Geopolitical and Cyber Risks to Oil and Gas

By Paul Sullivan

Whether an oil and gas company is working in the United States or is spread throughout the world, it will face geopolitical and cyber risks which could affect global energy security.

Geopolitical Risk

There are numerous geopolitical risks for any oil and gas company. Even if a company just works in the United States, it needs to know what is happening in countries all over the world, especially those countries that are large oil and gas producers. Because oil markets are so tightly connected globally, major political events in oil exporting states could seriously affect the price and even availability of oil. An attack on an oil platform in Nigeria, a terrorist event in Iraq, the closing down of port facilities in Libya and many other examples come to mind. Consider the potential effects of a major attack on the Ab Qaiq facility in Saudi Arabia. If this facility is damaged or destroyed on a large scale by rockets or bombs, the world oil market could be out 6-7 million barrels of oil a day- out of the 90-92 millions of barrels a day the world needs. World spare oil production capacity is about 2.3 million barrels a day. It could take some time to get this online. The spare production can be ramped up, but not immediately. Given that the grand majority of excess capacity in the world is located in Saudi Arabia and that this excess capacity could be significantly cut back with damage to Ab Qaiq, the situation is even riskier.

Another major risk nearby is transits through the Straits of Hormuz. About 16-17 million barrels a day goes out of the Straits. Any attempts to close the Straits (even unsuccessful ones) could have significant effects on the prices of various grades of oil. Even with the seemingly warming in relations between the U.S. and Iran, it is still possible that things could take a turn for the worse in the Gulf region. If the present negotiations with Iran break down, tensions could rise to even higher levels than before negotiations began. This could bring discussions of the military option more public. If there is a major conflict involving Gulf countries, the United States and its allies, then all bets are off on where oil prices may go. There could be many scenarios: from oil prices increasing $100 over the pre-conflict base price to well over $200 over the pre-conflict base price.

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In many other parts of the world, geopolitical risks going “kinetic” can affect oil markets. Syria is a potential whirlpool of trouble for the entire Middle East. Egypt and Libya are far from stable. Algeria could be heading into some rough times. The Sudan’s will remain problematic and potentially quite violent for some time to come. The East China Sea and South China Sea disputes are not resolved. The Central Sahara could be a source and locale for troubles for some time to come.

Terrorist events can happen anywhere. Google Earth allows terrorists and others to get very close looks at major oil and gas facilities, transport choke points and more. Also, there are not that many tankers plying the vast seas and oceans of the world. Some of the most important routes are between the Gulf region and East Asia and Europe. Others travel from West Africa to Europe, and less so to the United States than before its shale oil revolution. The Mediterranean has many important tanker shipping routes. The Red Sea is a crucial route for both ships going north and south. Over 50 percent of oil trade happens on maritime routes. Many of these tankers cross through vital chokepoints like the Strait of Malacca, the Strait of Hormuz, The Bab al Mandab, The Suez Canal, The Turkish Straits, The Danish Straits, The Panama Canal, and various harbor and river routes where risks may be higher at sea. Even whilst at sea, ships are at risk as shown by pirate attacks and hijackings off of East Africa, West Africa and previously off of Indonesia. There are about 1,996 crude oil tankers. However, only 623 of these are of the Ultra Large Crude Carrier (ULCC) or Very Large Crude Carrier (VLCC) variety that are the most important for transporting crude oil economically over long distances from the Gulf region to places like China (the biggest importer of oil), the United States, Japan, South Korea, and Europe. VLCCs can carry about 2 million barrels of oil while ULCCs can carry up to 2.3 or, rarely, 2.5 million barrels of oil. Normally these massive ships carry crude oil, but sometimes carry many different types of crude oil. Smaller petroleum tankers may carry both crude and refined products depending on their trade routes and the state of the markets at any times. There are about 493 Suez Max tankers, which can hold about 1 million barrels of oil and refined products and about 408 Afrimax vessels, which hold about 500,000 to 800,000 barrels of crude or refined products. Additionally, there are 417 Panamax vessels, which can carry 300,000 to 500,000 barrels of oil or refined products.

This may seem like a lot of ships to some. However, especially in tight markets, the pressure is immense to keep these ships at sea and to keep them on time. Moreover, there are lots of logistical complexities in trying to keep the crude moving at the right times and to the right places. If anything disturbs this complex economic and logistical ballet of behemoths, then the economic effects could be considerable. If the oil does not arrive on time then refinery production and deliveries of refined products to markets could be disturbed. Most countries have crude and product reserves to handle short term disruptions that may result from tanker losses. If the tanker losses are large or other
disruptions occur in the supply chains of crude via ships, then those reserves could be worn down. It takes well over a year to build one of these tankers.

If the market for tankers is soft and some available tankers are moored in port, (such as when close to 500 hundred ships and dozens of tankers were moored off Singapore a few years ago), then the chances are better of getting the shipping logistics back to normal faster. However, problems could still arise in getting ships needed in Houston or Ras Tanura from Singapore. The travel times of these massive ships add considerable costs and disruptions.

When disruptions occur, some crude cargos can change direction and can be sold and resold, depending on the sorts of contracts that are in effect, along the way. Sometimes the disruptions are from political events, such as revolutions, insurrections, civil instability, and natural events like hurricanes and tsunamis. For example, when the tsunami hit Japan on March 11, 2011, many cargos were delayed or reconfigured. However, these sorts of events are different from terrorists blowing up a series of ships, as the psychology is different.

There is a certain amount of flexibility built into crude tanker transport markets, but a larger question is what would happen if many of them were taken out in various parts of the world. Would such a “black swan event” cause great disruptions? This is most likely. The follow on question would be how the tanker and other connected markets would react to this to help resolve the logistical attacks and how this might affect tanker insurance and lease rates.

Given that the crude and other products feed into other supply chains and markets, there could be cascades of disruptions in many parts of the world from a significant attack on even one large VLCC. Attacks on more ships would become increasingly more complex and costly in their effects.

If even one ship is sunk with a missile, the effects on oil markets and the world economy could far outweigh the mere few hundred millions of dollars in value the tanker and its cargo may represent. Ports, pipelines, refineries, tankers and other parts of the oil, transport and other infrastructures could be affected.

The destruction of an oil facility in a sensitive area that may be worth a few billion dollars could have a negative economic impact globally in the hundreds of billions, if not more. Attacks on the Houston Ship Channel, the Louisiana Offshore Oil Port, Ras Tanura in Saudi Arabia, the Jubail Complex in Saudi Arabia, Kharg or Lavan Island in Saudi Arabia could have considerable impacts economically and even militarily.
The impacts of attacks on these facilities would be stronger when oil and tanker markets are tight, and when the world or salient regional economies are growing quickly. An attack on a major tanker route out of Saudi Arabia heading to China or Japan will have a lot less effect on tanker and oil markets when there are excess tankers at anchor, and when there is excess capacity in oil production to make up in a relatively short time than when both tanker and oil markets are tight and there is little excess capacity. The less elastic the markets, the more effect any attacks will have. If a terrorist group wanted to have the most impact on the world economy it would likely attack in times of high growth in various important economies and when there is little excess oil capacity and no spare tankers. Often these three markets are tied together. When the global economy is growing quickly oil markets are under stress. When oil markets are under stress then tanker markets are stressed.

Looking to the future, some countries could be facing political turmoil such as Russia, Saudi Arabia, Iran, and Venezuela. This turmoil is not deterministic, but it is also not completely out of the bounds of probability. Depending on the type of turmoil, damage, and loss of production and export capacity, these events could have significant effects on world oil markets.

If such turmoil is going to happen, it is better for the world oil markets and the world economy that these happen during times of greater excess production and export capacity than the losses in oil production and export capacity from the turmoil. The worst of all possible combinations would be the loss of production and export capacity during very tight market times in a country where most of the excess capacity is found, which is in Saudi Arabia. If the world economy is growing quickly all around, then the effects of such turmoil will be far greater than if the world economy is in a slow growth period.

There are also regional aspects; during the 2011 Libyan Revolution, Europe’s economy was starting to dig itself out of a deep recession that had affected most European countries. Most of Libya’s oil that was cut off for a while was supposed to go to European countries, especially Italy, Spain, and France. Libyan oil production was about 1.7 million barrels a day until the civil war/revolution began in February 2011. About 1.5 million barrels a day was exported. After the beginning of the conflict, production dropped to about 200,000 barrels a day, and did not recover until the post-civil war “recovery” that began about 8 months later. In the period between the start of the civil war/revolution and the start of the ramp up, oil production dropped to 100,000 barrels a day and then on down to about zero barrels a day. Very little was exported during the times of the conflict. The fact that many European economies were growing slowly, or in some cases not growing at all, helped alleviate the potential effects of the cutting off of oil shipped from Libya. About 85 percent of Libya’s oil exports before the conflict went to Europe. The countries that relied considerably on Libyan were
Italy, Austria, Ireland, Switzerland, Spain, Austria, and France. However, most of these were in slow-growth phases due to the ongoing recession and growing financial crises in their countries. The tanker markets were also soft and there was significant excess capacity of oil production in Saudi Arabia. The Saudis tried to backfill some orders for Libyan crude, but some of these did not work out well due to the heavier, sourer nature of the available Saudi crude compared to the usually light, sweet crude out of Libya. Switzerland is different from the other European countries as its “consumption” of Libyan oil was mostly for trading the oil in hedge funds and the big commodity firms in Geneva. The rest of these countries needed it for their overall economic needs.

Libyan crude production increased to about 1.4-1.5 million barrels a day until further problems occurred in mid-2013 with strikes at the ports and some energy facilities. Production is now down to 200,000 barrels per day. The effects on prices has been a lot less this time than during the civil war due to new, more flexible trading arrangements and better planning for such contingencies out of Libya, but also because the European economy and tanker markets remain weak.

Many Americans may think that they are relatively immune from geopolitical turmoil in oil disruptions because of the shale oil and gas revolution in the United States and Canada. However, there is potential for the increase in trade of oil with Canada which will result in greater access to oil and gas. But, this will not buffer the United States from the vagaries of oil prices caused by geopolitical events. This is mainly due to oil being a globally traded commodity.

Unlike the oil industry, the natural gas industry is not fully globally integrated, but it looks to be heading that way. As more countries invest in both conventional and unconventional reserves production, the development of LNG (Liquefied Natural Gas) export and import facilities, and expansions of major international pipeline networks, the world natural gas market will have some great changes. Some of these may include the convergence of prices of natural gas globally. Recent prices of natural gas (FOB – Freight on Board, where the buyer pays for transport costs) in China were about $15 per MMBTU (Million British Thermal Units), a common measurement of natural gas amounts. In Japan they were in the $16-17 ranger per MMTBTU. In many parts of Western Europe LNG (FOB) prices were about $9-11 per MMBTU. Natural gas in the United States recently has sold for about $3 per MMBTU. Qatar could sell at cost for much lower, as it sells to the United States for about $3 MMBTU similar LNG that it sells to China and Japan for much higher prices. With the convergence of prices, the lower cost countries will likely be the survivors. Others may have to drop out if they have to export the LNG at a loss, unless the country subsidizes these exports, which would be problematic under the World Trade Organization (WTO) agreements.
Those countries that develop their LNG export facilities the fastest will capture more of the most important markets (such as Japan, South Korea, and especially the potentially gigantic market in China), than those countries that doddle along in their decisions to export or not. The future of global gas markets is more of a very competitive and very expensive 4D chess game played by very powerful people, rather than just some engineering or economics exercise as some look at it.

As the now regional and segmented natural gas markets develop into global integrated markets, they will become more efficient and regional prices will start to converge toward a global price, much like oil. As the global natural gas markets develop, there will be more spot markets developed and less need for long term contracts in many instances. For decades, oil and gas prices were linked. As a global natural gas market develops, and especially with the further spread of the shale gas revolution, fewer and fewer natural gas contracts will be linked to oil prices. However, this integration of the natural gas industry globally also brings the risk of terrorist or political driven turmoil at or near LNG ports, LNG ships, and even in the market trading centers in places far removed from the United States. The more globally integrated the natural gas markets are, the more likely reverberations to prices will occur globally, rather than just locally. It is sort of like dropping a large rock in a pond with many barriers compared to dropping a large rock in a pond without many barriers in it. The waves will have more extensive effects without the barriers.

At the moment, the United States has a special domestic market that is fairly immune from outside events, as one would expect that they would happen in Canada, the United States’ major natural gas trading partner. This will change over time as U.S. natural gas markets get more connected with the world. The United States have some buffers during difficult gas shocks globally due to massive shale gas reserves. However, it could take a long time for these reserves to surge into the domestic markets to make up for the price increases.

Large profits can be made in exporting natural gas to places like China, Japan, South Korea, and Western Europe where gas prices are much higher. Over time those price differentials will decline because more LNG and piped gas will be flowing to the more profitable markets, hence putting pressure on prices. Global gas prices will tend to converge, but not entirely given different extraction, production, liquefaction and gasification prices.

With greater integration there are also new risks to consider. Some of these include potential attacks on major LNG facilities as natural gas becomes a more vital part of the world economy and some countries. There are also increased risks that as the global markets get more integrated in natural gas, events distant from the United States could affect prices in the United States much like what happens now with oil markets.
There are great profits to be made from exporting the potentially massive amounts of natural gas (mostly shale gas), from the United States into these newly developing world markets. (The greatest profits can be made in the first years of the development of these markets prior to the lowering of prices in Asia, Europe and higher priced areas as the markets get integrated.)

However, nothing is ever certain and some planning and emergency regulations may be required to help potential shocks from entering U.S. markets. Complete immunity is not possible when a market is globalized, but with proper consideration risks might be mitigated. A very large natural gas strategic reserve system might be best built and filled when the natural gas is cheap for times when it may be less accessible (likely for the short run given how quickly shale gas pads and production can be set up).

Cyber Risks

According to Europol there have been many cyber-raids in 2012 on logistics and computer networks connected to container ships by criminal gangs to obtain the illegal drugs they had hidden in the holds of the ship. The gang truck drivers were able to find the containers, get the security codes, and were able to get the drugs off the ship without being caught. This could be the start of far more serious cyber-attacks on shipping and maritime logistical networks. The oil and gas industry is information intensive and it is hard to get around that. Computer systems, the internet, and other cyber-based devices and operations are key elements to the operations of the industry. For example, Saudi Aramco and many other oil companies in the Middle East region have been cyber-attacked in recent years.

In addition, cyber-attacks have both financial and real effects, including distortions in the prices of oil and gas. Hacking into the derivatives and futures markets could wreak serious havoc on the industry. Real effects could include attacks on SCADA (Supervisory Control and Data Acquisition) systems that control oil and gas pipelines. SCADA is also used in refinery operations. If a container ship can be hacked, how far off is it when an LNG or oil tanker is taken over or hacked? Tanker traffic is often controlled and monitored via computer systems and the internet. Clever cyber warriors and others are likely trying to crack these systems (or potentially have even cracked them at times), but the industry would rather not discuss such events. It may be entirely possible to use something like STUXNET on affected SCADA systems to send the wrong signals to those trying to monitor the complex logistics of the shipping. A ship may be seen on the company’s monitor being one place, whereas it might be somewhere else. That is anyone’s guess, but I suggest that is not impossible. The new pirates
attacking tankers may be cyber-pirates sending in malicious code, not just the barefoot Somalis and others tossing hook anchors on to the stern of the tanker and climbing up.

Cyber risk can also have considerable effects on the overall supply chains for the oil and gas industry. To get an oil rig, a refinery, a series of pipelines up and running takes a massive administrative supply chain effort that could involve sometimes hundreds if not thousands of subcontractors and suppliers that have to get things done in a specific order and on time. Anyone who has built a house or even had a kitchen remodeled knows how important it is to get the carpenters, electricians, masons, and roofers to be on schedule and in the right order. Now consider the complexity of getting all the right people, equipment and information on schedule and in the right order in the build out of a complex oil rig in 10,000 feet of water 150 miles at sea with millions of dollars (and maybe lives) at risk due to any scheduling mistakes.

A cyber-attack on major refineries and pipeline systems could bring costs that may seem unthinkable at the moment. However, this could just be a matter of time if the industry does not constantly update its protective systems and understanding of the risks. The industry remains constantly vigilant as hackers and cyber-warriors like the SEA (Syrian Electronic Army) are always looking for opportunities to attack. Constant vigilance will not be enough if one of these attackers gets “lucky” and gets through. The sophistication of cyber warriors and hackers is not static, nor should the sophistication of the oil and gas industry to counter these threats be static.

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