IRAN Petroleum
MONTHLY
Iran Petroleum
Issue No. 127
June2023

$40bn Oil Agreements Signed in 20 Months

Oil Exports, Condensate Exports Rise

Attractive Oil Terms for Foreign Investors

Ali Forouzandeh
Director General of Public Relations

Development of energy diplomacy and cooperation with various nations continues to top the agenda of the Ministry of Petroleum in the 13th administration. Despite unjust US sanctions, this strategic policy has yielded achievements in interaction with Russia, Qatar, Oman, Turkmenistan and even Latin America. Under the aegis of the 13th administration's policy of regional convergence, a different model of cooperation has materialized in energy diplomacy, offering bright horizons.

Minister of Petroleum Javad Owji recently told the OPEC seminar that Iran was ready to attract foreign investment. He said the country planned to attract $250 billion in investment into the petroleum industry over eight years.

The 13th administration has struck $40 billion worth of agreements with domestic and foreign companies over 20 months. Now it is wooing foreign investor by offering sweeter contract terms and conditions. The new contracts seem to consider good yield for foreign investors who would develop oil and gas fields in Iran. Furthermore, owing to Iran's abundant gas reserves, would-be investors can convert gas into LNG and market and export the final product to recoup their own investment, as well as profits. Foreign investors would also have the option to recoup their costs and capital from selling petroleum products after launching the projects. Contracts and MOUs have been signed with many companies, including Russian companies.

Iran's petroleum industry offers attractive opportunities for investment with the Ministry of Petroleum welcoming foreign investment under win-win deals. Nevertheless, it wouldn't mean activity would come to a halt; rather, Iranian contractors and manufacturers would continue to be prioritized by the Ministry of Petroleum.

Ministry of Petroleum Islamic Republic of Iran

Managing Editor:
Ali Forouzandeh
Director General of Public Relations

Chief Editor:
Parastoo Younchi

Deputy Chief Editor:
Hamid-Reza Shakeri-Rad

Executive Editor:
Negar Sadeqi

Graphic Designer:
Saman Goodarzi

Translator:
Kianoush Amiri

Reporter:
Mahnaz Mohammad Qoli

Coordinator:
Maryam Dehlavi

Photo:
Photography Unit of the PR Department of the Petroleum Ministry

Tel/Fax: (+98 21) 61626113
www.iranpetroleum.ir
iranpetroleum.pr@gmail.com

Photo: Mojtaba Mohseni

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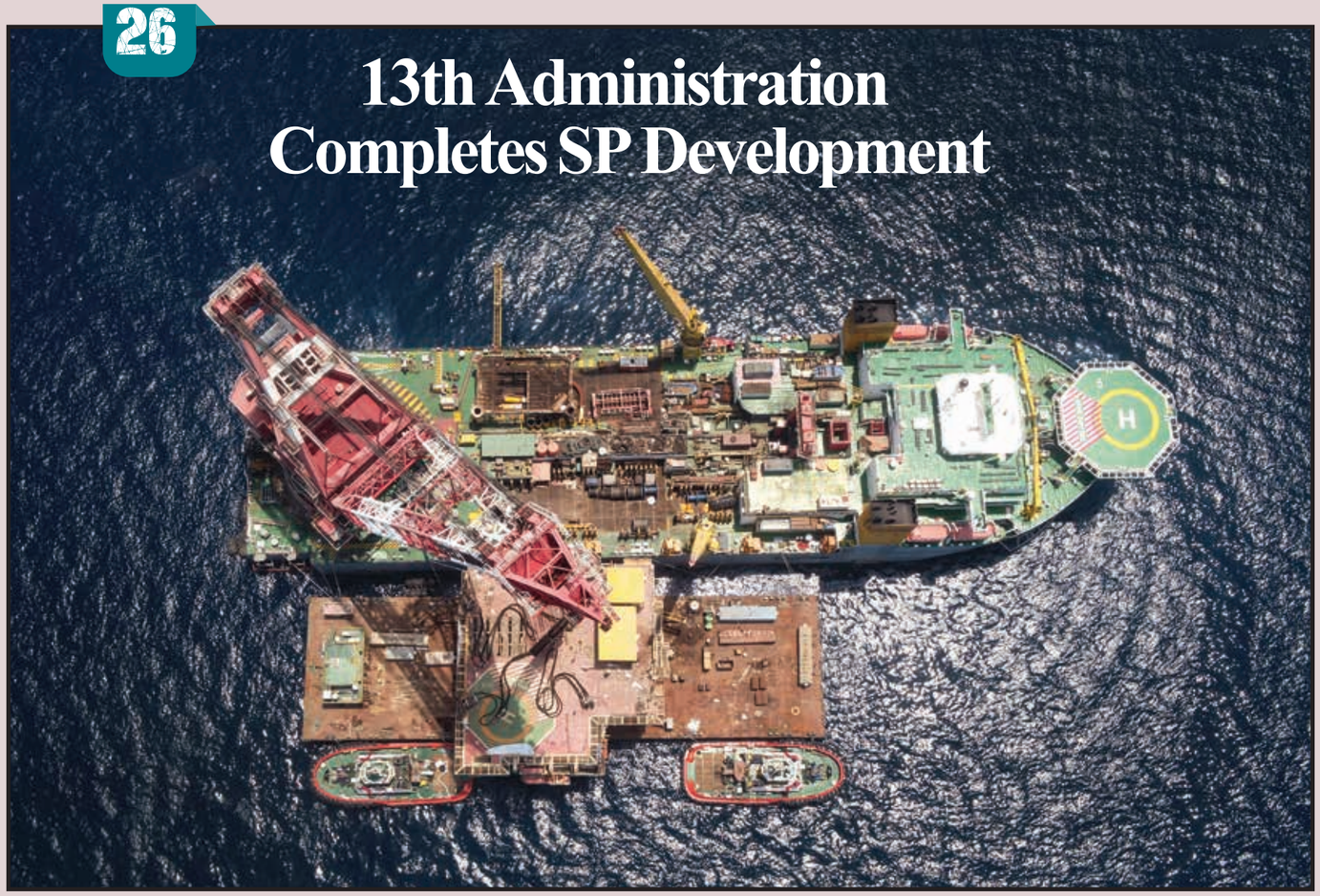
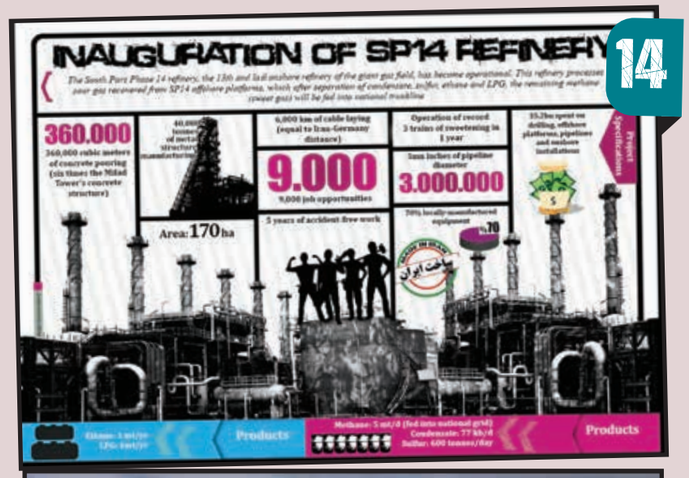
13th Administration Completes SP Development





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$40bn Oil Agreements Signed in 20 Months

After a three-year hiatus due to the COVID-19 pandemic, the 8th International OPEC Seminar was held in Vienna on 5-6 July. Seminar participants included OPEC ministers, executives of energy companies and energy experts among others.

The OPEC International Seminar is held every three years to facilitate exchange of views on key issues in the petroleum industry and upgrade cooperation and dialogue between energy stakeholders. The 7th OPEC International Seminar took place on 20–21 June 2018 under the theme "Petroleum - Cooperation for a Sustainable Future". The 8th seminar was initially scheduled for June 2021, but was delayed twice due to the COVID-19 pandemic. During the two-day event this year, four ministerial meetings as well as six panel discussions were held.

Iran's Minister of Petroleum Javad Owji, addressing the "Investments, Finance and Inclusive Petroleum Growth Strategies" panel, said: "Over the past 20 months, $40 billion worth of oil contracts have been signed in Iran."

He called for investment in Iran's oil and gas projects, saying: "[Iran's] new oil contracts are attractive to investors."

"With new oil contracts, we are seeking to make presence in Iran's petroleum industry attractive to investors," said Owji. Referring to Iran's hydrocarbon reserves, oil and gas production capacity and sanctions imposed on the petroleum industry over recent years to bar investment in Iran, he said Iran was open to investment in the upstream and downstream sectors, as well as flare gas gathering projects. "We're planning to attract $250 billion investment in the petroleum industry over eight years," he said. Owji said Russia and even oil companies in neighboring nations had welcomed new agreements. "In these agreements, we have considered acceptable profits for foreign investors who would develop oil and gas fields. Moreover, owing to the country's gas reserves, investors who develop these fields may convert natural gas to LNG, and market and export the final product in order to recoup their own investment in addition to profits." He also said the 13th administration was determined to develop refinery-integrated petrochemical projects. "Foreign investors may recoup their investment and costs by selling petroleum products once such projects are launched. To that end, we have signed agreements with many companies including from Russia," he added.

Flare Gas Gathering

Minister Owji said $6 billion of flare gas gathering projects had been envisaged, the bulk of which had recently become operational. He said Iran had planned to be in position to generate 7,000MW of renewable energy in three years. "We have called for investment in projects pertaining to flare gas gathering, renewable energies and energy efficiency. We are open to investment in this sector." "Investors in these sectors would be able to export as much as they save energy. That could be attractive to foreign investors," he said.

3.8b/d Output

Iran sits atop 33 tcm of natural gas in place and 154 billion barrels of recoverable oil, giving the country the first rank in terms of hydrocarbon reserves. Minister Owji said Iran was producing 3.8 mb/d of crude oil and gas condensate, adding the county is running more than 10 oil refineries and 21 gas treatment facilities.

"In light of Iran's high potential for oil and gas production and the global need for energy security, we have formulated plans for enhanced recovery," he said.

Owji said sanctions continued to remain in effect against Iran's petroleum industry, adding: "Although we are faced with unjust sanctions imposed by one country and the sanctions against Iran's petroleum industry and economy have not been imposed by the UN, we have managed to develop our oil and gas fields and build refineries and petrochemical plants during years of sanctions, as a result of which, Iran's oil and gas production capacity has now increased." Despite sanctions, he said, Iranian petroleum industry staff were developing all oil and gas fields from A to Z. He said that oil and gas refineries were being repaired in Iran without any foreign expert present.

Fossil Fuels Inevitable

Owji said the world needs energy security, particularly in the natural gas sector. "The onshore and offshore gas fields in Iran are developed by Iranian companies and we have become self-sufficient in horizontal and vertical drilling," he added. He said Gas Exporting Countries Forum (GECF) member states were supplying the bulk of global gas demand, adding: "As far as energy transition is concerned, we can by no means put fossil fuels aside. In other words, in coincidence with developing fossil energies we need to focus on developing renewable energies in the future." Noting that the future of energy market is unpredictable, he said: "Fossil energies will be used alongside renewable energies for some time in the future." On the sidelines of the OPEC seminar, Owji held intensive meetings with Saudi Energy Minister Prince

Abdulaziz bin Salman, UAE Minister of Energy and Infrastructure Suhail bin Mohammed Al Mazrouei, Egypt's Minister of Petroleum and Mineral Resources Tarek El Molla, Iraqi Oil Minister Hayan Abdulghani, and GECF Secretary General Mohamed Hamel.

During the meetings, Owji said Iran welcomed joint investment with these nations and developing economic and commercial ties, sharing technical and engineering services and cooperating in trading energy, petroleum and petrochemical products. Market Realities Matter

Prince Abdulaziz bin Salman said at the opening of the OPEC seminar that compliance with obligations would clear the ground for consensus between big and small oil producers.

"OPEC has over the past 58 years been key to oil market stability and OPEC+ is continuing the same path," he said, referring to the alliance of OPEC member states with 10 allies.

Referring to Saudi Arabia's voluntary oil production cut, he said: "We not only agreed voluntarily to cut 1 mb/d from our production, but also Russia agreed to reduce its supply by 500 tb/d in order to blunt any negative impact on the market."

He acknowledged that speculation was rife in all markets, adding that speculators first emerged to help reduce market risks, but in some cases conflicting news emerge out of the market. "We have also different tools in our hand, which we would use based on market conditions," he said. The Saudi minister said: "We are not intimidated at OPEC and we focus on market realities because most rumors about the oil market are proven shortly to have been untrue."

Demand for Fossil Fuel

Addressing the "Market Stability and Energy Security" panel, Al Mazrouei highlighted growing global demand for fossil fuels and OPEC's role in balancing prices. "Without OPEC, price fluctuations would have struck varieties of energy in addition to oil."

Referring to OPEC member states' planning for investment in renewable energies, decarbonization and green hydrogen production, he said: "However, the energy transition period would be long. Therefore, fossil fuels will remain with us for long and we have to contain pollutants." He highlighted the key role of natural gas as a bridge for transition from today to tomorrow, saying: "Return to coal is a weakness in the energy transition trend."

He also said that OPEC+ countries could mutually invest in energy production. "Reduced investment in the oil and gas industry would reduce oil supply shortage in the market. Even Golden Sachs, a US bank, had predicted that oil prices would rise significantly due to underinvestment in the petroleum industry and LNG."

No Dreaming on Fossil Energy

TotalEnergies CEO Patrick Pouyanne told another panel on energy security that Europe was required to diversify its energy sources. "Tensions between Russia and Ukraine push the Europeans towards new initiatives because one would think of recreation when he is forced to do so. Therefore, we have moved towards diversity in the energy sector," he said. "Another issue is the sustainable energy supply. If we want to slash fossil energy consumption by 80% we have to note that demand for energy has jumped due to demographic growth. Therefore, we have to stop daydreaming," said Pouyanne.

"The share of low-carbon energies currently is 10% in the world and we cannot expect everything to change overnight. Therefore, we have to first reduce the current pollutants based on a realistic vision while reducing carbon in the new systems," he added.

He said: "In case investment falls in oil and gas, it would not go to renewables immediately and therefore prices would increase."In 2022, he said, the Europeans had no money to buy LNG and had to opt for coal. "We were asked why we did not invest in renewables. I replied that we have to supply today's energy needs based on the market conditions and for higher profitability," he added.

Gas, Not Simply a Bridge

GECF Secretary General Hamel said gas was not merely a bridge for the future energy transition; rather, it is a destination. "This energy carrier has played an unrivaled role in decarbonizing activities associated with fossil fuels production."

He said that coal, which is not a clean fuel, was behind 37% of power generation in the world.

"That is why I believe that gas will really change the future of world energy," he said.

Hydrogen Costly

Amin H. Nasser, CEO of Saudi Aramco, said the world would need all sorts of energy because energy consumption is growing annually. "Therefore, there is no single solution for all countries. As energy prices increase, return to coal is up and demand for this non-clean energy carrier will shoot up," he said. He also drew a parallel between hydrogen and crude oil production, saying: "Each tonne of hydrogen production would cost the equivalent of about $250 for producing a barrel of oil. How many countries can afford it?" "High hydrogen production costs would push countries towards using coal. You cannot impose a general rule on all nations. According to reliable international forecasts, demand for crude oil would increase 2 mb/d this year," he said.

"The spare production capacity is on the decline and it means countries have reached the bottom of production. We will hit snags if no action is taken for investment," said Nasser. He said Asia's per capita income had grown and demand for fuel would naturally increase. "A large number of people in the world have no sufficient access to energy sources, and we cannot blame them for return to coal consumption," said Nasser.

High Investment Costs

Jim Burkhard, head of crude oil research and energy and mobility research at S&P Global Commodity Insights, said oil production had increased in the world over recent years. "The US, Canada, Mexico, China and Norway increased their production 2 mb/d together, but demand has not necessarily increased as much in global markets. Meantime, the petroleum industry is faced with higher costs for investment," he said.

Oil Exports, Condensate Exports Rise

Iran's Petroleum Ministry has left behind two tough years. Ever since the 13th administration took office, the ministry was faced with numerous challenges including floating gas condensate cargoes and a 250 mcm/d gas imbalance. Action was taken immediately to sell oil and condensate. Due to diversity in oil contracts and precise marketing, oil and condensate sales increased. Iran is currently producing 800 to 854 tb/d of gas condensate. Even a single day of halt in condensate export would be costly and dangerous for Iran. Meantime, Iran's oil exports have increased significantly over the past five years. Diplomatic developments and settlement of gas debt to Turkmenistan are among major measures Iran has undertaken over the past two years. The following is a review of some measures taken by the Iranian Ministry of Petroleum over the past two years:

Energy Diplomacy

Dynamism in energy diplomacy has been in line with the 13th administration's endeavor to restore political diplomacy with regional and transregional nations. Developing these ties was first focused on neighboring nations as the Ministry of Petroleum moved to revive ties with Turkmenistan, Azerbaijan, Iraq and Persian Gulf states. Afterwards, the ministry promoted its diplomacy in China, Russia and Latin American nations.

The outcome of this diplomacy was seen quickly in the economic sector. In the calendar year to March 2022, Iran's crude oil exports hit a record for the first time since the United States imposed unjust sanctions on Iran's oil sector in 2018. Gas swap between Turkmenistan, Iran and Republic of Azerbaijan was resumed after a hiatus while gas exports jumped a record 22%. Apart from strategic and economic interests for the country, gas swap would contribute to gas supply security in eastern Iran. Meantime, Iran's longtime dream of building refineries overseas came true, which was also resulted in exporting technical and engineering services. Under the aegis of diplomatic consultations, the Ministry of Petroleum also collected its debt to throw fresh lifeline into national economy.

Energy Security

Reviving relations with Turkmenistan was very vital to ensure national gas security. The drop in gas pressure and the possibility of its imbalance always plagues the country in the cold months of the year. Despite all development plans and increased gas production on an annual basis, this threat has always existed due to unbridled energy use in the country.

Turkmenistan's suspension of gas supply to Iran had caused problems specifically in gas supply to eastern Iran in winter. That led Minister of Petroleum Javad Owji to travel to Turkmenistan in the first days of taking office and make efforts for the resumption of ties between the two countries. Owing to his efforts; Iran, Turkmenistan and Azerbaijan inked a trilateral gas swap agreement on the sidelines of the 15th Economic Cooperation Organization (ECO) summit. The resumption of gas swap in January 2022 facilitated gas supply to eastern Iran.

According to the initial swap agreement, Iran was required to receive 1.5 to 2 bcm a year of gas (5 mcm/d) from Turkmenistan and in return pump gas to Azerbaijan. After some time, the amount was agreed to double to 10 mcm/d.

Ties with Russia

Russia may be considered the first target of Iran's energy diplomacy under the 13th administration. Tehran-Moscow ties were upgraded quickly after President Ebrahim Raeesi took office. National Iranian Oil Company (NIOC) and Russia's Gazprom signed a $40 billion MOU in June 2022. Cooperation between Tehran and Moscow was extended to the petrochemical sector for exchange of technical savvy and knowledge-based cooperation in petrochemical industry equipment. Meantime, construction of the North-South Corridor commenced to provide an easy and quick access to markets.

Latin America

Iran's entry into Latin American nations' petroleum industry began with gasoline exports to sanctions-stricken Venezuela. Exactly when Venezuela was under tough sanctions, Iran moved to supply fuel to its Latin American ally. Then, Iran identified opportunities for investment in Venezuela's refining projects, which enabled Iran to stabilize its foothold in the petroleum industry of Latin American nations. That coincided with the period when most petroleum industry projects in Latin America had been abandoned by American and European companies. Under the 13th administration, Iran decided to export technical and engineering services to those countries for the revival of projects. The head of National Iranian Oil Engineering and Construction Company (NIOEC), said all refining units of the El Palito refinery in Venezuela would become operational in coming months. Some refining units have already resumed operation following implementation of overhaul by NIOEC which is active in other units including atmospheric distillation, vacuum distillation and solvent. Nearly 3 million items were needed for the overhaul of the El Palito refinery, which were supplied by 1.600 Iranian manufacturing companies.

Sustained Oil Exports

Despite sanctions and contrary to forecasts, Iran's oil exports have experienced a sustained upward trend under the 13th administration, which may be mainly attributed to the adoption of new marketing methods for Iranian oil and condensate. Reuters and Bloomberg recently reported Iran's May oil exports at 1.6 mb/d. President Raeesi and Minister Owji had always laid emphasis on oil production and exports. Iran's current oil production capacity is 3.9 mb/d. According to Owji, Iran's current oil production is above 3 mb/d.

Through its 10 oil and condensate refineries, Iran can process 2.2 to 2.3 mb/d. The Bandar Abbas gas condensate refinery, known as the Persian Gulf Star, can process 450 tb/d of condensate. The remaining 9 refineries are fed by crude oil. At full capacity they would need 1.7 to 1.8 mb/d of crude oil.The prominent role of oil in national economic growth also bears proof to sustainability of oil and condensate exports. Oil and gas extraction experienced a 7% growth last calendar year, which enables the country to export more oil. It has to be recalled that by March 2022, following NIOC investment in the renovation of oil extraction installations, Iran's oil production capacity returned to pre-sanctions levels. Iran has capacity to produce 3.838 mb/d of oil.

Refining Development

Implementation of several new refining projects in the petroleum industry is on the agenda for coming years. Totally, €16.5 billion is to be allocated to these projects. Chief among them are a 300 tb/d refinery-integrated petrochemical plant named after Gen. Qasem Soleimani with an investment of $11.5 billion, the Khuzestan refinery with an estimated investment of $4.5 billion and the second phase development of the Abadan refinery with an investment of €1.7 billion. The Iranian Ministry of Petroleum has in parallel eyed constructing refineries overseas. To that end, during a recent Latin American tour of President Raeesi, Iran signed agreements with Venezuela, Cuba and Nicaragua for developing their refining sector. Venezuela's refining sector is decrepit due to sanctions, and local companies are unable to upgrade refineries there. In 2020, the rated refining capacity of Venezuela was 1.3 mb/d with a throughput of only 123 tb/d. Iran may help blunt the impact of sanctions on Venezuela.

Iran's heavy crude oil may be blended with ultraheavy oil of Venezuela to be processed at the latter's refineries. Export of petroleum products, gas condensate and petrochemicals is under way in-between. By exporting technical and engineering services and overhauling refineries there, they may restore their rated capacity. Iran's Ministry of Petroleum is also ready to overhaul Venezuela's largest oil refinery – 955 tb/d Paraguaná Refinery Complex. Located in Punto Fijo, the Paraguaná refinery is the third largest refinery in the world. It comprises three refineries, including the Cardon and the Amuay refineries in the Paraguaná peninsula, and the Bajo Grande refinery in the Zulia state of Venezuela. Due to US sanctions, the Paraguaná refinery is now out of service.

Petchem Value Chain

In addition to activating local small-sized industries by feeding them, the petrochemical industry has earned the country proper hard currency income. Iran fetched $26 billion from producing 70 million tonnes of petrochemicals last calendar year. Of that, about 27 million tonnes was exported for $16 billion, while 12 million tonnes was sold for $10 billion on local markets.

In the calendar year to March 2022, the petrochemical industry earned $14.3 billion from exports with petrochemical companies accounting for 24% of national hard currency needs. The petrochemical industry earned more than $30 billion in revenue over two years.

In the first months into office, Minister Owji called for the local development of all catalysts used in the petrochemical industry. Catalysts are the main infrastructure for self-sufficiency in the petrochemical industry. In collaboration with knowledge-based companies and scientific centers in the country, Petrochemical Research and Technology Company (PRTC) updated catalyst needs for the petrochemical sector. A total of 99 catalysts are used in the petrochemical industry, 88 of which have been developed in the country. The remaining 11 are expected to be produced domestically by the end of the term in office of the 13th administration.

Owing to self-sufficiency in catalyst production, Iranian catalysts have been exported to neighboring and regional nations including Russia. Iranian catalysts are successfully in use in Russian petrochemical plants. In addition to currency generation, it shows that Iranian engineers could be trusted in the way towards self-sufficiency in the petrochemical industry.

GOGPC Supplies 17% of Iran Crude Oil

Gholam Reza Kamali, CEO of GOGPC, tells "Iran Petroleum" the company is determined to run at full production capacity in the current calendar year (started on 21 March 2023), up from 80% last calendar year."

Gachsaran Oil & Gas Production Company (GOGPC) is a subsidiary of National Iranian South Oil Company (NISOC) with a 22% share of oil and gas output by NISOC-run offshoots. GOGPC also accounts for 17% of National Iranian Oil Company (NIOC)'s crude oil output.

With 23 oil fields, 16 of which being operational, GOGPC accounts for about 22% of NISOC's crude oil production and 17% of NIOC's oil output.

Would you please tell us about GOGPC's extent of activity?

GOGPC is a NISOC subsidiary and is well known as the heart of Iran's oil. It runs the giant Gachsaran oil field and has always been among key and revenue-generating companies in Iran. GOGPC covers a geographical area measuring 400 km long and 150 km wide. It is based in Gachsaran in Kohguiluyeh and Boyer Ahmad Province and covers also Khuzestan, Bushehr and Fars provinces. GOGPC runs 23 oil fields with 853 wells, 105 oil and gas separators, more than 7,500 km of oil land gas pipeline with diameters varying from 4 to 52 inches, 10 production units, 7 desalination units, 10 compressor stations, 4 gas injection stations, 3 gas and LPG injection units, 6 water supply units, 3 pressure boosting stations, 2 export manifolds and 6 strategic oil tanks.

What's the share of GOGPC in NISOC's oil production?

With 23 oil fields, 16 of which being operational, GOGPC accounts for about 22% of NISOC's crude oil production and 17% of NIOC's oil output. In terms of crude oil production volume, it comes second after Karoun Oil and Gas Production Company (KOGPC) in Iran. GOGPC supplies more than 650 tb/d of crude oil, 1.2 mcf/d of rich gas, 25 tb/d of gas condensate and 15 tb/d of naphtha. In addition to feeding Shiraz oil refinery, it sends feedstock to the Persian Gulf Bidboland gas refinery and the BuAli and Bandar Imam petrochemical plants.

Goreh pumping station, one of the oldest in Iran, lies within GOGPC's area. How much oil does it pump?

Three stations there handled over 6 million barrels of oil in the 1970s. During the imposed war, one of them was bombed and it stopped operating. Currently, the entire onshore crude oil is transferred to the Goreh pumping station prior to being carried to the Kharg terminal for exports. That is why the Goreh pumping station is known as the heart of Iran's oil. Since crude oil exports are done from the Goreh pumping station, GOGPC is responsible for stewardship and maintenance of pipelines, as far as coasts.

Iran's oil production capacity and subsequently exports have increased under the 13th administration. Can the Goreh pumping station handle more oil delivery to the Kharg terminal?

Under the present circumstances, we have no problem with the current level of oil exports, but we would need to renovate equipment for further exports, for which necessary policymaking has been done by upstream units at NISOC.

What are GOGPC's main plans in the current calendar year in line with increased output?

Following up on the overhaul of installations for enhanced production, making wells safe around the Chamshir Dam, continuing pipeline reparation, repairing defective valves, improving access routes, supplying necessary equipment and commodities for compressors and gas injection installations in line with plans for enhanced output and flare gas gathering are top plans for GOGPC in the current calendar year.

Did you increase your oil production last calendar year?

We had been required by the former administration to cut our production capacity to 25%, but once the 13th administration took office, NISOC decided to increase oil and gas production and we were instructed with necessary plans to enhance production. Last calendar year, we managed to enhance our production 55% year-on-year to reach 80% of our capacity in that year. Now, we intend to reach our 100% capacity in the current calendar year, for which we have workover plans for 17 wells. Well workover would add 20 tb/d to our production this year.

How much of your production target have you met over the past three months?

Due to sanctions, no precise data is released, but our first-quarter production was higher than decided by NISOC for us.

One of the most important impacts of sanctions has been the failure to renovate equipment. How much has it affected GOGPC's activities?

I would be wrong to claim that the petroleum industry has not been affected by sanctions, but the Iranian petroleum industry's performance over the past 43 years shows that we have managed to turn threats and sanctions into opportunities in this industry. Once Iran's petroleum industry was controlled by foreigners and foreign companies handled everything from A to Z, we were dependent on them for overhaul. Due to such dependence, foreign companies imagined that we could no longer steer this sophisticated industry if they leave Iran. But more than four decades since the Islamic Revolution, we have managed to steer this industry independently. Today, we are manufacturing 75-80% of our commodities. I remember once we faced serious challenges in buying a pair of bolts and nuts. Or we were worried how to repair a turbine's blade. Today, we are manufacturing most turbine parts in the country while oil pumps are close to full domestic manufacturing, which indicates the strength of the Islamic Republic and its direction towards a brighter horizon. We are working without foreign companies and we are going ahead despite all restrictions caused by sanctions.

Have sanctions had any impact on your compliance with production standards?

Not at all. Due to the sensitivity of oil and gas production, compliance with standards in this sector is the red line of the Iranian petroleum industry. We have never ignored compliance with oil production standards. Without such compliance, we could not have exported oil. Full compliance with standards is translated into success. Regulatory bodies in charge of oil and gas in the country are overseeing compliance.

How much did you spend on buying commodities last calendar year and what was the share of knowledge-based companies?

Last calendar year, GOGPC purchased 3,900 items for IRR 4,000 billion, IRR 530 billion of which was supplied by local companies. The bulk of purchases has been made from knowledge-based companies due to the sensitivity and significance of oil installations.

We had been required by the former administration to cut our production capacity to 25%, but once the 13th administration took office, NISOC decided to increase oil and gas production and we were instructed with necessary plans to enhance production

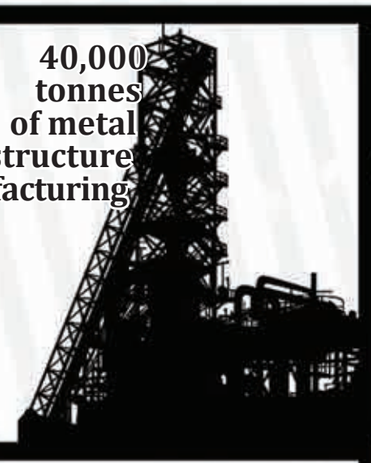
INAUGURATION OF SP14 REFINERY

The South Pars Phase 14 refinery, the 13th and last onshore refinery of the giant gas field, has become operational. This refinery processes sour gas recovered from SP14 offshore platforms, which after separation of condensate, sulfur, ethane and LPG, the remaining methane (sweet gas) will be fed into national trunkline

360.000

360,000 cubic meters of concrete pouring (six times the Milad Tower's concrete structure)

40,000 tonnes of metal structure manufacturing



Area: 170 ha

6,000 km of cable laying (equal to Iran-Germany distance)

9.000

9,000 job opportunities

5 years of accident-free work

Operation of record 3 trains of sweetening in 1 year

3mn inches of pipeline diameter

3.000.000

70% locally-manufactured equipment

$5.2bn spent on drilling, offshore platforms, pipelines and onshore installations

Project Specifications

Ethane: 1 mt/yr
LPG: 1mt/yr

Products

Methane: 5 mt/d (fed into national grid)
Condensate: 77 kb/d
Sulfur: 600 tonnes/day

Products

Design: Saman Goodarzi

133 Drilling Rigs Operational in Iran

Hormuz Qalavand, director of supervision on production at National Iranian Oil Company (NIOC), has said 133 onshore and offshore drilling rigs are serving Iran's drilling industry. He said they included 114 onshore and 19 offshore rigs, adding: "Of the 114 onshore rigs, 102 are operational and the rest are being repaired. Of the 19 offshore rigs, only 11 are operational with the rest being repaired." Qalavand said that 98 of the total 133 rigs had 2,000hp capacity. Noting that there was only one 3,000hp drilling rig for drilling oil wells at the depth of 5,000 to 6,000 meters in the Khami geological layers, he said: "In order to enhance recovery from the Khami layers, we need to increase the number of powerful drilling rigs." He said that the Achilles' heel of Iran's drilling industry was the lack of onshore and offshore super rigs (over 3,000hp rigs) and cold tubing. "National Iranian Drilling Company (NDC) with 73 rigs, North Drilling Company (NDCO) with 12 rigs and Oil Exploration Operation Company (OEOC) with 8 rigs are among owners of the best drilling rigs in the petroleum industry," he added. He said that only 106 drilling rigs in Iran had received the COF certificate, adding: "These rigs are currently operating in 36 oil and gas fields like Maroun, Ahvaz and Azadegan."

600mcm/d Gas to Fuel Power Plants

Deputy CEO of Pars Oil and Gas Company (POGC) for Operations and Logistics Salman Khazaei said the overhaul of South Pars gas field platforms had started with a view to maximizing output next winter. "In the summer, in order to generate power sustainably and supply gas to power plants, 660 mcm/d of rich gas is being recovered from the jointly-owned South Pars gas field," he said. He added that overhaul operations began under sweltering heat in the Persian Gulf on Platform 5, to be followed by work on Platforms 6, 7, 8 and 9,respectively. Then, overhaul would begin on Platform 1, 17A, 17B, 18A, 18B, 15, 10 and 11, respectively. "Overhaul of the four platforms of SP14 will be also carried out," he said, adding that the entire overhaul operation would last until November. Khazaei said each platform would take 7 to 20 days to be overhauled, adding: "For instance, the overhaul of Platform 16 would take longer because of the renovation of pipelines." "We will by no means allow these interruptions caused by overhaul to affect gas production. Now in the summer, we need gas to supply power and keep power plants running.

Gas Supply to Power Plants up 3.3bcm in Q1

CEO of National Iranian Gas Company (NIGC) Mohammad Chegeni said gas supply to power plants totaled 21.814 bcm in the first quarter of the current calendar year (started on 21 March), up 3.3 bcm year-on-year.He said gas imbalance was not limited to winter as summertime was also prone to imbalance. "Therefore, NIGC makes necessary arrangements for plugging any energy imbalance during overhaul of giant installations in the refining sector, gas trunklines and gas compressor stations," he said. Chegeni said gas supply to power plants was growing year-on-year, adding: "NIGC has maintained the upward trend in the process of gas supply to power plants for power generation in the domestic and industrial sectors." He said in a single day in summer, a record 313 mcm/d of natural gas was delivered to power plants. He said the average volume of gas supply to power plants during the first quarter of year stood at 237 mcm/d. Chegeni said gas supply to industries and power plants was a driver of national economy, particularly in job creation. He added that gas supply to power plants would be in line with Supreme Leader Ayatollah Ali Khamenei's call for "inflation control and production growth" with a view to economic prosperity and social welfare.

Iran Oil Output Capacity Set to Jump 16% by 2027

Iran's oil production capacity is expected to experience a 16% jump by the end of the 7th National Economic Development Plan (2023-2027). It is expected to reach 4.45 mb/d from the current 3.838 mb/d by that time. According to the draft plan, Iran's real oil production would reach 4.25 mb/d with gas condensate output at 804 tb/d. The petrochemicals production capacity would rise from the current 92 mt a year to 131.5 mt by 2027, registering a 43% increase. Furthermore, in order to implement propylene production as a strategic product in the downstream industry, propylene and its chain production capacity would grow to 11.6 mt by the end of the 7th plan, far from the current 1 mt a year. The propylene produced in the country is entirely used by downstream plants, while there is much more demand for this product. Methanol is also a petrochemical product for which capacity building has been done in recent years. The bulk of methanol produced in the country is destined for export. However, once its chain is completed, higher value would be created. To that effect, the methanol chain production capacity would increase to 0.7 mt a year by 2027.

Belal Gas Recovery to Hit 500 mcf/d in 2 Years

CEO of Petropars Farrokh Alikhani has said that gas recovery from the Belal gas field would increase to 500 mcf/d in two years. He said that construction and installation of the gas field's platform would have been done within two years. "Meantime, eight wells would be drilled," he said. The platform is being built by Iranian Offshore Engineering and Construction Company (IOEC), he said, adding that the jointly-owned field's jacket would be built by Iran Marine Industrial Company (Sadra). Pipelines are also to be constructed by IOEC. "Eight wells are planned to be drilled in this platform. The appraisal well has been drilled and is being studied before other wells are planned," said Alikhani. "The jacket construction is expected to be over by the end of the year. Then drilling operations will start. According to planning made, platform construction and installation would take two years," he added. Alikhani said Petropars had nine projects under way, one of which is on the renovation of an oil jetty in Venezuela. The other eight are under way at home.

SP Ethane Recovery to Yield $300mn Profit

Minister of Petroleum JavadOwji has said ethane recovery from the giant offshore South Pars gas field would earn the country $250-300 million in annual profits.

He made the remarks as he oversaw the signing ceremony of a project for increased ethane recovery from 9 refineries of South Pars Gas Complex (SPGC).

Work on this project is set to start in coming months, which would involve 18 South Pars phases.

"Currently 66% of ethane produced at South Pars refineries is recovered with the rest being fed into national trunkline and burnt," he said. Owji said the project would aim at the annual production of 1.1 million tonnes of ethane, adding that benefits from the project would be either invested in the same value chain or be invested in public benefit projects like launching pharmaceutical factories. Hamid Reza Khalili, CEO of Tadbir Energy Development Group (TEDG), said this project would be knowledge-based and job-creating as the ethane would create high value in the olefin and polyethylene units.

"The North Yaran oil field development project was operated by TEDG, and the agreement for the second phase development of the Yaran field took effect in October 2022 with a $200 million investment," he said, adding that a 20-year agreement had been signed with National Iranian Oil Company (NIOC) for the development of the Kupal field. "The project would be operated with an investment of $950 million in partnership with a foreign partner (80%) and NIOC's main objective in this project is to reach 85 tb/d output."

"ASP pump manufacturing, building and overhauling Homa, Shanol and Varavi gas compressors with €280 million investment are other projects under way by TEDG," he said, adding that drilling 15 wells was also under way in other fields. Referring to the gas value chain project at ParsianSepehr Refining Company, Khalili said: "In this project, with $75 million investment, about 3.4 mt of various products would be produced, including 1.4 mt of ethane and 2 mt of LPG and naphtha."

Iranian-Made Smart Pig 90% Complete

The head of Research and Technology Division at National Iranian Oil Refining and Distribution Company (NIORDC), Reza Kazemnejad, has said the domestically-manufactured intelligent pig is 90% complete. "Before this, we had to benefit from the services of foreign companies to study and analyze the conditions inside the pipelines, but now this device has been designed domestically and its construction is 90% complete," he said. "For the first time in the world, an entirely national technology is being used in this device, which would significantly cut pigging costs in the country. This project would have been completed by the end of the first half of the current calendar year," he said, adding that it could be used in pipelines if administrative procedures are shortened. Kazemnejad also said that another key issue in the refining industry was fuel oildesulfurization. "More than 24% of crude oil delivered to refineries is converted to fuel oil, which is a big figure. Effective measures have been taken under the aegis of the private sector and a desulfurization pilot plant is being completed at a refinery and we think that it would come online soon to be used in studies," he said.

NPC Drafting Petchem Strategic Development Plan

CEO of National Petrochemical Company (NPC) Morteza Shah-Mirzaei has said a strategic development plan for the petrochemical industry was being drawn up. "Iran's petrochemical industry is among the most prosperous in the world. It complies with scientific and safety principles and standards at the global level," he said. He stressed the significance of applying chemical defense rules and regulations to the oil and gas industry, particularly the petrochemical sector. "NPC has long applied strict rules to petrochemical zones," he said. Shah-Mirzaei referred to the production of 550 polymer and petrochemical grades at 70 petrochemical plants across the country, saying: "All chemicals supplied by the petrochemical industry are destined for industrial purposes and in favor of progress and welfare." He said that international bodies were monitoring petrochemical products on a regularly annual basis. He said Iran's installed petrochemical production capacity stood at 92 mt/yr., adding: "Steered by NPC, Iran's petrochemical industry is being run by holdings, investors and stakeholders who comply with safety rules and regulations."

GachsaranPetchem Plant to Come Online

CEO of Persian Gulf Petrochemical Industries Company (PGPIC) Abdol-Ali Ali-Asgari has said that the Gachsaran petrochemical plant would come on-stream shortly. He said that PGPIC was planning to bring 8 projects online in the current calendar year,noting that the Persian Gulf Hoveyzeh refinery was recently inaugurated as an environmentally friendly project. "The Persian Gulf Bidboland refinery has $1 billion worth of flare gas gathering projects under way. The current calendar year would mark history in ending flaring, which would be a national environmental project," he said. Ali-Asgari touched on the four planned projects worth $9 billion, adding: "PGPIC's main strategy is to distance itself from selling raw materials to be able to implement downstream projects." He said Chabahar, Jask, Minab, Parsian, Nayband, Deilam, Genaveh, Omidieh and Arvand had been chosen as the 9 zones for establishing petrochemical parks. He said that PGPIC would provide necessary land and infrastructure for petrochemical parks, adding that bidders can file their applications for investment in these projects. Ali-Asgari underscored support for knowledge-based companies, adding that PGPIC had opened a corporate venture capital with an initial investment of IRR 20 trillion, which would increase gradually.

Iran's oil shipments to China triple amidst U.S. sanctions

Iran's oil shipments to China have more than tripled over the past three years despite the U.S. sanctions on the country and the increase in Russia's shipments to China. According to data released by data analytics firm Kpler, Iranian crude exports to China have been consistently around one million barrels per day (bpd) in 2023, compared to approximately 325,000 bpd in 2020, EnergyPortal.eu reported. The upward trend of Iranian oil shipments to China began in 2019, with exports reaching 585,000 bpd in 2021 and 766,000 bpd in 2022. The International Energy Agency (IEA) also confirmed Iran's daily export of one million barrels of oil to China in its recent report titled "Oil 2023." The report stated that despite severe financial restrictions, Iran managed to increase its crude oil production by 140,000 barrels per day in 2022 to an average of 2.5 million barrels per day. Official data shows that Iranian oil production has also increased this year, with the country's oil output reaching 2.9 million bpd in May, 350,000 bpd higher than in 2022. Chinese private refineries have been buying more Iranian oil, even amidst rising competition from Russia. These refineries, known as teapots, have prioritized Iranian oil as Russian supplies become more expensive.

1mb/d Oil Output Hike in 6 Months

CEO of National Iranian Oil Company (NIOC) Mohsen Khojasteh-Mehr said 1 mb/d had been added to Iran's oil production during a six-month period. "As the JCPOA (Iran's nuclear deal) become ineffective under the former administration, Iran's oil output capacity was cut by 1 mb/d due to Western sanctions imposed on Iran and non-reparation of oil installations. But under the 13th administration, by spending $500 million, we have managed to restore the lost capacity within six months," he said. "Twenty months ago, our oil exports had fallen below 300 tb/d and about 80 million barrels of condensate parked in the Persian Gulf was becoming the Achilles' heel of the petroleum industry. The former administration's solution to this problem was to increase the number of leased tankers and paying $450 million for this purpose. Gas condensate kept on water for three years," said Khojasteh-Mehr. He said Iran's oil exports had doubled year-on-year despite tough conditions. He added that the country faced more than IRR 4,800 trillion in budget deficit when the 13th administration took over. According to the NIOC chief, this deficit was offset by oil sales. Khojasteh-Mehr said revival of energy diplomacy was key to NIOC's success in oil export, adding that Iran's oil revenue last calendar year was up 79% year-on-year.

"Iran's oil production capacity stood at 2.2 mb/d at the start of the 13th administration, but it has now reached 3.1 mb/d," he said. Khojasteh-Mehr said Iran's "synthetic oil" production by combining condensate and heavy oil was key to increased exports and finding new buyers. He put Iran's recoverable oil reserves at 160 billion barrels. Enumerating NIOC's achievements over the past 20 months, he referred to the operation of the gas condensate desalination unit of SP2 and SP3, allocation of drilling rig for the development of the Belal field, finalization of the agreement to develop the South Pars Oil Layer, start of construction work on the jacket of the Farzad B field, accelerating increased production from the Forouzan field, resolving the environmental problems of the Sohrab field, drilling 40 wells in the Azadegan field and increasing drilling rig count in Azadegan.

Iran, Potential Key Player in Oil Market

Petroleum industry is a key sector in the Iranian economy. Iran has been trying its best to benefit from its giant hydrocarbon resources to realize its objectives set out in its development plans. Along with sustainable oil and gas production, Iran been instrumental in global energy supply. It may not be eliminated from global energy trading as it continues to play an effective role in this sector. Once the 13th administration took office, most plans and projects pertaining to Iran's petroleum industry were reconsidered. First and foremost, the Ministry of Petroleum enhanced the oil production capacity to reach levels acceptable under sanctions imposed on Iran. Minister of Petroleum Javad Owji recently announced that Iran had set records in the production and export of crude oil, gas condensate as well as refined petroleum and petrochemical products.He said $12 billion worth of incomplete oil projects had come online in one year, adding they were directly involved in enhancing the country's production capacity."We're self-sufficient almost in all petroleum industry sectors. In parallel with this output hike, we have increased our exports level. Despite the tightening of unjust sanctions, crude oil and gas condensate exports have doubled since the 13th administration took office," he said. Owji said Iran's oil output has exceeded 3 mb/d and gas production rate reached 1 bcm/d, adding that oil exports had doubled.

He said during the calendar year to March, 83 mb/d more oil was exported year-on-year, adding that a new record is expected to be set in oil exports in the current calendar year (started on 21 March 2023). CEO of National Iranian Oil Company (NIOC) Mohsen Khojasteh-Mehr has said that Iran's oil production capacity reached 4.038 mb/d by March 2023. It is indicative of NIOC's initiative for implementing oil output hike plans. The output hike is the result of enhanced recovery from low-yielding wells, development of new fields and implementation of enhanced recovery methods. According to the NIOC chief, Iran is able to raise its oil production to 5.7 mb/d within eight years. He reaffirmed that crude oil and gas condensate exports had doubled under the 13th administration. It implies that Kharg terminal has been fully used for oil exports by providing metering and docking services and transport facilities.

Revenue Hike

Khojasteh-Mehr said income from oil, condensate, gas and petroleum products sales last calendar year (ended on 20 March 2023) had grown 40% year-on-year. In the gas condensate sector, more than 70 million barrels was sold. In its 2023 Oil Report, the International Energy Agency (IEA) put it as follows: "Iran remains a wildcard for world oil markets. If it is released from sanctions, production could ramp up gradually by roughly 900 tb/d to reach capacity of 3.8 mb/d." "Despite tough financial restrictions, Iran managed to increase crude oil output by about 130 tb/d in 2022 to an average 2.5 mb/d," it wrote. "Tehran appears to be keeping up brisk oil sales to China that have been running at an estimated 1 mb/d since the third quarter of last year." "Higher exports and domestic throughput have pushed Iranian crude production up to around 2.9 mb/d in May 2023 and we have maintained that level throughout the remainder of the forecast period. We are of the opinion that Iran is still able to maintain its sprawling oil network, enabling it to ramp up relatively swiftly if and when sanctions are eased."

It added: "Lower wellhead production most likely led the National Iranian Oil Co to shut in wells at its high-cost offshore fields, and perform maintenance at its mature oil fields. Shutting in output may be helpful for ageing oil fields, as it will allow pressure to rebuild and make it easier for operations to restart." The report said: "As for capacity building, Iran's efforts in this respect have largely stalled given the impediments posed by the collapse of exports since the end of 2018 and the lack of foreign investment due to sanctions. The previous round of international sanctions had already left the oil sector in urgent need of foreign cash and technology, particularly in enhanced oil recovery methods to sustain and raise output at older oil fields." "Tehran is looking to the core West Karun oil fields of North and South Azadegan, Yaran and Yadavaran to drive future growth with a 1 mb/d boost. Undeterred by sanctions, Iran expects in 2023 to double capacity to 320 tb/d at its southern Azadegan field, which straddles the border with Iraq," concluded.

Energy Trade with Neighbors

In its latest estimate, OPEC put Iran's proven oil reserves at 208.6 billion barrels in 2021, placing Iran in the third position among oil owners in the world. Iran is also the second largest holder of gas reserves in the world with 1,203 tcf of gas in place. Iran saw it gas reserves grow 3 tcf in 2021 year-on-year. Iran accounts for 17% of the world's gas reserves.

Given its giant hydrocarbon reserves, Iran is planning to acquire an acceptable share of energy trading with neighboring nations. Minister Owji said energy diplomacy was a major policy pursued under the 13th administration, praising efforts undertaken by ministries of petroleum and foreign affairs. He said that Iran's share of gas trading in the region was on the rise, adding that the Ministry of Petroleum had relevant plans under way.

Overseas Refineries

Along with boosting oil production and export capacity and gas swap operations, the Ministry of Petroleum has for the first time moved towards refineries overseas, which is the first of kind since the 1979 Islamic Revolution. Owji said benefiting from the capacity of overseas refineries would be closely pursued by the Ministry of Petroleum. He said Iran's oil was already being processed in some of overseas refineries. That would help Iran avoid selling crude oil, and rather than that would empower Iran to generate higher value.

Analysts say refined petroleum products are unsanctionable due to global demand for them. That would provide countries sitting atop hydrocarbon deposits with a golden opportunity.

Gas Exports to Iraq Quadruple

Iran is a leading exporter of gas. It is pumping gas to Turkey, Iraq, Azerbaijan and Armenia. The country also plans to expand its markets with minimum investment. Owing to its massive recoverable gas, Iran is trying to transform Assaluyeh into a gas hub in cooperation with Russia, Turkmenistan and Qatar. Minister Owji said required arrangements had been made for this purpose. Gas represents Iran's bargaining chip in economic exchanges. Relying on its gas capacity, Iran is trying to improve its ties with regional nations.

Iraq's Electricity Ministry spokesman said last October that his country had settled its debt vis-à-vis Iran. He said Iraq would need to import more gas from Iran. To that end, high-level talks have been under way between Iranian and Iraqi officials. The gas agreement signed with Baghdad expires in the current calendar year. The agreement is expected to be renewed and relevant negotiations have already started. As both sides are in favor of renewal, the agreement is highly likely to be extended. The agreement for gas delivery to Basra is also expiring within two years, which would then be subject to renewal. Iraq needs 55-60 mcm/d of gas with Iran having voiced its readiness to supply 45 mcm/d. Turkey also needs Iran's gas. Iran's 25-year gas export deal with Turkey expires in 2026 and Tehran is seeking to renew deal under better terms and conditions. It is the first long-term gas deal Iran signed after the Islamic Revolution. Under this agreement, Iran could supply up to 10 bcm/y of gas to Turkey, but it may be increased to 13 bcm/y. Renewal of the gas deal is acceptable to both sides; however, possible scenarios about the volume of gas and mechanism of gas delivery are being discussed by the two countries. Iran's natural gas exports to Turkey is estimated to have reached 3.3 bcm during the first five months of 2023.

Higher Share

As soon as the 13th administration took office, the Ministry of Petroleum focused upon revival of ties with Turkmenistan. Turkmenistan was the first destination of Minister Owji. Efforts made by the current administration for a thaw in the ice between Iran and Turkmenistan came to fruition very soon. Owji's talks in Turkmenistan came to fruition several months later when Iran, Turkmenistan and Azerbaijan signed a trilateral gas swap agreement on the sidelines of an Economic Cooperation Organization (ECO) gathering. The agreement was implemented in January 2022, which was instrumental in the gas network stability, particularly in northern and northeastern Iran. It did not end at this point. In early June that year, Minister Owji travelled to the Republic of Azerbaijan where he signed an MOU to double the volume of Turkmenistan's gas delivery to Azerbaijan via Iran. Under the trilateral agreement, Turkmenistan is required to deliver 10 mcm/d of natural gas to Azerbaijan. Iran-Turkmenistan ties were not bound to these agreements; rather, they inked protocols for exporting technical and engineering services as well as refined petroleum products, which resulted in the reopening of Turkmenistan's border terminals. Majid Chegeni, CEO of National Iranian Gas Company (NIGC), said the volume of Iran's gas swap increased 358% in 2022 year-on-year. He added that the figure was expected to grow 70% in 2023 year-on-year.

This agreement was a major initiative by the Ministry of Petroleum in enhancing Iran's share of global energy trading with neighboring nations, which would be a win-win deal. A major advantage for Iran is that the deal would prevent it from being eliminated from global energy interactions and would instead help Iran boost its share of global natural gas trading. Turkmenistan is the world's fourth largest gas holder, and Iran can receive 40-50 mcm/d of gas from this country to be delivered to other nations. NIGC signed a deal in 1995 with Turkmenistan for the latter to supply 14 bcm a year of gas to Iran. In 2017, the deal was suspended over financial issues.

Complete Chain

Improving political, economic and commercial ties between Iran and Turkmenistan, preventing Iran from being eliminated from energy exchanges in the region, empowering Iran to become an energy hub, bolstering Iran's share of global natural gas trading, stability in gas network in northern and northeastern Iran, secure fuel supply to power plants and industries in northern and northeastern provinces and reducing gas transmission costs from south to north are among advantages of the agreement. It has also been instrumental in offsetting Iran's gas imbalance as it would push Iran closer to becoming an energy hub in the region. The agreement is also important for Turkmenistan which is looking for secure routes to transmit its gas. In Turkmenistan's gas export roadmap, Iran is considered the most attractive route. In addition to significant gas reserves, Iran has necessary infrastructure including compressor stations, gas transmission centers and pipelines, covering a full chain of production, supply and distribution of gas, which is a key issue in gas exports.

Owji Addresses Oil Exhibition:

Iran Broadening Oil Ties to LatAm

Strategic Ties

Iran's energy diplomacy has become more active than before. That is not limited to neighboring nations; rather, Iran has sought to boost economic and energy ties with Latin America. One of Iran's advantages in expanding its economic relations with other nations is its energy resources. Iran claims the top spot in the world in terms of oil and gas reserves together. On the other hand, due to the sanctions imposed on its petroleum industry over the past four decades to bar Western companies from providing required technology for the petroleum industry development, the country has become self-sufficient. A case in point is development of the giant South Pars gas field in the absence of foreign companies. Foreign experts who have visited South Pars confirm its incredible rate of development. Foreign companies imagined that Iran would not be able to develop South Pars by itself. But the gas field was developed by local firms and has production capacity of more than 700 mcm/d now. Alongside developing South Pars, Iran has overhauled and renovated its oil and gas refineries and petrochemical plants. That empowers Iran to offer technical and engineering services to other countries. In the petrochemical sector, Iran's output capacity has exceeded 90 million tonnes. Iran continues to export petrochemicals despite sanctions. In the refining sector, Iran's crude oil and condensate treatment capacity is now 2.2 mb/d, which is planned to reach 3.5 mb/d.

Iran has been under sanctions over recent years, failing to deliver as much oil as it can to global markets. But Reuters and Bloomberg recently reported that Iran's oil exports had reached all-time highs since the US imposed sanctions on its oil sector in 2017. They reported Iran's May exports at 1.6 mb/d. Iran does not release any official data on its oil production and exports, but it is more than clear that oil and condensate exports have grown significantly over this period of time.

El Palito Reconstruction 70% Done

Iran and Venezuela together hold 40% of world energy reserves and both are under unjust sanctions. Despite restrictions, Iran has managed to manufacture 85% of equipment it needs for its petroleum industry locally, which has in turn resulted in exporting technical and engineering services to other petro-states including Venezuela. Over the past 20 years, Iran has been in talks to enhance Venezuela's refining capacity. Four oil refineries in Venezuela process 1.4 mb/d of oil. These facilities had been abandoned to their own fate due to the US sanctions which led foreign exports to quit. "Under the 13th administration and adoption of an active energy diplomacy, we embarked on talks for the development and overhaul of Venezuela's refineries, oil and gas condensate exports. To that effect, MOUs were signed between Iranian companies and the Venezuelan refineries," Owji said.

One of these MOUs require Iranian knowledge-based companies to overhaul and recommission Venezuela's mothballed refineries. So far, more than 2.8 million items of equipment supplied by 1,600 Iranian manufacturers have been installed at Venezuela's refineries where part of Iran's crude oil and condensate is being processed. Farhad Ahmadi, CEO of National Iranian Oil Engineering and Construction Company (NIOEC), said more than 2 million items had been delivered to the El Palito refinery, adding that the project is now more than 70% complete.

Venezuela Petchem

Iran is also interested in getting involved in Venezuela's petrochemical sector. Minister Owji said: "Petrochemical plants in this country had become non-operational due to sanctions. Venezuela has capacity to supply more than 12 million tonnes of petrochemical products such as ammonia, urea and polyethylene. By relying on the capabilities of Iranian companies in the techno-engineering sector catalysts and technical knowhow, we hope to relaunch this country's petrochemical plants, like its oil refineries, and supply their products on international markets." To that end, an agreement was signed for the overhaul of Venezuela's ammonia facility that has stopped working due to US sanctions. Its recommissioning would supply ammonia on the market and return Iranian investment.

Venezuela's installed petrochemical capacity stands at 12 million tonnes, only 2 million tonnes of which is currently operational as US sanctions are in effect. Iranian Petroleum Ministry experts estimate that supply of Iranian equipment and services to Venezuela would double the figure. Negotiations are under way on other petrochemical plants in Venezuela as Iran's private sector is ready to provide technical and engineering services, as well as equipment to Venezuela's petrochemical plants.

Jose Terminal Upgrade

During President Raeesi's visit, Petropars agreed with Venezuela's state oil company PDVSA to upgrade the Jose export terminal. The agreement was signed by Mohammad Sadeq Azimifar, Chairman of Petropars, and Pedro Rafael Tellechea, the oil minister of Venezuela and CEO of PDVSA. Under the Engineering, Procurement, and Construction (EPC) deal, which would be financed by Venezuela, the storage capacity of the Jose terminal would be upgraded within one year. That would involve renovation of storage tanks, overhaul of pumping stations and boosting loading capacity. That is the first international EPC agreement by an Iranian company. Petropars and PDVSA have already cooperated in conducting feasibility studies on four oil blocks in Venezuela, as well as assessing development of a heavy crude oil block in the Dobokubi oil field. Latin America is home to 20% of the world oil reserves. Venezuela's huge oil reserves and economic overtures, as well as presence of international companies in Latin America have pushed Petropars to view South America as one of its overseas investment priorities.

Marketing

Against the backdrop of sanctions, the Iran's Petroleum Ministry is planning to set up "Oil Supply Security" and "Market Share" working groups and diversify its tools in exporting resources and techno-engineering services. To that effect, significant measures have been undertaken over the past 20 years. As far as market share is concerned, approaches and orientations had to change in order to create mechanisms for supply security. When it comes to diversity in tools, conditions were created for Iran to overhaul internationally-operating refineries which would give a share to Iran's oil. Regarding marketing in the oil sector, in order to secure Iran's share in the oil market, it was necessary to win footholds in other countries. Mohammad Sadeq Jokar, director of Institute for International Energy Studies (IIES), has said arrangements had been made between various organs and the ministries of petroleum and foreign affairs. "We have stepped into a domain to create a market for crude oil in addition to exporting technical and engineering services," he said.

27 Protocols Inked

During President Raeesi's Latin American tour, 19 protocols were signed with Venezuela, 3 with Nicaragua and 6 with Cuba. The protocols were aimed at upgrading bilateral relations, bolstering trade and economic cooperation level, exchanging experience and scientific and technological achievements, exporting technical and engineering, healthcare and medical services. The Latin American tour is indicative of the 13th administration's firm determination to develop ties with transregional nations. Creating a market for Iranian private and semi-state companies in those countries and supporting them, as well as increasing crude oil and condensate exports and commodities and equipment are among objectives pursued in Raeesi's Latin American tour.

13th Administration Completes SP Development

The platform of Phase 11 of the supergiant South Pars gas field, known to be the heaviest platform, has been installed by Iranian engineers. According to Minister of Petroleum Javad Owji, SP11 may earn Iran $4-5 billion in revenue, and would partly offset Iran's gas imbalance.

The minister said that installation of the SP11 platform completed the whole process of development of South Pars phases. Referring to the 20-year delay in development of SP11, Owji said: "Located in the unmanned land, SP11 was the only undeveloped phase." He added that despite sanctions, this phase was developed under the 13th administration. He said an initiative by the Ministry of Petroleum helped develop this field three years earlier than envisaged. "We will soon reach 50 mcm/d rich gas production at this phase," he said, adding that the project came online through collaboration by National Iranian Oil Company (NIOC), Pars Oil and Gas Company (POGC), Petropars and Iranian Offshore Engineering and Construction Company (IOEC).

Owji said France's Total, the forerunner to TotalEnergies, had signed a $4.9 billion deal to develop SP11, but it pulled out, adding: "They lost and today the project came online by reliance on Iranian workforce."

He said SP11 would initially start supplying 12-15 mcm/d of gas, adding President Ebrahim Raeesi would soon oversee inauguration of this project.

He said big companies like Shell, TotalEnergies and CNPC were surprised to see Iranian engineers develop SP11. Owji said moving Platform 12C, weighing 3,200 tonnes, requires special logistics, adding that despite being risky, it was successful. "We have no more development phases in South Pars and we now focus on these phases for increased production and compression," he said.

Owji said the 13th administration had carried out prioritized projects over the past 22 months. He said that inauguration of the refinery of SP14, NGL 3200 and installation of SP11 platform were among them. "To offset gas imbalance, we have adopted some initiatives to overcome winter challenges," he added. Owji said $12 billion worth of incomplete oil projects came online last calendar year, adding that 68 more projects, worth $15 billion, would become operational this year. The minister also said that studies on boosting pressure at South Pars phases was nearing completion.

$5bn in Annual Revenue

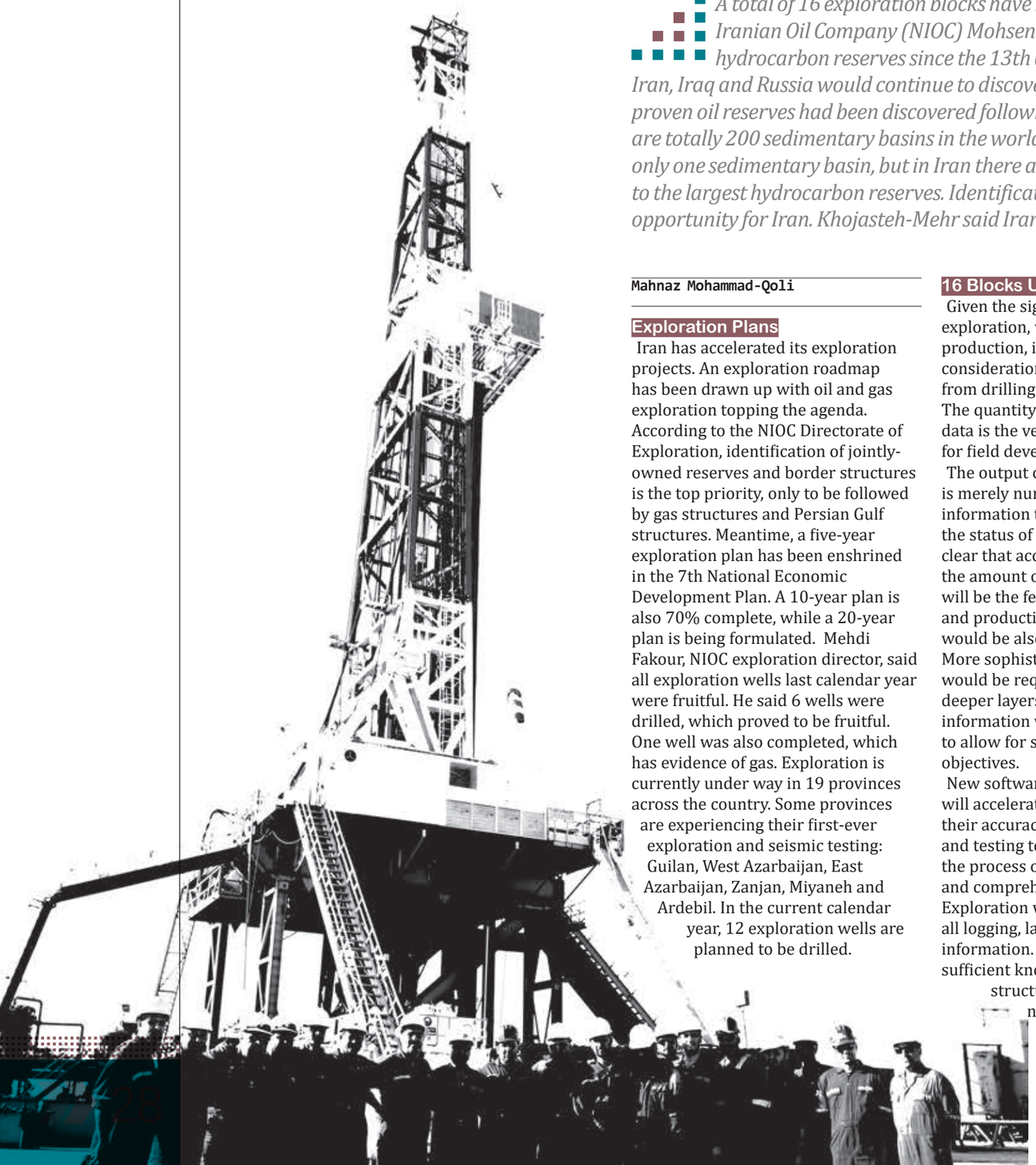
CEO of NIOC Mohsen Khojasteh-Mehr said totally $4.8 billion had been invested in SP11 development, adding it would earn the country $5 billion in annual revenue. He said that foreign companies were present in Iran to develop this field before pulling out for a variety of reasons over the past two decades. He said Total and China's CNPCI also pulled out in 2018 due to the US sanctions. Khojasteh-Mehr said under the 13th administration, NIOC embarked on developing SP11.

"One important issue was that we needed a platform to be able to produce gas in SP11, and building a platform would take three years. Therefore, we used Platform 12C, the largest and heaviest structure in South Pars," he said. The next challenge was moving the platform, he said, adding that it was Iran's first experience to move an offshore platform. He said it was done merely by local experts. Khojasteh-Mehr said sanctions barred the presence of foreign advisors, adding that the platform was moved all at once. He said that Total had promised to develop SP11 in five to six years, but now it would come online much sooner to help rise gas supply in the country. "The SP11 development has materialized after 20 years, indicating the effectiveness of the 13th administration. Had it been developed in previous years, we would have earned significant revenue from South Pars," he said. He said that development of SP11 was important both nationally and internationally.

He added that in parallel with starting to develop SP11, NIOC had focused on building the second platform's jacket, which local companies are building now. "With a view to maximizing Iran's revenue in the petroleum industry, we have become self-sufficient particularly in engineering, operation, construction and installation. Furthermore, in line with completing the value chain, we export our capabilities," he said.

"Under the 13th administration, our objective is to restore energy diplomacy, indications of which are a two-fold surge in crude oil and condensate exports as well as exporting technical and engineering services." SP11 is expected to produce 56 mcm/d of gas.

Modern Techniques in Block Exploration



A total of 16 exploration blocks have been recently identified in Iran, bringing the total number of blocks to 26. CEO of National Iranian Oil Company (NIOC) Mohsen Khojasteh-Mehr has said that 2.5 billion barrels of oil has been added to Iran's proven hydrocarbon reserves since the 13th administration took office. According to the United States Geological Survey (USGS) data, Iran, Iraq and Russia would continue to discover new hydrocarbon reserves. In Iran, more than 70% of proven gas and more than 50% of proven oil reserves had been discovered following the 1979 Islamic Revolution. However, undiscovered reserves are still significant. There are totally 200 sedimentary basins in the world. Some countries like Saudi Arabia, the United Arab Emirates (UAE) and Qatar have each only one sedimentary basin, but in Iran there are 9 of them, including 3 internationally important ones. The South Zagros basin is home to the largest hydrocarbon reserves. Identification of reserves in the Persian Gulf and in the Zagros mountainside has created a unique opportunity for Iran. Khojasteh-Mehr said Iran would still keep producing oil and gas for a century.

Mahnaz Mohammad-Qoli

Exploration Plans

Iran has accelerated its exploration projects. An exploration roadmap has been drawn up with oil and gas exploration topping the agenda. According to the NIOC Directorate of Exploration, identification of jointly-owned reserves and border structures is the top priority, only to be followed by gas structures and Persian Gulf structures. Meantime, a five-year exploration plan has been enshrined in the 7th National Economic Development Plan. A 10-year plan is also 70% complete, while a 20-year plan is being formulated. Mehdi Fakour, NIOC exploration director, said all exploration wells last calendar year were fruitful. He said 6 wells were drilled, which proved to be fruitful. One well was also completed, which has evidence of gas. Exploration is currently under way in 19 provinces across the country. Some provinces are experiencing their first-ever exploration and seismic testing: Guilan, West Azarbaijan, East Azarbaijan, Zanjan, Miyaneh and Ardebil. In the current calendar year, 12 exploration wells are planned to be drilled.

16 Blocks Unveiled

Given the significance of hydrocarbon exploration, which supports production, it is necessary to take into consideration acquisition of full data from drilling wells and testing layers. The quantity and quality of obtained data is the very basis of calculations for field development and output.

The output of all exploration activities is merely numbers, figures and information that define and determine the status of a field and it is crystal clear that accuracy in calculations and the amount of primary information will be the feed for development and production activities, which would be also key to investment. More sophisticated technology would be required to obtain data on deeper layers so that more reliable information would be acquired to allow for setting exploration objectives.

New software with many capabilities will accelerate calculations and their accuracy, and new logging and testing tools will complete the process of obtaining complete and comprehensive information. Exploration wells are drilled to obtain all logging, layers and drilling data information. Considering the lack of sufficient knowledge of geological structures and the exploratory nature of the wells, the need to use all the facilities and the best equipment and materials is necessary. The NIOC Directorate of Exploration is planning for fresh exploration activities which would be necessary for the oil and gas industry. With an investment totaling about $1.2 billion, about 16 new exploration blocks are now up for grabs by contractors, the private sector and E&P companies. About $1.5 billion has been allocated for exploration activities in the 7th National Economic Development Plan. Iran's private sector can afford this amount of investment.

Cutting Edge Technologies

As exploration operations become more complicated, more sophisticated technology and higher investment would be needed. Currently, aeromagnetic survey and surface geochemistry operations are modern technologies that Iranian engineers have achieved in the field of exploration. Magnetic and gravimetric methods are mainly used in the early stages of oil exploration in order to identify the geological situation of the target area in order to get a general picture of the subsurface of the said area. Magnetometry is one of the most widely used geophysical methods. Revealing the edge of subsurface structures is one of the important goals of magnetometric data interpretation. Among them, aerial magnetometric surveys are the most common type of aerial surveys that are carried out for the exploration of minerals and hydrocarbons.

Given the significance of this issue, the NIOC Directorate of Exploration has recently applied this method to identify new oil blocks. In aeromagnetic survey, Iranian pilots are hired to help identify sedimentary layers. It had not happened prior to the 1979 Islamic Revolution, but now this knowhow has been mastered and necessary tools are available in the country. This new method would facilitate hydrocarbon exploration up to 7,000 meters deep. This method is already in use in the Zagros area and its knowhow is owned by the NIOC Directorate of Exploration. Aeromagnetic survey is planned to be conducted in 14 exploration blocks covering 175,000 square kilometers. An aeromagnetic survey is a common type of geophysical survey carried out using a magnetometer aboard or towed behind an aircraft. The principle is similar to a magnetic survey carried out with a hand-held magnetometer, but allows much larger areas of the Earth's surface to be covered quickly for regional reconnaissance. The aircraft typically flies in a grid-like pattern with

height and line spacing determining the resolution of the data (and cost of the survey per unit area). Aeromagnetic surveys are widely used to aid in the production of geological maps and are also commonly used during mineral exploration and petroleum exploration. Some mineral reserves are associated with an increase or decrease in the abundance of magnetic minerals, and occasionally the sought after commodity may itself be magnetic (e.g. iron ore reserves), but often the elucidation of the subsurface structure of the upper crust is the most valuable contribution of the aeromagnetic data. It has also been used to find buried fault zones that are prone to damaging earthquakes.

Geochemical Survey in Iran

Iran is using geochemical survey for the first time in processing exploration data. Geochemical surveys are surveys of the chemistry of mineral reserves. They are done by, among other things, sampling soils, waters, and bedrock to identify areas of anomalous mineral values and quantities that may in turn identify mineral reserves. Geochemical exploration is any method of mineral or petroleum exploration that utilizes systematic measurements of one or more chemical properties of a naturally occurring material.

The materials analyzed most commonly are rock, soil, stream and lake sediment, natural waters, vegetation and soil air. Surface prospecting for subsurface accumulations of oil and gas is a concept that has been around for many years in one form or another. The early days of contemporary surface geochemical prospecting were somewhat tainted with entrepreneurs overselling somewhat dubious techniques. Much of the overselling resulted in client experiences providing surface prospecting with a bad name in the industry. More recently, with the general improvement of techniques, the integration of surface prospecting with geologic and geophysical information and the use of the technique more as a regional tool rather than a specific anomaly indicator has led to a more acceptable climate for surface geochemistry within the industry.

Gas Hydrates

The NIOC Directorate of Exploration is planning to explore unconventional hydrocarbon resources in gas hydrate, as well as oil and gas shale areas. Therefore, exploration of gas hydrates off the Gulf of Oman is under way.

According to the NIOC Directorate of Exploration, a vessel is gathering data in the Gulf of Oman. Iran is yet to mature in gas hydrate exploration knowledge; however, alongside China and Japan, it has managed to master the technology. One major exploration achievement in Iran is the discovery of the Bamdad block in Hormuzgan Province. It covers four gas fields with total gas reserves of 23,000 bcm.

Seismic Data Project

The Haftkel-Naft Sefid project, extending over 2,250 square kilometers in Khuzestan Province, recently started. It covers the cities of Ramhormoz, Haftkel, Bavi, Shoushtar, Masjed Soleiman and Bagh Malek. This is the largest seismic data gathering project in Iran's petroleum industry. Given the project's ecology, the NIOC Directorate of Exploration has been prompted to make planning for accelerating the project and protect the environment.

Iran Savvy

The issue of complexities of Iran's hydrocarbon reservoirs has created a special expertise for the Iranian oil industry actors in light of the fact that these complexities do not exist in the reservoirs of regional countries. Therefore, other countries are willing to benefit from Iran's technical knowhow.

To that effect, a Russian delegation recently met with the managing director of NIOC to discuss manner of benefitting from Iran's technical knowhow.

Iraq also needs Iran's exploration experience in order to create a local structure for exploration management within its petroleum industry. This issue was underscored during a visit to Iran by an Iraqi delegation to discuss development of joint fields.

SPGC Value Chain Completed

South Pars refineries have processed over 2,030 bcm of natural gas during the past 26 years. South Pars Gas Complex (SPGC) has been supplying more than 75% of Iran's gas needs, thereby playing an instrumental role in national economy.

Ahmad Bahoush, CEO of SPGC, tells "Iran Petroleum" the gas complex plans to sell flare gas. The following is the full text of the interview he gave to "Iran Petroleum":

We experienced an unprecedented cold spell in the country, which drove up gas consumption. However, we managed to enhance our production capacity 7% year-on-year

Where does SPGC stand in the Middle East and the world?

SPGC currently runs 13 gas refineries fed by 22 phases of the South Pars gas field. It houses a power plant, corridors, centralized storage facilities and other installations.Given the volume of activity under way there, SPGC is unique in the Middle East and the world. Currently, all steering activities and transfer of gas from platform to refineries and refinery construction are handled by Iranian companies. Recently, the fully-domestic 13th refinery was launched. At the beginning, foreign companies were active here, but today, even refinery building is done by Iranians.SPGC is the largest gas production plant in the Middle East, not to mention its unique processing and diversity of products. SPGC is honored to supply more than 75% of national gas demand.

How much gas was processed at SPGC last calendar year?

Last calendar year, more than 221,171 mcm of gas was processed at SPGC. LPG production was 42% higher year-on-year, while we also produced more than 527,000 tonnes of high-quality granulated sulfur. Last calendar year was special for National Iranian Gas Company (NIGC) from several aspects. We experienced an unprecedented cold spell in the country, which drove up gas consumption. However, we managed to enhance our production capacity 7% year-on-year. I would like to note that despite increased gas consumption last winter, our refineries were running without any interruption.

SPGC has for the first time managed to produce mercaptan. Where is it used?

Mercaptan is added to gas for safety in order to detect possible gas leaks. We used to import mercaptan. But now it is being produced by the first refinery of SPGC and delivered to provincial gas companies to be added to refined gas. In addition to putting an end to the annual 600 tonnes of mercaptan imports, we have saved on significant hard currency.

How much mercaptan has thus far been produced at SPGC?

We've produced over 1,683 tonnes, more than 553 tonnes of which was produced since previous years. The mercaptan production unit of the first refinery of SPGC is the sole supplier in the Middle East. Mercaptan has been produced with Iranian technology. This unit is producing 1.8 tonnes of mercaptan daily, but given daily increasing demand for this substance and future gas supply plans, numerous projects are under way to export it.

What are your plans for refinery overhaul to maximize throughput next winter?

Preparation and necessary planning for the start of overhaul in the current calendar year started last November. In April we started our overhaul. This year, our overhaul is totally different from previous years as everything is done online. Currently, due to gas imbalance in the country, we have arranged for the refineries to experience very short halt. Meantime, overhaul of two or three refineries would be carried out simultaneously in order to keep other refineries running too. Therefore, it is clear from the very beginning which refineries would stop working during overhaul. The bulk of overhaul concerns gas trains and we have tried to minimize days of halt. In some refineries, overhaul may take 3 to 5 days and the remaining trains would be online. However, sometimes we overhaul refineries train by train so that the refinery would keep running.

What would be the achievement of this shift in approach?

With changes in approach and reducing the duration of overhaul in the current calendar year, we would be increasing SPGC output by more than 7 bcm.

Are overhaul contractors Iranian?

The contractors and equipment are entirely Iranian. Overhaul is performed under the supervision of SPGC specialists.

What share of SPGC equipment is supplied domestically?

More than 90% of our equipment is locally manufactured. Last calendar year, SPGC claimed the top spot in first-time manufacturing in national ranking. SPGC is self-reliant and no longer depends on foreign commodities. More than 90% of refinery equipment has been manufactured domestically owing to increased knowledge, technical inspections and regular engagement of knowledge-based companies and domestic manufacturers.

What has been done with regard to refinery renovation and upgrade?

The engineering team constantly upgrades electrical, mechanical and processing units. We also upgrade the refinery equipment and parts. I would like to note that we are currently in good conditions. The equipment used in renovating the refinery is entirely Iranian and all operations are handled by Iranian contractors. We have tried to upgrade refineries with available equipment.

What's SPGC role in feeding petrochemical plants?

SPGC is instrumental in the petrochemical industry of Assaluyeh. If one day we lose SPGC we would have no petrochemical plant any more. SPGC is feeding all downstream facilities, mainly petrochemicals. SPGC also feeds condensate to the Persian Gulf Star refinery (common name for Bandar Abbas Gas Condensate Refinery) by pipeline.By delivering 10,000 tonnes a day of ethane to the surrounding petrochemical plants, SPGC is the largest feedstock supplier of downstream facilities. Last calendar year, following overhaul, more than 2,194,290 tonnes of ethane was produced at SPGC refineries in addition to 3.283 million tonnes of propane and 2.286 million tonnes of butane.

How much feedstock does SPGC supply to the Persian Gulf Star refinery?

We're delivering 450 tb/d of condensate to the Persian Gulf Star refinery as feedstock. Last calendar year, more than 110 million barrels of condensate was supplied from all South Pars refineries to the said refinery. In addition to feeding the Persian Gulf Star refinery, SPGC is playing a strategic role in national self-reliance for fuel production, particularly gasoil and gasoline.

How much power is generated at Besat Power Plant of South Pars?

The power plant's capacity is 1,500 MW, which is partly operational. Last calendar year (ended on 20 March 2023), more than 3,247,179 MW of electricity was produced at the Besat Power Plant, resulting in stable power supply at the refineries of Site 1 and Site 2 of SPGC. In the light of growing electricity consumption in summer, this power plant can help supply power to Assaluyeh.

What measures have been taken for mitigating pollution in Assaluyeh?

The 13th administration and the Ministry of Petroleum are firmly determined to cut environmental pollution in Assaluyeh. To that effect, cases of pollution have been identified at SPGC during technical inspections and replacing decrepit equipment is envisaged. Installing new equipment would largely contribute to cutting gasflaring. Contracts have been signed for this purpose and necessary commodities are being supplied for the refineries of Site 1 and Site 2. Meantime, reforming systems of SPGC's 12 refineries that are instrumental in mitigating air pollution and flaring has been outsourced. It is noteworthy that SPGC embarked on reclaiming mangroves in Nayband in 2011 and won a prize. So far, nearly 30 ha of land has been covered with mangroves. Last calendar year(ended on 20 March 2023), more than 2,200 mangroves were planted with a view to expanding greenery at SPGC refineries and surrounding areas.

What have you done for zero flaring and cutting flare gas?

Simultaneously with mitigating environmental pollution, flare gas sales is auctioned off, which has been warmly welcomed by the private sector. Rather than sending gas to flare, we will deliver it to the buyer. The buyer processes the gas and then chooses to sell it to downstream industries or give to SPGC. In addition to precluding losses in this sector, that would help make up for gas imbalance in the country.

How much gas do you think would be recycled back to production?

More than two-thirds of flare gas would be recycled.

mcm of gas was processed at SPGC. LPG production was 42% higher year-on-year, while we also produced more than 527,000 tonnes of high-quality granulated sulfur. Last calendar year was special for National Iranian Gas Company (NIGC) from several aspects

Petchem Value Chain Completion Easy Task

Completing the value chain of the petrochemical industry is crucial for Iran. From the standpoint of value creation, it would be possible to enhance national revenue by supplying petrochemical products of high value-added. On the other hand, it would be possible to develop the petrochemical industry to end dependence on imports for supplying domestic needs, which would in turn reduce dependence on crude oil and natural gas sales. The petrochemical projects operated under the 13th administration are all aimed at value chain completion. Implementation of these projects would result in the supply of 21 products in line with the value chain completion. National Petrochemical Company (NPC) expects to accelerate implementation of these projects by engaging holdings and investors.

Value chain completion in the petrochemical industry may also create job opportunities at various levels, while enabling Iran to become more influential in world markets and getting closer to economic independence. Additionally, selling raw substances is associated with high risks. For instance, oil prices are tied to political and economic factors, which may drive down Iran's revenue. Also, if we can import the entire petrochemical equipment needed in the country, we would be able to reduce hard currency costs and minimize the negative impact of international sanctions.

According to the draft of the 7th National Economic Development Plan, Iran's petrochemical production capacity would reach 131.5 million tonnes, up 43% compared with the current level. Furthermore, the planned implementation of propylene production projects and its chain would bring propylene and its chain production capacity to 11.6 million tonnes by the end of the 7th plan. The current propylene production capacity stands at 1 million tonnes a year and the entire propylene produced by the petrochemical industry is consumed by downstream units. The demand for propylene exceeds 1 million tonnes.

Methanol is also a petrochemical product for which major capacity building has been made in the past years. Iran is currently selling the bulk of methanol it produces. But value chain completion would lead to higher value creation as the methanol production capacity would reach 700,000 tonnes a year. Meantime, the ethylene production capacity would reach 11.9 million tonnes and the aromatic chain production would hit 3 million tonnes by the end of the 7th plan.

Iran Privileges

Thanks to abundant oil and gas reserves, Iran's petrochemical industry has long been involved in petrochemical production; however, it is yet to form a complete value chain. For instance, if finished petrochemicals like polymers, disinfectants, and textile products among others are produced in the country they can be instrumental in increasing national revenue and creating jobs.

By completing the value chain of the petrochemical industry, it would be possible to look for technological growth and development. Widely-used petrochemicals are used in car manufacturing, pipe manufacturing, construction, electronics, and food industry. Therefore, by completing the petrochemical value chain, it would be possible to look for development of technology and upgrading the quality of final products to rival regional nations' products.

Competitiveness

Iran's petrochemical industry can rival some European nations in terms of value chain and diversity of products although it is by far distant from them in some sectors. Iran's petrochemical industry is internationally recognized for producing light hydrocarbons (like ethylene), polymers (like polystyrene and polyolefin) and chemical fertilizers (like ammonium nitrate). But the distance is too much between Iran's petrochemical industry and European rivals in the supply of such sophisticated products as highly-recyclable plastics or green plastic. That is why many developed nations in Europe are looking to develop sophisticated products pertaining to highly recyclable products.

World Markets

Iran's petrochemical industry is looking for balanced development and value chain completion despite all existing challenges particularly under conditions of sanctions. It is now on the path towards growth and development, for which it needs to complete its value chain. In coincidence with developing the upstream sector of the petrochemical industry, its downstream sector has been taken into consideration as a national strategy. NPC managers have said any project to come online would be based

on value chain completion. Today, under conditions of sanctions, there is a chance to develop the downstream sector and upstream sector alike. It would be possible to use domestically-developed technologies and investment by holdings and banks to help accelerate completion of the value chain. Energy experts believe that investment in the downstream sector would be reliable and profitable. Construction and expansion of petrochemical parks, which has been pursued by NPC and Iran Small Industries and Industrial Parks Organization (ISIPO), can pave the way for the growth and development of the downstream sector of the petrochemical industry. It has been recently decided that downstream facilities be located in industrial parks. Industrial parks have all necessary advantages to house downstream petrochemical facilities. By expanding these parks, particularly in border provinces, it would be possible to accelerate development of the petrochemical industry.

Owing to its regional position, Iran can export commodities supplied by the downstream petrochemical sector to neighboring nations with an estimated population of 600 million. Access to new markets and diverse mix are achievements of development of the downstream petrochemical sector, which would significantly boost the production capacity of this industry in coming years.

Over the past years, conversion of ethane produced in southern Iran has picked up speed. However, given the fact that 60-70% of world's ethylene is polyethylene and glycol and the rest to non-PE polymers, there is abundant polyethylene in Iran. That is why PE-dependent industries have been developed in the country, while propylene-dependent chemical industries have not been developed and the latter provides raw materials for the big chain of downstream industries. The downstream products of propylene and polypropylene go beyond polyethylene and ethylene. Therefore, many Iranian and foreign experts believe that propylene shortages are to blame for the non-development of propylene-related downstream industries.

Propylene, Petchem Feedstock

Propylene is the second widely consumed petrochemical substance used as feedstock for polymer production. The main derivatives of propylene are polypropylene, acrylonitrile, propylene oxide, phenol, acrylic acid, isopropyl alcohol, and oligomers. They are finally used in electronics, car manufacturing, construction, and packaging among other sectors. Olefins are highly-valued petrochemicals. Ethylene and propylene are among most-valued petrochemicals due to their extended value chain and various applications. In Iran, significant measures have been undertaken for supplying these two products. However, for a variety of reasons, ethylene has outstripped propylene in production with demand for propylene growing on a daily basis. That is while under the present circumstances, downstream facilities powered by polypropylene have experienced periodic shortages.

The Middle East, with 8 million tonnes of propylene production per annum, comes fourth, behind Southeast Asia (Chia, South Korea, Japan and Taiwan), the European Union and North America. Iran's current rated propylene production capacity exceeds 1.2 million tonnes a year. Surveys by the "Value Chain Studies Center" show that 95% of propylene in the country is converted to polypropylene with the remaining 5% converted to 2-ethylhexanol at the Shazand petrochemical plant. That is while other highly-valued products of this value chain are not manufactured due to insufficient propylene in the country.

Iran is expected to see its methanol production grow by 25 million tonnes over five years. Among existing projects, the three main projects of Kaveh methanol, Marjan methanol and Bushehr methanol are near finalization. With only these units, 5.61 million tonnes would be added to national methanol production capacity.

Methanol-to-Propylene

Iran's petrochemical industry is expected to become propylene-based and that is why it no longer issues any permit for the construction of methanol units. It has also to be taken into consideration that by converting gas to methanol, methanol to propylene and then propylene to polypropylene, it would be possible to generate higher value.

It is currently possible to convert natural gas to methanol in the country. At Petrochemical Research and Technology Company (PRTC), a pilot project for converting methanol to propylene in Mahshahr with capacity of 120,000 tonnes a year has been implemented successfully.

At the Arak branch of PRTC, there is a project under way to convert propylene to polypropylene with capacity of 130,000 tonnes, which would complete its value chain. The pilot polyethylene-via-methanol (PVM) resulted in the successful production of propylene with purity of over 99.6% at the Mahshahr research center. It is the most valued and mostly applied polymer grade in the petrochemical chain.

The Ministry of Petroleum of the 13th administration is largely supporting the value chain completion of the petrochemical industry. Under NPC stewardship, petrochemical companies may go ahead on the path towards value chain completion. If any company is not able to finance such projects on its own, it may team up with other companies to invest.

Iran, Russia Broaden Petchem Ties

The world petrochemical industry is among the most dynamically developing sectors. Each country uses its competitive advantages – availability of cheap raw materials, leading technologies, and access to financial resources. At the same time, the most important players in the industry are the governments with their tools of support.

Being one of the largest producers of hydrocarbons,Russia with its huge potentialresources is almost invisible on the world petrochemical map.

The Russian petrochemical industry is mainly dominated by large companies, and its main players are Sibur, Rosneft, Lukoil and Gazprom. Historically, these and other Russian companies have underinvested in petrochemical production capacity, preferring to export crude oil and primary refined products.

The present report is reviewing Russia's petrochemical industry before looking into opportunities for cooperation between Iran and Russia in this sector.

The petrochemical sector in Russia, unlike the upstream oil and gas sector, has not grown much, and it mainly supplies basic products. However, the Russians have a well-formulated plan for their petrochemical industry. Russia's Ministry of Energy, which governs the petrochemical sector, has considered plans to build several petrochemical hubs. Building infrastructure such as pipelines and railwaysis part of the planning. The current standing of the petrochemical sector in the Russian economy is relatively average. The share of this sector in gross domestic product (GDP) does not exceed 1.6%. Moreover, investment in this sector is less than 3% with tax revenue from the petrochemical sector at 1-2%.

Petchem Clusters in Russia

The existence of huge gas resources in this country has facilitatedoperation of important projects in this sector for Russia. Big natural gas projects have been built in Yamal over the past decade. The far northern peninsula that stretches into the Arctic Ocean has vast reserves, and thousands of kilometers of pipeline have been built to connect the area with markets in Europe.

But following its full-scale onslaught on Ukraine, sanctions have put a halt to the gas flows.

Russia has no longer a European market for its pipeline gas, and Moscow is grappling with what to do with the abundant energy that now is "stuck" in the Arctic.

According to a document, a so-called roadmap approved by government on the 16 May, a major development of new petrochemical plants is outlined, and the Yamal Peninsula is a key priority region.

In a government meeting recently, Prime Minister Mikhail Mishustin summoned key ministers to discuss what he sees as prospective way to use the excessive gas - the development of petrochemical industry.

"On the instruction of the Head of State, the government is expanding its support for the development of petrochemical clusters in the Arctic zone, in the immediate vicinity to the resource base," Mishustin said.

"This decision will have a multiplicative effect on a whole range of related industries and will help trigger long-term economic growth," he underlined.

Mishustin and his government are in a hurry. Already by the end of 2023, key measures in the roadmap are to be executed. By July 2024, a more comprehensive plan for the development of petrochemical industry in Yamal is to be presented. And by year 2025, Russia's production of polymeric materials is to be increased by more than 30 percent to 9.9 million tonnes.

In the study entitled'Russian Petrochemical Industry: Any Changes Coming Up?' VYGON Consulting experts analyzed the international experience of petrochemical industry development and studied the possibility of its application in Russia. The authors considered the peculiarities of the tax regulation of the domestic petrochemical industry, investigated the impact of the tax maneuver on the entire industry, individual producers, and evaluated the investment and operational efficiency of projects for different types of raw materials.

The study proposes the concept of a comprehensive system of industry stimulation. It covers not only petrochemicals, but also the whole chain - from extraction of raw materials to production of final products. The key principles of the concept are a balanced system of subsidies by types of raw materials and types of products, as well as taking into account the interests of all industry players.

Rosplast 2023

Rosplast is the leading actively developing exhibition that demonstrates modern equipment, various materials and technologies for recycling and production of plastic goods.The 13th International Exhibition of Machinery and Materials for Plastics Industry was held during6-8 June. This is a leading trade fair where exhibitors from Russia and East Europe display their products in the plastic industry. Iran showcased a strong presence at Rosplast 2023, as the two countries are developing strategic cooperation in the oil sector. Iran and Russia recently signed a series of agreements in Tehranfor further cooperation.

At Rosplast 2023, Iranian companies exhibited their achievements in a number of booths, offering knowledge-based products. The head of Iran's National Petrochemical Company (NPC), Morteza Shah-Mirzaei, and Iran's Ambassador to Moscow Kazem Jalali as well as a group of Iranian MPs oversaw the inauguration of Iran's pavilion at Rosplast 2023. The high-quality products with competitive price turned out to be attractive to visitors and Russian companies. Five top Iranian petrochemical companies – Arya Sasol, Maroun, Shazand, Amir-Kabir and Tabriz – alongside private petrochemical companies put on display their knowledge-based and innovative products. Given the long history of Iran's petrochemical industry, Russians are keen to benefit from Iran's experience and technology. Shah-Mirzaei said Russia was no rival to Iran in the petrochemical sector, as is wrongly imagined. He said Russia was a major buyer of Iranian catalysts and equipment. He added that Iran and Russia could be good partners in the petrochemical industry.

Iran Ready to Aid Russia Petchem

Addressing a forum of Iranian and Russian petrochemical industry managers, Shah-Mirzaei said Iran was planning to record a jump in the petrochemical industry. He invited Russian and other investors to invest in new projects in Iran. He highlighted Iran's experience in skirting around the US sanctions, adding: "By implementing investment projects, Iran would raise its

installed petrochemical production capacity from 92 million tonnes to 140 million tonnes. After that, under a six-year plan, this capacity would increase to 200 million tonnes." "Relying on its experience gained against the backdrop of sanctions and having access to high seas, sitting atop 1,100 billion barrels of hydrocarbons and its human resources, Iran prioritize its friendly and allied nations with regard to attracting investment into the petrochemical industry," he said. "At the beginning of the Islamic Revolution, Iran's petrochemical production capacity stood at 1.5 million tonnes a year, which depended on foreign expertise. But today, our own experts have brought this figure to 92 million tonnes," he said. Shah-Mirzaei said Iran was ready to provide technical and engineering services to Russia and exchange chemicals and catalysts with this country. "Fortunately, under the aegis of MOUs and agreements signed between Iranian petroleum industry companies and Russian sides and with the promising potential for tens of billions of dollars in investment, a favorable opportunity has been created for Russian investors to get involved in the upstream, midstream and downstream sectors of the petrochemical industry," he said. Regarding Iran-Russia petrochemical cooperation, he said: "Our studies show that Russia can export some of its surplus petrochemical products like styrene and polypropylene to Iran in return for importing technical and engineering services in the technology and catalyst fields." Iran's long-term strategy is based on cooperation with friendly and neighboring nations in the oil, gas and petrochemical sectors as well as technological development, he said. "Iran's rich oil and gas reserves, proximity to high seas, easy access to export markets like India, China, East Asia and Africa, specialized manpower, locally developed technologies, domestically-manufactured commodities and equipment for the petroleum industry and low cost prices are among advantages of investment in Iran," said Shah-Mirzaei, adding that the 13th administration has made necessary arrangements for foreign investment in the country. For his part, Jalali said Iran's state and private sectors were ready to upgrade cooperation with Russia in the fields of technology and commodity supply. "In 2022, the volume of exchanges between the two countries reached $5 billion, which would increase to $8 billion in two years," he said.

Iran Petchem Potential

Jalali said Russian companies had got to learn about Iran's potential in the petrochemical sector, adding that proper opportunity had been created for better cooperation between the two sides.

He said Iran had diversified the basket of its products delivered to Russia. "Until last year, we merely exported agriculture products to Russia, but now there is cooperation and interaction between Iran and Russia in various sectors including petrochemicals and technology." He recalled cooperation in the medical sector, adding: "Russia has a big market, which requires big work. Iran is also a big market for Russian goods, while it can itself supply a wide spectrum of products and equipment. That creates potential for cooperation between the two countries. Of course, there are some obstacles in the way, which would be overcome soon."

Jalali said Iran's presence at Rosplast 2023 was indicative of the strong presence of its petrochemical industry in Russia. He said Iran's petrochemical industry is well recognized in the world, adding that it may fail in some cases to meet growing demand. He termed Iran's presence at Rosplast a god opportunity, adding: "Presence in Rosplast has several advantages for Iran's petrochemical industry. The first one is expansion of market and customers in Russia and the second one pertains to joint investment with exhibitors." "The third advantage is Iran's startling capacity in the petrochemical sector. Many Russians were not familiar with this sector and therefore there was no cooperation in it. Now due to sanctions, they have learned about Iran's capabilities and there is a chance for cooperation," said Jalali. "A large number of companies took part in this exhibition and good agreements were signed, which we hope would come to fruition," he added. Jalali said one had to be grateful to the petrochemical sector because Iran is now recognized in the world for its petrochemical industry. He said that petrochemical companies had taken major strides in expanding the market in Russia although they had already a big market in the world. "Russia enjoys proper capacity for market expansion and we have to accelerate cooperation in a bid to win a bigger share of the market," he said. Dozens of MOUs were signed between Iranian and Russian companies during the three-day event.

Catalyst Export

In line with the 13th administration's energy diplomacy, Iranian catalysts have been exported to neighboring and regional nations. Shah-Mirzaei said: "Russia is among nations that successfully used Iranian catalyst at its petrochemical plants and then ordered more." "The Russians never imagined that Iranian catalysts would have such high quality because Chinese catalysts have failed to function at petrochemical plants' reactors there. They finally saw that Iranian catalysts could rival the best in the world due to their high quality. It seems that the accelerating trend of development of ties between Iran and Russia in the petrochemical sector in the light of emphasis laid by the two countries' leaders on broader economic ties and adoption of a roadshow for oil cooperation between Iran and Russia has created good changes for petrochemical actors in both countries. Given Russia's status as one of the top suppliers of oil and gas in the world, upgrading cooperation between Iran and Russia in the energy sector is a must. As a political tool, energy may clear the way for economic development and also boost national interests. Iran has always favored increased ties with Russia in the energy sector. Ahmad Assadzadeh, deputy minister of petroleum for international affairs and trading, said Iran and Russia could cooperate in the energy sector.

Centrica Expands UK North Sea Gas Storage Capacity

Centrica has enhanced gas storage capacity at the Rough gas storage facility, the largest in the UK, situated 18 m off the Yorkshire coast in the southern North Sea. The complex/subsurface reservoir, converted from a former gas production center, ceased storing gas in 2017 but was reopened for this purpose last October due to concerns over energy shortages. Rough currently accounts for half of the UK's total gas storage, the company added. When it was reopened, the storage capacity was close to 30 Bcf, but following further engineering work, it can now hold up to 54 Bcf of gas.

North Sea

C-Kore Secures Brazilian Subsea Contract

C-Kore Systems recently delivered its automated subsea testing tools for a large subsea construction campaign in Brazilian waters. The C-Kore tools will be used to perform the subsea electrical verification of new umbilicals after installation. C-Kore says its subsea testing tools are used by operators and installation contractors on both installation campaigns and fault-finding operations. The Cable Monitor unit confirms the insulation resistance and continuity of the electrical lines while the Subsea TDR unit localizes anomalies along the line. C-Kore's new Subsea Optical TDR can now verify the subsea fiber optics as well.

Apus Energy to Prospect offshore Guinea-Bissau

PetroNor E&P AB has agreed to transfer its 100% interest in two exploration licenses offshore Guinea-Bissau to a special purpose vehicle owned by Petromal subsidiary Apus Energy DMCC, based in Dubai. Under the agreement, PetroNor will receive a payment of up to $85 million covering past licence costs of at least $25 million on completion of the transaction, and two contingent payments of $30 million subject to government approval of a field development plan and the subsequent achievement of continuous production.

Guinea-Bissau

Brazil

India

ONGC Adds Subsea Pipeline Offshore India

ONGC has connected a subsea pipeline to the Panna process platform, part of the offshore Bassein & Satellite Asset. The Panna-Mukta oil fields are northwest of Mumbai. According to the company, the new arrangement will save about $43,000 per day in operating costs and should also minimize production downtime associated with tanker changeovers and eliminate demurrage charges during bad weather.

VIEW

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VIEW

Australia

Rig Facing Long-Haul Assignment Offshore Australia

Transocean has negotiated a binding 16-well award for the harsh environment Transocean Equinox semisubmersible offshore Australia with a consortium of four operators. The estimated 380-day campaign could generate revenues totaling $184 million, excluding full mobilization/demobilization, and there are options that could keep the rig working in Australian waters through 2028. Work should start in first-quarter 2025 in direct continuation of the rig's previously announced five-well, 300-day commitment in Australia with an unnamed major operator. This is due to take effect early in 2024.

Hydrogen, Green and Clean Energy

Fereydoun Barkeshli
Energy Market Analyst

As the world gets closer to the 28th Conference of Parties (COP) to be held in the United Arab Emirates, competition amongst renewables in order to stay ahead of the curve intensifies. However, according to latest data and statistics released by International Energy Agency (IEA) on April 2023, energy from hydrogen is ahead compared to all other sources of energy in, as long as the rate of new investments is concerned. Though green hydrogen is still behind solar and wind in absolute term. According to the above-mentioned IEA report, total renewables accounted for 11 percent of total global energy consumption in 2022. Among these renewables: solar, wind, hydroelectric and geothermal energies, hydrogen stood last.

Unlike fossil fuels, for which large reserves are concentrated in certain countries and areas of the earth and most consuming countries are importers, renewable in general and hydrogen energy could be produced everywhere. As such we may not get involved with issues related to the geopolitical aspects of energy the way we know it today. However, as we go over, we will encounter issues related to the technology and dependence of the less industrial countries on technology and equipment to develop hydrogen and more notably green hydrogen that is less carbon emitting and fueled by other sources of renewables; namely solar or wind or tidal.

Hydrogen energy has immense potential to revolutionize the global energy landscape. Hydrogen is a versatile and clean and possibly hundred percent green source of energy that could be used in various sectors such as transportation and industry.

Hydrogen does not produce any harmful emissions when used as a fuel, making it an attractive option for combating climate change and reducing pollution that is attributed to the use of oil, gas and coal.

Hydrogen could be produced from a wide range of sources, including water, biomass and renewable electricity. This flexibility in production methods ensures that hydrogen could be sustainably sourced, further contributing to its environmental benefits.

Bottlenecks

It is also important to note and highlight the long-term storage capabilities of hydrogen, which makes it an ideal solution for intermittent renewable energy source such as solar and wind. Excess electricity generated from these sources could be used to produce hydrogen through electrolysis, which can then be stored and utilized during periods of low renewable energy availability.

Further, as acknowledged by IEA-OPEC+ workshop held in OPEC Secretariat on April 2021, hydrogen has the potential to create a decentralized energy system. With the establishment of hydrogen refueling stations and infrastructure, individuals and communities can even generate their own hydrogen, reducing dependence on centralized energy grid.

However, there are challenges to overcome for widespread adoption of hydrogen energy. These include the high cost of production and infrastructure development, as well as the need for technological advancements in hydrogen storage and transportation. I believe that one of the issues that should be discussed in COP28 in November 2023, will focus on ways and means to encourage investments on green hydrogen energy. For the time being, new investments may be pending due to the determination of governments to subsidize and support green hydrogen.

The theory of effective pain that is developed by Joe Blown refers to a situation that is called renewable and energy justice. I need to explain a bit of history. Back in 1970's when international oil prices went up, influential members of OPEC decided to create an agency called OPEC Fund for International Development (OFID). This was created to help countries that could not afford high crude oil prices. Affluent countries in the Western Hemisphere paid higher oil prices but then the oil producing countries recirculated the revenues back to the West for their requirements.

What I intend to say is that, green hydrogen, will possibly be a reality in two decades' time. A reality, yes, but possibly a "rich man" energy. Sophisticated technology and high cost precision know how may make it out of reach for poor nations that still rely on fossil fuels to drive home and cook.

Prospects for Green Hydrogen

As mentioned above the prospects for green hydrogen is promising. It is in fact so positive that some experts argue that when it comes to green hydrogen, the future is already with us.

Some key factors that contribute to the optimism and positive outlook are referred to as follows:

Climate change mitigation. Green hydrogen is considered a clean and sustainable energy carrier as it doesn't lead to greenhouse gas emissions when used. Therefore, it has the potential to

significantly mitigate carbon dioxide emissions, particularly in sectors that are difficult to decarbonize such as heavy industries, transportation and heating.

Industrial applications. Green hydrogen has various industrial applications, including the production of ammonia, methanol and synthetic fuels in industries such as steel making, chemical production and mining machineries, leading to significant emissions mitigations.

Supportive policies and investments. Many countries and regions are recognizing the potential of green hydrogen and have started implementing supportive policies and investing in its development. Governments are providing financial incentives, setting targets and funding research and development to accelerate the deployments of green hydrogen technologies. However, there are still challenges to overcome for widespread adoption of green hydrogen, such as high production costs, limited infrastructure and technological advancements and increasing investments that improve optimistic views towards global green energy markets.

In the following parts, experiences and achievements of some countries and areas of the world in green hydrogen energy production are to be reviewed.

Experience of Japan

Japan has been actively pursuing the development and deployment of green hydrogen. The country aims to become a global leader in hydrogen technology and has set ambitious targets for hydrogen production and usage. One of Japan's key initiatives is the Fukushima Hydrogen Energy Research Field, which is the world's largest hydrogen production facility. It utilizes renewable energy sources, such as solar and wind, to produce hydrogen through electrolysis. The facility has a capacity of 10 MW and may produce up to 1,200 cubic meters of hydrogen per hour. Japan is also investing in hydrogen infrastructure, including the construction of hydrogen refueling stations for fuel cell vehicles. The Japanese government has set a target of having 160 hydrogen refueling stations in 2020 (last year data), to 900 by 2030. This infrastructure development is crucial for promoting the widespread adoption of hydrogen-generated vehicles and supporting the growth of hydrogen economy in Japan. Furthermore, Japan has been actively promoting international collaboration in the field of hydrogen. Japan has now posed as a key player in hydrogen production. The role of Japan in hydrogen production could be possibly similar to the role of Saudi Arabia in crude oil production within the coming years.

Overall, Japan's experience in green hydrogen showcases its commitment to transition towards a sustainable and low-carbon energy system. The country's investments in research, infrastructure and global collaboration demonstrate its determination to become a leading player in the world hydrogen economy. In fact, Japanese Central Bank has already lowered its financial support for any future investments in fossil fuels energy in the Middle East, Africa and South America. Japan green hydrogen policy is considered an important case study for the subject in that, the country has incorporated hydrogen into its energy strategy pathway and expects to raise the percentage share of green hydrogen energy in total energy production and consumption to 17 percent. Although many analysts consider the Japanese green hydrogen impetus as too ambitious, still worth contemplation. Japan requires to invest $ 0.75 Trillion for that purpose. Private sector is the main contributor but government subsidiaries are inevitable.

EU and Green Hydrogen Energy Initiative

The European Union has also been actively pursuing the development and deployment of green hydrogen. The EU's Hydrogen Strategy, released in July 2020, aims to establish a clean hydrogen economy by 2050. The strategy sets out a comprehensive roadmap for scaling up production, reducing costs and creating a market for green hydrogen.

One of the key initiatives of the EU is the European Clean Hydrogen Alliance, which brings together industry, national and regional governments and other stakeholders to support the development of sustainable hydrogen value chain. The alliance aims to build a robust and competitive European hydrogen industry, with a focus on renewables and low-carbon hydrogen production.

The EU is also investing heavily in research and innovation in the field of green hydrogen. The Horizon Europe Hydrogen Energy Program, the EU's research and innovation framework, includes funding opportunities for projects related to hydrogen technologies. Additionally, the EU's Innovative Fund provides financial support for large scale demonstrations projects in clean energy, including hydrogen.

In terms of infrastructure, the European Union is working on developing networks of hydrogen refueling stations for fuel cell vehicles. The European Commission has set a target of 1,000 hydrogen refueling stations by 2025 and 2000 by 2030. The EU is also exporting the potential of using existing gas infrastructure for transport and distribution of hydrogen.

Furthermore, the EU is actively promoting international cooperation in the field of green hydrogen. It has established partnership with countries such as Australia, Canada, Japan and Morocco to facilitate collaboration in research, innovation, and investment in hydrogen technologies.

Overall, European Union's experience in the field of hydrogen is behind Japan.

The main reason is the addiction of most European countries to cheap and abundant gas supply from Russia and North Africa. Nevertheless, EU's climate commitments to achieving climate neutrality and transitioning to a sustainable and low to zero carbon energy system is the major driving factor to an enhanced green hydrogen supply chain system. The EU's strategies and initiatives aim to foster innovation, create a market for green hydrogen, and establish Europe as a global leader in the hydrogen economy.

Mideast and Green Hydrogen Energy

Among the Middle Eastern countries of OPEC, there prevailed a sense of skepticism and perplexing situation in so far as green hydrogen initiative is concerned. In fact, there has always been suspicions on what major oil and gas consuming countries really meant by hydrogen economy. United Arab Emirates was somehow a pioneer within OPEC and in the Middle East. However, at a later stage, Saudi Arabia pioneered the green hydrogen campaign and made some impressive inroads towards renewables in general and hydrogen energy in particular.

The country recognized the potentials of green hydrogen and developed strategies to promote its production and use. Some of the key strategies include:

1. The National Industrial Development and Logistics Program (NIDLP). The program focuses on developing a competitive green hydrogen industry in Saudi Arabia. It aims to attract investments, promote research and development and establish partnerships with international companies to accelerate the growth of the sector.
2. Renewable Energy Project Development Office (REPDO), is responsible for the procurement and development of renewable energies projects, including those related to green hydrogen. It has launched tenders for utility-scale products on green hydrogen energy. According to a 2021 annual report, project had completed and registered roughly 15 percent progress.
3. Collaboration with international partnership. Saudi Arabia has actively seeking collaboration with international companies and countries to advance its green hydrogen agenda. To this effect, the country has involved Japan, Australia and Germany to foster its green hydrogen sector.
4. Saudi Arabia has surpassed UAE on infrastructure investments for green hydrogen production and distribution. This includes building electrolyzer facilities, hydrogen pipelines and storage facilities to support the growth of the industry.
5. Hydrogen Energy exports ambitions. Saudi Arabia is keen to keep remaining an energy exporter, from oil to renewables and to green hydrogen. It plans to leverage its existing infrastructure for oil and gas exports to transport hydrogen to global markets.

As mentioned, the United Arab Emirates too has ambiguous green hydrogen plans and several initiatives are under scrutiny. Abu Dhabi Hydrogen Alliance was formed in 2021 with the aim of developing a hydrogen economy in the Emirates. It aims to bring together government entities, industry players and research institutions to collaborate on hydrogen projects and initiatives. Several other initiatives and projects are underway but all at pilot stage. Qatar is also warming up and preparing for a post-fossil fuel era. Nevertheless, it is noteworthy that most Persian Gulf countries are preparing for a massive Public Relations campaign for the upcoming 28th COP in UAE. Green hydrogen is considered the flagship of pioneering renewable energy sources for the remaining years of the current decade. In conclusion, it is important to note that the green or gray energy provides electricity. However, electricity is not the sole energy source that humanity needs to survive and prosper with. Oil has got much more to do with the human society than electric energy. What the world needs is sustainable, affordable and secure sources of energy. Crude oil has no direct use. Crude oil is vital when it is refined and converted to several other products for which fuel is the least important of all the benefits of oil. In the meantime, it is absolutely important to emphasize that green hydrogen is costly and sophisticated to produce and process. As such the issue of energy justice and fair availability of technology is important. We do not want to see a world divided and separated between the clean energy users and not so clean energy users.

For a country to be able to develop green hydrogen, it is essential to already have or simultaneously should have developed a powerful renewable energy infrastructure. Producing gray or blue hydrogen energy as commonly referred to, that is hydrogen from fossil fuels is not quite and sustainable and desirable, since it's not pollution-free and besides, lots of energy is needed to produce hydrogen. This is a problem that most developing countries and oil and gas producing nations are going to encounter in the process of production and use of green hydrogen energy. As such, post-fossil fuel energy era will not bear geopolitical implications and aspects of oil and gas the way we have been experiencing during the last hundred years, but we should not witness a technological divide between the "Haves" and "Have nots" of certain phases of technology. An energy re-awakening is underway and no nation must be left out if green hydrogen is to popularize around the world. With green hydrogen, there will be almost zero-carbon emissions.

Energy; Chance for Iran-Cuba Cooperation

Cuba is among countries principally dependent on overseas to supply its energy needs. However, this Latin American nation is endowed with potential offshore oil and gas reserves whose exploration and extraction may, to a large extent, help Cuba meet its energy demand and bring an end to its imports. That is why Cuba has over years embarked on extensive efforts for exploration and drilling, signing contracts with a variety of nations. But US sanctions imposed on Cuba bar American and top European companies from investing in this country's huge oil and gas reserves. A brief review of Cuba's energy profile and Iran's progress in technical and engineering sectors indicate that the two countries enjoy significant potential for developing energy cooperation.

Shuaib Bahman

Energy Status

Oil and natural gas account for nearly 80% of Cuba's energy mix. It consumes about 145 tb/d of oil at refineries, power plants, industrial plants, gas stations, airports and households. Cuba is estimated to hold 124 million barrels of crude oil. Cuba has seen its crude oil production drop by a half due to US sanction and lack of investment and cutting edge technology. In 2015, Cuba produced over 104 tb/d of oil, which was sharply down to 50 tb/d in 2018. Therefore, Cuba had to purchase crude oil from its allies like Venezuela. But when Venezuela also saw its oil output fall in 2016, exports to Cuba were affected, leading to fuel shortage in the latter. According to a 2000 agreement signed between Caracas and Havana, Cuba settled Venezuelan oil imports by providing medical services, dispatching sport trainers and even advisors to that country. By 2015, Venezuela was supplying about 90 tb/d of crude oil to Cuba, but US sanctions on Venezuela in 2017 resulted in an output fall there. Venezuela, however, sought to help Cuba even in the midst of sanctions. It is currently exporting 55,300 b/d of crude oil and fuel to Cuba, which is below the decade-long average.

US sanctions on Venezuela not only affected Cuban crude oil imports, but also caused difficulties to Havana in terms of gasoline, gasoil, fuel oil, lubricant and cooking gas consumption, specifically because it was difficult for Cuba to offset its fuel shortage with imports at market prices as it lacks sufficient budget for that purpose. That is why Cuba has, over recent years, adopted austerity measures like limiting public lighting and switching off air conditioning at government offices.

Iran-Cuba Cooperation

Common positions on global issues have led to seeing Iran and Cuba as allies. Tehran-Cuba ties bear proof to this, as both sides are making big efforts to upgrade their ties particularly in the economic sector. Although Tehran-Cuba trade has never hit a significant level, political relations between them may clear the way for further commercial cooperation. Energy is one of the most important sectors in which Iran and Cuba are interested to cooperate in. Iran is among the world's largest oil and gas holders and producers, while Cuba is facing daily increasing demand for energy. Given the present circumstances, Iran and Cuba may cooperate in two sectors pertaining to energy issues. The first area for cooperation could be Iran's oil and petroleum products export to Cuba. Given Cuba's dependence on energy imports, Iran could be instrumental. Cuba is seeking to make up for its fuel shortage through imports from Venezuela, but increased global prices due to the Russia - Ukraine tension and Havana's insufficient fund have brought up challenges for Cuba. Due to their close and deep-seated ties, Iran and Cuba can resort to bartering trade. Cuba can meet Iran's needs in some areas like agricultural products, cereals and animal feed. It would be interesting to recall that Iran and Cuba jointly produced the PastoCovac vaccine during the COVID-19 pandemic.

The second area of cooperation could be Iran's involvement in exploration, extraction and renovation in Cuba's petroleum industry. Iran's progress in the oil, gas and petrochemical sectors could be of help to Cuba. Havana intends to reach new agreements with foreign investors on oil exploration and extraction in its Exclusive Economic Zone in the Gulf of Mexico. Cuba's need for foreign investment and state-of-the-art technologies for oil exploration and extraction could provide Iran with a proper opportunity to make a significant and effective presence in Cuba's petroleum industry thanks to its progress over recent years. Iran's successful experience in exporting technical and engineering services in the petroleum industry to Venezuela and Nicaragua has added to demand for this sector.

Cuba can definitely benefit from Iran's engineering experience in oil exploration and production. Furthermore, investment in Cuba's energy sector could provide Iran with a proper opportunity, as it would neutralize US sanctions against both nations, and add to Tehran's political and economic clout with Latin America.

Refinery Supplies Catalyst Needs Locally

Recently, a homegrown catalyst developed by the Residue Fluid Catalytic Cracking (RFCC) of the Imam Khomeini refinery in Shazand was unveiled. RFCC is one of the most important and most sophisticated operational units of the refinery, which mainly supplies gasoline, liquefied petroleum gas (LPG) and propylene. Majid Rajabi, CEO of the refinery, said as sanctions were tightened against Iran, catalyst supply became a major cause of concern for the facility. He said homegrown development of this catalyst ended Iran's dependence on foreign companies. Rajabi said a catalyst was being developed at the Reduced Crude Desulfurization (RCD) unit of the refinery, which would soon be unveiled.

Mahnaz Mohammad-Qoli

Most Modern Oil Refinery

The Imam Khomeini refinery is the most modern oil refinery in Iran. Having a refining capacity of 250 tb/d of crude oil, it is among modern refining facilities in the Middle East region. Compliance with Euro-4 standards has added to the significance of the refinery. The project to upgrade the quality of refined products at this facility with a view to maximizing gasoline production, reducing fuel oil yield and creating value-added got under way by a consortium of two Iranian companies and a Chinese one. Despite sanctions-induced pressure, the project came online in February 2013. Operation of this giant national project, which is a megaproject in the refining sector, constitutes an effective step towards sustainable development. In addition to supplying domestic gasoline needs entirely to end gasoline imports, it provides a chance for exporting gasoline and other refined products. Sulfur, propylene, normal hexane and bunker are among products exported by the Imam Khomeini refinery. An outstanding feature of this project is the 100% boost in the complexity of the refinery, which attests to enhanced productivity and profitability. Furthermore, the first RCD and RFCC units in Iran are among unique features of this project.

16 ml/d Gasoline Output

Enhancing the crude oil refining capacity of the refinery from 150 tb/d to 250 tb/d, changing feedstock from entirely Ahvaz Asmari light crude oil to a blend of Asmari and heavy crude oil from other areas, reducing environmental pollution, increasing gasoline production from 4.7 m/d to 16 ml/d, supply of polymer-grade propylene for the first time in Iran and slashing the sulfur content of gasoline from 10,000 parts per million (ppm) to below 50 ppm, as well as supplying Euro-4 grade gasoil are among the key features of this project. Supplying kerosene with the sulfur content of less than 20 ppm, production of 3 ml/d of premium gasoline, installing the heaviest integrated refining reactor weighing 1,450 tonnes, supplying granulated sulfur at 700 tonnes a day, converting fuel oil to Euro-4 gasoline at RCD and RFCC units, increasing LPG production capacity from 500 tonnes to 2,000 tonnes a day and reducing the benzene content of gasoline to comply with global standards are also highlighted in this project.

Most Complicated Unit

The RFCC unit of the Imam Khomeini refinery, with capacity of about 95 tb/d, was built to produce gasoline, LPG and light diesel. It can now produce 8 million liters of high-octane gasoline, which would be hydrotreated prior to being supplied on the market. The RFCC unit is the most sophisticated unit of the Imam Khomeini refinery. Rajabi said one of the main bottlenecks of this unit was its catalyst supply. "Imposition of sanctions against our country posed serious challenges and obstacles to sustained production by this unit. Having realized the importance of this issue and national independence with regard to catalyst production, it was developed by an Iranian knowledge-based company. That neutralized the impact of sanctions on this strategic unit. Previously, Iran used to import catalyst for the RFCC unit from China, Germany and Russia. Rajabi said that the Imam Khomeini refinery was among the leading receivers of catalyst from local companies that have supplied nearly 90% of catalysts, absorbents and chemicals. He said it was a big step towards self-sufficiency and ending dependence on foreign companies, not to mention saving hard currency and establishing a catalyst production plant. Compared with foreign ones, the catalyst developed at the Imam Khomeini refinery enjoys high quality and standards and therefore it has parameters for competitiveness.

Abadan, Isfahan Needs Supply

This breakthrough can help supply needs of other refineries like Isfahan and Abadan while facilitating the steering of gasoline production units at these refineries. In case of non-development of this catalyst, it would become risky to purchase it from overseas. Without this catalyst, gasoline production would have been slashed 8 ml/d, LPG 1,500 tonnes a day and propylene 500 tonnes a day. Rajabi said further use of the Iranian-made catalyst would help upgrade its technical parameters and lead to its branding.

RCD Catalyst

Rajabi said a homegrown catalyst developed for the RCD unit of the refinery would be unveiled soon, adding it was aimed at the planned full supply of domestic catalytic needs. For the first time in the country, a hydrotreating unit has been built at the Imam Khomeini refinery with capacity of 69 tb/d with a view to reducing the sulfur, metal and nitrogen content of residues. It would allow for converting heavy fuel oil to gasoline and lighter products. One of the most important refining processes pertains to hydrotreating processes of heavy fractions like fuel oil. Desulfurization is the process of removing sulfur from crude oil (or its fractions). It prevents contamination and also improves the efficiency of petroleum. Desulfurization removes elemental sulfur and its compounds from solids, liquids and gases. High sulfur components in crude oil has undesirable influence in the refining process because of erosion problems in pipelines and refining equipment, also its harmful impact on the environment. The essential characteristics of heavy crude oil are high viscosity, high density, high acidity and high sulfur. One of the traditional industrial methods for desulfurization is hydro-desulfurization (HDS), which is the most commonly used method in petroleum refineries for reducing the sulfur content to a minimum, but HDS method is high costs, needs high conditions of temperature and pressure, also could not remove aromatic heterocyclic sulfur compounds such as thiophene, benzothiophene, and dibenzothiophene.

1933 Concession; a Historical Review

We have heard and read a lot about William Knox D'Arcy and his team, whose endless endeavor ended in the discovery of oil in Iran. The D'Arcy Concession was the beginning of Britain's dominance on the Iranian nation's God-given wealth. It also marks the start of a new period in contemporary history which is intertwined with oil. After the Qajar dynasty was overthrown to be replaced by the Pahlavi I dynasty, the D'Arcy Concession was declared null and void, but another deal was signed: 1933 Concession. The present article aims at comparing these two concessions. The D'Arcy Concession was struck five years before Constitutionalism, under the reign of Mozaffar ad-Din Shah. It was the Qajar king who let D'Arcy and his team into Iran to pave the way for Britain's pillage of Iranian wealth.

First Oil Concession

In the midst of the conflict between the Constitutionalists and the Qajar dictatorship, the British were extracting Iranian oil and making plans for its future. But what were the Iranians getting in return for this immeasurable wealth?

Mohammad-Qoli Majid, in his book Reza Shah and Britain; Based on US State Department Documents, put it as follows: "In return, the concessionaire D'ARcy agreed to pay Persia 20,000 Sterling pounds – about 100,000 dollars – in cash, as well as dividends from 10% of shares. In addition, the concessionaire agreed to pay Persia a royalty equal to 16% of the total profit. After the expiration of this privilege, all the assets of the company, whether in Persia or outside it, will be at the disposal of the Persian government."

Although this contract was completely colonial, the insatiable appetite of the British was not satisfied with this amount. They generally tried to change some of its provisions in favor of the interests of England.

Good Opportunity

With the establishment of Pahlavi kingdom in Iran, protests rocked the country with regard to Iran's revenue from the D'Arcy Concession. Under pressure from the press and public opinion, the first Pahlavi ruler discarded the document into a fireplace in presence of his ministers. That showed the irreversibility of modifying the terms of the concession. Sir John Cadman, chairman of Anglo-Persian Oil Company (APOC), stepped up his efforts. Politico-economic developments and shuttle diplomacy pushed Reza Shah to deal with Cadman in 1933. It was the second oil concession in Iran's contemporary history. The Pahlavi regime boasted of this agreement, but what was really inside it? In the book Downfall: Proceedings of 1st Seminar on Reasons of Pahlavi Monarchy Collapse, we read: "The 1933 Concession was signed following direct talks between Reza Shah and Sir John Cadman, chairman of APOC. Pursuant to one of the important articles of this agreement, it was decided that from the beginning of January 1, 1933, for every tonne of oil that was sold for consumption in Iran or exported from Iran, APOC pay four shillings to the government of Iran and to pay about 20% of the excess of its income, and in any case, this set of payments should not be less than 750,000 Sterling pounds annually." This 4% higher payment than the D'Arcy Concession created the impression that the 1933 deal would be more beneficial to Iran. But when the developments are reviewed we notice some key points. Gholam Reza Nejati, in his Invasion: A Review of Response to History, puts it as follows: "Referring to this article, many believe that Reza Shah was able to take a big step in improving the D'Arcy contract because earlier, Iran's royalty was equal to 16% of the total profit, and this amount had been reduced many times for various reasons. This was despite the fact that the company's overall earnings had increased drastically due to the increase in operation and production, and Iran's royalty could be much more than this amount. However, Reza Shah invoked this article to cancel the Darcy Concession. He even illuminated cities to celebrate the new agreement but the real winner was Britain because the share of disadvantages in the new contract was more than its advantages for the country."

It seems that Britain had found a chance to modify the D'Arcy contract in its own favor, while creating the impression that Iran had achieved victory with regard to its oil resources. Fuad Rohani, in The History of Nationalization of Iranian Petroleum Industry, puts it as follows: "As mentioned, according to this agreement, Iran's share of oil revenues increased compared to the D'Arcy agreement. However, contrary to D'Arcy Concession's provisions, in this case, Iran's share was determined only from the profits of APOC, and the issue of Iran's participation in the interests of the subsidiaries was ruled out, and in addition, the government had no means to check the company's calculations and even obtain information about the discounts that APOC considered in its major transactions. Iran's revenue during years following the new concession did not change significantly compared with the past, and the apparent increase was the result of enhanced recovery rate and higher prices. In return for giving up its right within the framework of the D'Arcy Concession for ownership of corporate assets, Iran received no damages. However, the worst part of the agreement was the 32-year extension time."

Protests Quashed

Despite the Pahlavi regime's anti-British propaganda and celebrations in show of victory, many people learnt about the disastrous provisions of the agreement, including the 32-year extension of the D'Arcy Concession. Protests broke out, which were entirely quelled. Britain took benefit from the situation and extended its dominance on Iran's politics and economy. Jalal Madani, in The Contemporary Political History, puts it as follows: "This chapter of the agreement, i.e. 32-year extension of the D'Arcy Concession, triggered protests in various cities. By incorporating this chapter, Britain was in fact establishing a shadow government within the Iranian government. All protests to this agreement were suppressed and government officials who disagreed with more influence of Britain were purged. Teimour Tash was arrested and jailed, while Sardar As'ad and Mostofi al-Mamalek were killed. Furthermore, in the 1933 Concession, Britain earned more concessions like right to exploit mines, build railroads and ports without having to pay any sum to Iran. More interestingly, if Iran wanted to defend its rights for any reason whatsoever, it had to indemnify APOC. That shows pretty well why Britain was struggling to have the D'Arcy Concession cancelled and sign a new one. From the very beginning of Reza Shah's reign, the British had shown willingness to renew the D'Arcy Concession and had even given Iran the Indian and European telegraph lines which were in fact unnecessary due to wireless telegraph."

Although the D'Arcy Concession was torched, the aftermath of the 1933 Concession show that what was supposed to safeguard Iran's national interests ended in Iran's detriment. The D'Arcy Concession gave way to a worse deal for Iran's oil.

NIOC Employee Shines in Asian Grappling Championship

Martial arts are often attractive to sport fans. Watching martial arts, including mixed martial arts (MMA), is not the only issue. In some cases, some people choose MMA as their professional career and train themselves. Grappling is one of them. Grappling is a fighting technique as well as a full-contact combat sport based on throws, trips, sweeps, clinch fighting, ground fighting and submission holds. Grappling contests often involve takedowns and ground control, and may end when a contestant concedes defeat. Should there be no winner after the match time-limit has lapsed, competition judges will determine the winner based on who exerted more control. The Asian Grappling Championship competitions were held in Kazakhstan June 21 – 24. Iran finished second with 82 points. Erfan Anvari was among participants. He won a bronze after overpowering his Indian rival. He's an employee of National Iranian Oil Company (NIOC). He says he would have won the gold had he not had a shoulder injury. The following is the text of his interview with "Iran Petroleum":

Would you please tell us briefly about you and your sport activities?

I was born in 1988 in Savadkouh, Mazandaran Province. I got my BSc in electronic engineering and MA in management. I was 15 when I professionally started martial arts. I became a judoka and I participated in provincial, student and national matches and achieved success. Although I was active in judo, this discipline faced some challenges and some of its matches were not held and that made me not to fully concentrate on it. Judo is known to be a heavy discipline at the global level and strong rivals like Russia, France and Japan are always competing. And of course, Iran has not achieved any important place in this discipline in the world. I was finally attracted to jiu-jitsu kobudo, which is a combination of karate and judo but with a different way of scoring. I also competed in "alysh" and belt wrestling. During my military service, I ranked the third in police Greco-Roman wrestling matches.

When did you start your grappling career?

In 2013, I moved from Mazandaran to Tehran as I was hired by NIOC. As I had come to a new environment, I was not active in professional sport. Before that I had won championship titles in jiu-jitsu. I chose for grappling in 2016, but due to changes in career and my marriage, I didn't have much time for professional exercise. I was far from sport for some time before deciding last year to be ready to take part in jiu-jitsu matches in Brazil. Fortunately, life conditions turned out to be such that I was able to return to championship sports. In the last 6 months, I even lost nearly 14 kg. Further, due to the presence of my brother as the head coach of the national grappling team, I participated in the selection competitions and was authorized to participate in the Asian competitions and win the bronze medal of this competition in grappling. Due to the severe shoulder injury I had in the qualifying competitions, I was only able to win a bronze medal in this competition. Previously, a world gold medal was won by Vali Fahimi and a silver medal by Jafar Ansari in the past years, but after a few years, Iran was able to appear again in these competitions and won 2 gold, 2 silver and 4 bronze medals. That put Iran in the second place.

Could you tell us about grappling in Iran?

Grappling is a fusion of judo, wrestling, freestyle wrestling and Brazilian jiu-jitsu, the grappling discipline is under the supervision of the World Wrestling Union, which covers seven disciplines overall. In Iran, it should be under authority of the Wrestling Federation, but it is classified under martial art. This lack of coordination has caused the federation to not provide much support for these disciplines, and the athletes active these disciplines have to pay personally to attend the sports fields. Due to the fact that the federation has not allocated a significant budget in this field, whatever field is under the federation's portfolio, the expenses will undoubtedly be lower and the support will be increased.

What are the characteristics of this discipline?

If I want to talk about the attractiveness of grappling, I have to compare it with football, which is always attractive. Besides that, some martial arts such as MMA or grappling have received much attention and the athletes of these disciplines are well supported. I hope conditions will be created to support athletes in such fields. The age limit for grappling in championship is 43. This discipline requires high level of intelligence, and overpowering the rival by putting pressure on the muscles and joints in the opposite direction requires high physical strength and endurance.

Do you plan to take part in forthcoming global matches?

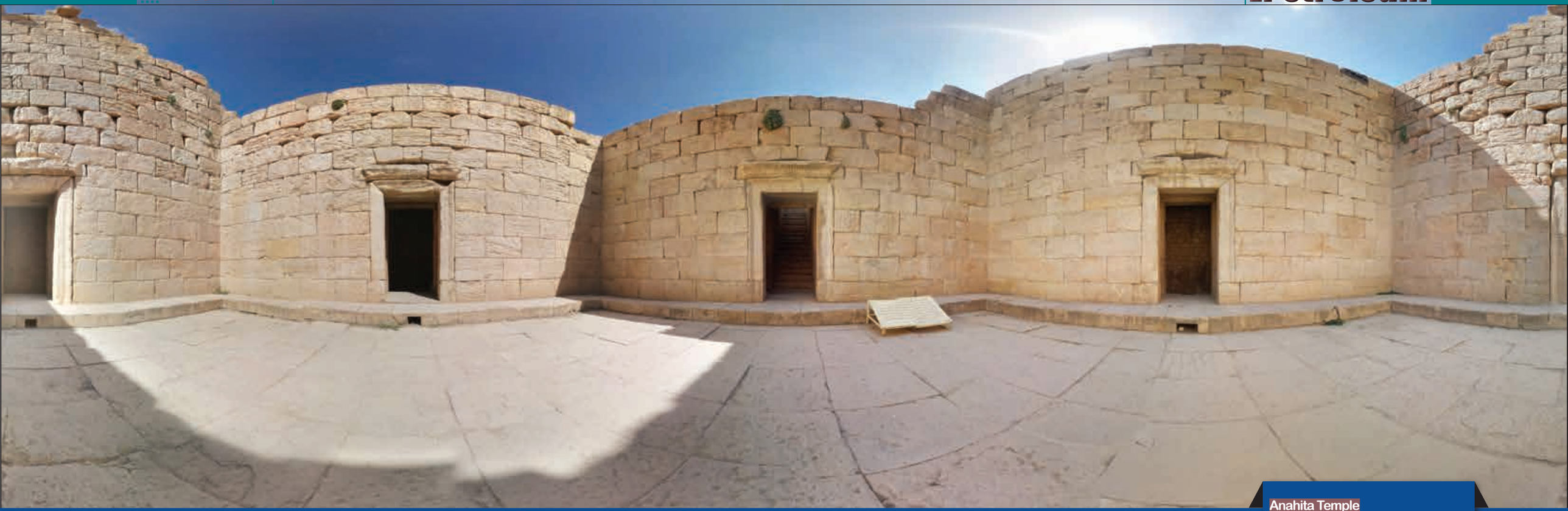
Due to my injury, the tournament will be held in a month and I will not be able to participate. Of course, the other issue is that there will be opponents from Zionist Regime in two weights of these world championships, and I don't want to face an opponent from this occupying regime. Currently, my main plan is to participate in Asian and World competitions next year. In November 2023, we have the Emirates BJJ or Brazilian Jiu-Jitsu World Championships ahead of us, and I will do my best to qualify for these competitions. It is interesting to note that this field is also very popular among women and strong teams of women participate in world competitions. Of course, women are not very familiar with this field in Iran.

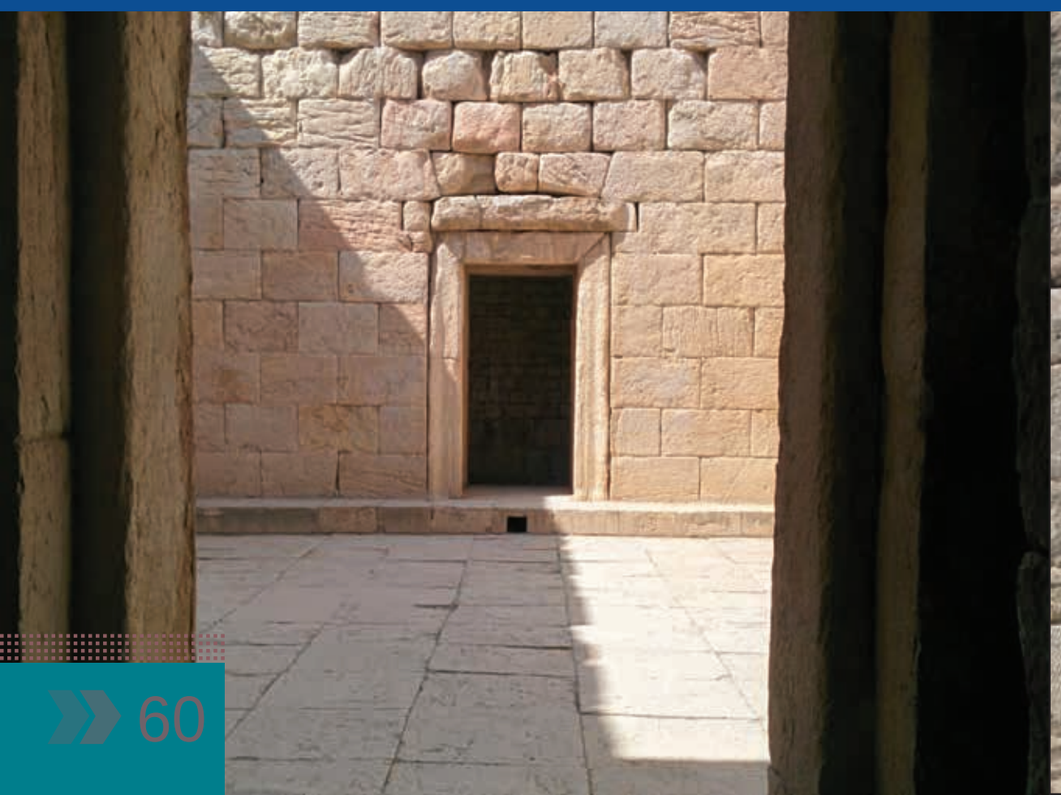
How do people see Iran's second place in grappling?

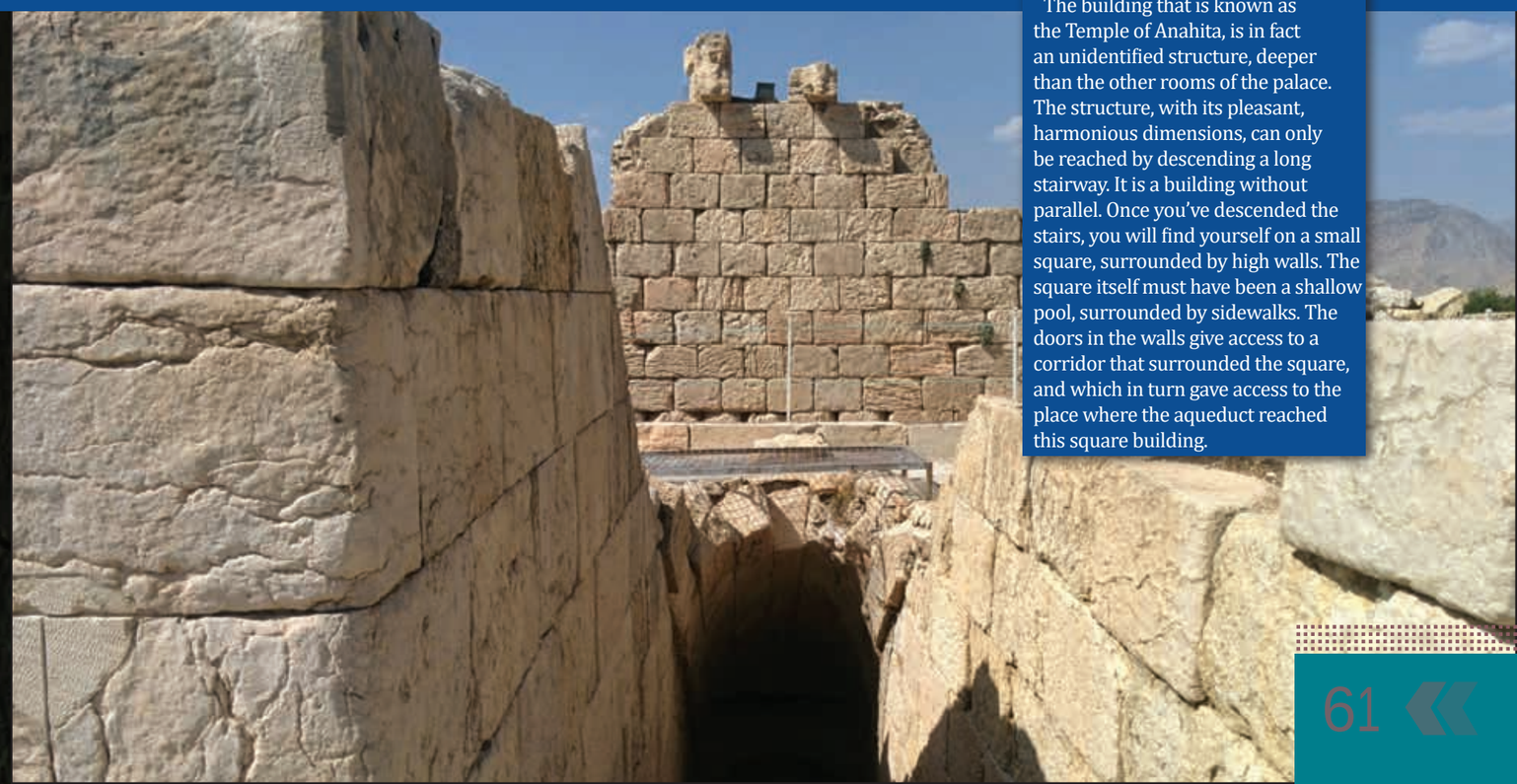
As I mentioned, this sport is not well known and it takes time to introduce it, but it is also very good. When we were at airport in Istanbul, people were happy that Iran had finished second in Asia for the first time, and they took photos with the trophy. And one more point is that my brother Amir Abbas was chosen as the top Asian trainer.

Bishapur, Symbol of Sassanid Triumph

Bishapur was built in 266 AD at the order of Shapur I (240-270). There were people living there up to the 14th century. According to inscriptions, Shapur I of the Sassanid dynasty had ordered the establishment of a city on the road connecting Persepolis to Ctesiphon. That came after Shapur I defeated Valerian, the Roman Empire. The road used to connect Ctesiphon to Susa during the reign of the Achaemenid dynasty. Bishapur is now located northwest of the city of Kazeroun in Fars Province in southern Iran.







Anahita Temple

The building that is known as the Temple of Anahita, is in fact an unidentified structure, deeper than the other rooms of the palace. The structure, with its pleasant, harmonious dimensions, can only be reached by descending a long stairway. It is a building without parallel. Once you've descended the stairs, you will find yourself on a small square, surrounded by high walls. The square itself must have been a shallow pool, surrounded by sidewalks. The doors in the walls give access to a corridor that surrounded the square, and which in turn gave access to the place where the aqueduct reached this square building.

Shapur Cave

Shapur Cave is located in the Zagros Mountains, in southern Iran, about 6 km from the ancient city of Bishapur. This cave is near Kazeroun in Chogan valley, which was the site of polo (Persian for Chogan) during the Sasanian period. In the cave, on the fourth of five terraces, stands the colossal statue of Shapur I, the second ruler of the Sassanid Empire. The statue was carved from one stalagmite. The height of statue is 7 m. and its shoulders are 2 m. wide, and its hands are 3 m. long.

Bishapur Columns

These columns are located in the city center at the intersection of two main roads. Famous French archeologist Roman Ghirshman has said people used to distribute donations there. These columns are significant because the historical document of urbanization in Bishapur is engraved on one of them in Ashkanid and Sassanid scripts.

Iran Petroleum

If you have any comments

regarding the articles in this magazine, please feel free to contact us through e-mail.
Your views are appreciated

PetroleumMinistry-PublicRelations

Thank you for reading Iran Petroleum

iranpetroleum.pr@gmail.com

Kazeroun,
Statue of Shapur I