



ISSUE BRIEF

Post-Vienna:

Prospects for Iran's oil production and exports

JANUARY 2017 SARA VAKHSHOURI

With the January 2016 implementation of a comprehensive international bargain over Iran's nuclear program, the Iranian energy industry is poised to undergo a dramatic transformation.

Since the 1979 revolution, recurring rounds of sanctions and eight years of war with Iraq have hammered Iran's oil production and export capacity. Despite boasting the fourth largest proven oil reserves in the world, Iran's oil production and exports languished at 4 million barrels per day (mb/d) and 2.5 mb/d, respectively, in 2011.¹

The entrance of the European Union (EU) and United States into an even more stringent sanctions regime in 2012 further crippled an already hamstrung industry. Iran's crude exports dropped 40 percent to 1.5 mb/d in 2012 and sunk to an average of just 1 mb/d by 2014 as foreign markets closed, international investment evaporated, and supply chains withered. With storage overflowing and domestic consumption able to absorb only 1.5-1.7 mb/d, total production likewise collapsed 30 percent to 2.7 mb/d by 2014.²

Despite a slight uptick in 2015, total oil and liquids production remained low at 2.9 mb/d of crude oil,³ and between 692,000 to 710,000 barrels per day (b/d) of natural gas liquid (NGL) and condensate.⁴ Iran's 2016 condensate production was 520,000 b/d.

Now, as the Joint Comprehensive Plan of Action (JCPOA) nuclear deal ushers Iran back into international energy markets, its oil and gas industry is poised to reach its full potential. The impacts promise to be profound and wide reaching as oil sales provided 80 percent of Iran's export earnings and 60 percent of its state revenues in 2013.⁵ With Iranian oil pro-

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1 Energy Information Agency (EIA), *Iran International Energy Data and Analysis*, June 19, 2015, http://www.eia.gov/beta/international/analysis_includes/countries_long/Iran/iran.pdf.
2 Iran's Ministry of Petroleum's News Agency, Shana, April 2013.
3 Most of Iran's condensate is the by-product of non-associated gas in the large South Pars gas field, which is a shared with Qatar.
4 SVB Energy International, *Iran Upstream Oil and Gas Report*, June 2015.
5 EIA, *Sanctions Reduced Iran's Oil Exports and Revenues in 2012*, April 26, 2013, <https://www.eia.gov/todayinenergy/detail.cfm?id=11011>.

duction and exports already rising following the nuclear deal, this paper examines scenarios for Iran's full reentry into international oil and gas markets.

Iran's Energy Resources

Iran holds vast hydrocarbon resources. Constituting 10 percent of global crude resources, its 546 billion barrels of oil in place reserves and 158 to 159 billion recoverable barrels rank fourth in the world after Saudi Arabia, Venezuela, and Canada. Similarly, Iran's 1,201 trillion cubic feet (tcf) of natural gas reserves are second only to Russia's.⁶

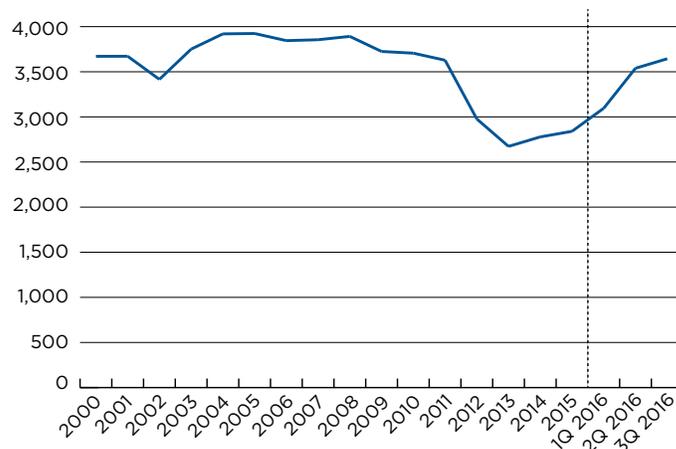
Despite sanctions, Iran's large reserves have enabled it to remain a major global producer, ranking among the top ten producers of oil and gas in the world, with an output of 5.6 tcf of natural gas in 2013. However, isolated by international sanctions, little of this oil and gas has reached international markets. Iran has never obtained more than 1 percent of the global gas market,⁷ and its peak of 1.4 mb/d in oil exports in 2014 accounted for only about 1.5 percent of global oil consumption.⁸

Iran's reserves and current production are highly concentrated geographically. Onshore fields constitute 70 percent of total reserves and almost 86 percent of production comes from southwestern reservoirs located in Central Zagros (i.e., Ahwaz, Izeh, Gachsaran, Masjid Soleyman), which tap into the Asmari and Bangestan (Sarvak) formations.⁹ Some limited additional output comes from the less developed West Zagros and Abadan Plain onshore fields as well as from offshore wells managed by the Iranian Offshore Oil Company, a subsidiary of the National Iranian Oil Company (NIOC).

Crude Oil Production

Since the easing of sanctions last January, Iranian crude oil production has surged. Output rose from less than 2.9 mb/d near the end of 2015 to over 3.5 mb/d in May 2016, rising to levels close to the country's pre sanctions' production in 2011, but still far short of its 6.6 mb/d peak in 1978. From May through September, however, Iranian

Figure 1. Iran Historical Oil Production (2000-3Q 2016)



Source: OPEC.

oil production has not risen much, likely reflecting the persistent slack in the global oil market.¹⁰

Sanctions hit production hardest in Iran's major southern oil fields. This is mainly because these fields are the most mature oil fields in Iran and it made economic and technical sense to reduce their production by minimizing their Enhanced Oil Recovery/Improved Oil Recovery (EOR/IOR) operations.¹¹ Also, most of the oil produced from these fields is heavy, which is sold at lower market prices. With sanctions lifted, these core regions rapidly increased output. This was mostly due to the EOR/IOR techniques and the reinjection of water and gas into these fields. The southern fields have already increased output by 500,000 b/d since January 2016.

Production from less developed fields is also playing a major role in increased output. The most significant newly developed fields are the West Karun oil fields, where production more than doubled between late 2015 and October 2016. Looking forward, the majority of Iran's new oil production will come from the West Karun oil fields.

Oil Production Rise in the West Karun Fields

Most of Iran's new oil production by 2020 will come from three major oil fields located to the west of the

6 EIA, *Iran Overview*, June 19, 2015, <https://www.eia.gov/beta/international/analysis.cfm?iso=IRN>.

7 Jude Clemente, "Iran's Natural Gas Exports Mandate US LNG Support," *Forbes*, July 24, 2016, <http://www.forbes.com/sites/judeclemente/2016/07/24/irans-natural-gas-exports-mandate-us-lng-support/#551e1a506b0f>.

8 EIA, *Under Sanctions, Iran's Crude Oil Exports Have Nearly Halved in Three Years*, June 24, 2014, <http://www.eia.gov/today-in-energy/detail.cfm?id=21792>.

9 EIA, *Iran International Energy Data and Analysis*.

10 Alex Lawler and Rania El Gamal, "Exclusive: Iranian Oil Output Stagnates for Third Month amid OPEC Bargaining," *Reuters*, September 9, 2015, <http://www.reuters.com/article/us-iran-oil-exclusive-idUSKCN11FOHU>.

11 Enhanced Oil Recovery (EOR) and Improved Oil Recovery (IOR) are techniques—which include injecting water or gas into the field—used to increase the production of crude oil from an oil field.



View of the South Pars area in 2009. *Photo credit:* Alireza824/Wikimedia.

Karun River in southwestern Iran: Azadegan, Yaran, and Yadavaran. Production from these regions has already risen from 100,000 b/d in 2015¹² to 280,000 b/d in October 2016.¹³ Analysts project that the completion of development projects, particularly in North Azadegan and Yadavaran, will boost total West Karun production to between 550,000 and 650,000 b/d by 2020.¹⁴ Iran's petroleum minister has offered even more optimistic forecasts, stating on several occasions that West Karun production will reach 700,000 b/d by 2017 or early 2018.¹⁵

However, reaching even the lower estimates will depend on Iran's ability to attract sufficient international

investment and development technology by the end of 2016. Fully financing the development will require about \$15.2 billion. Under the nuclear-related sanctions, Iran's National Development Fund approved the allocation of this amount to the NIOC, but Iran is now looking to attract international oil companies (IOCs) to invest and develop these fields since the removal of sanctions. To reach these targets, the NIOC has prioritized the development of the West Karun fields as its highest priority, largely because the fields are shared with Iraq. Provided NIOC can bring to bear the necessary resources, the West Karun fields will play a crucial part in future Iranian oil production.

It is important to note that in its fifth five-year economic plan (from March 2011 to March 2016), Iran estimated that the country needed about \$200 to \$250 billion total investment in its upstream, downstream, midstream, and petrochemical industries.¹⁶ Out of this, \$155 billion of the investment would have been for the

¹² SVB Energy International, *Iran Upstream Oil and Gas Report*.

¹³ SVB Energy International, "Iran's Post Nuclear Deal Energy Investment Requirements; Risk-Reward Analysis," December 2016.

¹⁴ SVB Energy International. "Iran's Post Nuclear Deal Energy Investment Requirements"; SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*, June 2016.

¹⁵ "Interview with Iran's Minister of Petroleum, Bijan Zangeneh," ISNA News Agency, May 1, 2015, <http://isna.ir/fa/news/93031808646/دی‌لوت‌جیب-96-ل‌اس‌ن‌ای‌ا‌پ‌ا‌ت‌م‌ی‌ر‌ح‌ت‌ط‌ی‌ا‌ر‌ش‌ر‌د‌ی‌ت‌ح>.

¹⁶ *Ibid.*

upstream oil and gas sector, aimed at raising oil production to 5.152 mb/d and gas production to 1 million cubic meters per day (mcm/d).¹⁷ However, the fifth five-year economic plan started at a time when nuclear-related sanctions bit into Iran's economy and energy industry; hence, Iran could not raise these required amounts. It is estimated that the country's energy industry is still in need of the same amount of investment to reach its planned oil, gas, refinery, and petrochemical production capacity.

Production Rise from the Mature Southern Oil Fields

Although most new crude production will come from the West Karun fields, Iran's mature southern oil fields will continue to provide a large portion of total output. Roughly 70 percent of Iran's oil is currently produced from ten fields that are mostly located in the southern oil fields. Sanctions in 2012 hit the southern oil fields the hardest, and their production declined between 800,000 and 900,000 b/d. Since sanctions relief in January 2016, the southern oil fields have rebounded rapidly, boosting production by 500,000 b/d.¹⁸

The NIOC achieved most of the southern fields' output increase through increased gas injection and EOR/IOR activities.¹⁹ After reducing gas injection and EOR/IOR from 2013 to 2014 due to the impact of sanctions on Iran's ability to export, NIOC significantly expanded its activities in 2015 and 2016. Gas injection in the southern oil fields grew by 33 percent between March 2015 and March 2016 compared to the previous year, rising from 11.3 billion cubic meters (bcm) to over 14.5 bcm.²⁰

The NIOC engaged in significant preparation and investment in the southern oil fields in anticipation of the nuclear deal, without which the rapid production increase would not have been possible. In early 2015, in anticipation of the removal of sanctions, Iran's petroleum minister ordered significant repairs and infrastructure investments to prepare the fields to ramp up production immediately after JCPOA implementation. In 2015 alone, Iran pursued 14,286 technical and engineering activities inside the oil

wells. NIOC also undertook 2,808 repair operations in its oil and gas processing units. It carried out a further 245 repair and cleaning operations in its export pipelines and facilities. By June 2015, NIOC was ready to initiate a "production test maneuver" in its oil fields.²¹

The long-term prospects of Iran's southern oil fields are limited as they are mostly in the second half of their lives. They are facing continued natural depletion of their production capacity at a rate of 8 to 11 percent per year coupled with a low recovery factor of 20 to 25 percent. The mature fields require increasing investment and treatments like gas reinjection to maintain production levels. These actions are expensive in both financial and material terms and cause Iran to lose between three to five hundred thousand barrels of oil through natural reductions each year.²² Most of NIOC's recent gas injections and Enhanced Oil Recovery/Improved Oil Recovery (EOR/IOR) activities have focused on seven southern oil fields: Ahwaz, Aghajari, Gachsaran, Kupal, Karanj, Mansouri, and Bibi Hakimeh.²³

Aghajari – Between March 2015 and March 2016, NIOC carried out the largest volume of gas injections in the Aghajari field. The total injection of 6.8 bcm of gas marked a 13 percent year-over-year increase.²⁴ Average daily gas injections in May 2016 registered at 32 mcm/d, sometimes reaching as high as 54 mcm/d. By April 2016, this heavy employment of gas injection and other EOR techniques increased the field's crude oil production by 130,000 barrels. Throughout June and July, Aghajari provided most of Iran's increase in NGL and naphtha production.²⁵

Karanj and Kupal – These oil fields also saw among the highest gas injection increases since 2014. In Karanj, gas injection increased 33 percent to 3.4 bcm between March 2015 and March 2016. Gas injection in the Kupal field rose 83 percent during the same time and reached 1 bcm.²⁶

Azar – The Azar region of the southern oil fields, located 20 km southeast of Mehran city in Ilam Province, is

17 SVB Energy International, "Iran's Post Nuclear Deal Energy Investment Requirements"; Sara Vakhshouri, *Iran's Energy Policy after the Nuclear Deal* (Washington, DC: Atlantic Council, November 2015), <http://www.atlanticcouncil.org/publications/reports/iran-s-energy-policy-after-the-nuclear-deal>.

18 SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*.

19 Ibid.

20 "Gas Injection to the Mature Fields to Increase," May 3, 2016, <http://www.yjc.ir/fa/news/5563043/ش-33-ي-د-ص-ر-د-ش-ي-ا-ز-ف-ا>
ب-و-ن-ج-ي-ت-ف-ن-ي-ا-ن-ا-د-ي-م-ه-ب-ز-ا-گ

21 SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*.

22 Iran's Ministry of Petroleum, "End of Cheap Oil," Donya-e Eghtesad, June 12, 2011; "Iran: Overview," Energy Information Administration, <https://www.eia.gov/beta/international/analysis.cfm?iso=IRN>, last updated June 19, 2015.

23 SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*.

24 Ibid.

25 Ibid.

26 Ibid.

Table 1. Iran's Oil Production Increase since January 2016

| Region | Field | | Targeted Production Capacity (b/d) | Production Status |
|-----------------------|----------------|--|------------------------------------|--|
| West Karun Oil Fields | North Azadegan | | 150,000 | In April 2016 the field production reached 75,000 b/d. This amount reached 85,000 b/d in October 2016. |
| | South Azadegan | | 300,000-320,000 | Today's production is about 50,000 b/d. The field's production is estimated to reach to its maximum capacity by the end of 2018. |
| | Yadavaran | | 170,000 | By December 2015, the field was producing 50,000 b/d. In April 2016 its production rose to 85,000 b/d. In October 2016 the field's production reached to 115,000 b/d. |
| | Yaran | | 50,000-60,000 | Production in May 2016: 15,000 b/d. The field's production reached 30,000 b/d in October 2016. |
| Southern Oil Fields | EOR/IOR | Mostly from Ahwaz, Aghajari, Kupal, Karanj | 3 million | Current production: 2.7 mb/d, including a 500,000 b/d increase from January to May 2016. |
| | New Production | AZAR | 30,000 | By mid-2017 |

Source: SVB Energy International, "Iran's Post Nuclear Deal Energy Investment Requirements."

undergoing increased development and rising production. In 2015 the National Development Fund allocated \$800 million for drilling Azar's 2.5 billion barrels of oil. The complexity of its field, however, tests the limits of NIOC's own domestic technology, mainly due to deep depth and high well pressure. The wells average a depth of 4,700 meters and require about 270 days to drill. Despite these difficulties, the field's production should reach 30,000 b/d by the end of 2016 through March 2017.²⁷

Condensate and Natural Gas Liquids Production

Iran currently produces about 750,000 b/d of condensate and NGLs. The South Pars gas field provides

520,000 to 530,000 b/d, with the balance coming from various other oil fields across Iran.²⁸ The Pars Oil and Gas Company (POGC) is the primary condensate producer, followed by the National Iranian South Oil Company (NISOC) and Iranian Central Oil Fields Company (ICOFC), the latter two of which are NIOC subsidiaries. NISOC and ICOFC produce 150,000 b/d and 80,000 b/d of condensate, respectively.²⁹

Iranian condensate production, most of which is the by-product of non-associated gas from the South Pars field, has risen modestly since JCPOA implementation. Iran's condensate production has increased from

²⁸ SVB Energy International, *Iran Upstream Oil and Gas Report*.

²⁹ SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*.

²⁷ Ibid.

Table 2. Projected South Pars Condensate Production

| South Pars Phases | Production Capacity | Latest Status |
|-------------------|---------------------|--|
| Phases 15 and 16 | 77,000-80,000 b/d | Completed & inaugurated in January 2016 (Current production: 40,000-50,000 b/d) |
| Phases 17 and 18 | 80,000 b/d | Expected to be completed by the end of 2016 to mid- 2017. |
| Total | 160,000 b/d | |

Source: SVB Energy International, "Iran's Post Nuclear Deal Energy Investment Requirements."

an average daily output of 480,000 barrels in 2015 to about 520,000 b/d in January 2016.³⁰

Production capacity could increase by a further 110,000 to 120,000 b/d by the end of 2016. This production surge would stem from higher output from the South Pars phase fifteen and sixteen projects, as well as from completion of the ongoing phase seventeen and eighteen developments. Phase fifteen and sixteen were completed and inaugurated in January 2016, but are producing only half of their 80,000 b/d capacity. This is mainly due to challenges related to the marketing and sale of Iranian condensate, which has high levels of sulfur content. Phases seventeen and eighteen will be completed by the end of 2016, adding a further 80,000 b/d of condensate production capacity (see table 2). With further investment, Iran's total condensate production capacity could reach 800,000 to 1 million b/d by 2020 to 2021.³¹ It is important to note that reaching this target could be delayed depending on Iran's ability to attract international investment and technology.

However, any condensate production increases will depend directly on Iran's ability to market and sell additional volumes, as condensate already fills about 70 percent of the country's total storage capacity—including floating storage. The easing of sanctions removed a major barrier to production, but as mentioned earlier high volumes of sulfur and mercaptans in Iran's condensate continue to make marketing and selling it abroad difficult.³²

Low Oil Prices and Iran's Export Policy

The low oil price environment, coupled with sanctions relief, will lead to some changes in Iran's export policy.

30 Ibid.

31 Ibid; Vakhshouri, *Iran's Energy Policy after the Nuclear Deal*.

32 Gas with high sulfur volumes requires more expensive processing.

Most changes will relate to variations in export destination and transportation agreements with its customers. Others will include adjustments to its refinery feedstock, particularly allocating for export some of its current light crude feedstock.

Export Destinations, Terms, and Transportation Agreements

Since the easing of sanctions, Asian buyers have continued to purchase the bulk of Iran's crude oil exports. The only significant change in export destination has been that the EU has renewed purchasing Iranian crude for the first time since 2012. With its EU clients, Iran has specified in its contracts that it will receive payment in euro-denominated cash through European banks.

The transportation method of Iran's crude oil exports to the EU has also changed. Traditionally, Iran sold its crude oil to the EU under Cost, Insurance, Freight (CIF) terms. It transported most of its crude oil through the Suez Canal for storage in rental units for delivery to European customers via the East Suez terminal of the SUMED pipeline. However, since January 2016, Saudi Arabia, which controls a 50 percent stake in the SUMED pipeline, has occasionally prevented Iran from using this pipeline to discharge its crude.³³ NIOC also faced occasional challenges for renting out storage facilities in this terminal. Accordingly, Iran's new contracts with European customers are under Free on Board (FOB) terms to minimize Saudi interference.³⁴

Iran also plans to employ some of its own tanker fleet to transport its oil to the EU. It has freed up some of its

33 "Iran Exports 500,000 b/d of Crude Oil to Europe," Farsnews, May 7, 2016, <http://www.farsnews.com/13950217000567>.

34 Ibid; Under FOB terms, buyers take ownership of an export once it is brought on board the ship at the port of departure. Under CIF terms, sellers maintain ownership of a product until it reaches the destination port.



Iran DENA crude oil tanker approaches the port of Rotterdam, Holland. *Photo credit: AlfvanBeem/Wikipedia.*

port facilities by using smaller ports and ship-to-ship methods to export refined petroleum products.

Refinery Feedstock for Export

International sanctions had limited Iran's access to imported refined petroleum products, particularly gasoline, and minimized Iran's ability to export crude oil. Meeting domestic demand for gasoline and refined products forced Iran to expand its refinery capacity. Its refinery capacity increased from 1.5 mb/d in 2011 to around 1.86 mb/d in 2013, and 2.03 mb/d in 2014.³⁵ In 2015, Iranian refineries processed an average of 1.85 mb/d of oil and liquids.³⁶ Most of the refining capacity increase came from two recently completed refineries at Lavan and Arak, complemented by capacity expansion at the Bandar Abbas refinery.

³⁵ Vakhshouri, *Iran's Energy Policy after the Nuclear Deal*.

³⁶ *Ibid.*

Even though Iran plans to continue increasing its refinery capacity as part of its Economy of Resistance program,³⁷ it reduced its refinery feedstock in early 2016 due to low oil prices. In addition to low capacity rates, Iran's refining sector is also disadvantaged because most of Iranian refineries are, technically speaking, very basic. Due to years of sanctions, these refineries had no access to the technology and investment required to upgrade them. Most refineries can process Iran's heavy crude oil only into middle to heavy distillates, which do not command high demand in the global market. Hence, it does not make economic sense for Iran to produce such products and then take the burden of finding a

³⁷ The Economy of Resistance program is based on Iranian Supreme Leader Ayatollah Ali Khamenei's doctrine, which seeks to create resistance toward current and possible future sanctions or international pressures on the Iranian economy, particularly on its oil and gas exports. The program aims to increase the value of non-oil exports and of the value-added chain of production inside the country, lower energy consumption, and boost economic self-reliance. It has also put a special focus on exporting the downstream and processed products instead of raw materials and resources.

market for the heavy distillate products. In other words, it is much easier for NIOC to sell its heavy oil to refineries than to market and sell heavy refined petroleum products.

The high amount of produced fuel oil in an environment of low oil prices caused a huge loss for Iranian refineries. Except for the Arak refinery, all the refineries in Iran lost revenue in 2015, and there remains a looming danger of widespread bankruptcy if the government does not step in to support them. Some of the smaller refineries such as Kermanshah are on the brink of bankruptcy. Some of the older and bigger refineries at Abadan, Bandar Abbas, and Isfahan are negotiating with Chinese, Japanese, and South Korean companies to renovate their technology and production to yield more light and middle distillates. These refineries, it must be stressed, require *significant* investment to upgrade their facilities. The estimates for the Isfahan refinery, for example, indicate that it needs about \$1.5 to \$2 billion in investment to reach its target production yield.³⁸

In the short term, the petroleum ministry has decided to switch part of its refinery capacity to export. For the same reason, some Iranian refineries, which have been producing at full capacity since 2013, reduced their production and suspended their units for “overhaul and maintenance” operations. This also helped free up some of Iran’s storage capacity, which was usually filled with unsold fuel oil. Upon removal of limitations and sanctions on its oil exports, Iran’s refinery feedstock fell from an average annual production of 1.85 mb/d in 2015 to 1.6 mb/d in January 2016.³⁹ The additional 250,000 b/d of crude oil was allocated solely for export. In April 2016, Iran exported about 2 mb/d of oil out of its 3.59 mb/d of crude production.⁴⁰ To alleviate storage limitations and financial pressures on its refineries, Iran will increase its efforts to transition its refineries towards exports.

Exporting More Light Crude Oil

Since January 2016 Iran has sought to increase its light crude exports. Exporting more light crude allows Iran to maximize its oil income in the low price environment while simultaneously shoring up its struggling refineries. The easing of sanctions allows Iran to import more

gasoline, enabling it to export more refinery feedstock. To further boost profitable light oil exports, Iran has focused its gas injections in reservoirs that contain light oil. In a number of oil fields, such as Darkhovain, it has changed the connecting route from refineries to export terminals.

The Darkhovain field’s high API crude oil was previously processed in the Abadan refinery to produce lighter distillate products, particularly gasoline. But NIOC redirected the field’s production to export terminals for blending with heavy crude oils for export. It completed the pipeline rerouting in early May 2016.⁴¹ Currently producing 130,000 b/d of crude oil, the Darkhovain field is expected to produce 240,000 b/d in 2021 upon completion of phase two and three of its development.⁴²

Iran’s OPEC Commitment in 2017

On November 30, 2016, members of OPEC (the Organization of the Petroleum Exporting Countries) agreed to reduce their overall output by about 1.2 mb/d starting in January 2017 for a period of six months, when the deal will expire. This deal was sealed after a more general agreement to cut overall aggregate output to 32.5 mb/d. Though Iran is required to keep production about 4.5 percent below its sixteen-year peak of 3.97 mb/d in 2005, based on current levels it could increase production by 90,000 b/d before reaching that cap.⁴³

Since the implementation of nuclear-related sanctions in 2012, which impacted its energy exports, Iran lost its preeminent position in OPEC. Losing its status as the second largest OPEC producer after Iraq was not an easy adjustment for Iran, to put it mildly. Hence, regaining its pre-sanctioned position in OPEC has been crucial for the country. Indeed, Iranian oil officials vowed to regain that position soon after sanctions were lifted in January 2016. By 2020, Iran hopes its crude oil production capacity will reach 4.7 mb/d.

During recent OPEC meetings where members had discussed policy options including freezing and cutting oil production, Iran had continually refused to do

38 “Investment in Iran’s Downstream Sector,” September 10, 2016, <http://khabareghtesadi.com/fa/news/74580/13-یراندگ-هی-امرس-نار-ای-ای-ه-اگش-ی-ال-اپ-ت-ع-ن-ر-د-ی-ر-ال-د-خ-د-ر-ای-لی-م>.

39 SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*.

40 Ibid; This number does not include Iran’s condensate export. Iran exports about 350,000 to 400,000 b/d of condensate.

41 “Darkhovain Oilfield Connects to the Export Network,” Shabestan News Agency, April 15, 2016, <http://www.ghatreh.com/news/nn31155741/تسه-وی-پ-روش-ک-ت-ف-ن-ی-ت-ار-د-اص-ه-ک-ب-ش-ن-ی-و-خ-ر-اد-ن-ادی-م>.

42 SVB Energy International, *Iran Oil Production & Export in the Post Sanctions Era*; “Darkhovain Oilfield Connects to the Export Network,” Shabestan News Agency.

43 Sara Vakhshouri, “How the OPEC Deal Breaks Down for 3 Major Producers,” Market Watch, December 3, 2016, <http://www.marketwatch.com/story/how-the-opec-deal-breaks-down-for-3-big-producers-2016-12-03/print>.

either—from Iran's perspective, it has already produced below its production capacity due to the 2012 sanctions.

Significantly for Iran, in this deal OPEC agreed to base Iran's production cuts on its 2005 production high of 3.97 mb/d. This agreement acknowledges Iran's historically high production share within OPEC, something that is of extreme sentimental importance for Iran. Moreover, while Iran technically must cut production by 4.5 percent, as is required of the other contributing OPEC members, Iran's drop in production since its 2005 peak gives it room to increase output under this agreement. Nonetheless, an increase of its crude oil production of 50,000-90,000 b/d in 2017 is not technically doable. As mentioned earlier, any further production rise will not be feasible before 2020-2021.

The formula OPEC used for Iran's production during the agreed period effective January 2017:

3.97 mb/d (reference production: historical record in last quarter of 2005) - 178,000 b/d (4.5 percent reduction) = 3.79 mb/d (agreed production level during first half of 2017)

*Today's production: 3.707 (October 2016), which is 90,000 b/d below the 3.79 mb/d agreed production level ⁴⁴

Conclusion

The landscape for Iran's energy industry has changed dramatically since the implementation of the nuclear deal in January 2016. With Iran's oil and gas industry no longer barred from many of the world's largest economies and with the removal of oil export limitations, potential demand for Iran's oil and gas surged within a few short months. Assiduous preparation in 2015 enabled capacity, production, and exports to respond rapidly to the changed context. Substantial new and ongoing investments in both mature and undeveloped fields promise to expand production capacity over the next five years.

However, Iran's energy industry still faces considerable uncertainty. It has sufficient capacity to increase crude

production by a further 100,000 to 150,000 b/d by the end of 2016, and should be able to increase its total capacity from 3.8 mb/d to between 4.69 and 4.79 mb/d by 2020-2022. But producing at capacity will ultimately depend on Iran's ability to market and sell its crude oil in a volatile price environment. To achieve its 2020 production capacity target, Iran also needs access to foreign investment and technology.

Economically, Iran reentered global markets at perhaps the worst possible time, with oil prices still languishing at lows not seen in well over a decade. Politically, the current tensions between Iran and Saudi Arabia, particularly over conflicts in Yemen and Syria, create risk factors for some potential energy investors. Most of the international oil companies and investors, particularly in Europe and the United States, remain leery and doing business with Iran still requires navigating a complex web of targeted sanctions. Iran's energy industry also faces internal divisions, with competition between power centers that delays and complicates crucial reforms like Iran's upstream investment regulations and the Iran Petroleum Contract (IPC), and also hinders engagement with the Financial Action Task Force (FATF).

To overcome external and internal pressures on its energy industry, Iran must strengthen a number of recent positive reforms. These include effectively negotiating under the new IPC to increase the flexibility and profits of foreign investors and IOCs; reforming its general foreign investment regulations; and working effectively with international organizations such as the FATF to ease international banking and financial transactions.

Regardless of whether Iran's energy industry overcomes its challenges, the enormity of Iran's oil and gas reserves and the rapidity of its production increases all but guarantee that its reentrance into global markets will profoundly impact international energy markets and economics.

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44 Ibid.

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