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Billion-Dollar Oil and Gas Projects Underway

Iran Key Energy Role Undeniable

Investment Key to Sustained Exports

Ali Forouzandeh
Director General of Public Relations

The surge in Iran's crude oil exports and associated income settlement under the 13th administration has materialized owing to the Ministry of Petroleum's effective and active energy diplomacy in neutralizing sanctions and finding avenues for capacity building. Minister of Petroleum Javad Owji recently said that Iran's oil production capacity had grown 40% in two years, noting that 67 projects worth $15 billion would come online by next March to increase oil and gas production.
At the start of the 13th administration's term in office, Iran was producing 2.2 mb/d of oil, which has now risen to 3.4 mb/d. Iran's oil exports have increased as well, despite sanctions being in effect.
Iran's oil production and export growth are highly valuable against the backdrop of sanctions. However, it is necessary to absorb as much investment as possible and use cutting-edge technology. To that end, Iran would need to absorb $160 billion in investment, two-thirds of which would be provided by foreign sources. That investment would be needed for Iran to bring its production from the current 4 mb/d to 5 mb/d and its gas output from the current 1 bcm/d to 1.5 bcm/s by March 2030.
The Ministry of Petroleum has held talks with foreign companies over the past two years to attract investment while sweetening the terms of oil contracts. The ministry has also sought to introduce opportunities to investors.
National Iranian Oil Company (NIOC) currently has $50 billion of oil and gas projects underway. It plans to operate another $33 billion of projects. It is planning to hold a conference soon to introduce 100 opportunities for investment in oil and gas reservoirs.

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Iran Key Energy Role Undeniable

Moscow hosted Russian Energy Week from 11-13 October, focusing on the new reality of energy in the world. Iranian Minister of Petroleum Javad Owji visited the Russian capital to attend the event. On the sidelines of the event, Owji met with Russia's top official Alexander Novak, and some Russian oil and gas industry CEOs. He also held talks about Russia's potential contribution to feasibility studies for developing three Iranian oil fields. Owji highlighted a 40% increase in Iran's oil production capacity in the past two years, saying: "Iran offers the most secure and least expensive route for energy transport to the high seas. The world cannot deny Iran's key role in the energy sector." The Russians showed an inclination for investment in Iran's petrochemical sector. Iranian knowledge-based companies last year exported $9 million worth of catalysts to Russia. A key topic of discussion between Iran and Russia was for Iran to become a gas hub. Iran currently owns the world's largest oil and gas reserves combined. Furthermore, its strategic position, access to the high seas, and availability of energy infrastructure empower the country to play a key role in the global energy market. Although Iran's petroleum industry is under sanctions, the fact about Iran's huge reserves, as well as the geopolitical and geostrategic position of Iran could not be denied. Addressing the event in Moscow, Russian President Vladimir Putin touched on Tehran-Moscow talks for boosting energy exchanges. In his talks with Novak, Minister Owji called for practical steps to establish an Iran-Russian gas hub on the northern coasts of the Persian Gulf. Meantime, CEO of Gazprom Alexey Miller told Owji his company would be ready for new cooperation with Iran. Iran has ramped up its oil exports in recent months although oil sanctions were still in effect. Over the past two years, the Ministry of Petroleum has held talks with foreign companies for investment in the petroleum industry. The terms and conditions of oil contracts have been sweetened to attract potential investors. Owji said Iran had enhanced its oil production capacity by 40% over the past two years, adding that 67 oil and gas production projects, valued at $15 billion, would come online by next March. "Given post-covid growing demand for fossil energies, we have made sufficient investment in oil and gas production to secure energy supply and provide welfare to people," he said. Noting empathy among OPEC+ members, he said: "OPEC decides policy lines concerning supply in a way to help market stability and oil prices in the world." Citing an OPEC report, he said global oil demand would reach 16 mb/d by 2045, adding: "It shows the significance of energy carriers in the global economic growth." "Iran and Russia may benefit from their common potential to defeat sanctions and become influential in the global energy market," he said. Owji said that downhole equipment and pumps installed in Khuzestan Province were among the cooperation projects between the two nations.

Iran Safest Route

Referring to Russian President Vladimir Putin's remarks on ties between Tehran and Moscow, the Iranian minister said: "In my capacity as the chair of the Russian-Iranian Business Forum, I make efforts for broadening strategic cooperation in various sectors of energy while supporting cooperation between Iranian and Russian ministries, organizations and companies."

"A historical opportunity has come up for the two countries to get closer together," he added.

"Iran-Russia cooperation not only would help both nations grow, but it would also prepare the ground for the prosperity of other nations in the region," Owji said.

"I'm sure if we cooperate further the trend of cooperation will pick up speed. Without exaggeration, unjust sanctions against Iran and Russia have been strengthened in many sectors," he added.

New Order

Owji said: "We view these sanctions as a big and historic opportunity for further rapprochement in all aspects and we believe that we need to benefit from these opportunities to establish a new order in economic interactions."

"All these achievements have been made under unjust sanctions and maximum pressure. Relying on self-confidence, we have managed to overcome these problems," he added.

The minister noted that Iran-Russia cooperation has not been without obstacles, saying: "Both sides have faced numerous challenges including sanctions pressure, but due to unflinching determination and endeavor we have found innovative solutions to overcome these obstacles."

"Iran and Russia have demonstrated how strategic alliance and cooperation can help overcome challenges. By benefiting from strengths and sharing expertise and technology, we have managed to expand cooperation in the energy sector," said Owji.

He said sanctions could not prevent Iran's economic growth and progress, adding: "During the first quarter of the current calendar year, Iran's oil and gas sector grew 19.8%, an achievement made under tightened unjust sanctions and maximum pressure."

The minister boasted improvement in the indexes of Iranians' access to energy over four decades, adding: "Currently, all Iranian cities and more than 85% of villages are connected to the natural gas grid and gas coverage rate in rural and urban areas totals 90%."

Undeniable Role

Minister Owji described Iran as the most secure and least expensive route for energy transport to the high seas, adding that the energy world could not ignore this key role.

"In addition to energy resources, Iran enjoys favorable geographical conditions; it lies at the intersection of Asia and Europe and is the only integrated land route linking the Caspian Sea and the Persian Gulf," he said.

"The countries surrounding us are oil and gas exporters or importers, which would facilitate Iran's future role as the energy hub," he added.

"By benefiting from its natural resources and northern neighbors, Iran may become the main energy trading actor in the Middle East and become the main gas hub," said Owji.

Touching on gas exports, he said: "Iran is currently exporting natural gas to Turkey and Iraq. Pakistan, India, and Oman are Iran's potential gas buyers. In addition to natural gas, crude oil, petroleum products, and petrochemicals have created a privilege for Iran."

"Export and import terminals, oil and gas pipelines indicate Iran's great potential to become the energy hub in the region," said the minister.

Regional Stability

Owji said Iran-Russia cooperation would not be limited to economic advantages, adding: "Such ties would boost mutual understanding and may help regional and global stability, not to mention they would clear the way for further cooperation in other sectors. The partnership between them can overcome existing challenges, while creating new opportunities which would finally help Iran, Russia, and the international community."

"Free and apolitical investment, jointly benefiting from technology in the development and utilization of resources of both countries is an essential obligation for both nations. Sharing experience in human resources training, and working out financial mechanisms in energy cooperation for facilitating and accelerating bilateral financial transactions would become possible through a partnership between the private and public sectors, which would be necessary for the completion of the value chain in the energy sector of the two nations."

"Iran has 15 neighbors, 12 of which are oil and gas-rich countries. Iran has a 1,880 km of water border, linking it to the high seas via the Gulf of Oman and the Persian Gulf. Many oil and petroleum products suppliers don't have such an advantage and they need it for exporting their oil and petroleum products," said Owji.

Attractive Contracts

Owji said: "Suitable territorial location and resources, geo-economic and geopolitical advantages, as well as expert manpower and access to inexpensive feedstock and technological knowhow, have made Iran attractive to investors in the oil and gas sector. Thanks to its supportive legal mechanisms, it secures investment."

The minister invited foreign investors to get involved in oil and gas projects in Iran, adding that the terms and conditions of contracts in Iran are desirable to prospective investors.

He noted that oil and gas trading should be separated from political ties. "As much as the world can succeed in depoliticizing global energy markets, particularly oil, it may boost global security," he said. "Economic development requires access to reliable and affordable energy. Iran-Russia energy cooperation may help regional synergy and peace and stability in regional nations."

Billion-Dollar Oil and Gas Projects Underway

Iran's oil production has seen a 1 mb/d surge in two years to reach 3.4 mb/d, as a result of which Iran became OPEC's third-largest producer, just behind Saudi Arabia and Iraq. With oil sanctions still effective on Iran, capacity building for oil production, overhaul, new marketing, and finding new customers among other measures have contributed to increased oil production and export by Iran. The Ministry of Petroleum has also tried its best to introduce opportunities for investment in Iran's petroleum industry. Minister of Petroleum Javad Owji said last July that Iran had sweetened the terms of oil contracts for developing oil and gas fields. Iran plans to raise its oil production capacity to 5.5 mb/d by 2029 from the current 4 mb/d. As far as natural gas is concerned, Iran targets 1.5 bcm/d, up from the current 1 bcm/d. Realizing these objectives would require $160 billion in investment, two-thirds of which should be provided by foreign investment. National Iranian Oil Company (NIOC) is currently operating $50 billion of oil and gas projects while eying $33 billion more. Mohsen Khojasteh-Mehr, the CEO of NIOC, recently said: "We intend to enter into negotiations for cooperation with insurance industry actors well beyond service provision." Enumerating the attractions of investment in the oil and gas sector to insurance agencies, he said: "Iran stands first in the world in terms of oil and gas reserves combined." He said Iran sits atop 340 billion barrels of oil equivalent, adding that there are also unknown reserves. Khojasteh-Mehr said the rate of recovery from oil fields was 25% and from gas fields 70%. The figures provided by the NIOC chief are indicative of the high attractiveness of investment in this industry for both local and foreign investors.

Pre-Sanctions OPEC Ranking

Khojasteh-Mehr said Iran had regained its pre-sanctions OPEC ranking, adding: "Iran's oil production stood at 2.25 mb/d under the former administration, which has now increased to 3.4 mb/d."

He said Iran would experience a new surge in its oil output by the end of the current calendar year, as well as during the next calendar year.

NIOC, he said, is trying to boost investment in oil and gas production. "Attracting $160 billion in investment by 2029 would require coherent planning and cooperation with businesses."

He said that for the first time, the insurance industry would get involved in contributing to investment in the petroleum industry.

Khojasteh-Mehr said the brilliant record of cooperation with banks in developing oil and gas fields in Iran despite international sanctions barring investment has persuaded NIOC to seek investment from the insurance industry.

He said that Tehran would host a conference to introduce opportunities for investment in 100 oil and gas reservoirs.

Noting that Iran's economy is mainly oil-driven, he said: "Our objective is to have a logical look at investment and make investment conditions attractive. Therefore, we can first introduce risk-free opportunities to insurance industrialists."

NIOC's first meeting with monetary market actors and banking network was held in February 2022, during which expert and management-level talks were held. The result was the formation of Dasht Azadegan Arvand Co. (DAAC) with $7 billion in capital to develop the giant Azadegan oil field. Eight banks and two E&P companies have formed DAAC.

Lucrative Projects

Reza Dehqan, the deputy CEO of NIOC for development and engineering, said one of the most important projects would be the development of Phase 11 of the massive South Pars gas field, which started production last August, after 20 years.

"To complete development of SP11, $2.4 billion in investment is needed," he said.

He said that $500 million in investment was envisaged to complete some South Pars wells, adding: "Furthermore, 35 wells would be drilled in South Pars with $1.1 billion investment to prevent gas migration."

Other NIOC plans for enhanced gas production include building gas compressor stations in South Pars with a $15 billion investment, development of Phase 1 of the Kish gas field with a $930 million investment, development of the Belal gas field with a $440 million investment and the Farzad B field with $1.8 billion investment.

In total, $22 billion worth of projects are underway in Iran to increase gas output, said Dehqan. "Currently $36 billion worth of 14 projects are underway for increasing gas production by building gas compressor stations and developing the Khartang, Madar, and Tous gas fields."

The projects underway by NIOC total $20 billion, including $1.4 billion South Azadegan field, $2 billion Sepehr and Jofair fields, $3.8 billion Yadavaran field as well as 33 enhanced oil recovery projects worth $5.8 billion.

Dehqan said 7 gas projects, worth more than $15 billion, would be implemented in the future to enhance gas output from Salman, Golshan, Lavan, and North Pars fields. As far as enhanced oil recovery is concerned $18 billion investment would apply to the development of Azadegan, Arvand, Darquain, Mansouri, Ab Teimour, Dehloran, and Susangerd fields.

He said the contracts would not be limited to the Iran Petroleum Contract (IPC) model, adding the mix of contracts also included EPCF, EPDC, BOO, BOT, and buyback.

Noting that 10 IPC contracts were in effect, he said: "These contracts have been fruitful and 8 more IPC deals are under negotiation."

Explaining details of IPC deals to insurance industry actors, Dehqan said: "In this type of contract, the interest of both parties is consistent and every oil barrel would mean higher revenue."

"If you're ready we can go through this process together," he said.

Amir Moqiseh, director of investment and business at NIOC, said: "IPC contracts received a big welcome in the upstream oil industry and we can describe it as the most successful."

Referring to developments in the petroleum industry contracts, he said: "There is a wide spectrum of contracts including buyback for investment. Most of the oil and gas deals currently effective, including at South Pars, are buyback. $37 billion buyback deals have been signed."

He said IPC deals, which have taken effect in Iran since 2017, have proven to be successful.

He said the advantage of IPC deals was that they take into account development, production, engineering, and technology as investors would gain revenue from production.

"The investors' proceedings depend on their performance. No ceiling is set in such contracts and the investor would gain more as more production materializes," said Moqiseh.

He said that investment would be recouped by revenue from the field, thereby being independent of the national budget and free of any risk.

IPC terms can be modified as long as the contract is in effect in a bid to guarantee higher and faster production. The IPC parties, i.e. NIOC and the investor, would share both profits and losses. IPC contracts are effective for at least five years.

New Contractual Framework for Low-Yield Wells

The average output of Iranian oil wells is 1.55 tb/d. Since the bulk of oil wells in Iran have already reached the second half of their lifecycle and would continue to see their production fall, the National Iranian Oil Company (NIOC) decided in 2021 to engage local technological companies to rehabilitate shut-in and low-yield wells. Amir Moqiseh, NIOC's deputy director of investment and business, has said rehabilitation of each well would require $1 million, adding that a new model of contract, similar to the "Iran Petroleum Contract" (IPC), has been designed for low-yield and inactive wells. Iran's oil production capacity has reached 4 mb/d. Currently, 64% of Iranian oil wells are running without applying mandatory production cuts. According to NIOC data, 1% of wells are under workover, 18% are shut in, 2% remain suspended and 15% are mothballed. Ali Barati, NIOC deputy director of supervision on oil and gas production, said about 15% of current oil wells could be rehabilitated. He added that rehabilitating low-yield wells would raise average output in coming years.

Mohammad Esmaeil Kefayati, the director of Petroleum Industry Innotech Park, said when the idea of rehabilitating low-yield wells was brought about two years ago, many were quick to think it was impossible. "But today, we see that in light of NIOC's reliance on local researchers and knowledge-based companies, it has become the largest knowledge-based project in Iran's petroleum industry," he said. "In our view, if we can rehabilitate even a single well, it would be a breakthrough. But we think numerous wells could be rehabilitated."

Rehabilitation candidates were screened and finally, 100 oil wells were shortlisted and introduced to knowledge-based companies. Referring to processing and transport facilities near low-yield oil wells, he said: "As soon as oil production increases by these wells, the extra output would be soon consumed locally or exported." NIOC would first introduce oil wells destined for rehabilitation to technological companies and then Innotech would agree with knowledge-based companies for rehabilitation agreements. So far 8 agreements have been signed for the rehabilitation of low-yield wells, three of which have come into effect. Recently, 9 more low-yield wells were put out to tender for rehabilitation by knowledge-based companies.

Attractive Project

Moqiseh said rehabilitation of low-yield oil wells was attractive to technological companies. That is why they have offered their bids during NIOC's four foreign licensing rounds. Currently, 4,000 oil wells are producing oil in Iran. In the first phase of rehabilitation, NIOC studied 750 wells, only to conclude that 100 wells could be rehabilitated. The average investment envisaged for rehabilitating each well is $1 million. Moqiseh has estimated that the rehabilitation of 750 wells would earn Iran $3 billion in revenue. How are contracts signed for rehabilitating low-yield and shut-in wells? Moqiseh said this contractual framework is the first VC in the upstream oil industry with no role for NIOC in designing the details. He said that the Economic Council had envisaged good support for technological companies operating such projects, adding that figures may be revised to raise wages based on oil price hikes. The economic and technical model is up to NIOC. The Directorate of Investment and Business is tasked with drawing up the text of the contract, while the Directorate of Supervision on Production is in charge of technical issues. Meantime, steering the project is up to Innotech. Barati said the new contracts represented a good chance for Iranian technological companies because scientific centers have been developing technology for years, but nothing is seen in the petroleum industry. He added that knowledge-based companies were facing an exceptional opportunity. One reason why NIOC is seeking to benefit from the capacity of knowledge-based companies is to use their creativity and innovation in rehabilitating low-yield and shut-in wells. "Knowledge-based companies are not supposed to pursue the same old method. They can apply modern and creative methods to reach their production target while cutting expenditures," he said.

Wells Up for Rehabilitation

During a national event held on 2 October in Tehran, production oil companies including Arvandan Oil and Gas Production Company (AOGPC), Iranian Central Oil Fields Company (ICOFC), National Iranian South Oil Company (NISOC), and Iranian Offshore Oil Company (IOOC) offered details on their subsidiaries as well as active and shut-in wells. They also noted challenges technological companies would be faced with in dealing with these wells. Issa Nobari, head of research and division at AOGPC, said the recovery rate of the Sarvak reservoir of the Azadegan oil field stood a 4.4%. He enumerated challenges lying ahead with regard to asphaltene sedimentation in well columns, reservoir pressure fall-off, and the impossibility of artificial lift in wells, adding: "In case modern technologies are used in low-yield wells of AOGPC, we will reach significant output hike. For instance, Well No. 100 started production in 2020, but it quickly experienced a pressure fall-off and low yield. The well is expected to see its output rise 300% if appropriate technology is applied. AOGPC is in charge of West Karoun fields. Its recoverable oil reserves stand at 8.3 billion barrels and it aims to reach 900 tb/d output. In West Karoun, Darquain, South Azadegan, North Azadegan, Yaran, and Yadavaran are either operational or under development. The Jofair, Sepehr, Susangerd, Band Karkheh, Sohrab, and Arvand are undeveloped, while exploration wells have been drilled in the Omid, Moshtaq, Khorramshahr, Minou, Arman, and Mehr fields. Saeed Attari, director of production engineering at IOOC, said the company was administering a total of 757 wells, including 638 oil wells, 54 gas wells, 63 water injection wells, and 2 gas injection wells.

He said that IOOC had 18 wells up for rehabilitation, noting that formation damage and weak reservoir rock were among the main problems. IOOC is currently active in the Bahregan, Kharg, Lavan, Siri, Kish and Qeshm areas. It runs 123 reservoirs and 51 fields. The representative of NISOC said the company had a total of 4,000 wells, including 3,000 active wells. He said that 2,250 wells were producing oil, adding that the NISOC was supplying 3 mb/d of oil.

NISOC runs 41 oil fields and 17 independent gas fields. It accounts for 80% of oil and 16% of gas production in Iran.

SZOGPC Eyes 280 mcm/d Output by 2027

South Zagros Oil and Gas Production Company (SZOGPC) is one of the three Iranian gas-supplying subsidiaries of Central Oil Fields Company (ICOFC). SZOGPC is currently steering gas distribution operations in five districts: Naar/Kangan, Aghar/Dalan, Parsian, Sarkhooun and South Gashouy, and Sarvestan/Saadatabad in the Fars, Bushehr, and Hormuzgan provinces. Newly discovered fields are opened, and Kohguiluyeh & Boyer Ahmad and Chahar Mahal & Bakhtiari provinces will be added to SZOGPC's list.

Ali Montaseri, the CEO of SZOGPC, has said the company's fields account for 3.4% of global gas production, noting its vital role in national gas supply. SZOGPC plans to bring its gas production to 280 mcm/d by 2027, as mandated by ICOFC.

He said that SZOGPC's gas production reached 163 mcm/d last calendar year, meeting its production target by 103%. SZOGPC also supplied 47 tb/d of condensate and 15 tb/d of crude oil from the fields it is running.

Parsian Output up 30 mcm/d

Montaseri touched on the existence of 96 wells in the Tabnak, Homa, Shanol, and Varavi fields in Parsian, adding: "The gas production capacity in this zone is 66 mcm/d, which provides the feedstock of the Parsian gas refinery."

"Given the operation of gas compressor stations in the Homa, Varavi, Eram, and Pazan fields over the coming five years by ICOFC, the production capacity from this zone would grow by 30 mcm/d," he added.

Aghar/Dey Output up 7 mcm/d

The Aghar and Dalan fields are among the producers of gas in Fars Province. The Dalan and the Aghar fields came online in 1992 and 1998, respectively. There are currently 30 wells in these two fields with a production capacity of 45 mcm/d.

Montaseri said under crash projects for gas production by ICOFC, the second phase of the Aghar field and the second phase of the Farashband refinery would come online by 2027, which would add 25 mcm/d to the Aghar and Dalan production.

ICOFC is committed to contributing to national gas output, which would focus on gas production from the fields located in Fars and Bushehr provinces.

Montaseri said the Aghar and Dey fields would add 7 mcm/d of gas to SZOGPC's output by winter, bringing the country's total gas production up to 170 mcm/d. Dey would see its output rise by 3 mcm/d and Aghar by 4 mcm/d.

5 Gas Fields in Nar & Kangan

The Nar and Kangan fields in Bushehr Province are among other fields accounting for 45 mcm/d of gas production from 66 wells. With the development and commissioning of the Madar, Khartang, Gordan, Sefid Zakour, and Sefid Baghoun fields and the construction of the Kangan gas compressor station and renovation of the Nar gas compressor station, 49 mcm/d of gas would be added to the output capacity of these areas. The gas from these fields would add to the production capacity of the Fajr Jam refinery.

Sarkhoun Gas Recovery

Montaseri said 16 wells were active in the Sarkhoun field, which currently produces 4.2 mcm/d of gas. Studies have been carried out for gas recovery from this field, which will be done over the coming 2 or 3 years. This field also contains about 100 million barrels of gas condensate. Montaseri said 3 tb/d of condensate was projected to be recovered from this field over 10 years.

Sarvestan/Saadatabad Oil Supply

SZOGPC's activities partly pertain to oil production. Montaseri said that oil production began in the Sarvestan and Saadatabad fields in 2013 by ICOFC at the rate of 6.25 tb/d from 16 wells.

The oil recovered from these two fields is delivered to the Shiraz refinery. Furthermore, ICOFC is planning to develop the Khesht oil field, which would be producing 20 tb/d of oil.

280 mcm/d Gas by 2027

As far as production is concerned, so far 56% of the gas and 8% of the oil in the fields run by SZOGPC has been recovered. Under a five-year plan, SZOGPC's gas production would rise to 170 mcm/d in the current calendar year to 20 March 2024, and 280 mcm/d by 2027. Montaseri said SZOGPC's development plan included maintenance of production levels, launching gas compressor stations, and drilling new wells.

45.5 bcm Annual Supply

Last calendar year (ended on 20 March 2023), 45.5 bcm of gas and 2.66 million barrels of oil was recovered from SZOGPC-run fields. Meantime, during the first five months of the current calendar year, 15 bcm of gas, 800 tb of oil, and 14 mb of condensate was produced. Production from SZOGPC-run fields was conducted following 257 cases of petroleum engineering operations. Montaseri said the overhaul was being envisaged in operation areas to guarantee sustained production.

More Oil/Gas Drilling

Hassan Nematollahi, SZOGPC's technical director, said 13 wells would be completed in the current calendar year (ending on 20 March 2024), which would reach 20 in two years. He said that by March 2028, 130 gas wells would have been added to SZOGPC's wells to contribute to enhanced gas recovery from the fields.

Regarding oil wells opening, he said that a well would become operational in the Khesht field in two years, while a total of 4 wells would be added to the Sarvestan and Saadatabad wells.

Nematollahi said that since the start of the current calendar year, 89 operations had been conducted on wells to guarantee sustainable oil and gas production. Mehdi Heydari, the CEO of ICOFC, had earlier said that 10 fields would be developed in Fars and Bushehr provinces, which would then be assigned to SZOGPC. The 10 fields located in Bushehr and Fars provinces are Dey, Aghar, Sefid Zakhour, Gordan, Madaar, Khartang, Eram, Halegan, Sefid Baghoun, and Pazan. The Varavi and Homa fields need gas compressor stations. An agreement has been signed with a local company for this purpose. Two gas compressor stations would be launched to help maintain output from these two fields. Furthermore, the Tabnak separation station would be also operational to upgrade the quality of feedstock supplied to the Parsian gas refinery. The separation center is expected to come online by the end of the current calendar year. Next calendar year, the Shanol and Kangan gas compressor stations as well as Phase 2 of the Farashband refinery would come on-stream.

The Aghar field would start producing 23 mcm/d of gas and its second phase development is envisaged. The investor for the development of the Khartang field has been chosen. In total, $3.6 billion is needed for developing these fields, which is scheduled over five years.

According to development plans, SZOGPC would see its output increase 120 mcm/d by 2027.

Aghar, Dey to Lift Gas Output 7 mcm/d

South Zagros Oil and Gas Production Company (SZOGPC), affiliated with Iranian Central Oil Fields Company (ICOFC), is centered on enhancing production from the Aghar and Dey gas fields by 7 mcm/d.

Under a crash plan for gas production through development projects, early production from the Dey field is to start by December while Aghar would see its output grow. As part of long-term development plans, Phase 2 development of the Aghar field would begin while the Dey field would see its output grow to 15 mcm/d.

Kamal Bolandparvaz Jahromi, the head of the Aghar and Dalan operational zone, has said that four fields – Aghar, Dalan, Dey, and Sefid Zakhour – lie in this area.

"The Aghar gas field is located near the city of Qir in Fars Province. The gas from this field is collected from four centers into a separation center and then gas and condensate are piped to the Farashband gas refinery for processing. The Dalan gas field lies southeast of the city of Farashband. The field has wellhead installations, pipelines, three gas gathering centers and a gas refinery. Depending on demand, the gas from this refinery is either delivered to National Iranian South Oil Company (NISOC) to be fed into oil fields or sent to National Iranian Gas Company (NIGC)'s national trunkline. It is also possible to deliver gas condensate by pipeline to the Fajr Jam or Shiraz refinery," he said. "The Aghar and Dalan fields were discovered in 1972 field in 1975, respectively. Production from both began in 1998. Only one-fourth of the Aghar field's reserves has been recovered and ICOFC's long-term plans include second phase development of the Aghar field," he added.

Jahromi said the gas recovered from the Aghar field would be sent to the Farashband refinery, adding: "The rated capacity of the refinery is 42-45 mcm/d, pertaining to sour and sweet gas. The treated gas would be partly injected into NISOC fields and partly be sent to the Bidboland gas refinery."

Aghar Output to Rise

ICOFC has long envisaged developing the Dey and Sefid Zakhour fields. Therefore, ICOFC decided to raise production from the Dey and Aghar fields as part of its crash plan. With regard to enhanced output from the Aghar field, three wells would start production by December, which would add 4 mb/d to SZOGPC's output capacity. Current gas production in the Aghar field stands at 24 mcm/d, which will rise to 28 mcm/d by next December.

Early Production from Dey

Early production from the Dey gas field was also considered by SZOGPC. Four wells will start production to raise output from 3.5 mcm/d to 4 mcm/d, in which case, Dey would join the group of active fields of SZOGPC. The gas produced by this field is sweet, which would be fed into the national trunkline after necessary processes. Overall, it is noteworthy that SZOGPC would see its output grow at least 7 mcm/d following increased recovery from Aghar and early production from Dey. The bulk of drilling work at Dey is already done, while the manifold has been set up. Jahromi said that development of the Dey field would not stop here as the field is planned to reach 15 mcm/d production in the long term.

Overhaul

Thanks to efforts made by SZOGPC to enhance gas production, the required overhaul was implemented in the Aghar and Dalan operational zone. Necessary arrangements have been made for SZOGPC to handle gas production from three wells in Aghar and 4 wells in Dey. Therefore, through precise and cohesive planning at the highest level of readiness, the overhaul of refinery equipment and pipelines was carried out in a bid to ensure gas supply sustainability during winter. The overhaul operation was conducted in full compliance with safety regulations. Aghar would see its output rise from 24 mcm/d to 28 mcm/d, while Dey would start production. Furthermore, the Dalan field would be producing 21 mcm/d. The Aghar and Dalan zone would experience at least 52 mcm/d output.

Development Plans

Gas production started from the Aghar field in 1998; however, only 26.2% of its gas has been recovered. Development of this field in two phases would enhance its production capacity by about 35 mcm/d. The second phase of the Farashband refinery would be developed simultaneously with the development of Phase 2 of the Aghar field. The refinery would see its capacity reach 70 mcm/d. It is noteworthy that 8-9 tb/d of gas liquids is recovered from the zone, which is sent straight to the Shiraz refinery.

Safety Valves

Ardeshir Kheirkhah, deputy head of overhaul for Aghar and Dalan, said: "More than 50% of reparation work in Aghar and Dalan has been done by local staff. Some significant measures have been taken, including the manufacturing of safety valves that were made in Europe." Vahid Nazari, the senior drilling supervisor in Dey, said: "In Fars Province, most fields are located in the Kangan, Upper Dalan, and Nar reservoirs, which hold gas."

Noting that Iranian companies had manufactured downhole equipment owing to self-sufficiency, he said: "The tools for downhole completion string, made in Iran, have been used for the first time in the field."

He said Well No. 2 of the field was supplying gas at good pressure, adding: "Each well in this field gives 1 mcm/d of gas. Totally, four wells have been drilled in this field, which would supply at least 4 mcm/d of gas. However, evidence is indicative of production hike in these wells."

GOGPC Crude Output at 580 tb/d

CEO of Gachsaran Oil and Gas Production Company (GOGPC) GholamReza Kamali has said that the company's output has reached 580 tb/d.

"Despite numerous problems at facilities, we are in second place in terms of production among subsidiaries of National Iranian South Oil Company (NISOC) and we have managed to meet our target at 100% in the first half of the current calendar year," he said.

He added that GOGPC was running over 16 oil and gas fields located in the four provinces of Khuzestan, Fars, Kohguiluyeh & Boyer Ahmad, and Busher.

Kamali said 857 wells had been drilled, more than 7,500 km of oil and gas pipeline had been laid, and more than 59 industrial facilities were active in the GOGPC-run area.

Regarding pig running, he said: "Since the beginning of the current calendar year, we have carried out pig running on more than 2,236 km of oil and gas pipeline, up 350% year-on-year."

He said that 20,000 spots had been identified to be prone to pipeline corrosion, covering an area of 6,000 square meters.

Homegrown RCD Unit Catalyst Unveiled

A locally developed catalyst for the "reduced crude desulfurization" (RCD) unit of the Shazand oil refinery has been unveiled. The catalyst was developed using the technical know-how of the Research Institute of Petroleum Industry (RIPI) and a knowledge-based company.

Azim Kalantari Asl, the head of RIPI, addressing the ceremony, referred to the effective role of knowledge-based companies in the development of this catalyst, saying: "Producing catalyst for the RCD unit has been done in cooperation with the technology completion chain, including a knowledge-based company. A 10-year agreement for this catalyst will put all these sections together in the long-term for more activity."

"The pattern envisaged by RIPI for many catalysts has proven to be successful, which would be also used in other units," said Kalantari Asl.

1 bcm of Gas Recovered from Tang Bijar

Mahmoud Nasiri, the CEO of West Oil and Gas Production Company (WOGPC), has announced the recovery of 5.7 mcm/d of gas from the Tang Bijar field in the first half of the current calendar year.

"Totally, 1.07 bcm of gas has been extracted from this field. During the same period, 73 tb/d of oil was recovered from the company's fields, which is in total 13.59 million barrels," he said. WOGPC covers the four provinces of Kermanshah, Ilam, Lorestan, and North Khorasan. It is currently running one gas field and 12 oil fields. Among the fields, five are jointly owned: West Paydar, Aban, Dehloran, Naftshahr, and Azar. That requires taking certain measures to ensure sustained production."The Tang Bijar gas field is currently the only developed gas field in western Iran, which explains its special role in winter gas supply. Its gas is among the sourest in the world, thereby requiring certain equipment for recovery and maintenance," said Nassiri.

MOGPC Flare Gas Gathering at 85%

Qobad Nasseri, the CEO of Maroun Oil and Gas Production Company (MOGPC), has said that about 85% of the associated petroleum gas produced by this company has been captured. He said that gas flaring would decline as the flare gas capture is ongoing, while the turbocompressor of the Maroun 5 and Maroun 6 gas compressor stations would be repaired. Nasseri gave a positive assessment of MOGPC's track record over the past year, saying that despite sanctions, the company had not halted and/or reduced production even a single day.

He said MOGPC had met its production target entirely. "Currently, the volume of oil production by MOGPC stands at 507 tb/d, which is above the plan."

Meantime, four industrial and development projects handled by MOGPC came online. The first project was the construction of a 36 km-long pipeline stretching from Shadegan to Maroun 3 and 4 for increased production by 15 tb/d.

South Azadegan Oil Output Up

The development project manager of the South Azadegan oil field has announced that production from the giant field has increased by 19 tb/d.

Arash Akhlaqi added that planning was underway to add 23.8 tb/d to the South Azadegan output by December.

Explaining about wellhead installations in the South Azadegan oil field development project, he said: "Of a total 41 wells run by Petropars, 10 wells with a production capacity of 10,700 barrels are operational and 7 more wells are about to come online."

"Five more wells are also underway. After high-integrity pressure protection system (HIPPS) equipment is supplied, the planned 4.8 tb/d output hike would materialize, in which case, Petropars share of South Azadegan output hike would reach 23.8 tb/d," he said.

Big Onshore Gas Find in Fars Province

Minister of Petroleum Javad Owji has announced the discovery of a big onshore gas field in southern Iran.

He said the Shahini gas reservoir, estimated to hold 22 tcf of gas in place, lies near the cities of Lamerd and Mohr.

"This is the largest onshore gas reservoir in the country. Seismic data shows it to be larger than the Kangan gas field," said the minister.

Owji said that four oil and gas fields, with 2.6 billion barrels of recoverable oil equivalent, had been discovered over the past two years, adding: "It means that for every 100 barrels of oil and gas production, we have discovered 78 new barrels. That is why we rank first in the region in terms of discovery."

The minister said the development of the Eram gas field near Lamerd would create jobs, adding: "There is nothing to worry about feedstock as discoveries have been made."

Owji also said no more gas condensate remained parked on the water. He added that oil production had increased from 2.2 mb/d to 3.3 mb/d during the past two years.

"We are planning to increase oil production, for which we have already buyers. Everything has been done under tough sanctions conditions and the US has shown no green light. Rather, it has added 223 more sanctions," said the minister.

The minister said the first phase of a small-sized refinery had been inaugurated for gas condensate treatment in Mohr, adding naphtha, kerosene, gasoil, and gasoline production was vital for the country due to its value-added generation. He expressed hope that the second phase of the refinery would become operational soon.

Owji also forecast oil prices to exceed $100 a barrel against the backdrop of tensions in the Middle East.

13th Administration Stresses Downstream Industry

The head of downstream industry development of National Petrochemical Company (NPC), Abbas Gholami, has said that NPC had for the first time steered credit sales. "According to statistics, the amount of petrochemicals sold on credit on the stock market has risen from below IRR 10,000 billion to over IRR 70,000 billion," he said. Touching on the role of the petrochemical industry in the completion of the value chain, he said: "From the viewpoint of law, the Ministry of Petroleum is responsible for petrochemical production, and from the viewpoint of the ministry, value chain completion is completed once petrochemical products are sold on the stock market to be finally converted into commodities." Gholami said under the 13th administration, NPC has for the first time pursued two key approaches in the downstream sector. He said the first step was to identify the biggest challenges and the second step constituted offering solutions for credit sales. He said the main challenge to the downstream industry was to supply the required capital because producers lack sufficient funds to buy raw materials and it would be difficult to receive facilities from banks.

$20bn Investment for 9 Petchem Parks

CEO of Ofogh Khalij Fars Petrochemical Parks Co. Ahmad Shahryari has said that $20 billion would be needed for building petrochemical parks. He said Persian Gulf Petrochemical Industries Company (PGPIC) was in favor of such parks, while investors have shown inclination for financing. Noting that the petrochemical industry in the world was moving towards building petrochemical parks, he said: "Currently, countries like Germany, China, South Korea, Japan, Saudi Arabia, and Turkey are on the way towards the development of the downstream industry and such parks." He said that Iran's current petrochemical production capacity stood at 92 million tonnes, 14 million tonnes of which was for methanol. "PGPIC plans methanol parks in which we would acquire four methanol chains. Of course, in other products like urea, we have made mistakes over the years that have affected the agriculture industry and we need to complete the value chain of this product. That is why PGPIC envisages a chemical fertilizer park in Chabahar and Nayband," he added. Shahryari went on to speak about planning to build two parks under polymer companies. Speaking about the difference between petrochemical parks and industrial parks, he said: "At petrochemical parks, infrastructure, utilities, byproducts, and feedstock are provided simultaneously and companies have easy access to all of them. More importantly, the final product is sold in the park."

Overhaul of South Pars Gas Platforms

Salman Khazaei, the deputy CEO of Pars Oil and Gas Company (POGC) for operations and logistics, has announced readiness for overhaul of the South Pars gas field installations in the run-up to winter. He said that the overhaul of the platforms of South Pars was done differently in the current calendar year. Noting that POGC remained the largest energy producer in the country, he said it is currently supplying 4-4.5 mb/d of crude oil. "As the largest joint gas field in the world, South Pars supplies 70% of Iran's gas.

To sustain production in winter, it plans to overhaul platforms and installations," said Khazaei. Although South Pars is 23 years old, insulation of offshore pipelines has been done for the first time at South Pars platforms.He said insulation would be done during overhaul, adding: "Technical inspections showed a rupture in the connection between two platforms of SP1 and SP15, which is a dangerous issue in the technical inspection of equipment as it can cause sour gas to leak." "To repair this rupture, we had to penetrate the 32-inch pipeline connecting the platform and offshore line. The last valve weighed 17.5 tonnes, which had remained off for 23 years. Due to rusting and corrosion, we used 100-tonne jacks to turn it on," said Khazaei.

Sigloo Petchem Plant Construction Begins

Construction has begun on the Sigloo Petrochemical Plant with a €277 million investment to complete the methanol value chain. The event was launched in the presence of Minister of Petroleum Javad Owji during President Ebrahim Raeesi's provincial tour of Fars in southern Iran. This project includes production of methylamines and its derivatives for the first in Iran. It covers 10 ha of land in the Lamerd Special Economic Zone in southern Iran. The project is scheduled to come online in four years. It would create 350 direct and 2,500 indirect jobs. So far, €54 million of equipment has been purchased for the petrochemical project which is financed by the Sigloo Investment Company. Once completed, the Sigloo petrochemical plant would produce 46,000 tonnes of MA, DMA, and TMA, 24,000 tonnes of DMF, DMAE, and choline chloride as well as 24,000 tonnes of higher amines a year. The Lamerd special zone is planned to produce 5 million tonnes of petrochemicals in the long term. For this purpose, 400 ha of land is allotted for petrochemical projects. Regional and international conditions and the necessity of creating a downstream industry's production cycle prompted the Lamerd special zone to shift strategy from upstream petrochemical to downstream petrochemical development to complete the production and value chain.

Four Oil/Gas Fields Discovered

CEO of National Iranian Oil Company (NIOC) Mohsen Khojasteh-Mehr has said that more than 2.6 billion barrels of oil equivalent has been discovered under the 13th administration.

"During the past two years, four oil and gas fields – Hirakan, Genaveh, Tangou, and Cheshmeh Shour – have been discovered," he said.

Noting that these new oil and gas finds had been made in northeastern and southwestern Iran, he added: "Under the 13th administration, 3D seismic testing has been up more than 300%, which puts Iran in the first place in terms of exploration activities."

Outlining the recent discoveries, he said: "Oil exploration in Hirakan started in April 2021 by drilling an exploration well. Finally, after drilling 2,971 meters, oil was proven to exist there."

"Located 30 km north of the city of Gorgan, this field contains significant heavy oil reserves," the NIOC chief said.

Referring to the Genaveh field, he said: "This field is located in the coastal section of Bushehr Province. Exploration well drilling began there in 2020. Despite reaching the depth of 4, 572 meters, this well struck liquid hydrocarbon in significant volumes in the Sarvak reservoir."

Khojasteh-Mehr added: "Exploration activities continued by drilling an exploration well to find the Tangou field. The main idea behind this drilling was to make a full assessment of the hydrocarbon potential of Asmari, Sarvak, Kajdomi, Darian, Gadvan, and Fahlian formations." Drilling operations started in May 2021 and ended last September after oil was found at a depth of 4,150 meters. The Tangou field is located south of the Rag Seif oil/gas field and near Hendijan in Khuzestan Province.

Touching on the Cheshmeh Shour gas field, the official said that drilling had started in May 2022 with gas being discovered at a depth of 4,505 meters.

"This gas field lies northeast of Khorasan Razavi Province and near the Khangiran field. Under the 7th National Economic Development Plan, we intend to invest about €5.1 billion there to drill 38 onshore and 7 offshore exploration wells, conduct 6,750 sq km of 2D seismic testing, 6,000 sq km of 3D seismic testing, and 10,000 sq km of offshore 3D seismic testing," he added.

Khojasteh-Mehr said that 6 onshore drilling equipment had been used to drill 6 wells, totaling 21,514 meters of onshore drilling.

Iran Exporting Techno-Engineering Services

Saturated domestic markets have pushed Iranian petrochemical actors to export technical and engineering services, as well as products to foreign countries. Minister of Petroleum Javad Owji has said exporting petrochemical catalysts to European and neighboring nations has already started. Iran has also moved to renovate overseas refineries, which would facilitate its involvement in overseas petrochemical plants. Recently, during a state visit by President Ebrahim Raeesi to Venezuela, an agreement was signed to develop petrochemical projects in the Latin American nation. Venezuela's installed petrochemical capacity stands at 12 million tonnes, but its petrochemical production is 3-4 million tonnes a year. Iran is expected to raise Venezuela's petrochemical output. Of course, Iran's involvement in overseas petrochemical plants would not be limited to Venezuela, and the agreement with this country would clear the way for working with some more countries. One advantage of Iran's involvement in overseas refineries and petrochemical plants is the activation of the capacity of Iranian petroleum industry manufacturers. Over the past one and a half years, Iranian companies have supplied nearly 2.8 million items to Venezuela for the renovation of an oil refinery there.

Scientific Self-Reliance

Today, Iran's oil, gas, refining, and petrochemical industry has become entirely self-reliant while foreign experts were present in most sectors of Iran's oil and gas industry by the late 1980s. The development process of the petrochemical industry, like the other economic sectors of the country, was affected by the imposition of unjust sanctions against Iran, but the Ministry of Petroleum, relying on domestic experts and industrialists, expanded cooperation with Iranian technological and knowledge-based companies. As a result, the way has been cleared for the development of Iran's petrochemical industry while the 13th administration's energy diplomacy has facilitated the development of the petrochemical market, as well as exporting technical and engineering services and catalysts.

In parallel with this objective, Iran has moved to set up a petrochemical self-sufficiency center to make maximum use of the scientific and research potential of the country in favor of developing the petrochemical industry. Established last calendar year, the center is aimed at improving conditions for better engagement of knowledge-based and technological companies, domestic manufacturers, universities, and research centers.

The first agreement for the renovation and reconstruction of overseas petrochemical plants was signed last June, based on which an Iranian company would overhaul some units of an ammonia plant in Venezuela and the investment would return by getting a share from products sold.

Meantime, an MOU has been signed between NPC and the Russian Chemists Union on exchanging technical savvy and knowledge-based cooperation in petrochemical industry equipment.

Russia has been a major buyer of Iranian catalysts which are used at petrochemical plants.

Currently, the technical know-how and all licenses required in Iran's petrochemical industry are supplied by Petrochemical Research and Technology Company (PRTC) and Research Institute of Petroleum Industry (RIPI). PRTC and RIPI have already granted dozens of widely-used licenses to petrochemical companies.

Some beneficiaries are Abnieh Fanni Tehran for 85,000 tonnes/y of polyethylene production, and Arya Ofogh Feeyar for 150,000 tonnes/y of potassium carbonate production.

As the research arm of the petrochemical industry, RIPI has played a significant role in developing technical savvy and manufacturing equipment during years of sanctions and economic pressure. The effective contribution of RIPI to the petrochemical industry has been even much more due to developing technical

know-how needed for catalyst production.

Confidence in Iranian Companies

The Iranian petrochemical industry has preferred to depend on local manufacturers in recent years. For instance, Marjan Petrochemical Co. has signed a deal with Turboseal Technology Development and Manufacturing Company for building John Crane coupling, a deal with Nikan Turbine Manufacturing Co. for building compressor parts, with Andiseh Turbine Parseh for pump parts, with Raymon Sorin Part for link bolt manufacturing, with Irsa Machine Development Co. for compressor parts and with Arka Polymer Apadana for bladder manufacturing.

Assaluyeh Petrochemical Green Tank Co. has signed an agreement with Saman Afsa Narin for the construction, installation, and launch of two storage tanks for ethylene glycol products at the Bushehr petrochemical plant with a capacity of 33,200 cubic meters.

Morteza Shah-Mirzaei, the CEO of NPC, has said that Iran is entirely using locally manufactured rotary equipment and centrifuges, adding that it is ready to supply the technical and engineering needs of other nations.

In general, developing countries tend to invest in creating related industries rather than importing manufactured commodities. On the other hand, due to the fluctuations in the global price of oil and the exhaustibility of underground oil reserves, many countries have formulated effective policies for the development of non-oil exports.

Meanwhile, the export of technical and engineering services, as one of the most efficient types of export, can be included in the process of economic development strategy. Also, paying attention to the export of technical and engineering services compared to the export of other services has a special place in terms of introducing the high level of technology of the exporting country.

In Iran, the export of technical and engineering services has increased significantly in recent years, so considering the potential and domestic talents, it is necessary to use these opportunities optimally and in marketing for the supply of technical and engineering services abroad. Therefore, it is important to study the export of technical and engineering services of these types of countries that have been successful in this field, to specify a suitable economic model that can provide experimental solutions.

India is one of the developing countries that has been able to leave behind a good history of exporting technical and engineering services in recent years. This country is home to more than one billion people and is economically ranked as the fifth largest economy in the world based on GDP. From 2020, with the implementation of economic liberalization policies, it is expected to become the third industrialized country in the world by 2025 after the US and China. The onset of the digital age and the large population of educated and English-speaking people in India have gradually made the country's economy an important destination for international companies that outsource their customer service and technical support departments. To reduce the threats of the entry of cheap Chinese goods, this country has considered reducing costs, renewing management, focusing on the manufacture of new goods, and relying on cheap labor and advanced technology in its industrial sector as a coping strategy. South Korea, with a population of about 49.2 million people, ranks the 13th largest economy in the world and the third largest economy in Asia. The GDP of this country ranks 13th in the world based on volume, and 14th based on purchasing power parity. GDP growth this year was 1.5%. Various economic sectors of South Korea, including industry, agriculture, and service sectors, have a growing trend. South Korea's major export items include electrical machinery and devices, home electronics, automobiles, and their parts, ships, and boats.

Brazil, with a population of about 190 million people, is the 15th largest economy in the world. In 1994, the World Bank announced that Brazil's economic growth from 1965 to 1989 was an average of 4.2 percent per year, which is very favorable compared to other developing economies in the world over 25 years. The state of Brazil's service sector, which constitutes 64% of its gross output and includes 66% of the country's workforce, is mainly in the form of financial services, banking, welfare and insurance, information and communication technology and telecommunications, electronics, biotechnology, and nanotechnology.

Currently, the technical and engineering services of the country's oil industry are exported to the countries of Central Asia, Latin America and Africa, the Middle East, and European countries in the following sectors. Iran's Ministry of Petroleum is trying to make the export of technical and engineering services a very serious competitor for the revenues from oil exports by supporting knowledge-based companies.

Last calendar year, Iran's Ministry of Petroleum struck IRR 31 trillion-plus $95 million in MOUs and agreements with knowledge-based and technological companies. The number of knowledge-based companies in the ministry's vendor list has trebled, and 85% of Iranian catalysts are made locally. In Iran, 35,000 tonnes of locally-made catalysts worth $1.12 billion are consumed annually.

Iran Plast 2023, Symbol of Futile US Sanctions

The 17th edition of Iran Plast was held over four days at the Tehran International Permanent Fairgrounds. This year's Iran Plast coincided with a 1 mb/d oil production growth and subsequent increase in exports. Meantime, despite sanctions, Iran's petrochemical sector has become a major source of hard currency income. A 10-fold increase in the number of foreign companies displaying their achievements with international sanctions still effective against Iran's petroleum industry is proof of the ability of Iran's petrochemical sector to develop its markets despite all restrictions. Foreign companies are assessing conditions for presence in Iran's market, as well as receiving technical and engineering services in this sector. Iran Plast 2023 saw more than 210 foreign companies put on display their achievements on more than 3,000 square meters. There were 300 foreign guests from various sectors of the petrochemical industry. Meantime, 20 specialized panel discussions and workshops were held on the sidelines of the event to let petrochemical industry players exchange views. Iran Plast 2023 was remarkable given the current special circumstances, as confirmed by most exhibitors and visitors.Addressing the event's inaugural ceremony, Minister of Petroleum Javad Owji said: "Despite tough sanctions, we are witnessing good events in the petrochemical industry with 210 foreign exhibitors. We may say confidently that sanctions on this sector have been neutralized." He said Iran Plast constituted a good opportunity for exchanging thoughts and experience gained over a year. "This exhibition is not limited to petrochemical and downstream products; rather, it is an opportunity to showcase capabilities in the materials and equipment domain in the petrochemical sector, where exporting technical and engineering services stems from," he added.

Unsanctionable Petrochemicals

Minister Owji said petrochemicals constituted a 50% share in nonoil exports, adding that 70 petrochemical plants were active in Iran.

"The petrochemical industry as good job creation and income generation. Furthermore, given the daily growing need for upstream and downstream products of the petrochemical sector, this sector is unsanctionable," he added.

The 13th administration's Ministry of Petroleum has properly planned to develop the petrochemical sector. Five petrochemical plants are scheduled to come online by next March, which would add 5-6 million tonnes to Iran's petrochemical output capacity.

Like previous rounds, Iran Plast 2023 drew a full picture of achievements in Iran's polymer industry, chiefly in the machinery and equipment sector. Meantime, exhibitors held serious talks with Iranian partners and regional businesspersons.

Given the fact that 70% of the value-added of the petrochemical industry is obtained from downstream industries, just developing this sector could earn Iran more than $48 billion a year, which would be about half of Iran's pre-sanctions income from crude oil exports.

Petchem Value Chain Completion

Morteza Shah-Mirzaei, CEO of National Petrochemical Company (NPC), highlighted the fast development of the petrochemical industry from base products to the end of the value chain, saying: "Value chain completion in the petrochemical industry is not a slogan; rather it is an inviolable strategy, an obligation, a plan and a task, which my colleagues are focusing upon wholeheartedly."

The petrochemical industry is the most prosperous industry in the world. In Iran, it is the top hard currency generator. Iran's petrochemical production capacity has reached 92 million tonnes a year, far from the meager amounts during the 1979 Islamic Revolution. Before the revolution, the petrochemical industry was entirely dependent, while today Iran is self-sufficient in catalyst, commodity, and equipment manufacturing, as well as pre-commissioning and commissioning.

Iran was manufacturing few petrochemical products in 1979, but today 550 grades of a variety of petrochemicals are being manufactured and supplied to local and foreign buyers.

Despite Iran's comparative advantage in the petrochemical industry, some disconnected chains are seen in this sector. Most materials are exported to China, Japan, and European Union nations to be transformed into final products which would be resold to Iran at exorbitant prices.

It has also to be noted that with the development of upstream and midstream petrochemical industries in recent years, key steps have been taken to complete the value chain of this industry. However, raw materials sales remain the main advantage of this industry in Iran, while available data indicate that about 70% of the petrochemical industry's value-added comes from downstream industries that have not been developed along with the upstream sector.

Such conditions are underway, while the competitive advantage of petrochemical products, particularly in the downstream sector, against oil and gas sales has brought this group of industries to the attention of decision-makers. Given the key role of these industries in economic and social development

as well as existing potentialities in the country, the petrochemical industry can be attractive to local and foreign industries. The petroleum industry in general, and the petrochemical industry in particular, cannot survive without interaction with the world and competition with foreign companies. Therefore, efforts should get underway to update this industry.

Market Diversity

Hossein Ali-Morad, director of international affairs at NPC, said foreign companies were less present in recent years at Iran Plast due to the COVID-19 pandemic. But more exhibitors attended the exhibition this year.

Noting that Iran's petrochemical industry, particularly the downstream sector, can cooperate in exchanging technical know-how and modern technologies, he said: "Nonoil exports growth and identifying new petrochemical markets may expand target markets and generate hard currency."

The presence of foreign exhibitors in this exhibition can be viewed from two perspectives: first, long-term presence in Iran's market, partnership in projects and investment in various sectors, as well as upstream and downstream industries; second, selling necessary machinery in the downstream industries, raw materials including more advantaged polymers, as well as industrial parts.

The most important issue with the presence of foreign companies in the oil, gas, and petrochemical industries pertains to upstream industries and units, oil and gas recovery as well as manufacturing petrochemical and polymer products that require technological capabilities and even financial capacity. This sector has so far failed to attract international companies independently mainly due to domestic and global restrictions.

Technological Breakthroughs

Hassan Abbaszadeh, director of planning and development at NPC, has said sanctions pushed knowledge-based companies to make achievements in the field of manufacturing technologies in harmony with the completion of the value chain of petrochemical products.

Iran's petrochemical production totaled 70 million tonnes last calendar year during which the country exported $16 billion worth of petrochemicals.

"If we can complete the value chain in the petrochemical industry, our export capabilities will significantly grow in this sector," said Abbaszadeh.

One of the important plans pursued by the Ministry of Petroleum in the petrochemical industry is to expand the value chain completion of petrochemicals and their diversity with a view to higher exports. In parallel with such planning, technical centers helped by knowledge-based companies are developing know-how for this sector. For instance, currently, 9 million tonnes of polymer is produced in the country, which would reach 19 million tonnes under the 7th National Economic Development Plan. Based on this plan, NPC has drawn up a blueprint to develop the petrochemical industry chain, containing 20 packages of investment worth $4 billion.

Iran is known in the world as the country exporting raw materials. Therefore, over recent years, due to toughened sanctions, knowledge-based companies became active in the petrochemical sector to develop a technological chain for methanol production. NPC is building the first unit with a $600 million investment.

Petchem Capacity Up

Iran's petrochemical production capacity has increased from 92 million tonnes at the beginning of the current calendar year to 95 million tonnes now. Currently, 35 million tonnes of final products are manufactured in the country, 72% of which is exported and the remaining 28% being used domestically.

Experts say the global growth rate for petrochemicals is 4.5% versus 1% for petroleum products. In coming decades, refined petroleum products consumption would slow down, while consumption of petrochemicals would keep rising at a higher pace.

Iran's 9 million tonnes of polymer export capacity, which is set to reach 21 million tonnes, and Iran doubling its share of global petrochemical markets drew business delegations from India, Turkey, Azerbaijan, Bosnia, Iraq, Syria, Jordan, Afghanistan, Kenya and the Kurdistan Regional Government to Iran Plast to benefit from this significant potential. The presence of these delegations has naturally not been useless for local manufacturers. B2B talks held during Iran Plast showed both sides were highly motivated to develop their commercial exchanges. Iranian companies' capacity to manufacture high-quality products and foreign parties' product-starved markets promise daily increasing growth and development.

Isfahan Refinery Gasoil Unit Launched

President Ebrahim Raeesi inaugurated the gasoil refining unit of the Isfahan oil refinery with an output capacity of 16 ml/d of Euro-5 gasoil on 29 September. The inauguration of such projects under the 13th administration is indicative of its firm determination to bring about full self-sufficiency in high-quality petroleum products. Minister of Petroleum Javad Owji has said over the past two years, about $20 billion of upstream and downstream projects have become operational, most of which were incomplete. He said a priority in the 13th administration was to upgrade the quality of petroleum products and reduce the sulfur content of products. Due to the current restrictions on crude oil sales, Iran is planning to increase its crude oil and gas condensate refining capacity to 2.4 mb/d, which currently stands at 2.15 mb/d. Thanks to planning by the Ministry of Petroleum, 850 tb/d of crude oil and gas condensate, which US sanctions would block from entering global markets, has been converted to higher-value products. Iran is planning to raise gas condensate refining capacity to 500 tb/d from the current 450 tb/d and crude oil refining capacity from the current 1.7 mb/d to 1.9 mb/d.

Green Gasoil

In addition to enhancing the quality of gasoil produced at the Isfahan refinery and the supply of more than 16 mb/d of Euro-5-grade gasoil, the new project would create capacity for 26 ml/d of Euro-5 gasoil shortly.

By commissioning these giant and environmentally important projects, besides producing the entire gasoil needed by Isfahan Province at Euro-5 grade, key environmental steps would be taken by this refinery which has recently been integrated by a petrochemical plant. It would also cut the sulfur content of gasoil at the Isfahan refinery from 10,000 ppm to 10 ppm while preventing the emission of 300 tonnes a day of sulfur into the air. The gasoil refining capacity of the Isfahan refinery is 100 tb/d, while the production of nearly 17 mb/d of clean gasoil has started at the facility. The Isfahan Oil Refining Company (IORC) has invested IRR 68 trillion plus €511 million in this project whose return would be nearly $460 million a year. Investment in this project would return completely four years after its full launch. About 80% of the equipment used in the new project at the Isfahan refinery has been manufactured domestically and sourced by local companies like Nargan, Chegalesh, and MAPNA, which have also carried out detailed engineering services due to sanctions.

On the sidelines of the inauguration ceremony, President Raeesi said the quality of refined petroleum products had to be taken into account as much as quantity was concerned.

8 Projects under Construction

Minister Owji said 8 refining projects were under construction in Iran, adding: "The refining and quality upgrading capacity of petroleum products has increased under the 13th administration."

He said: "Ever since the very establishment of the 13th administration in Iran, growth in investment in oil and completion of incomplete projects in four sectors of this ministry (oil, gas, petrochemical, and refining) has been the main priority for my colleagues and me." Owji said more than $12 billion worth of incomplete projects came online last calendar year. Owji touched on the refining projects operated under the 13th administration, saying: "A significant part of this increase is due to upgrading the refining capacity." He said Iran is currently exporting crude oil and gas condensate rather than treating them, adding it would deprive the country of value-added. "Moreover, it has become the Achilles' heel of our country and made it vulnerable to sanctions over recent years. Apart from that, due to high energy intensity in the country, building new refineries is inevitable to guarantee energy security and fully cover the local demand for petroleum products," he added.

That is why as soon as the 13th administration took office, this issue was taken into special consideration and numerous measures have been taken over the past 1 and a half years.

Within the framework of the Crude Oil and Gas Condensate Downstream Development Support Act, 8 crude oil and gas condensate refining projects are under construction with an investment of $28.6 billion for a capacity of 1.46 mb/d. Furthermore, as per Article 59 of the Energy Consumption Pattern Reform Act, upgrading the quality of petroleum products and reducing sulfur content was seriously pursued by the Ministry of Petroleum in the 13th administration. In this regard, 11 projects are under construction with a total investment of $6.7 billion.

The Isfahan refinery can receive 400 tb/d of crude oil as feedstock. It produces 13 ml/d of Euro-5 gasoline and about 20 ml/d of Euro-5 gasoil.

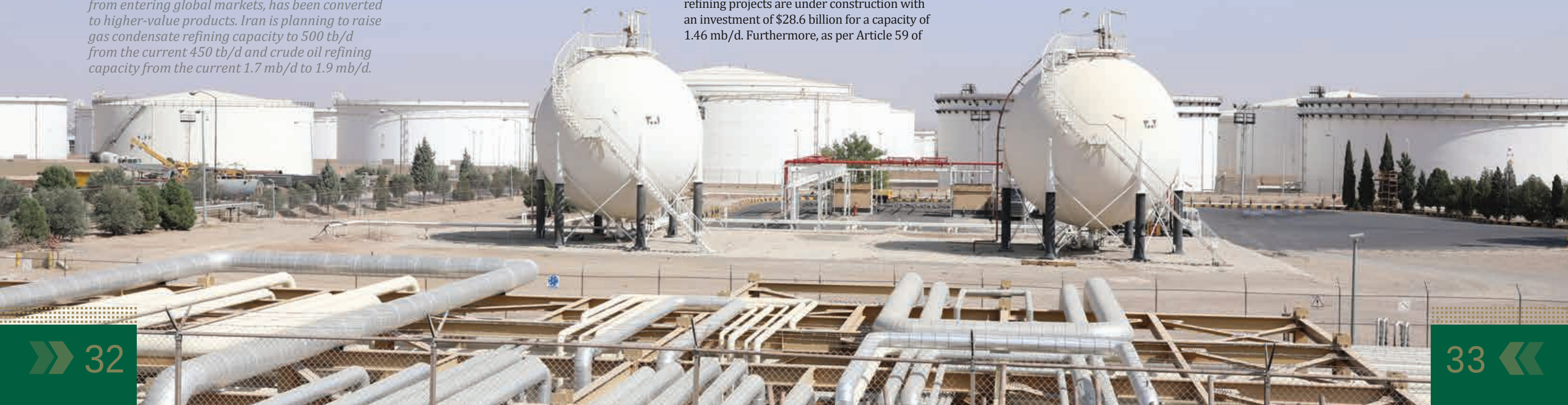
New Technologies Needed

Despite implementing development projects at Iranian refineries over recent years, the decrepit structure and outdated technology of oil refineries continue to inflict heavy losses on the private sector in Iran. Currently, oil refineries are receiving crude oil at a 5% discount, but they gain no significant profits in return. Rebuilding and renovating these refineries requires cutting-edge technology and investment. Should refineries not be renovated, Iran would be lagging behind world nations, which would be difficult to make up for. The private sector is not very interested in renovation. Therefore, the government is helping the private sector by granting loans and guaranteeing foreign investment. The main scourge at oil refineries in Iran is low technology and decrepit equipment, as well as high fuel oil output. Therefore, reducing fuel oil production and increasing the output capacity of high-value products at oil refineries is a top priority of the Ministry of Petroleum.

This issue has been taken into consideration by mastering modern technologies and building new refineries using new technologies, similar to the case of the Persian Gulf Star refinery and the Siraf refining project. Currently, in light of the use of heavy and super-heavy crude oil by refining companies, the significance of access to state-of-the-art technology in the world to establish research institutes is underway in collaboration with the Ministry of Science, Research, and Technology. The main institutes envisaged under this scheme are to focus on residue fluid catalytic cracking (RFCC), delayed coking (DCU), residual-current device (RCD), hydrodesulfurization (HDS), continuous catalytic reforming (CCF), and hydrocracking.

Under the 5th Five-Year Economic Development Plan, 1% of the budget earmarked for investment projects of the National Iranian Oil Refining and Distribution Company (NIORDC) would go to technology upgrade and energy intensity reduction.

Given the significance of the application of modern technologies to quality projects and developing refineries in Iran, this sector is highly attractive to investors. Iran's Ministry of Petroleum has also considered incentives for investors willing to develop refineries and build refinery-integrated petrochemical plants. Domestic investment is no longer sufficient for enhancing the crude oil refining capacity, while crude sales continue. Foreign investment is a good option and Minister Owji has said Iran would be open to foreign investment in this sector under win-win deals.



Tehran Refinery to Integrate Petrochemical Plant

The Tehran oil refinery plans to build an integrated petrochemical plant in line with the global perspective of refined petroleum products. Due to its proximity to the Iranian capital, the facility is also planning to upgrade the quality of its products by establishing a continuous catalytic reforming (CCR) unit. CCR is a chemical process that converts petroleum refinery naphtha distilled from low-octane oil into high-octane liquid products called reformates, which are premium blending stocks for high-octane gasoline.

The process partially dehydrogenates paraffin, isoparaffin, and cyclic naphthene and converts them into high-octane aromatics. In an interview with "Iran Petroleum", Hamed Armanfar, CEO of the Tehran refinery, speaks about projects envisaged at the refining facility.

Mhanaz Mohammad Qoli

Preparing the ground for cooperation with knowledge-based companies is a major objective of the Tehran oil refinery

What measures are underway on the path toward integrating a petrochemical plant into the Tehran oil refinery?

Moving towards integrating petrochemical plants may be the most significant project in the future outlook of the Tehran refinery. Experts predict that petroleum products consumption will go on the decline as of 2035, as a result of which we would have to move in such a direction, in which case we would have to abandon the fuel-based model and brace for the profit-based model. To that end, we are planning to acquire Shazand refinery. In the future, the output of the RFCC and RCD units would be cracked gasoline, which is planned to serve as feedstock for olefin plants. Then, we will enter the petrochemical phase, which would have two advantages for us; we would no longer be fuel-dependent and we would provide feedstock for petrochemical plants. The Shazand petrochemical plant is the closest liquid fuel petrochemical plant to the Tehran refinery with diverse products. The infrastructure for the pipeline is also ready and we can use it. The project would have big advantages for the Tehran refinery and Shazand petrochemical plant whose feedstock would be guaranteed. We can purchase it in the current calendar year and we hope to finalize it. Meantime, the normal hexane solvent unit project is envisaged to recover normal hexane free of aromatics and benzene, using isomerization byproducts. The project has been awarded to capable Iranian manufacturing companies with a capacity of 2 tb/d of 52% and 85% grades. It is forecast to come online sooner than scheduled, which is next calendar year.

Would you please tell us about the project for upgrading fuel oil quality?

Studies for the fuel oil quality upgrade will be conducted by the best-known local knowledge-based companies. We have reviewed about 11 projects regarding fuel oil quality upgrade and we have entered into a contract with a company. We have completed its feasibility studies and we are entering the phase of detailed and basic design, as well as technical know-how licensing. Gasoil accounts for about 35% of the refinery's products, for which development projects have been done. On average, 14 ml/d of Euro-5 gasoil (sulfur content below 50 ppm) is produced at the Tehran refinery, which is instrumental in mitigating air pollution in Tehran, whose gasoil needs are entirely supplied by the refinery. Gasoline makes up about 13% of the Tehran refinery's output, whose sulfur content is up to Euro standards. For this purpose, the CCR project at this refinery was designed and the ground was broken for it in April 2021. Tehran refinery also produces naphtha, which would be converted into gasoline in the new unit. The refinery is currently producing 6.5 ml/d of gasoline, which will reach 8 ml/d after new projects become operational.

Where does the CCR project stand now?

It has had 52.5% physical progress. The initial estimate for investment in this project stands at about €280 million. We've never sought to pocket profits only. The main objective of projects at the refinery has been to upgrade the quality of products and none of the Tehran refinery projects has sought quantitative increase.

What's the share of local manufacturers in the Tehran oil refinery's activities?

In a bid to realize its self-sufficiency objectives in the face of shocks from sanctions and also to accelerate the domestic manufacturing of strategic refining equipment, the Tehran oil refinery has focused on local manufacturing since a couple of years ago. As far as we know, about 80% of the items required by the Tehran refinery (including spare parts, instrumentals as well as electrical, mechanical, and chemical parts) are sourced locally.

Could you tell us about the plans in the knowledge-based sector at this refinery?

Preparing the ground for cooperation with knowledge-based companies is a major objective of the Tehran oil refinery. Technology transfer and locally developing catalysts, chemicals, and refining equipment continue to top the agenda of the refinery. Meantime, the refinery is always helped by knowledge-based companies. Inking MOU with the Iran University of Science and Technology to use technological and innovative services to build a pilot to produce 1 tonne a day of CS2 as the strategic material for tire making, using the sulfur produced at the Tehran refinery for completing the sulfur value chain is among issues associated with supporting knowledge-based companies.

Would you please explain about environmental projects at this refinery?

The Tehran refinery's environmental projects are divided into 6 categories; air pollution and climate change management, water and wastewater management, waste management, soil pollution and underground water control, environmental risk management, and urban community projects. Designing, engineering, manufacturing, and installing the CCR heavy naphtha refining, reducing benzene and deethanization of LPG, environmental impact assessment of the RCD unit, and fuel oil upgrading are among the environmental measures underway at this refinery.

What has the Tehran oil refinery done for higher-value products?

In line with upgrading the chain of high-value products and reducing sulfured fuel oil, the Tehran oil refinery is conducting comprehensive engineering studies. It has also taken measures to diversify its special products like carbon dioxide, azote, and refining solvents. Talks have been also started for supplying electricity to adjacent industries. A hybrid cooling tower is also planned to be built at the Tehran refinery, which would significantly cut water consumption at the refinery.

Studies for the fuel oil quality upgrade will be conducted by the best-known local knowledge-based companies. We have reviewed about 11 projects regarding fuel oil quality upgrade and we have entered into a contract with a company

OPEC+Heavyweights Join Handsto StabilizeOil Market

International oil markets were caught by surprise when the OPEC+ ministers unanimously approved the production cut initiated by Saudi Arabia and Russia to continue curbing output. The move was further strengthened in mid-July 2023 when OPEC+ ministers met and reaffirmed their commitment to work an output management that would lead to a stable market and adequate supply of oil for the consumers. Major market players; companies, hedge fund managers, and Central Banks welcomed the decision and agreed that upon full recovery of the demand side from the pandemic, markets would welcome back the OPEC+ to retain its traditional role as the energy Central Bank of the world.

Fereydoun Barkeshli
Energy Market Analyst

Demand Equation and China Factor

By late 2019, or early 2020, global oil markets faced a total demand destruction. Global oil demand fell by 13.5 mb/d within weeks. According to the OPEC Secretariat report of June 2023, the world oil demand will exceed 103.4 mb/d by the end of the year. This tremendous recovery of demand will be met once the price is right and investors are content that the capital value of investment will be compensated.

This was further discussed and elaborated during the 8thOPEC International Seminar on 5-6 July in Vienna. Participants in the seminar who were more at liberty to express themselves, overwhelming supported OPEC+ decisions to hold back some 2.5 mb/d production for the rest of the year 2023 and with possible extension for 2024. During the discussions, the issue of the demand side was addressed from different angles.

First of all, demand growth isn't going anywhere anytime soon. Demand will grow well into the second half of the century. The bulk of demand comes from Asia. India and China, as well as many other emerging markets in South East Asia, ASEAN and APAC, Bangladesh, and Pakistan. Of course, Africa is going to be a significant demand driver for oil within the next twenty years. Africa has a population of 1.3 billion with an average age of below 30 and is desperately in need of oil to sustain its development projects. Asia and Africa will be the major consumers and producers of oil by the middle of the current century.

Still, on the demand side, I have got to make a reference to the war in Ukraine and consequent disruptions in gas flow from Russia to Europe. Parts of piped natural gas(PNG) from Russia was replaced by LNG cargoes. However, over 70 percent of energy lost due to disruptions was substituted by oil and oil products. As mentioned by the ex-energy commissioner of the EU, Kardi Stimson,no EU member country trusted that energy from solar or wind could fill up the gap for the missing gas supply from Russia. Of course, for France, nuclear power plants did come to the rescue but other European countries specifically Germany had to import oil products to substitute the lost imported natural gas. Having said that Europe had to build a new refined products portfolio for industrial, as well as household consumption. Germany imported a massive quantity of LPG and oil products obtained from light crude oil. Germany's import of Norwegian crude oil was more than doubled by the end of the second quarter of 2023. This trend will have to be continued in the absence of adequate natural gas imports. China and India which are currently the biggest importers of Russian crude, resell a large portion of refined products from the Russian crude to Europe to compensate for the loss of natural gas supply from Russia. According to different sources, there are other countries including in the Persian Gulf region that refine Russian crude for re-exports to Europe. In this piece of writing,I am not going to dig deeper into the demand side. However, I have to point out that Green energy, is Energy-Intensive. Greening of the economy requires, no less oil and gas. According to Cipher &Co., a scientific research institute, it is possible to produce steel, not from mining and iron ore but from chemicals. The process allows the production of steel sheet samples with different strengths but the amount of energy that it takes to build one steel sheet of 4/6 meters is highly energy intensive.

It is impossible to talk about demand and not to mention the Chinese factor and its impacts on energy demand.

China has been the driver of growth for the oil market since early 2000. China once was and still is the most sought-after for any major oil-producing country. According to China General Administration of Customs statistics, compiled by Bloomberg, the country imported 11.4 mb/d during the first half of 2023, the highest recorded volume of imports by Chinese oil imports. Imported volumes were from Russia, Iran, Saudi Arabia, and Brazil. However, figures for imports from Iran are indicated under a different category. What makes China an important and highly sensitive market for oil exporters is complications related to the direction of the economy and the consequent oil and energy consumption attributed to the policy. There are doubts about the continuation of export-led economic policies of the last three decades, as against the adoption of a new import-substitution economic policies. Economists have divergent views if China will be willing to continue to be the world's factory or in case, it is still willing, if the United States of America will still support such policies. As such, each of the policy courses by China will have a different demand outlook for oil imports and consumptions. When Chinese demand grows, most China-based minerals such as copper, iron ore, or lithium go up. Those minerals mostly end up in Chinese manufacturing folds. During the G20 Summit of the Head of States in New Delhi, India on September 9 and 10, where Chinese President Xi Jinping was not in attendance, Western leaders overwhelmingly supported investments and technology transfer to India. Such general support may indicate that Western countries are now willing to replace India with China as the global manufacturing hub. This would, therefore, mean that during the decade ahead, India's oil consumption will be the engine of growth for the international oil market.

OPEC+ Supply Cuts Surprise

Last year,at this time of year, i.e. September, countries participating in the OPEC+ deal were fighting for $60 per barrel of Brent crude oil. Today on the 20Th of September 2023, Brent is comfortable at $94 per barrel and the market is guessing if and when it will go to $100. In fact, for Saudi Arabia and major producers of the Persian Gulf, $100 per barrel is almost already there. Brent crude has narrowed its differentials with WTI and Arab Light crude types and, in some cases, Middle Eastern crude is higher valued than Brent.

The root of the upward trend in oil prices is many folded. As such the roots of the OPEC decision are also divergent. As mentioned before,the OPEC+ decision is certainly the focal factor. In the meantime what prompted the core OPEC+ members to decide to trim their output is important. As explained by the OPEC Secretary General in July, in the OPEC international seminar, OPEC and the OPEC+ are highly sensitive towards the inventory and crude buildup by major consumers; namely the United States, China, and India. The three countries have been building excessive reservoirs both onshore and offshore since early 2020 when the international market was soft and prices were low.

Deepsea Nordkapp Cleared for Drilling in Alvheim

Aker BP has permission from Norway's Petroleum Safety Authority (PSA) to use the semisub Deepsea Nordkapp for production drilling on fields in the Alvheim area of the northern North Sea. One program relates to the Alvheim Field, which began production in 2008 and has undergone development with subsea templates tied to an FPSO.

The other consent concerns the Tyrving project 20 km east, which comprises the Trine and Trell discoveries, 5 km apart, in 120 m of water. The plan for development and operation, approved earlier this year, calls for one multilateral well on each structure, tied back to the Alvheim FPSO, with production set to start in 2025.

Norway

Environmental Hurdle Cleared for Brazil Project

Brazil's environment agency IBAMA has confirmed Petrobras' environmental license to drill two exploratory wells in deepwater Block BM-POT-17 in the Potiguar Basin on the Equatorial Margin.

The first well will be drilled 52 km offshore with the program starting in the next few weeks after the rig has reached the location.

Petrobras aims to increase its knowledge of the area's geology to assess the economic feasibility and extent of the 2013 Pitu oil discovery. It does not plan oil production at this stage.

Trio Awarded Block Offshore Eastern Egypt

Egypt has awarded a consortium of Eni (operator), BP, and QatarEnergy a new offshore exploration block under the 2022 EGAS International Bid Round.

The exploration and production rights cover Block EGY-MED-E8 (East Port Said) in the Mediterranean Sea, covering a 2,600 sq km area in water depths up to 800 m.

QatarEnergy now has stakes in four offshore Egyptian exploration blocks, the others being Red Sea Block 3 and Block 4, and the North Marakia Block in the Mediterranean Sea.

Egypt

Valeura to Expand Thailand Oil Field

Valeura Energy says two recent appraisal wells on the Wassana Field in the Gulf of Thailand have increased its estimate of the recoverable oil.

The company has now started the concept select phase for a project to expand the development to capitalize on this increased potential.

Wassana was offline for much of the third quarter following a precautionary suspension on July 7 to address issues with operating practices on the third-party-owned and operated FSO.

Valeura plans to appoint a new subcontractor to operate the vessel, with production resuming shortly.

Thailand

Brazil

VIEW

VIEW

VIEW

Australia

KBR Modifying Pluto LNG for Scarborough Gas

Woodside Energy has awarded KBR an engineering, procurement, and construction management contract to perform modifications to Train 1 of the Pluto LNG complex near Karratha, Western Australia.

These will enable the processing of up to 3 MM metric tons/year of gas from the offshore Scarborough Field development via Train 1.

UAE and Renewables; Ambitions and Challenges

Shuaib Bahman

Over recent years, investment in the renewable energy sector has increased across the globe. In the meantime, the Persian Gulf oil exporting nations, which have always relied on exporting energy, have adopted a new approach and formulated comprehensive plans to reduce carbon emissions and increase the share of renewables in their energy mix.The United Arab Emirates (UAE), a Persian Gulf littoral state and a key OPEC member country, has invested heavily in all sectors of the energy industry in recent years. In addition to reducing its dependence on non-renewable energy, the UAE is seeking to improve its position in international fora and present an environmentally friendly image of itself.

The UAE has announced a comprehensive carbon reduction plan for up to 2050 in a bid to bring its carbon emissions down to zero. According to Dubai ruler Mohammed bin Rashid Al Maktoum, the UAE would need to invest about $165 billion in clean and renewable energies up to 2050 to realize its goal. For the UAE, investment in renewables would help enhance the economic growth rate, much less create job opportunities. That can also become a major source of income for this country in the future to reduce its economic dependence on fossil energy sales.

Renewables

Furthermore, the advancement of plans related to increasing the role and share of renewables in the UAE's energy mix, along with the use of the nuclear power plant and the development of a program for the use of hydrogen, will improve the political position of the UAE in global equations and international organizations as in a region that is still dominated by fossil fuels, the UAE is trying to show itself as one of the leading countries in climate change.

Accordingly, the UAE is the first country in the Middle East to sign the Paris Agreement. In accordance with the 2015 Paris Climate Treaty, the UAE has committed to use a combination of solar, nuclear, and other energies to replace fossil fuels with renewablesin the future. However, the UAE's renewable energy program is not only limited to the country's domestic consumption; rather, it aims to become the first power in the region in this sector.

According to the UAE's Energy Vision 2050, 44% of the country's energy needs should be suppliedby renewable sources. For this purpose, the UAE has invested $160 billion in the infrastructure of renewable energy use. Forpowergeneration from solar energy, the UAE is one of the leading countries in the region, with the production of 140 MW of electricity per year, standing third in the production of concentrated solar energy in the world.

The UAE's most significant renewable energy project is Mohammed bin Rashid Al Maktoum Solar Park. It is a solar park spread over a total area of 77 km2 in Saih Al-Dahal, about 50 kilometers south of the city of Dubai. It is one of the world's largest renewable projects based on an independent power producer (IPP) model. Besides solar farms using PV technology, the long-term project will also include concentrating solar power (CSP). The total capacity of the entire project is planned to reach more than 4,000 MW.

The 200-megawatt second phase of the project attracted global attention as the winning bid of the tender set a new record-low tariff. This is about 20% lower than any previous, unsubsidized power purchase agreement (PPA) the world has seen before. The PPA is set to a 25-year time frame.

The plant was implemented by the Dubai Electricity and Water Authority (DEWA). The first phase of the project was commissioned on 22 October 2013. At the end of 2020, the solar PV complex reached a generating capacity of 1.013 GW to reach 5GW by 2030. Currently the 4th (700 MW CSP + 250 MW PV) and 5th phase (900 MW PV) are under construction.Thanks to a storage capacity of up to 15 hours, the plant can produce power day and night.

In addition, the UAE plans to establish the tallest concentrated solar energy tower in the world and double its solar energy production. This tower with a height of about 260 meters, almost 60 meters shorter than the Eiffel Tower, is supposed to use about 70,000 heliostats, which are like mirrors to reflect the rays of sunlight and convert it into thermal energy and store it for about 15 hours.

Challenges Ahead

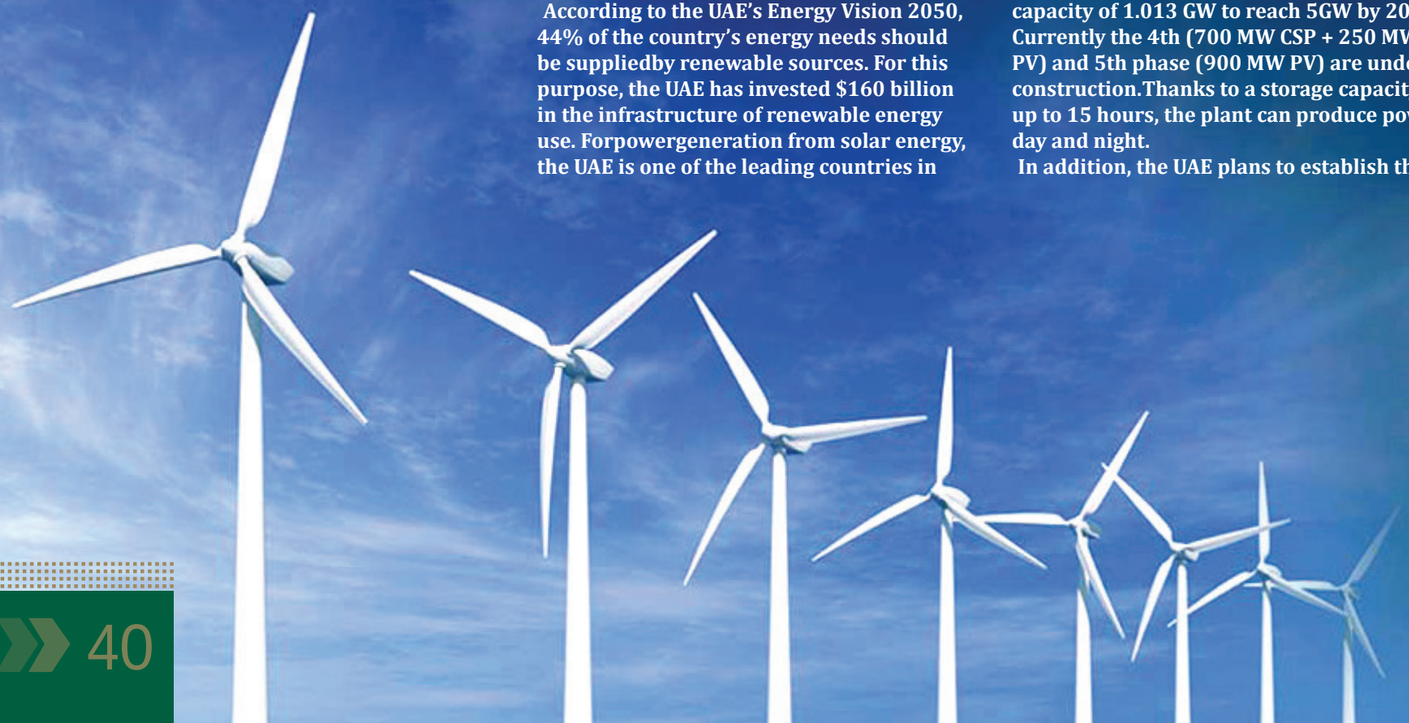
Although the UAE government's determination and decision to reduce the role of fossil fuels in the country's economy is important, Abu Dhabi is also facing challenges in advancing its plans.

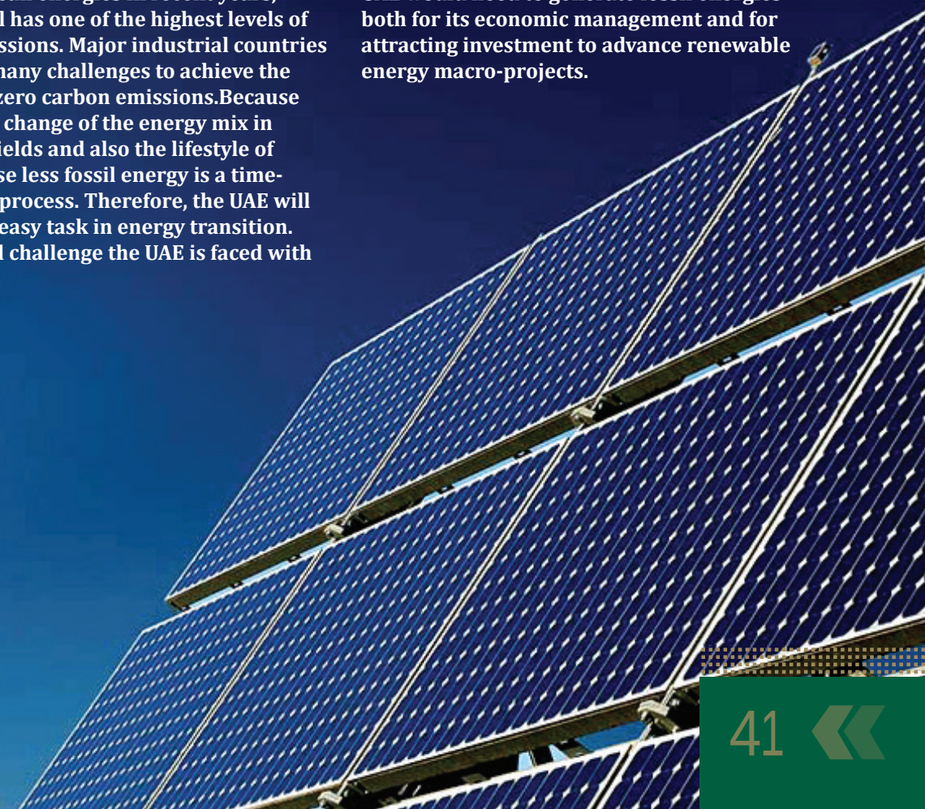
The first challenge is the transition from fossil energy consumption to clean energy. The UAE, a country of ten million, emitsvery big amounts of carbon dioxide in the world. Australia and the United States, it is responsible for one of the highest levels of GHG emissions in the world. For this reason, despite investing more than $40 billion in clean energies in recent years, the UAE still has one of the highest levels of carbon emissions. Major industrial countries are facing many challenges to achieve the goal of net zero carbon emissions.Because the gradual change of the energy mix in industrial fields and also the lifestyle of people to use less fossil energy is a time-consuming process. Therefore, the UAE will not face an easy task in energy transition.

The second challenge the UAE is faced with in renewable energy generation is foreign investment attraction. The UAE intends to generate 70% of its electricity from renewables by 2050, which would require foreign investment. There are legal obstacles; however, by deregulating the energy market, the UAE intends to engage more players in energy production.

The third challenge to the UAE's renewable energy generation is the concentration of renewable generation in Dubai. While Dubai is going its way towards more solar energy and less carbon, other UAE areas still heavily depend on traditional sources of energy. These areas are also taking great strides to pave the way towards the future through strategic investment.

Overall, despite the UAE's efforts to diversify its energy mix, oil and gas exports remain the main pillar of its economy, accounting for 30% of its gross national product (GNP). Undoubtedly, it would be tough for the UAE to reduce fossil energy production at a time when renewables require investment.The UAE would need to generate fossil energies both for its economic management and for attracting investment to advance renewable energy macro-projects.





Half of SPGC Equipment Homegrown

The development of technology, establishment of technology management, and development of innovation centers are among the policies pursued by South Pars Gas Complex (SPGC) in terms of research and technology.

Abbas Sayyadi, director of research and technology at SPGC, has said the complex's research activities have been going on in line with full cooperation with knowledge-based companies in favor of sustained production by SPGC. SPGC is moving in parallel with leading companies involved in developing technology for gas production and refining including designing and manufacturing sensitive rotary machinery and high-tech fixed equipment like cold boxes supplied by knowledge-based companies.

A roadmap has been drawn for SPGC's Directorate of Technology. The roadmap has been drawn based on the Ministry of Petroleum's research and technology code, which is aimed at providing technical and engineering services for the manufacturing of equipment whose technology is monopolized by several nations. The head of research and technology at SPGC has said most of the equipment had been manufactured for the first time in Iran. "Given the approach recently adopted vis-à-vis knowledge-based activities in the country, SGPC remains one of the leading companies of the Petroleum Ministry in using the potential of knowledge-based companies. Furthermore, it has carried out significant activities for the transfer and upgrade of level of technology in the country based on demand for chemicals and oil and gas industry equipment, as well as control systems," Abbas Sayyadi said.

He added that SPGC was ranked the first in the country in terms of using first-time locally-manufactured equipment.

Referring to the effective role of engineering, technical, and operational units as well as science parks in Bushehr Province for establishing this technical knowhow, he said: "The complex is not limited to the province because more than 75% of the energy and mix of oil and gas industry products is provided by South Pars. Therefore, we should benefit from the full capacity of knowledge-based centers, as well as science parks."

100 Knowledge-Based Companies

Using the potential of knowledge-based companies at SPGC is a priority for the complex. To that effect, knowledge-based companies are assessed by the Office of the Vice President for Scientific and Technological Affairs before being introduced to SPGC.

SPGC is currently cooperating with more than 100 knowledge-based companies in commerce, research, and first-time manufacturing of equipment. Some of these companies are working under a consortium. SPGC is also directly cooperating with science parks.

Sayyadi said that cold boxes and turboextenders which are currently at the disposal of SPGC had already been manufactured by 4 to 5 companies in Japan, Europe, the US, and China.

With the domestic development of technical know-how for this equipment, foreign companies' monopoly was broken by Iranians.

Sayyadi said self-sufficiency in the manufacturing of necessary equipment for SPGC was highlighted in 2011, adding: "We give industrialists this chance and provide them with necessary infrastructure. In this way, we can use Iranian technology."

Currently, at SPGC, technology is being developed for compressors, rotary equipment, cold boxes, and valves.

SPGC has been investing in high-tech equipment since 2020 and agreements have been signed for 25% of these commodities. This percentage is projected to reach 40% by 2025.

Sayyadi said all measures taken in the development of technology are aimed at preventing any halt in production.

As far as SPGC's cooperation with science parks is concerned, this complex has good ties with the Persian Gulf, Isfahan, Tehran, Mashhad, and Fars science parks. Recently, an agreement was signed with Shiraz University regarding the development of knowledge management.

What was described above shows that SPGC's cooperation with knowledge-based centers is running smoothly.

Indirect Cooperation with Foreign Firms

Indirect cooperation with some foreign knowledge-based companies and scientific centers, particularly in Russia, Iraq, and Persian Gulf littoral states, is underway at SPGC. For instance, the Persian Gulf Science Park is in contact with 16 companies from the Persian Gulf littoral states.

Making systems intelligent is another top interest at SPGC. Nearly 22 years have passed since the first refinery was built at SPGC. Many technologies have since changed and therefore using new systems has become essential.

Sayyadi said SPGC had fared well in making systems intelligent, adding: "In old phases, upgrading software and hardware and control systems and technologies has been done. Furthermore, necessary technologies have been developed locally."

Domestic capacity and hard currency spending are among the factors involved in deciding to develop necessary technologies. If local manufacturing is more cost-effective than purchasing equipment from foreign countries, investment is made in this sector.

Sayyadi said: "The technologies used by SPGC are required to guarantee production while upgrading the mix of products with minimum costs."

SPGC has four important projects with the Persian Gulf University, two of which are about waste and two related to power generation.

Yazd Gem in The Desert

Parisa sadeqieh

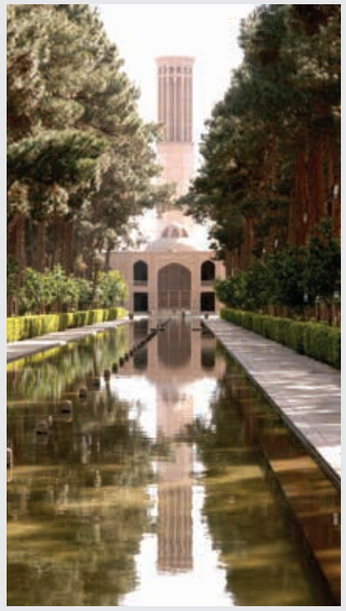
Whatever grows in desert are patient and valiant trees standing tall benefitting from the least amount of water available. These trees without expecting to enjoy ideal circumstances surface in infertile desert and continue their lives. Yazd is an adobe city built on frugality. People in Yazd are hard-working and clever. They first developed wind-catchers from mud. They also dug desert to reach water. People of Yazd planted trees in the middle of desert and left a legacy which surprised the entire world. Yazd subdued the desert.This old city is almost entirely built in brown-red adobe clay, helping to blend it into the surrounding desert landscape and to keep its building interiors cool.

Jameh Mosque

One's eyes adapt to this mono-color, after which the bright turquoise and intricate Persian Islamic design in the Jameh Mosque will make you feel like you've put on 3-D glasses. Gaze at the mosque's designs long enough and they'll dizzy you, pull you in and play tricks on your eyes as you try to discern the calligraphy, symmetry and symbolism buried within. Yazd's Friday Mosque, which is one of the largest and the most beautiful mosques in Iran, was built in the 8th century AH when the Ilkhanid Dynasty was in power in Iran. The foundations for the mosque were first laid two centuries before. The building which currently exists in Yazd spans around 10,000 square meters. The mosque is a fine specimen of the Azari style of Persian architecture. The mosque is crowned by a pair of minarets, the highest in Iran, and the portal's facade is decorated from top to bottom in dazzling tile work, predominantly blue in color. Inside the mosque, there is a long arcaded courtyard where, behind a deep-set south-east (veranda), is a sanctuary chamber (shabestan). This chamber, under a squat tiled dome, is exquisitely decorated with faience mosaic: its tall faience altar, dated 1365, is one of the finest of its kind in existence. This mosque is an important monument for a variety of reasons: First, it is an ancient architecture which has been used in Yazd's religious buildings for centuries. Second is the mosaic decoration of rooftops. Third is the carving out of Quranic verses on white tiles set on a turquoise background in the altar. A collection of valuable Qurans are put on display there.Two large minarets, measuring 50 meters high, were built under Shah Tahmasb of the Savafid dynasty. The body of these minarets is covered with tiles graved with Arab admiration for God and Quranic verses.

Amir Chakhmaq Square

Amir Chakhmaq Shami and his wife, Seti Fatimeh built this square, in the 9th century AH. Hadji Qanbar Bazaar on the east side of the square was one of the buildings constructed by Nezameddin Hadj Qanbar Jahanshahi. The famous Mir Chakhmaq Mosque and theater for passion plays are located on the north of the square.Amir Chakhmaq Complex is a prominent structure noted for its symmetrical sunken alcoves. It is a mosque located on a square of the same name. It also contains a caravanserai, a bathhouse, a cold water well, and a confectionery. At night, the building is lit up after twilight hours and after sun set with orange lighting in the arched alcoves which makes it spectacular.The prominent structure has a three-storey elaborate façade of symmetrical sunken arched alcoves. It is the largest structure in Iran. In the centre, are two very tall minarets. The spiral staircase in one of the two minarets is said to create a feeling of claustrophobia, while it provides views of Yazd. Arcades have been added recently on the flanks to provide safety from traffic. Only the first floor above the ground level is accessible. There is a shopping complex in the basement of structure. This is a grand structure of which many innocents souls spent their lives.



Tallest Wind-Catcher

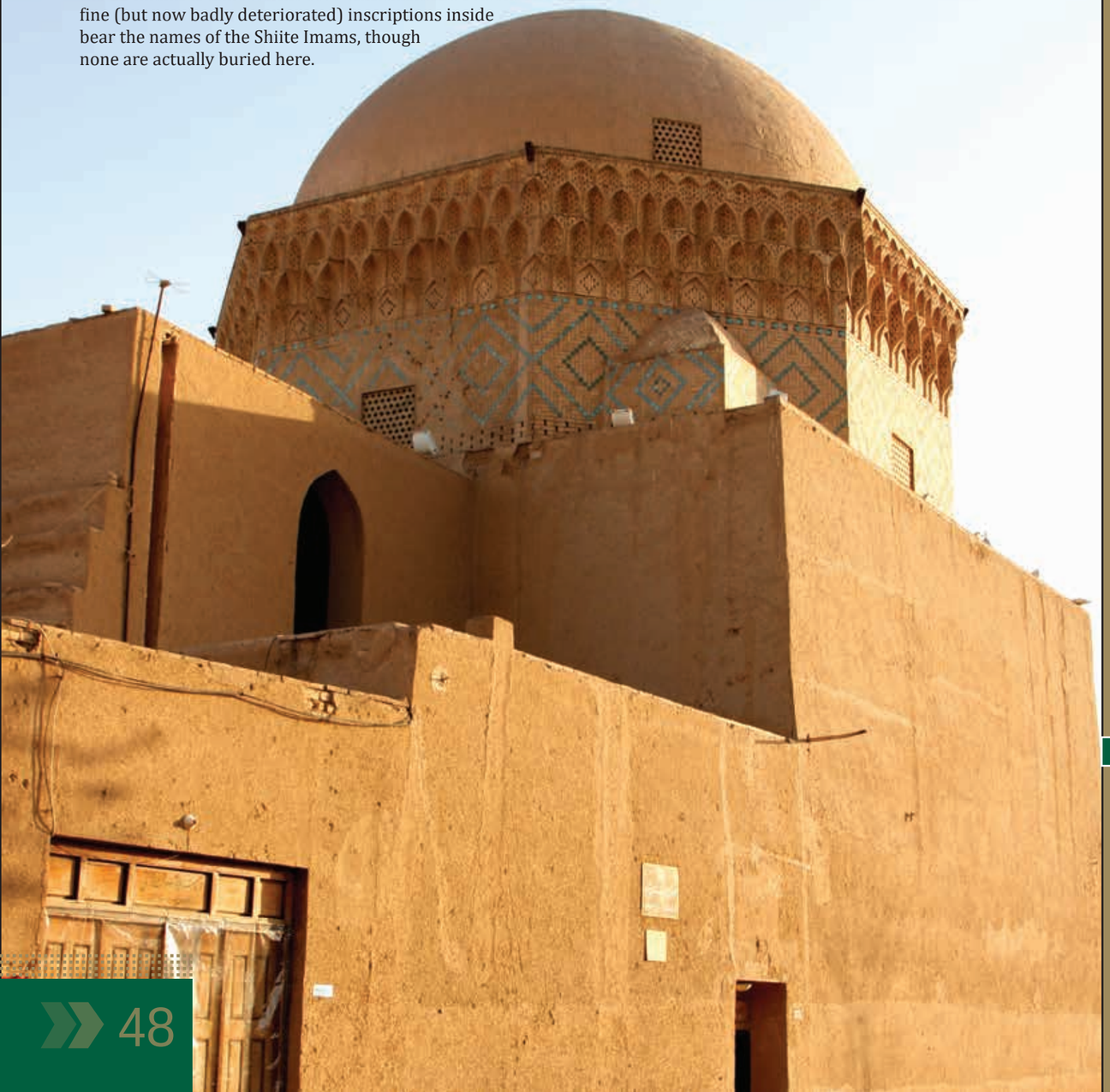
Dowlatabad Garden, built in 1160 AH, is among famous gardens in Iran. A wind-catcher installed in this garden is the tallest ever known in the world. Its archway provides an attractive view of the building. This garden has an aggregate of different buildings which were designed and constructed during the time of Mohammad Taqi Khan in the Zandieh era. It was the residence of Khan , his government and officials. The wind trapper of this garden is 33 meters high and is considered an architectural masterpiece and a symbol of the Yazdi architects' genius, mental ability, talent and art. The most significant characteristics of the design of this building is believed to be the attempt of the architect in selecting tactful angles for providing the best views and landscape internally. The Dowlatabad garden is regarded as one of the sites worth visiting due to verdant gardening skill in landscape architecture, irrigation method, and in the richness of architectural design. It is for this reason that the same has been recorded as a historic building.

Fire Temple

The majority of Iran's Zoroastrian population lives in Yazd province. That is why Yazd is known as the province of fire temples. Varahram Fire Temple is the most famous fire temple of Zoroastrians, Varahram is widely known for the age of its fire, which is approximately 1,500 years old and never extinguished. It originated in the Nahid Fire Temple situated in southern Fars province. Then it was shifted to the village of Haftador near Aqda. Later on, it was again taken to another village called Torkabad in Ardakan. The fire finally came to Yazd in 1325 from the cave of Eshgeft-e-Yazdan. Before the current Fire Temple was built, the fire was housed in Moubedan. But today, you can see it burning amidst the heart of the city in a well-known residential area of Yazd. Built by the Zoroastrians based in Yazd and the country of India, this temple depicts architecture reminiscent of the ancient times of Persia.

Alexander's Prison

The city of Yazd has long won fame for housing the Alexander's Prison. Some historians believe that after occupying Iran, Alexander of Macedonia sent people to exile in Yazd. Alexander Prison is a five-century year old school. There is a well inside the courtyard which is 5 meter deep that according to local legends it has been built by Alexander the Great as a dungeon. Now, through a spiral staircase you can climb down the well, relax for some moments and have a drink in its nice teahouse. Some of the inner rooms have been changed into souvenir shops producing and offering handicrafts. From outside, an 18-meter tall dome distinguishes Alexander Prison from its surrounding buildings.The 15th-century domed school may be known as Alexander's Prison because of a reference to this apparently dastardly place in a Hafez poem. It is not thoroughly clear whether the deep well in the middle of its courtyard was in fact built by Alexander the Great and used as a dungeon or not. The building itself is worth a look for the small display on the old city of Yazd, the clean toilets and the mercifully cool subterranean teahouse. The early-11th-century brick tomb of the 12 imams is almost next door to Alexander's Prison. The once-fine (but now badly deteriorated) inscriptions inside bear the names of the Shiite Imams, though none are actually buried here.



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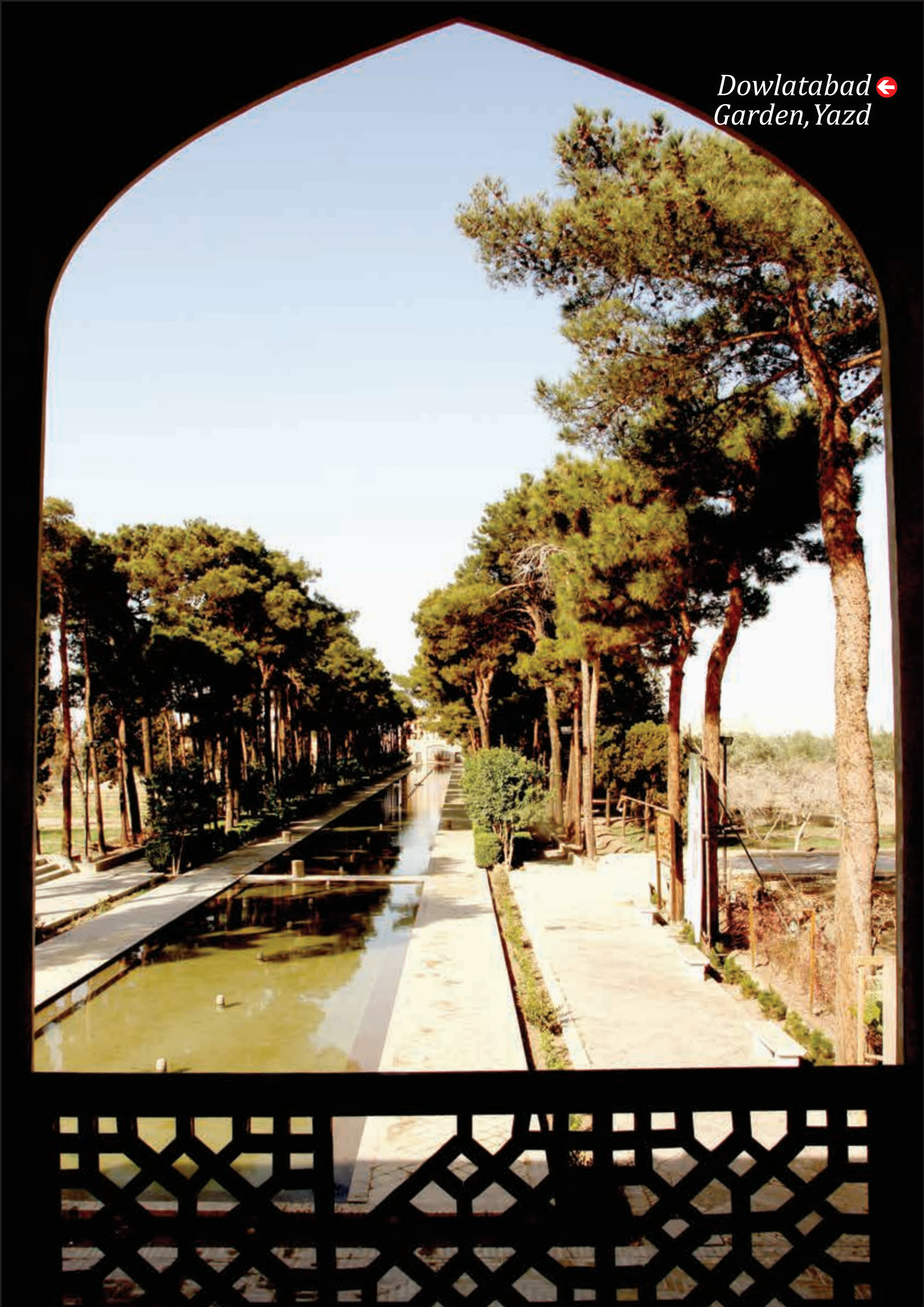

Dowlatabad Garden, Yazd