succeeded in its second effort. The tactical lessons learned from the Cole attack where, in turn, applied against the MV Limberg in 2002.

That al Qaeda and other insurgents are able to strike with such regularity and success in Iraq is not surprising given the security situation facing that country. However, al Qaeda attempts to destroy oil infrastructure in neighbouring Saudi Arabia have also occurred and are more alarming for global energy security. Initially, attacks focused on Western personnel working in the oil industry in Saudi Arabia. Examples of these efforts included an incident on May 1, 2004, when al Qaeda operatives attacked a petrochemical plant in Yanbu 'al Bahr, killing 5 foreign workers, including one Canadian.<sup>12</sup> That same month, on May 29, 2004, oil industry offices in Khobar were attacked resulting in the deaths of 22 foreign workers.<sup>13</sup> These, and similar attacks, create economic problems for Riyadh as foreign workers became reluctant to work in the monarchy. Saudi security forces struck hard at the jihadis seriously degrading their ability to launch attacks.

Possibly in response to the Saudi security clampdown, bin Laden changed the focus of attacks in 2004 when he issued a decree that legitimized targeting oil infrastructure in the Gulf region used to supply the West.<sup>14</sup> This led to a change of strategy, reinforced by al Qaeda second-in-command, Ayman al-Zawahiri, in a December 7, 2005 videotape when he called on militants to "concentrate their attacks on Muslims' stolen oil, from which most of the revenues go to the enemies of Islam, while most of what they leave is seized by the thieves who rule our countries."<sup>15</sup> This call to the faithful marked a shift in the battle within the Middle East and led to direct attacks on major oil infrastructure in the region.

The first significant attempt to directly target vital Saudi Arabian oil infrastructure occurred on February 24, 2006 when al Qaeda operatives were thwarted attempting to detonate bombs in the Abqaiq oil processing plant.<sup>16</sup> The authorization for this operation is believed to have come from Osama bin Laden, indicating the importance the al Qaeda leader places on the new strategy.<sup>17</sup> A successful attack on Abqaiq would have devastating international economic consequences since this central hub, processes around two-thirds of Saudi oil, is the world's largest refinery, and is

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<sup>12</sup> See "Saudis identify mastermind of Yanbu attack," *USA Today*, May 4, 2004; P.K. Abdul Ghafour, "Al Qaeda Claim Yanbu Attack," *Arab News*, May 15, 2004; and Mark Silverberg, "Bush's Folly," International Analyst Network (<http://www.analyst-network.com/>), January 16, 2008.

<sup>13</sup> See "Hostages held in Saudi oil attack," *BBC News* (<http://news.bbc.co.uk/>), May 29, 2004., and "Saudis storm besieged compound," CNN (<http://news.bbc.co.uk/>), May 30, 2004.

<sup>14</sup> Anthony Kimer, "Bin Laden and the Oil Weapon," *HS Today* (<http://www.hstoday.us/>), October 23, 2007.

<sup>15</sup> Fred Burton, "Attacks on Energy Infrastructure: Desire, Capability and Vulnerability," *Stratfor* (<http://www.stratfor.com/>), March 2, 2006.

<sup>16</sup> "Two attackers on Saudi's most-wanted list," The Associated Press, February 26, 2006.

<sup>17</sup> Hameed Bakier, "Sawt al-Jihad Calls for Attacks on Western Energy Interests," *Terrorism Focus*, Vol. 4, Issue 2, February 20, 2007.

key to the country's oil industry.<sup>18</sup> In 2006, Saudi Arabia produced roughly 10.86 million barrels of crude per day (mb/d) accounting for 13.1 percent of total global production.<sup>19</sup>

It seems that al Qaeda planners recognize the strategic value of the Abqaiq facility. A month after this failed attempt, security forces discovered oil company vehicles loaded with explosives at the residence of a Saudi Aramco employee near the Abqaiq facility.<sup>20</sup> On April 27, 2007, approximately 172 terrorist suspects were arrested by Saudi security officials and accused of preparing to attack oil infrastructure. Several of those apprehended had been training as pilots and were alleged to be planning to strike facilities and army installations within Saudi Arabia using airplanes. The Interior Ministry announced that they had seized arms and more than US\$5 million cash during arrests.<sup>21</sup> The degree of organization and resources necessary to support these types of operations is indicative that al Qaeda is determined to strike at major Saudi Arabian oil infrastructure.

Saudi Arabia provides liquidity for the market since it is able to increase production moderately in order to make up for shortfalls in other producing regions.<sup>22</sup> A successful attack on Abqaiq, or any other large facility or major pipeline network in Saudi Arabia would prevent Riyadh from doing that. It could also remove enough oil from the global market for a sufficient period of time to cause a major recession or even a depression. Such an outcome would go a long way to meeting al Qaeda's goal of severely damaging the US and Western economies. Considering the persistent and adaptive nature of al Qaeda operations, it is likely that efforts to strike Abqaiq, or other key installations in the Middle East, will continue and may become more sophisticated until successful. This approach was already demonstrated with bin Laden's efforts—in 1993 and, later, in 2001—to destroy the World Trade Center in New York.

Saudi Arabia is not, however, the only target. Al Qaeda has also been implicated in attempted attacks on pipelines in Yemen. On September 15, 2006, Yemeni security forces thwarted two suicide bombing attempts on oil targets in that country. Al Qaeda in Yemen claimed responsibility for these attacks and vowed to carry out more.<sup>23</sup> Another attack was prevented in June 2007 when two men, linked to al Qaeda, were arrested preparing to blow up a section of pipeline near Aden. A successful attack was launched on November 5, 2007, when terrorists blew up a section of oil pipeline in Marib province. Reports in the press linked this attack to al Qaeda.<sup>24</sup>

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<sup>18</sup> Peter Brookes, "Al Qaeda's Saudi Agenda: Terror vs. Oil," The Heritage Foundation (<http://www.heritage.org/>), June 21, 2004.

<sup>19</sup> *BP Statistical Review of World Energy June 2007*, p. 8.

<sup>20</sup> "Saudi Arabia: Abqaiq Attack Thwarted," Stratfor (<http://www.stratfor.com/>), March 29, 2006.

<sup>21</sup> See Scott MacLeod, "The Saudi Arrests: How Big a Plot?" *Time*, April 27, 2007; and "Saudis foil 'air attack plotters'," BBC News (<http://news.bbc.co.uk/>), April 27, 2007.

<sup>22</sup> Brookes. "Al Qaeda's Saudi Agenda: Terror vs. Oil."

<sup>23</sup> "Two Attacks Fail in Yemen," Stratfor (<http://www.stratfor.com/>), September 15, 2006; "Yemen jails 32 for Al Qaeda oil attacks," Reuters, November 7, 2007

<sup>24</sup> "Unidentified saboteurs bomb oil pipeline in Yemen," *International Herald Tribune*, November 5, 2007.

## 4 Canada as an al Qaeda Target

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Although the media has reported on al Qaeda's threat to target Canadian oil and gas infrastructure in recent months, this is not the first time that our country has been singled out for attacks by bin Laden. During a statement broadcast on November 12, 2002, he listed Canada as a target of the global jihad.<sup>25</sup> This threat was reiterated in March 2004 when an al Qaeda manual was posted on the internet, listing Canada as the organization's fifth most important international target.<sup>26</sup> Neither of these proclamations specifically mentioned the oil industry, however al Qaeda's desire to target Western economies was well known by 2002 when the first statement was released. Given the energy industry's important role in Canada's economy—oil and gas extraction accounted for approximately 3.5 percent of Canada's GDP in 2007<sup>27</sup>—the threat to it could be logically inferred from these announcements. A February 2007 posting on the Sawt al-Jihad website, determined to belong to al Qaeda, advocated attacks on oil infrastructure used to supply the United States. It explicitly included Canada, Mexico, and Venezuela as legitimate targets.<sup>28</sup> Successful attacks against energy exporting infrastructure in these states could seriously affect the US economy since they rank within the top 4 biggest suppliers—Canada, Saudi Arabia, Venezuela, and Mexico in order—of oil and refined products to the United States. In 2007, the US imported 12.04 mb/d of oil and refined products of which Canada provided 18.6 percent, Saudi Arabia provided 12.4, Venezuela provided 11.1, and Mexico provided 10.4.<sup>29</sup>

To date, al Qaeda has not made good on its intention to strike at Canadian oil and gas infrastructure. It is possible that it might do so in the future. The arrest of the Toronto area jihadist cell in June 2006 highlighted the fact that groups sympathetic to al Qaeda operate within Canada. Doubtless, there are other sympathetic terrorist organizations, possibly some with direct links to al Qaeda, active in Canada. Moreover, al Qaeda has demonstrated patience in the past when carrying out its attacks so the threat to Canadian energy infrastructure should be taken seriously.

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<sup>25</sup> Stewart Bell, "Al-Qaeda says Canada deserves bombing," *National Post*, May 15, 2004.

<sup>26</sup> Ibid, and "Al Qaeda website urges attacks on Canada," CTV News (<http://www.ctv.ca/>), March 31, 2004.

<sup>27</sup> Figure calculated from Statistics Canada website at <http://www40.statcan.ca/101/cst01/prim03.htm?sdi=oil%20industry>.

<sup>28</sup> Ian MacLeod, "Al-Qa'ida targets Canada," CanWest News Service (<http://www.canada.com/>), February 14, 2007; and "Al-Qaeda calls for attacks on Canadian oil facilities," CanWest News Service (<http://www.canada.com/>) October 23, 2007. See also "Al-Qaeda calls for oil attacks," *Aljazeera.net*, February 14, 2007; and Bakier, "Sawt al-Jihad Calls for Attacks on Western Energy Interests."

<sup>29</sup> Percentages derived from the US Energy Information Agency website. At [http://tonto.eia.doe.gov/dnav/pet/pet\\_move\\_net\\_i\\_a\\_ep00\\_IMN\\_mbbldpd\\_a.htm](http://tonto.eia.doe.gov/dnav/pet/pet_move_net_i_a_ep00_IMN_mbbldpd_a.htm).

## 5 The Impact of Petro-Terrorism

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As of yet, the impact of petro-terrorism on global oil supply has not been that serious. However, in some countries such as Iraq, there are major disruptions. On the eve of Sadaam Hussein's invasion of Kuwait, Iraq hit an historic oil production high of approximately 3.5 mb/d.<sup>30</sup> Production rose again to approximately 2.6 mb/d in 2000. Production fell again in 2002 and has hovered near 2.0 mb/d since that time.<sup>31</sup> The main reason for this decline during this period is the insurgency and the repeated attacks on pipelines and other oil infrastructure.<sup>32</sup> Given the tightness on the global oil market, the loss of approximately 1.5 mb/d is quite significant. (In 2006, global oil demand was 84.5 mb/d while supply averaged 85.3 mb/d according to IEA figures). It is very reasonable to argue that until the global supply situation improves considerably, should a successful attack be launched on a major supplier, such as Saudi Arabia, it would create market chaos.

There has been an economic impact of petro-terrorism. Reports available in the open literature indicate that the price per barrel of oil is inflated from US\$2 to US\$10. This so-called "terror premium" is due to increased security costs, repair costs where attacks have occurred, and general skittishness on the part of oil traders fearful of supply disruptions.<sup>33</sup> According to the BP Statistical Review, global oil consumption in 2006 was slightly less than 84 mb/d. With a premium between US\$2 and US\$10 the total annual added cost is somewhere between US\$61.32 and US\$306.6 billion. Considering the vital role that oil plays in the world economy, this premium is a significant consequence and has reduced global economic productivity by inflating fuel costs.

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<sup>30</sup> Lawrence Kumins, "Iraq Oil: Reserves, Production, and Potential Revenues," CRS Report for Congress (Washington, D.C.: Library of Congress, Congressional Research Service, April 13, 2005), p. 1.

<sup>31</sup> *BP Statistical Review of World Energy 2007*, p. 8.

<sup>32</sup> Peter Grier, "Iraq's Oil Production Falls Short of Goals," *Christian Science Monitor* (<http://www.csmonitor.com>), May 7, 2007.

<sup>33</sup> See Robert Block and Chip Cummins, "Saudi Arrests Stoke Oil Facility Worry," *Wall Street Journal*, April 28, 2007; John W. Schoen, "Oil prices include a growing 'risk premium'," MSNBC News (<http://www.msnbc.msn.com/>), May 12, 2004; and Scott Peterson, "Why oil prices may stay high," *Christian Science Monitor* (<http://www.csmonitor.com>), August 2, 2004.

## 6 Vulnerabilities

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Oil and gas pipelines present a particular challenge owing to their length and their location. In North America, there are several hundreds of thousands of kilometers of oil and gas pipelines that present lucrative targets. Other regions of the world endure similar vulnerabilities. Often these pipelines run through remote areas or underwater making surveillance and physical protection tasks more onerous than they might be if the pipelines were located in more accessible areas. Paradoxically, the remoteness can make it difficult for would-be attackers to inconspicuously approach their targets. Yet, geography is not the only concern for pipelines also present a cyber-target; a hacker could conceivably disrupt computer monitoring and control processes to interrupt pipeline flows. However, as remote as some pipelines may be, al Qaeda's access and ease of operations is far greater in the Middle East than in other regions. Hence, while the threat of an attack outside of the Middle East is real, it is more likely that lucrative targets in that region will be the focus of al Qaeda operations in the near-term. In light of the anti-Western focus of al Qaeda and other transnational terrorist groups, infrastructure owned or managed by Western firms can be expected to be a higher priority target. However, al Qaeda has consistently demonstrated patience and adaptability with regard to its operations so it is possible that a lucrative North American energy installation might also be targeted by jihadis at any time.

While pipelines are perhaps easier to hit than other oil industry targets, the impact from a single attack is less significant than it might be if a processing facility were to be targeted. This is because pipeline design accounts for disruptions due to natural or man-made causes. Destroying a point on a line may disrupt the flow and cause extensive local damage but this can normally be overcome relatively quickly through repair and rerouting oil and gas flows. The same is not true of major facilities, such as Abqaiq or many other processing and storage sites in the world, whose repair would be more labour and resource intensive, making restoration more difficult and time consuming. Moreover, given that refinery capacity is already stretched, losing a major refinery, even for a short period of time, can have an extremely devastating economic and political impact.<sup>34</sup> Attacking these critical nodes is more challenging because it is easier to protect a point target than a linear one, but the potential devastation of a successful attack may well outweigh the added difficulty of achieving that success.

Oil tankers and the chokepoints on routes that they traverse are also single point targets. Some of these vessels are large enough to carry over two million barrels of oil. Given the narrow margin between oil supply and demand, it seems likely that tankers transiting chokepoints are becoming increasingly relevant as targets for terrorists seeking to disrupt the world economy. In 2006, approximately 42.7 mb/d were transported on ships that transited chokepoints including the Panama Canal, the Suez Canal and Sumed pipeline, the Bab el-Mandab, the Turkish Straits (Bosporus and Dardenelles), the Strait of Hormuz, and the Strait of Malacca.<sup>35</sup> Ships transiting these lanes are vulnerable to attack and could be blocked for hours or days by disabling or sinking a single vessel, thereby delaying or preventing the delivery of oil to world markets. Likewise, tanker loading and offloading ports present lucrative target options to terrorist organizations.

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<sup>34</sup> Friedrich Steinhäusler, P. Furthner, W. Heidegger, S. Rydell, and L. Zaitseva. "Security Risks to the Oil and Gas Industry: Terrorist Capabilities," *Strategic Insights*, Vol. VII, Issue 1, February 2008.

<sup>35</sup> "World Oil Transport Chokepoints," Energy Information Agency (<http://www.eia.doe.gov>), January 2008.

Aside from the potential impact on global energy markets, such an attack could have devastating casualty affect depending on the method and location of the strike. For example, the Turkish Straits narrow to 698m when passing through Istanbul placing portions of its population at risk should a large explosion occur offshore. The successful attacks on the Limburg in 2002 and the USS Cole in 2000 demonstrated that al Qaeda has the desire and capability to carry out anti-shiping operations.

No country is energy independent in the sense that they are completely self-sufficient in energy supply. Thus countries develop dependencies on other countries in order to meet their energy needs.<sup>36</sup> Over time, these dependencies have led to the integration of energy systems shared by neighbouring states or countries within a politico-economic bloc. The EU and the North American energy market integrations are good examples. Countries in these markets rely on networks of pipelines and power grids that cross national boundaries at multiple locations. These energy nodes present vulnerabilities that need to be protected. Consequently, integrated energy markets may necessitate the development of energy security policies in addition to the regulatory and pricing frameworks.

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<sup>36</sup> Frank Verrastro and Sarah Ladislaw, "Providing Energy Security in an Interdependent World," *The Washington Quarterly*, Vol. 30, No. 4, Autumn, 2007. p. 99.

## 7 Protective Options

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Responsibility for the protection of oil and gas infrastructure is shared by governments, industry, and even private citizens. The particular options and responsibilities vary depending on the infrastructure type, the threat assessment, the legislated jurisdiction, and the security measures already in place.

Governments have options to reduce the terrorist threat to energy infrastructure. These include, developing a robust and extensive intelligence gathering and analysis system in order to appreciate where vulnerabilities might be exploited. Intelligence related to threats must also consider possible targets so an audit of the existing infrastructure and assessment of its security status could help to prioritize the application of protective measures. Coordination amongst different levels of government could also help to reduce the threat of attack and to enact consequence management when attacks occur. Governments could also cooperate with like-minded allies, especially with those countries that share their integrated energy grids. They could also develop mechanisms to share intelligence and analysis with energy companies, when appropriate, since the industry should also participate in safeguarding its infrastructure and resources.

Assessing potential targets is only part of the protection equation. Taking effective action to thwart attacks also necessitates the development and maintenance of security forces adequate to deal with the terrorists and other would-be attackers. Again, they should work in conjunction with industry to practice emergency response and coordinate amongst the other levels of government, security services, and private sector actors that might be involved in a given situation.

The oil and gas industry also has a role to play in safeguarding the supply chain. Aside from working with government in the manner noted above, industry can also conduct a vulnerability assessment and take steps to reduce the threat as appropriate. In the case of pipelines and critical complexes there are a plethora of monitoring equipment that can increase situational awareness and facilitate early response before a crisis develops. Redundancy could also be pursued whenever possible. For example, computer control systems or surveillance equipment should be backed up by alternate systems located in different sites in order to ensure uninterrupted function in the event of an attack on the primary system. Physical security measures, such as monitored fences or controlled access points could reduce the risk or impact of attacks. Pipelines and processing plants can also be protected with shut-off isolation valves in order to isolate damage and minimize the size of repairs necessary to restore function. Security screening of employees should be carried out commiserate with the perceived threat.

Hardening of infrastructure is another option open to companies. A case in point is the Baku-Tbilisi-Ceyhan (BTC) pipeline that runs through Azerbaijan, Georgia, and Turkey connecting oil fields in the Caspian Basin with an oil outpost in the Mediterranean Sea. The design and route of the BTC were deliberate. It is buried for most of its 1,700km and runs through countries considered to be less likely to disrupt the flow for political or security reasons. These measures drove up the costs for this project to US\$3.6 billion. However, it is less susceptible to terrorist attack. Major pipeline projects in the future could be modeled on the BTC.

Another security measure that could be implemented is reduced public access to information on the location and nature of energy infrastructure. It is relatively easy to locate maps of oil infrastructure and other information useful to terrorists via the internet or other publicly accessible information sources. Companies and governments should consider limiting the information regarding critical energy infrastructure that is available in the public domain.

Government can also enhance energy security by enacting programs that encourage use of alternative resources. This could result in a reduced reliance on oil and gas and increased consumption of other energy sources that are less susceptible to terrorist attack. In countries with dramatic temperature variations for example, programs that encourage conversion to geothermal heating and cooling systems might help to significantly reduce the consumption of natural gas, heating oil, or electricity used to heat homes and buildings. Such a program could also benefit industry, individual consumers, and the environment. This is just one example of a product that could reduce fossil fuel consumption thereby limit the potential damage caused by an attack on energy infrastructure. By reducing the potential economic and physical damage of an attack, the value of the target for the terrorist is decreased thereby limiting the likelihood of a strike.

## 8 Conclusion

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In light of the tightness in global oil markets, the strategic impact of a successful attack on major oil and gas infrastructure will be significant. Transnational terrorist groups, especially al Qaeda, are aware of this situation and have been attempting to take advantage of it. Al Qaeda has proclaimed its intention to destroy the economies of the US and its partners, and it has indicated that oil is the lifeblood of these economies and therefore should be targeted. It has already backed up these assertions with attacks on personnel and infrastructure in several oil producing states. This suggests that the level of threat of terrorist attack on major oil and gas infrastructure, including pipelines, is likely to grow so long as oil markets remain tight. Protective measures should be implemented to the extent possible in order to prevent a strike and to minimize the consequences of those attacks that are not prevented. However, successfully implementing these measures will prove challenging given the patience and adaptability of al Qaeda and its associated jihadist groups. Therefore, efforts to thwart an attack should be given a high priority by governments, security force, and the energy industry. The health of the global economy lies in the balance.

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This Technical Memorandum discusses the nature and extent of the terrorist threat against the petroleum industry. It specifically focuses on al Qaeda's efforts and stated intent to strike at energy infrastructure in the Middle East and in other parts of the world, including Canada, Mexico, and Venezuela. Additionally, it highlights economic costs of petro-terrorism and vulnerabilities to oil infrastructure, and suggests possible options for governments and industry to reduce the risks posed by terrorists.

Le présent document technique traite de la nature et de l'ampleur de la menace terroriste qui pèse sur l'industrie pétrolière. Il porte plus particulièrement sur l'intention déclarée du réseau Al-Qaïda d'attaquer l'infrastructure énergétique au Moyen-Orient et ailleurs dans le monde, y compris le Canada, le Mexique et le Venezuela, ainsi que sur les efforts que ce réseau déploie à cette fin. En outre, il fait ressortir les coûts économiques du « pétro-terrorisme » de même que les vulnérabilités de l'infrastructure pétrolière et présente aux gouvernements et à l'industrie des options possibles pour réduire les risques que représentent les terroristes.

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