While National Transitional Council (NTC) forces, with the help of NATO, were successful in toppling the regime of Moammar Gaddafi, future Libyan oil production remains uncertain. Current production is at very low levels as a result of the tenuous security conditions created by the eight month conflict, which began in February 2011. Uncertainty surrounds the NTC’s ability to create a secure environment, in which foreign oil companies are willing to return to the oil fields of Libya. This report provides a chronological overview with a discussion of the role and significance of Libyan oil both domestically and internationally. The document then explores the economic implications of the Libyan conflict on oil markets. It examines the challenges to be met in resuming oil production in post-conflict Libya and the rising concerns over oil prices and future oil production.

Pre-conflict Libya: The International and Domestic Importance of Oil

According to the United States Institute of Peace (USIP), although Libya ranks 17th as a world oil supplier, it is Africa’s largest oil reserve, producing 1.8 million barrels per day (bbl/d). Libya contains nearly 46.4 billion barrels of oil, as of January 2011, and data from the Central Intelligence Agency (CIA) and United Nations (UN) states it also ranks fourth among African countries with large natural gas reserves estimated at approximately 55 trillion cubic feet (tcf). The majority of existing oil fields are located in three major basins; Sirte, Murzuk and Pelagian. Foreign Affairs explains that the Sirte basin is known to be the oldest and largest, producing approximately two-thirds of the country’s oil.
The United States Energy Information Administration (EIA), reports that prior to February 2011, there were five refineries in Libya with a total capacity of 378,000 bbl/d.

<table>
<thead>
<tr>
<th>Libyan Oil Production</th>
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<tr>
<td>Domestic Refineries</td>
<td>Refining Capacity (barrels/day)</td>
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<tr>
<td>Ras Lanuf</td>
<td>220,000 bbl/d</td>
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<tr>
<td>Az Zawiyah</td>
<td>120,000 bbl/d</td>
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<tr>
<td>Tobruk</td>
<td>20,000 bbl/d</td>
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<tr>
<td>Sarir</td>
<td>10,000 bbl/d</td>
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<tr>
<td>Brega</td>
<td>8,000 bbl/d</td>
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Source: United States Energy Information Administration (EIA)

According to the EIA, Libya’s energy consumption needs are met primarily through its oil sector. Approximately 72% of the country’s energy demand is met with oil, and the remaining 28% is provided by natural gas. The EIA indicates that in 2009 electricity demand was on the rise, which required the pre-conflict Gaddafi regime to invest more into expanding the natural gas sector, which as of 2010 supported 40% of generated electricity. In 2010 oil consumption was estimated to be 270,000 bbl/d and natural gas for 2009 was 212 billion cubic feet (bcf).

Although Libya supplies less than 2% of the world’s oil, according to the Petroleum Economist, its high quality makes it valuable on the global market. The majority of Libyan oil fields supply sweet, light oil that is waxy and thick.1 “Sweet” crude has very low sulphur content—under 0.6%, as opposed to sour crude, which is above 0.6% and is rich in sulphur. The smaller the amount of sulphur, the easier and cheaper it is to refine the oil. Additionally, when petroleum crude oil with low-sulphur content is refined, the resulting primary-end products2 such as gasoline and diesel are cleaner-burning fuels. CNBC notes that cleaner-burning fuels are in high demand in European markets because of European Union’s (EU) strict environmental policies, which aim to curtail the level of sulphur in the environment when fuels are burned.

Libya’s oil is also light. The Centre for Energy3 explains that the light/heavy classification is determined by the American Petroleum Institute (API) scale for gravity. Additionally, the Centre for Energy describes the different gravity categories for crude oil: light, medium or heavy. Heavy crude oil is difficult to move through pipelines and therefore requires preheating or diluting, both of which raise the cost of refinement. The API is measured in degrees, with light crude being anything higher than 31.1° gravity. A Financial Times article explains that it is more profitable to handle lighter crudes because they “yield more diesel per barrel” than heavier oil and that European and Asian refineries in particular are designed for processing lighter and sweeter oil.

As a result of the high quality of Libyan oil, demand, particularly in some European states, was high prior to February 2011. According to the Economist, Italy was the most dependent on Libyan imports with 376,000 barrels a day (b/d), followed by France with 205,000 b/d and Spain with 136,000 b/d. The EIA notes that the United States is not heavily dependent on Libyan oil, with imports for January 2011 at only 29,000 b/d, which equates to less than 1% of United States consumption.4 The New York Times states that in comparison to Europe, the United States is less dependent on Libya because its refineries are more versatile and are capable of processing both sour and sweet crude oil. Additionally, the New York Times reports that the United States is capable of refining sour crudes because a large amount of its oil imports are from Latin America; where the crudes are high in sulphur. Prior to the Libyan conflict, continues New York Times, European nations were among Libya’s primary customers.

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1 An exception is the Pelagian Shelf basin, located off the coast of Tripoli, which has two oil fields producing sour crude
2 More on the Petroleum refining process and products
3 Canadian not-for-profit organization which provides energy information
4 For further information visit: United States Energy Information Administration
Effects from the Conflict

Domestic

On 26 February, 2011 the United Nations Security Council adopted resolution 1970, that imposed an arms embargo and sanctions on key regime figures; freezing Libyan assets owned by Gaddafi, his relatives and associates. The New York Times reported that the EU and United States also responded to the conflict by imposing sanctions on the Libyan government as well as on companies and individuals that assisted the Gaddafi regime. Reuters noted that the retreat of international oil companies from the country, as a result of security concerns and sanctions, significantly curtailed the production of oil, impacting operations for both the Gaddafi and opposition militaries. Similarly, the Guardian reports, oil became so scarce that its price in Libya increased approximately 50 times from 0.15 Libyan dinars per litre (0.04 gallons) to 7.5 (1.98 gallons) or more per litre.

According to Reuters and CNN, the conflict affected trade and domestic services such as electricity and transportation in Libya. Libyan assets in various EU member states were frozen and travel bans were imposed. Reuters reported that as of 14 July 2011 there was no official oil embargo but the EU and UN’s sanctions list of Libyan oil companies continued to expand. NATO successfully intercepted oil shipments that were intended to finance Gaddafi’s military operations. The ratification of United Nations Security Council Resolution 1973, in March 2011, authorized “all necessary measures” to further protect civilians and approved a “no-fly zone” in Libyan airspace. With the country essentially cut off from outside commerce, inflated oil prices and limited domestic services, criminal activity such as smuggling increased. France 24 reports that petrol availability in Algeria and Tunisia was significantly affected from the increase in petrol smuggling that occurred at the border with Libya. Despite efforts by the Tunisian government to increase the number of its armed forces along borders such as Tataouine, Ben Gardane and Remada, Reuters reports that this did not stop smuggling activities. Both anti-Gaddafi forces and loyalists relied heavily on these same smuggling activities to continue hostilities against each other.

International sanctions caused prices of black-market gasoline to spike and shortages of domestic services to occur, especially in the transportation sector. Reuters remarked that during Ramadan in August 2011, gas stations had kilometers-long queues for petrol. CNN explained how the international blockade on Libyan seaports significantly impacted Tripoli particularly when the Cartagena fuel tanker, which was intended to dock in Tripoli loaded with gasoline, was seized by opposition forces, and the loyalist-held city remained without gasoline. The situation worsened, as described by the Associated Press, when the anti-Gaddafi forces advanced in late August 2011 to the Libyan capital and cut off pro-Gaddafi forces from the only functioning oil refinery in Zawiya. Al Jazeera reports that in August 2011, opposition forces entered Tripoli and established control over the Libyan capital forcing Gaddafi’s regime to fall and his family members to flee to neighbouring African countries.

International Effects:

As Libyan oil became scarce on global oil markets, other oil suppliers stepped in to fill demand. A Financial Times article identifies oil alternatives available on the market from certain Organization of Petroleum Exporting Countries (OPEC) member states. Alternatives came from Algeria’s Sahara Blend, Nigeria’s Qua Iboe and Saudi Arabia’s Arab Light (Figure 2.). However, these blends are of a lesser quality, as the Financial Times article further explains. OPEC member states such as Saudi Arabia increased production from 9.1 million b/d in February 2011 to 9.8 million b/d in June 2011 in an attempt to regulate the international oil market price.

Additionally, the majority of oil produced by OPEC

November 2011
members is light “sour oil” as opposed to the Libyan sweet crude. Two of Libya’s most exemplary crudes are Es Sider and El Sharara both of which are light and sweet. Economist Carl Weinber, explains that Arab Light and Libyan crudes are not interchangeable. Additionally, each refining facility is specifically designed to process only oils with certain qualities. As a result, a short-term adjustment is impossible, says Weinber, who asserts long term adjustments could be achieved, though they would involve “expensive retooling”, which would take considerable time. CNN Money reports that the unanticipated cut in Libyan oil exports caused a number of “developed nations” to rely on their “strategic stockpiles” as oil prices spiked during the peak of the Libyan conflict. According to the New York Times, even though the United States has limited reliance on Libyan oil in terms of meeting domestic supply and demand, the reduction of high-quality crude on global markets increased oil and gasoline prices for Americans as well.

A simple way to measure price impacts before and after the Libyan conflict would be to compare two of the most renowned oil benchmarks. Canadian newspaper Globe and Mail discusses how crude oil benchmarks “were first introduced in the 1980s to establish standard yardsticks for the world’s most actively traded product.” The “Brent Blend” benchmark is used to price approximately two-thirds of internationally traded crude. The article explains Brent crude is light and sweet. Brent crude oil prices are the European benchmark prices, and Libyan oil is typically priced against this benchmark. The United States, on the other hand, uses the “West Texas Intermediate” (WTI) benchmark which is also light, sweet crude. According to Globe and Mail, the WTI is the “underlying commodity of the New York Mercantile Exchange oil futures contracts.”

The differences and fluctuations of these two benchmarks are reflected by European and United States oil price market behaviour during the winter of 2010. Foreign Affairs reports that in the winter of 2010, the Brent (European measurement) average surged from nearly USD 95 per barrel to USD 114.48, Bloomberg reports, in the beginning of the Libyan conflict in February 2011 (Figure 3). Prices topped USD 120 per barrel in April 2011.

According to the United States EIA and GA Search Energy Intelligence, the WTI price in December 2010 was USD 86, followed by a slight increase to USD 89 in January 2011 and finally a surge up to USD 106 in April 2011. Shortly after, prices returned to pre-February 2011 rates. The Wall Street Journal (WSJ) attributed the price surge for both Europe and the United States in April 2011, to the uncertainty and violence in Libya. The WSJ states, there were concerns that the unrest could spread to the Middle East and affect global oil production. Additionally, the WSJ partially attributed the erratic behaviour of the oil markets to the global economic crisis.

The Post-Gaddafi Libya

While in cities, such as Sirte, there was some resistance to the opposition, Reuters reports that the National Transitional Council (NTC) has been recognized by more than 60 countries, making it the official government, with the responsibility of restructuring and repairing the Libyan oil industry and production. The NTC will need to increase production from virtually nothing to nearly 1.8 million barrels (the maximum production rate before the conflict began in February 2011) according to CNN Money. Eurasia Press reports that Libyan National Oil Corporation (NOC) director, Nuri Beruin, states Libya’s main obstacle is not production but rather equipment. CNN Money shares that some of the vehicles and machinery used at the refineries were looted during the conflict and new equipment must be imported. Foreign Affairs indicates that the lack of timely and adequate facility maintenance has negatively impacted the ability of facilities to function. Vital parts, such as the electrical submersible pump, could be damaged if not cleaned periodically as it is located at the bottom of a well where it is exposed to the “waxy and thick” Libyan crude. Foreign Affairs explains that the lack of upkeep could severely

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5 GASearch Energy Intelligence is a for-profit oil consulting organization. Cloud GASearch provides oil and natural gas price data.
impact production. At this time, it is unknown whether there is significant damage to the pipelines or to the refineries, notes Foreign Affairs, but other difficulties that could slow the return of the pre-February 2011 production rates include lack of guarantees over the security of employees and the ability of the eastern oil wells to be pressurised so oil will begin flowing again.

According to the Reuters, the biggest challenge for the Libyan oil industry is not the resumption of production, but ensuring security for employees. Throughout the conflict, Gaddafi forces threatened the security of oil refineries and employees by planting mines around refineries. The Seattle Times states that nearly 40,000 anti-personnel and anti-tank mines were placed in Brega alone. Fortunately, in Brega less than 10% of oil facilities were damaged largely as a result of efforts by local engineers and staff to protect and maintain facilities. Although the location of planted mines is now known, explains Seattle Times, removing the mines will take considerable time as there are no foreign mine-clearing organisations to assist in their removal or to train more Libyans. Currently, trained Libyan forces could secure approximately 700 mines per day. Petroleum Economist explains that demining Sirte and Ras Lanuf, where sporadic loyalist attacks occur, is critical for exporting products coming from oil fields in the Waha area. Reuters states that the eastern terminal of Ras Lanuf experienced no damage and is operational. Security in major ports has been increased to ensure the safe arrival and departure of shipments.

**Resuming Production: Shipments and Economic Consequences**

According to CNN Money, returning to old production rates could take up to 36 months as much needed maintenance of oil facilities was, at times, impossible to perform during the conflict. The Associated Press reported on 26 September, 2011 that Libyan oil field Abu-Attifel, south of Benghazi, had resumed production with 31,900 barrels a day and 15 working wells. Bouri offshore oil field, which, pre-conflict, produced 40,000 barrels per day, is to return to normal rates in November remarks the WSJ. The facilities are being operated by Mellitah Oil & Gas, a partnership between Italian oil company Eni and the NOC, reports AP. Eni also announced that more oil fields would be placed back in service in order to reach the operating capacity of the Abu-Attifel and Zuetina port pipeline. Reuters reports that as of 25 October Libya’s total daily output has risen to 500,000 bbl/d. Additionally, Reuters reported that the first Libyan crude oil shipment departed from Mellitah aboard the Trident Hope Tanker on 27 September, 2011. Oil is also being produced from the Sarir and Misla oil fields via a pipeline to the Marsa el Hariga port, situated in eastern Libya, next to Tobruk. According to Reuters, shipments from that port were already en route to Italy on the Hellas Warrior tanker.

**Anticipated Changes and Challenges**

The New York Times reports that the NTC is now responsible for reviewing contracts with oil companies and determining which to honour. Many oil companies are interested in renewing or signing contracts with the new government.

Reuters reports that Eni, is the biggest foreign oil producer in Libya. An article in the Guardian states that as early as the beginning of September 2011, the Italian oil company had sent representatives to Libya in order to evaluate and prepare for resuscitating production.

Russian news source RIA Novosti reports on a swap deal between Eni and Russian Gazprom negotiated in February 2011, before the Libyan conflict worsened. The deal focuses on the Elephant oil field situated in the Murzuq Basin, nearly 800 km south of the Libyan capital. The Guardian states that the oil field is a recent discovery (1997) and has recoverable reserves.
of nearly 700 million barrels. Gazprom has acquired half of Eni’s stake in this oil field, which is equal to 33% but according to Reuters, the Eni field was severely damaged by the war and unlikely to be brought back online before 2012. Apart from the Elephant oil field, the Guardian indicates that Eni also operates a 310 km pipeline, which carries natural gas from the Libyan coast to Sicily. Fox News indicates that the pipeline reopened on 13 October 2011 after an eight month break.

United Press International reports that British Petroleum (BP) is likely to push the launching of a “USD 1 billion deep-water exploration program in the Gulf of Sidra” after the suspension of oil exploration in Libya back in February 2011. The program, initially signed with Moammar Gaddafi in 2007, was delayed first by the Deep Water accident in the Gulf of Mexico and the subsequent Libyan conflict has stalled development of the deal.

According to Bloomberg Business Week, Spanish oil and gas company Repsol YPF is assessing its Libyan assets in order to determine when it will resume past production rates. French energy company Total is discussing contract proposals and will be delivering a list with multiple offers to the NTC by the end of 2011. Prior to February 2011, Total produced close to 55,000 b/d. Now, Total is considering expanding its role and helping “develop business with liquid natural gas in Libya” or helping the NOC with untapped oil fields.

The NTC confirmed, reports the Christian Science Monitor, that it will favour states that demonstrated support for their fight against the Gaddafi regime. This could mean Chinese and Russian companies will face difficulties in Libya, despite their presence in the region prior to the uprising in February 2011, as they took a wait-and-see approach on the conflict. According to Fox News, Mustafa El-Huni, the NTC oil official has stated that contracts will be reviewed by the Libyan courts.

Bloomberg announced on 13 September 2011 that the United Nations Security Council had removed the sanctions it imposed on the national oil industry, and disputes over who is to assume presidency of the NOC began almost immediately. The NOC is deemed by the Financial Times as the most important Libyan company and its influence is considerable in the national oil industry. Tripoli has been headquarters for the NOC since 1970, but Benghazi is where the largest number of known oil fields are located. The dispute surrounding the relocation of NOC is driven more by job creation than access to oil revenue further reports Financial Times. Additionally, the NOC controls all the “oil levers” and is also the “largest partner” to all the major foreign oil companies. The NTC envisions structural changes that will balance this concentration of power over Libyan oil in a more proportionate manner.

According to the Financial Times, some suggestions have included a split of the NOC into different cities, but no decisions have been confirmed by authorities at this time. Global Witness, an international NGO, explains that the NTC must provide “public disclosure of how Libya manages its oil sector, and disclosure of all revenues” from it. Absolute transparency of contracts and their terms should be readily available to the public in order to prevent mismanagement and corruption; a change from Gaddafi’s regime.

Conclusion

According to Agence France Presse (AFP), OPEC sees fellow member Libya restoring its pre-February rates by the end of 2012. While this may be seen as a long delay, there are many challenges to be addressed in post-Gaddafi Libya. Recent strikes by workers in the Waha oil company, reported by Al Arabiya, show that people are no longer content with any residual management from Gaddafi’s era and seek a fresh start. A protester, quoted by Al Arabiya, concludes:

We are very cautious to rebuild our country in a new way and we don't want to see the same names and figures that used to exist in the reign of Muammar Qaddafi, even for an interim period. Because it is disrespectful to the blood of the martyrs who have sacrificed their lives.

In a historic visit to Libya that marked the end of NATO’s mission, Operation Unified Protector, Secretary General Anders Fogh Rasmussen met with Mustafa Abdul Jalil the Chairman of the NTC on 31 October. Addressing the Libyan leader and representatives of Libya's civil society, the NATO Secretary General said, “At midnight tonight, a successful chapter in NATO's history is coming to an end. But you have already started
writing a new chapter in the history of Libya. A new Libya, based on freedom, democracy, human rights, the rule of law and reconciliation.” Rasmussen went on to say, “hard-won freedom brings high hopes and great expectations, and the hard work to make them real has begun.”

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