Volume 48 November 2023

Petroleum Today

Not For Sale

CLIMATE CHANGE AND INDUSTRY: BEYOND AN INVESTMENT OPPORTUNITY

TALENT & TECHNOLOGY

TECHNOLOGY APPLICATIONS

INDUSTRY AT A GLANCE

ENERGIZING EGYPT'S FUTURE: THE PATH TO ENERGY TRANSITION AND SUSTAINABILITY

Celebrating Victory, Innovation and Excellence:

The 48th Egyptian Petroleum Day


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تبنت شركة اسيوط الوطنية لتصنيع البترول (انوبك) ، المعايير الخاصة للاستدامة وفقاً لافضل الممارسات العالمية متضمنة منهج متوازن ومستدام لتحقيق النمو الاقتصادي والتنمية المجتمعية وحفظ الموارد الطبيعية والبيئية حيث تم اعداد تقارير دراسة تقييمات التاثيرات البيئية والمجتمعية لمشروع مجمع التكسير الهيدروجيني للمازوت باسيوط وفقاً لمنهجية تقييم المخاطر البيئية وتعزيز عملية التنمية و ضمان التنمية المستدامة - وان تلبي التنميةاحتياجات الجيل الحاضر دون المساس بقدرة الأجيال المقبلة على تلبية احتياجاتها الخاصة .

كما طبقت الشركة مبادىء استراتيجية قطاع البترول والثروة المعدنية لتعزيز مفهوم التنمية المستدامة والمسئولية المجتمعية وفقاً لرؤية مصر 2030 متضمنة الاتي : -مبدأ تمكين المرأة: - مبدأ التعليم وتأهيل وتدريب الشباب متضمناً ذوي الهمم - مبدأ التمكين الاقتصادي -مبدأ الطاقة النظيفة والمتجددة حيث تم التركيز للبحث عن مصادر بديلة للطاقة التقليدية , وزيادة الوعي للمجتمع المحيط بالمجمع بضرورة ترشيد استهلاك مصادر الطاقة التقليدية من اجل اتاحة فرصة للتحول الي اقتصاديات الطاقة المتجددة لذلك تم الاتجاه الى تنفيذ مشروع الغاز الحيوي (البيوجاز) بالقرى المستهدفة

وتقوم الشركةبإعداد استراتيجية بناء القدرات التشغيلية لمجمع انتاج السولار بأسيوط، و السعي والتخطيط لبناء القدرات البشرية المدربة ذات كفاءة واعتمادية تتوافق مع حجم العمل في مجمع التكسير الهيدروجيني للمازوت، وأن يكون هذا المشروع نواة لتحقيق توفير الإيادي العاملة المدربة بصعيد مصر مما يحقق تنمية مجتمعية واقتصادية مستدامة لأبناء محافظة أسيوط والمحافظات المجاورة لها، وبشأن تنمية قدرات المجتمع المحلي فان المشاريع المستهدفة للمشاركة المجتمعية التي تغطي الاستراتيجات المحددة من وزارة البترول والثروة المعدنية، تقوم على أساس الاستدامة الشاملة، والشمول المالي والاقتصادي وتمكين المرأة، والتدريب على الاعمال التي تزيد من دخل الفرد وكذلك تم تحديد قياس الأداء للمشاريع لرصد قصص النجاح. واختيار المشاركة بالمشاريع التي تتميز بالاستدامة وعائد الاستثمار كمردود للتنمية.

Petroleum Today

contents

Yesterday's challenge is the Today's Backbone

This month Egypt is used to celebrate the Egyptian Petroleum Day which is on 17th of November & this year will celebrate the 48th anniversary.

As a result of the triumph of October War, the petroleum fields of Sinai were regained on the 17th of November 1975, and this day is considered as Petroleum's Day to commemorate the start of the widening of exploration of petroleum and gas operations in Egypt and the enterprise of the IOC's to work in Egypt that yielded a great broadening of the oil prospect operations in the state.

Another great achievement of the reviving the oil fields is the re-operating Suez oil refineries and inauguration of the strategic petrochemical industry on which many complementary industries are based on in the country in order to meet the growing needs of petrochemical products in different fields. In addition, it has a direct impact on supporting the national economy.

In 2016 Egypt set an ambitious strategy that aims to boost the production capacities of petroleum and petrochemical products in an attempt to secure their availability locally as well as reduce imports which is a part of modernization strategy that keen to upgrade the national plan for the petrochemical industry, unleash its capabilities and achieve the greatest return to the Egyptian economy.

The Egyptian Ministry of Petroleum and Mineral Resources further revealed that it is accelerating works on the implementation of new refining projects with a total investment cost estimated at $7.5 billion.

Recently Alexandria Petroleum Company and other state-run refiners completed projects with a total value of around $5.3 billion, resulting in a production increase of nearly five million tons from 12 MTPA to 17 MTPA and reduced imports of refined and petroleum products from 8 MTPA to 6 MTPA.

In the end, greetings to you, Egypt has pride and dignity

Petroleum Today

Petroleum Today

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Special thanks to all the
Society of Petroleum Engineers (SPE)
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Design and Print by:

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EGYPT NEWS

The Introduction of the CLIMATECH Challenge at the Seventh Edition of Egypt Energy Show (EGYPES)

Demonstrating a firm commitment to Egypt›s Nationally Determined Contributions and its ambitious target of reducing greenhouse gas emissions by 65% by 2030, the Egyptian Ministry of Petroleum and Mineral Resources announces the launch of the region's first CLIMATECH Challenge at the seventh edition of the Egypt Energy Show (EGYPES), taking place in Cairo from 1921- February 2024.

The CLIMATECH Challenge serves as a global platform for start-ups to pitch their technological solutions and business models before a panel of influential selection committee members, spotlighting pioneering start-ups with cutting-edge solutions to expedite the energy transition and amplify the role of undiscovered energy innovators in advancing global net-zero targets.

Featuring a rich programme of keynote speeches, motivational talks, and panel discussions, the CLIMATECH Challenge will gather global energy industry visionaries, investors, change-makers, and emerging start-ups to showcase their critical innovations and groundbreaking climate technologies.

Cheiron eyes drilling $160mln natural gas wells in Egypt in H1 2024

Cheiron Petroleum Corporation has invested around $160 million to explore and produce natural gas in the West El Burullus Concession, south-east the Mediterranean, two government officials told Asharq Business.

The firm is seeking to start production from the concession in the first half (H1) of 2024, with a production capacity of 150 million cubic feet of natural gas a day, an official said.

It is planning to drill seven natural gas wells and other natural condensates, the source added.

Egypt's $1.8B drilling spree led by Eni

Eni, the Italian multinational energy company, marked a significant milestone on 10 October as it initiated drilling operations for the Orion-1X exploration well in the Northeast Ha'py exploration license, situated in the offshore Nile Delta.

The Saipem Santorini drillship, equipped with state-of-the-art technology and expertise, is currently engaged in operations in a challenging water depth of 730 metres. This endeavor is part of Egypt's ambitious plan to propel its energy sector forward by drilling up to 35 new gas exploration and development wells in the East Mediterranean, offshore Egypt, within the next two years.

The Orion-1X well is a crucial component of this strategic initiative, targeting a Cretaceous four-way dip structure with immense potential. Preliminary assessments suggest that the prospect holds an estimated 10 trillion cubic feet (Tcf) of natural gas and 400 million barrels (MMbbl) of valuable liquids, solidifying its status as a highly prospective asset.

Shell, NPIC join race for military-owned Wataniya Petroleum

Shell, the global oil giant, has formed an alliance with Saudi Aramco to bid for Wataniya Petroleum, a subsidiary of the National Service Products Organization (NSPO), which is owned by the Egyptian military. The government plans to sell its stake in Wataniya as part of its economic reforms.

Another contender for Wataniya is the North Petroleum International Company (NPIC), a wholly owned Egyptian subsidiary of the Chinese Zhen Hua Oil. NPIC is interested in expanding its presence in the Egyptian market, not only in the distribution sector, but also in the exploration and production of oil and gas.

According to informed sources who spoke to Daily News Egypt, there are four other competitors: TAQA Arabia, ADNOC from the United Arab Emirates, Emirates National Oil Company (ENOC), and Petromin. ADNOC's offer is considered one of the best so far.

The sources said that the companies are still conducting due diligence on Wataniya, which was recently restructured by a team of advisors. The advisors created a new entity that owns 174 stations out of more than 300 stations that Wataniya operates. The remaining stations, which are of strategic importance, will be kept under the name "Wataniya."

ExxonMobil eyes expansion in Egypt soon

Egyptian Prime Minister Mostafa Madbouly has met with the US-based ExxonMobil's Senior Vice President Loic Vivier to discuss the company's expansion plans in Egypt in the coming period, as per a statement. During the meeting, the Minister of Petroleum and Mineral Resources Tarek El-Molla announced that the production from an oil exploration well affiliated to the American firm in Egypt is expected to start within a few months. For his part, Vivier noted that the company has significant investment plans in Egypt.

Egypt's AMOC says refinery upgrade project on track

An Egyptian refining company which is partly owned by the government has said it is carrying out a project to upgrade its facilities to increase output. Alexandria Mineral Oils Company (AMOC) said in a bourse statement that it produced nearly 1.5 million tonnes of products which includes naphtha, LPG, gasoil for domestic consumption during fiscal 20222023-. AMOC Chairman Amro Lutfi, speaking during a general assembly meeting on Saturday, said the company has been locked in a project to upgrade facilities and boost efficiency with the aim of increasing output of most products.

ARAB & INTERNATIONAL NEWS

Qatar signs 27 - year gas supply deal with Italy's Eni

State-owned QatarEnergy said on Monday it would supply Italy›s Eni with gas for 27 years, following similar deals this month to supply the Netherlands via Shell and France through TotalEnergies. Affiliates of QatarEnergy and Eni signed a long-term sale and purchase agreement for up to 1 million tons per year (mtpa) of liquefied natural gas (LNG) from Qatar›s North Field expansion project. LNG will be delivered to the FSRU Italia, a floating storage and regasification unit in Tuscany›s port of Piombino from 2026. Eni has a 3.125% stake in the North Field East expansion that, together with the North Field South expansion, will lift Qatar›s liquefaction capacity to 126 mtpa by 2027 from 77 mtpa. Qatar, already the world›s top LNG exporter, in the last two weeks signed 27-year deals to supply 3.5 mtpa from 2026 to Shell and TotalEnergies, its largest and longest European gas supply deals.

Oman Manufactures its First Well Drilling Rig

Oman has completed its first well drilling rig among four others expected to be manufactured, with the aim of strengthening and localizing its oil and gas industry. The total value of expenses retained in Oman amounted to 40 million US dollars, from which small and medium-sized Omani companies benefited. This 1,250 HP rig was custom-designed and built with an emphasis on electronic operation using the latest technology to provide safe, efficient, and sustainable drilling operations. It can be controlled via the platform's central operating system and the automated drilling chair, through custom software to enhance the ability to control operations remotely, which enhances performance with the highest health, safety, and environmental standards.

Iraq's Oil Exports Surged in September

Iraq's Ministry of Oil announced that the country's crude oil exports reached a total of 103.143.199 million barrels in September, generating revenues of $9.422 billion. In July 2023, the Iraqi Parliamentary Oil and Gas Committee revealed the government plans to increase oil production to over 5 million barrels per day (bpd). Notably, Iraq's crude oil exports in May was 3.3 million bpd generating $7.3 billion, with an average price per barrel of $71.30. According to the final statistics issued by the State Organization for Marketing of Oil (SOMO), a total of 102.220.441 million barrels of oil were exported from the central and southern fields in Iraq. Additionally, 473.335 thousand barrels of oil were exported from the Qayyarah field. The report also highlights that 499.423 thousand barrels were exported to Jordan, with an average price per barrel valued at $91.353.

US LNG Exports Reach Second Highest Monthly Level

US liquefied natural gas (LNG) producers increased their exports in October, reaching a level of 7.92 million metric tons, according to data provider LSEG, marking the second-highest monthly level on record, just shy of the record 8.01 million metric tons achieved in April of this year. Notably, exports were up from 7.12 million metric tons in September, when plant maintenance reduced U.S. production.The increase in exports came as output fell at Berkshire Hathaway Energy's Cove Point, Maryland, terminal. The loss from a 12-day maintenance outage was more than compensated for by higher production at Cheniere Energy and Venture Global LNG plants, LSEG data showed.

Global Natgas Demand Set for Slower Growth to 2026

Global natural gas demand is expected to experience slower growth to 2026 after peaking in mature markets such as Europe and North America in 2021, according to a report by the International Energy Agency (IEA). The IEA's annual medium-term gas market outlook predicts that global gas demand is on course to increase by an average of 1.6% per year from 2022 to 2026, which is slower than the average annual rise of 2.5% between 2017 and 2021. Russia's attack on Ukraine last year resulted in lower supplies of pipeline gas to Europe from Russia, prompting a race for alternative energy supplies. Overall gas demand from mature markets in the Asia Pacific region, Europe, and North America peaked in 2021 and is forecast to decline by 1% annually to 2026, according to the report. The accelerated roll-out of renewables and improved energy efficiency are also driving the downward trend for natural gas in mature markets. For Europe, the loss of pipeline gas from Russia forced governments to seek alternative solutions to maintain energy security, the IEA said.

China to Cap Crude Oil Refining Capacity at 1B Tons by 2025

China will cap its crude oil refining capacity at 1 billion metric tons by 2025 to streamline the country's vast oil processing sector and reduce carbon emissions, the country's state planning agency affirmed in an online post. In 2022, China surpassed the United States as the world's largest oil processor by increasing its oil refining capacity to 920 million tons per year (mtpa), equivalent to 18.4 million barrels per day (bpd). The National Development and Reform Commission (NDRC) said earlier this month that it would limit new refining capacity and promote the upgrading and optimization of existing refineries in addition to accelerating the closure of small and outdated plants. The capacity cap of one billion tons, or 20 million bpd, was initially mentioned in October 2021 when Beijing announced its action plan for reaching peak carbon emissions by 2030.

CORPORATE NEWS

TAQA Celebrates Milestones and Expands Service Footprint in Africa and Iraq

The Industrialization and Energy Services Company (TAQA), a leading well solutions provider to the energy industry, celebrated its 20th anniversary at Abdeen Palace in Cairo. The celebration witnessed the announcement of the integration of "Tendeka", "Cougar", "TARGET", and "AlMansoori Petroleum Services", as a regional provider in the energy sector under one website, TQ.com

This milestone reflects TAQA›s commitment to enhancing its presence in the rapidly advancing energy sector, aligning with recent developments and increasing its workload in Egypt to become its central hub and gateway for well solutions serving both Africa and Iraq. Having operated in Egypt for 17 years, the company has established deep-rooted relationships within the country, expanding the range of services provided to its customers.

Enppi, OAPEC Sign Training MoU

Minister of Petroleum and Mineral Resources Tarek El Molla witnessed the signing of a memorandum of understanding (MoU) for cooperation in the field of training between Enppi and the Organization of Arab Petroleum Exporting Countries (OAPEC).

The MoU was signed by Mohamed Abdelaziz, Chairman of Enppi, and Jamal Essa Al Loughani, OAPECs Secretary-General.

Methanex Invests $2M to Support Youth Employment in Damietta

Methanex Egypt signed a new five-year partnership with the International Labor Organization (ILO) Cairo Office to support the Decent Jobs for Egypt's Young People (DJEP) program. The signing ceremony was attended by H.E. Tarek El-Molla Minister of Petroleum and Mineral Resources, Mr. Brad Boyd, Methanex Corporation Senior Vice President, Mr. Eric Oechslin, ILO Cairo Director and Mr. Mohamed Shindy, Managing Director, Methanex Egypt.

Through a $2 million donation by Methanex Egypt, the program will create 1,000 jobs, promote entrepreneurship, facilitate job matching and build the capacity of local service providers to help youth in Damietta. This unique partnership is a testament to Methanex's commitment to making a positive impact on people's lives through its business.

Bp Egypt appoint Wail Shaheen as Vice President

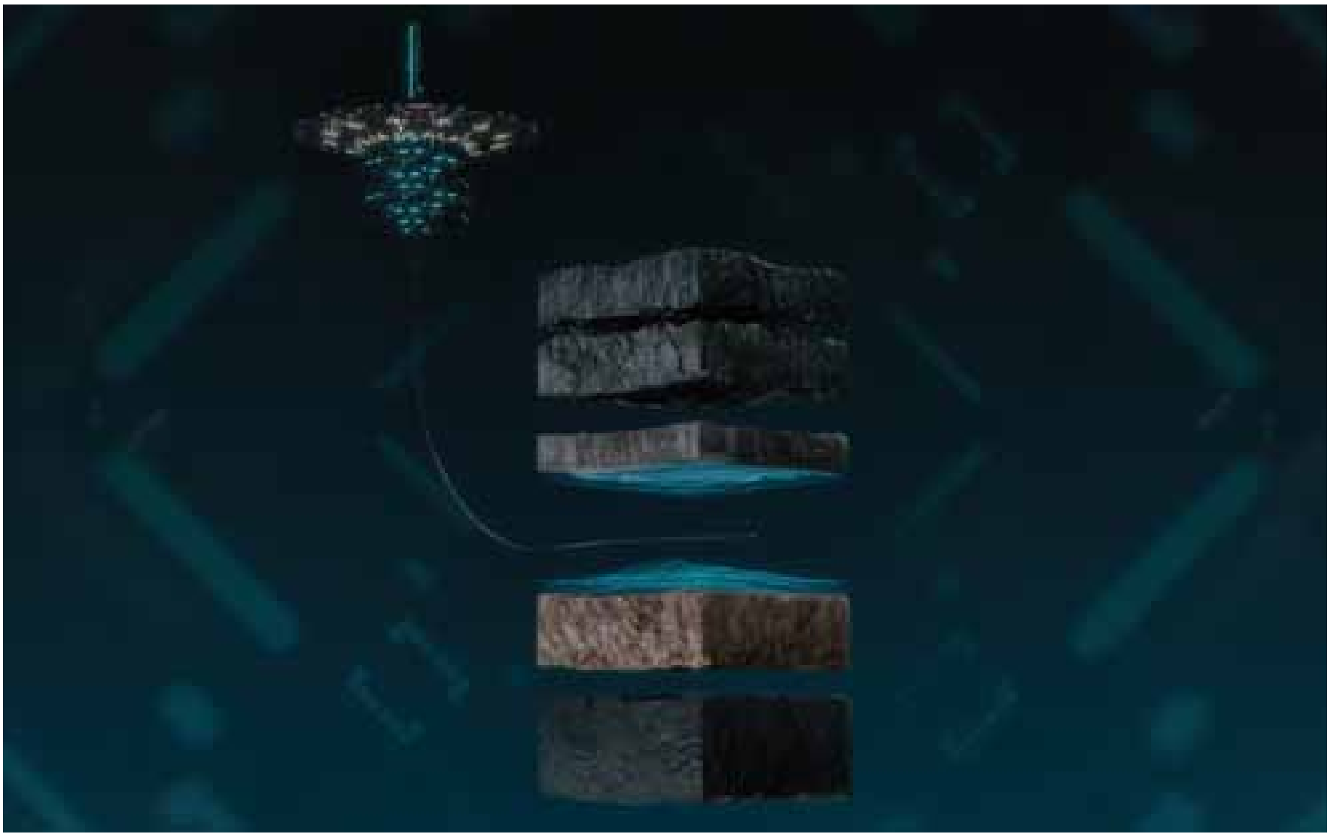
Bp Egypt has announced the appointment of Wail Shaheen as Vice President Egypt, effective 1 November 2023.
Wail is a reservoir engineer by background with 30 years of industry experience. He brings a wealth of knowledge and insights from a wide range of technical, commercial, and leadership roles in Canada, Egypt, Indonesia, Italy, Oman, Trinidad and Tobago, and the USA. This included the Cypre project in Trinidad and Tobago, Tangguh Train 3 in Indonesia, and the development of the Khazzan/Ghazir project in the Sultanate of Oman. Wail also contributed to developing and leading the exploration and petroleum engineering talents at BP globally throughout his career.

Shell Egypt Announces New Discovery in North East El-Amriya Block in the Mediterranean

Shell Egypt has announced a new discovery after successfully completing the drilling of the first well in its three-well exploration campaign, Mina West, located in the North East El-Amriya block, in the Mediterranean Sea.
The company said in a statement that drilling activities took place at a water depth of around 250 meters below sea level in the offshore Nile Delta and the primary data confirmed the presence of gas-bearing reservoir.
It explained that acquired data requires more evaluation to determine the size and recoverable potential of the discovery.
On this occasion, Khaled Kacem, Vice President and Country Chair of Shell Egypt, said: “This discovery is an important step forward for Shell Egypt bolstering our growth aspirations and ongoing commitment as a key partner in Egypt’s energy landscape. Successful delivery of our current exploration campaign is part of Shell Egypt’s growth strategy. Shell, together with its partners, will continue to work towards safely and efficiently reaching the development phase of the block.”
It should be noted that Shell signed a Farm Out Agreement (FOA) with Kuwait Foreign Petroleum Exploration Company (KUFPEC) last September, under which KUFPEC acquired a 40% stake in North East El-Amriya block, with Shell holding the remaining 60% stake, of the partner’s share with the Egyptian Natural Gas Holding Company (EGAS).

A delegation from Zamil Steel Buildings Company meets with a delegation from Hadi Maizer to inspect walkers

A delegation from Zamil Steel Buildings and Orascom Construction, the main contractor for the Plasma Project in the New Administrative Capital, the project consultant office Muharram-Bakhoum, and the consultant office Fouad-Farhat, met with them about the treadmills produced by Hady Meiser Egypt.
Acc. Taha Abou Rabia - General Manager
Mr. Ahmed Yehia - Director of Planning
Mr. Ahmed Al-Gamal - Sales Manager
The walkers impressed the delegation he headed
Eng / Mamdouh Abdel Moneim - Consultation Engineer from the Muharram Consulting Office - Bakhoum
Eng / Mohamed Samy - Consultation Engineer from the Fouad - Farahat Consultant Office
Eng / Hamdi Saad - Quality Engineer at Zamil Steel Buildings Company
Eng / Ibrahim Mohamed - engineer from Orascom Construction Company



Schlumberger Introduces Neuro Autonomous Solutions

Schlumberger has announced the introduction of Neuro* autonomous solutions. These solutions use advanced cloud-based software and connected intelligent systems that create a continuous feedback loop between surface and downhole. This significantly increases the efficiency and consistency of E&P operations while reducing human intervention and footprint. The announcement was made at the Schlumberger Digital Forum, which is taking place this week in Lucerne, Switzerland.

"Neuro autonomous solutions transform hydrocarbon exploration and development workflows for the well construction process today and lay the groundwork for our customers to achieve fully autonomous operations tomorrow," said Abdellah Merad, EVP, Core Services & Equipment, Schlumberger. "Over the next several years, we will scale autonomous solutions across the energy value chain to revolutionize our industry's operating model and achieve higher-value outcomes for our customers."

Schlumberger's first Neuro solution delivers steering autonomy for directional drilling. The solution uses artificial intelligence with surface and downhole automation workflows to self-determine steering sequences and deliver the well trajectory on plan. As the well is drilled, a real-time continuous feedback loop between an intelligent downhole system and a surface advisory system automates downlinks, reducing control loop time. The instantaneous correlation between downhole and surface actions in accordance with the well plan significantly reduces risk, refines precision and increases efficiency—reducing associated drilling emissions.

Halliburton introduces digital platform to optimise ESP performance

Halliburton Company has introduced a new data science-driven platform that helps operators? design, build, and operate end-to-end electrical submersible pump (ESP) monitoring solutions. This application can be customized for specific? needs.?

The Intelevate platform integrates historical engineering and performance data with active operational information to provide a holistic view of an operator's ESP system. The service intelligently processes, analyses, and models production data with real-time visualization and reporting to develop a comprehensive optimization plan, including remote changes and interventions, to achieve production goals.

"The Intelevate platform uses existing data, artificial intelligence and machine learning along with real-world experience to provide accurate predictions, insights, and potential solutions for critical business decisions," said Greg Schneider, Vice President for Artificial Lift. "With the Intelevate platform, we support safe and sustainable ESP operations by delivering extensive, customizable technical well monitoring and optimization solutions, allowing us to maximize the asset value for our customers."

Locus Bio-Energy launches biosurfactant technology for enhanced wellbore remediation

Locus Bio-Energy recently launched AcidBoost™ – a biosurfactant-based product line to address the prevalent challenges in wellbore remediation with acid stimulation fluid systems. The biosurfactant technology allows operators to use a single acid additive.

Wellbore remediation with acid-based fluid systems is critical for eliminating carbonate scales, controlling iron deposition and removing formation damage to restore production rates. The process typically requires multiple stages to successfully incorporate the required chemical package needed for acidizing.

Acid Boost was specifically designed with unique, multifunctional properties to mitigate the lengthy and complex process often needed to ensure chemical compatibility. The biosurfactant-based micro emulsion is effective as both a surfactant and a detergent at low concentrations, making single stage deployment of acid, surfactant and solvent possible. This allows operators to reduce multi-step processes into a single, efficient application.

"By simplifying wellbore remediation treatments, AcidBoost helps operators bring their wells back into profitable production with less downtime," said Megan Pearl, Vice President of Technology at Locus BE. "It enables an easier, more efficient process that also improves performance."

AcidBoost's robust detergency power efficiently removes oil from the reservoir rock, optimising the surface for acidising. Moreover, AcidBoost's strong demulsification and wettability alteration leave the system emulsion-free and in a water-wet state. As a result, the acid treatment achieves better penetration and reactivity, ultimately delivering more effective remediation for improved production rates.

The product offers operators a comprehensive and highly efficient solution using sustainable biosurfactant technology.

TWMA has launched the latest model of its RotoMill technology

RotoMill 2.0 has promised to deliver operators with an environmentally sustainable wellsite processing solution. It features TWMA's XLink™ remote monitoring software, delivering greater operational insights, while automating the wellsite processing system.

The technology provides operators with low costs, improved safety and lower carbon emissions. The control scheme allows condition monitoring of the system, providing a predictive maintenance approach.

Gareth Innes, Chief Engineering & Commercial Officer at TWMA said: "RotoMill 2.0 offers all the benefits of its predecessor while increasing operators' overall efficiency. Our team of specialist engineers have worked hard for more than a year to develop and build the RotoMill 2.0, incorporating feedback from our customers along the way.

"By integrating our XLink technology into the RotoMill 2.0, we are offering customers with real-time insight into their operations. In addition to removing the requirement to ship drilling waste to shore, the RotoMill 2.0 features an improved engine design, working to further advance operators' decarbonisation goals."

The unit is fitted with over 110 digital sensors in strategic locations within the modules and can now be operated fully remotely from the supervisor's office on-site or onshore.

The new standardised design will reduce maintenance requirements, installation times and footprint while increasing processing performance.

Eliminating the need to transport drilling waste long distances for treatment, the RotoMill 2.0 processes drilling waste at the wellsite. The solution recovers oil, water and solids from drill cuttings, allowing the reuse and recycling of all materials from the drilling waste.

TCO has announced the installation of a

Intelligent Wellhead Systems launches mobile app

Intelligent Wellhead Systems, Inc. (IWS) has announced the introduction of the inVision™ Mobile App, a technology that provides current users of the IWS inVision Technology Platform with instant access to key wellsite operational data. It is the latest addition to the company's portfolio of digital technologies for completion operations, further enhancing safety and reliability.

Incident-free performance in the field

To date, inVision completion technology has delivered more than 95 000 stages without a wireline or pressure control incident while utilising the IWS system. This incident-free safety and reliability track record continues to encourage oil and gas operators to adopt a digital infrastructure to improve wireline and hydraulic fracturing operations.

"Developing the inVision Mobile App represents the next step in our efforts to encourage operators to embrace a digital infrastructure," said Bill Henn, Vice-President of Business Development for IWS. "By giving operators even greater, easier access to operational data at the wellsite, they can respond immediately to changing conditions, helping to reduce risk, lower costs, and improve uptime while on-the-go."

Comprehensive access to operational data

With inVision Mobile, users can view a wide range of key data from a cell phone or tablet. They can inspect pad progress and current well activity, a live frac tree and live valve positions. When running frac and wireline data through IWS safety and efficiency controls, users can analyse frac and wireline plots remotely, as well as a pre-set frac and wireline plots with the most pertinent data. Plus, they can select and de-select additional channels on the plot through the plot data configuration option. Data channels can also be turned on and off from the plot views. Finally, users can request invaluable assistance via the direct chat window to the IWS ROC Support Center, which is manned around-the-clock.

Looking ahead, IWS is firmly committed to providing operators with a virtual window into all wellsite operations. The inVision Mobile is a tool that is set to play a critical role in making that a reality.

new injection valve

TCO has announced the successful development and installation of the API 19CI Qualified FNR (fall through protection, non-return, retrievable) injection valve.

The installation, for a major Norwegian Operator, is the first API 19CI qualified retrievable injection valve to be successfully installed on the NCS.

The API 19CI specification, which was released in 2019, states the requirements for chemical injection devices intended for use in the worldwide petroleum and natural gas industry.

This includes requirements for specifying, selecting, design verification, validation testing, manufacturing, quality control, testing, and preparation for shipping of chemical injection devices.

The FNR injection valve allows operators to retrieve and change the valve or Anti-U-Tube mechanism during the well's lifetime, which can save operators the potential costs of recompleting a well due to CIV failure.

The FNR injection valve has a pressure rating of 10 000 psi and can operate at temperatures up to 150 0C, making it suitable for various applications.

The technology is based on CIV from TCO and the back-pressure retention mechanism was redesigned to meet the requirement of 5000 psi Anti-U-Tube prevention.

The company developed the FNR injection valve with support from SLB, who supplied mandrel and running tools in the API test and field trial. This enabled TCO to increase the side pocket mandrel offering, to meet the enhanced criteria.

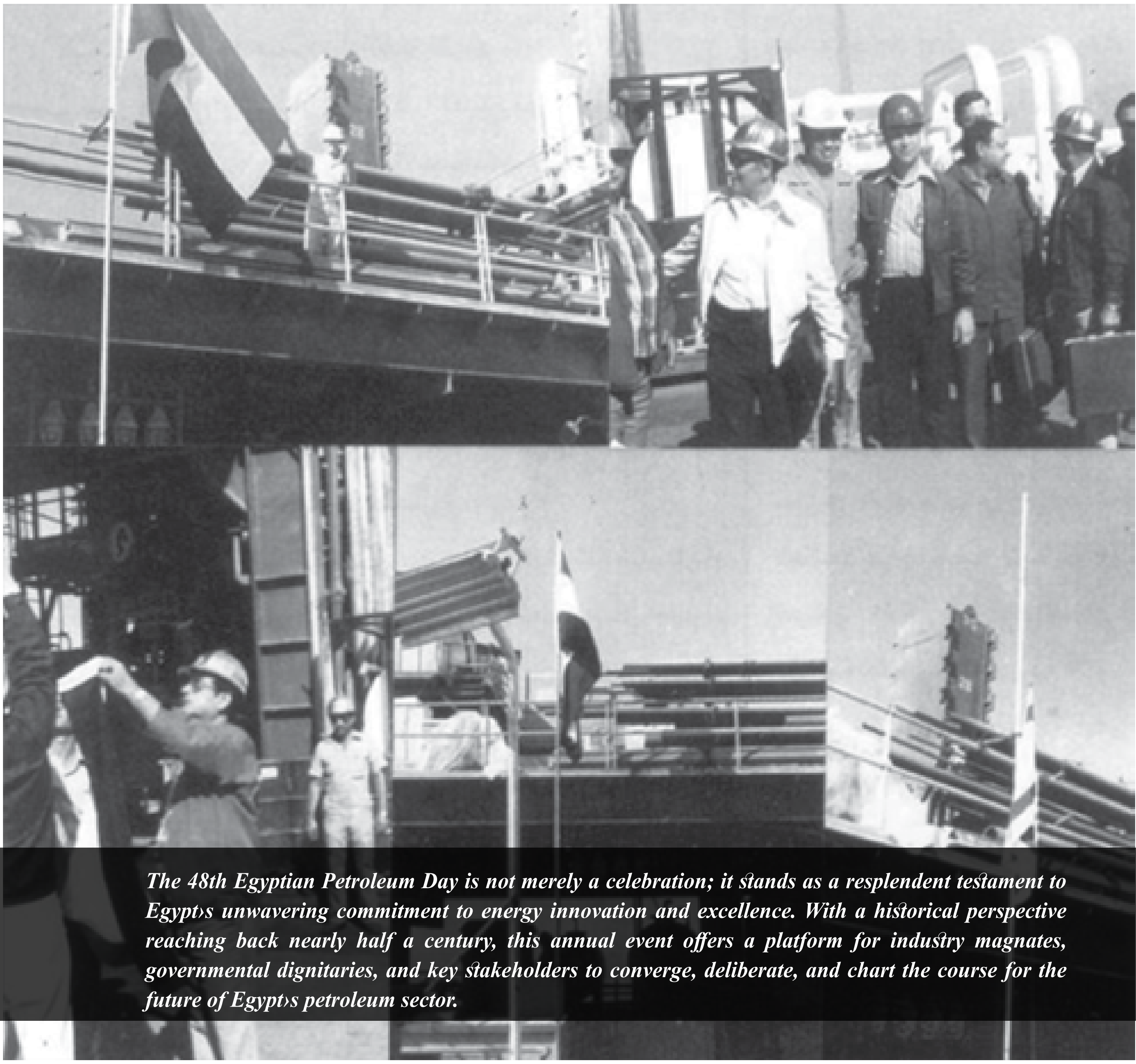
Henriette Bringsvor, Sales Manager, TCO, said: "We recognise that by working with leading technology providers, we can ensure that we can deliver the best possible solution for our customers.

"This development has set a new standard for injection valves. The FNR injection valve provides flexibility, safety, and reliability, allowing operators to improve efficiency in their operations which in turn reduces costs."

CELEBRATING VICTORY, INNOVATION AND EXCELLENCE

THE 48TH EGYPTIAN PETROLEUM DAY

Egypt's Oil and Gas Industry Shines on the 48th Egyptian Petroleum Day



The 48th Egyptian Petroleum Day is not merely a celebration; it stands as a resplendent testament to Egypt›s unwavering commitment to energy innovation and excellence. With a historical perspective reaching back nearly half a century, this annual event offers a platform for industry magnates, governmental dignitaries, and key stakeholders to converge, deliberate, and chart the course for the future of Egypt›s petroleum sector.

Historical Roots and Growth

To grasp the full tapestry of the 48th Egyptian Petroleum Day, it›s crucial to delve into its roots. The genesis of this event dates back to when the Egyptian sovereignty over the Sinai oil fields was restored as a result of the Egyptian victory in its war with Israel October 6, 1973, which had a positive impact on the global, Arab and Egyptian oil industry, oil price revolution came with the October victory, and its results on the oil-producing Arab countries later.

As for Egypt, This was the most important outcome of October war, According to the second disengagement agreement, the Sinai fields (Ras Sidr - Balaim - Abu Rdeis) were back Through a third party represented by two oil companies (American Mobil and Italian Eni) on November 17, 1975, and For 48th years, the petroleum calendar marked that day as the day of glory.

It is worth noting that the oil fields in the Al-Tur area, specifically the Sha`ab Ali oil field (formerly Alma), were restored within the fourth phase of withdrawal after the signing of the peace agreement with Israel on March 26, 1979. The field was received by the American company, Omco, which owns the concession in the area.

At this time, Eng. Hamdi Al-Banbi, the former Minister of Petroleum and Chairman of GUPCO Petroleum, was the one who carried out the receiving process, despite the difficult task as he mentioned at the time, and the Egyptian flag was raised on the offshore platform during the presence of the Israeli side.

The field covered about 50% of Israel’s needs of oil, and it

was called “The Israeli treasure” and for this it was of prime importance in the Egyptian-Israeli peace negotiations.

As for “Morgan” field, the period between the occupation in 1967 and the epic of victory in 1973, tells of great heroism and achievements. It is first necessary to thank and salute GUPCO and all the Egyptian petroleum sector employees for thier great effort and the wonderful epic that they made and was accomplished during The period from 1967 (with the start of “Morgan” field production in 1967) until the Sinai fields were received in 1975.

Morgan field saved Egypt’s economy during this period thanks to the determination and valor of GUPCO men who doubled their efforts for research, exploration and development and increased the field’s production tenfold in record time, in addition to other discoveries.

165 million barrels and 70 billion cubic meters obtained by the Israel

An official study issued by the Petroleum Authority showed the quantities of oil and gas that the Israeli occupation authorities drained from the oil fields in the Sinai and the Gulf of Suez during the period from 1967 to 1979.

The study, entitled «Top Secret,» said that the Israeli authorities, over the years of their occupation of the Sinai and the Gulf of Suez, depleted Egypt’s natural oil and gas resources in a systematic manner that relied on obtaining the largest possible amount of oil to meet its growing energy needs.

The study revealed for the first time that the fields of three companies operating in the Sinai and the Gulf of Suez were subjected to depletion operations, represented by General Petroleum Company, Petrobel and GUPCO.

The data of the study, published by Al-Masry Al-Youm, showed that Israel seized quantities amounting to 146.79 million barrels of oil and 65.9 billion cubic feet of gases from the Balaim and Bahri fields owned by Petrobel, 9 million barrels of oil and 9 billion cubic feet of gas from GUPCO, 6 million barrels from the fields of the General petroleum Company.

The study said that the total of what the Israeli occupation forces seized was about 165 million barrels of oil and 70 billion cubic feet of gas, valued at about $7 billion at the prices of the occupation period from 1967 to 1979.

Key Themes and Objectives

As the 48th edition unfurls its grandeur, several pivotal themes and objectives take center stage. Sustainability, an issue that reverberates worldwide, assumes a place of prominence. With the specter of climate change looming large, the Egyptian oil and gas industry showcases its tireless endeavors to truncate its carbon footprint. It boldly embraces renewable energy solutions, pledges responsible resource management, and stands as an unwavering steward of the environment.

Technology and innovation are keystones as well. From cutting-edge exploration and production techniques to the seamless integration of artificial intelligence, data analytics, and automation, the industry reigns supreme in the arena of technological advancement. These innovations do more than augment operational efficiency; they also reduce the sector's environmental footprint.

Highlights from Previous Years

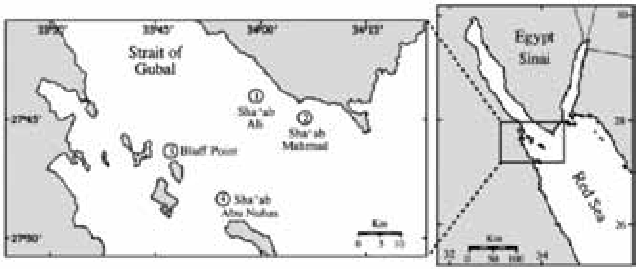
Contemplating the annals of the Egyptian Petroleum Day, one traverses the arc of the industry's evolution. Past events have borne witness to staggering achievements, including groundbreaking discoveries in the offshore Mediterranean and substantial augmentations in production capabilities. Infrastructure development and governmental initiatives, fostering an investment-friendly climate, have been instrumental in luring international heavyweights to Egypt's oil and gas sector.

Industry Leaders and Participants

The event perennially summons an august assembly of industry titans, counting major energy conglomerates, high-ranking government officials, and luminary experts from the farthest reaches of the globe. Their presence is not merely ceremonial; it underscores Egypt's oil and gas sector›s weighty role on the global energy stage, emphasizing its continuous growth and development.

Technological Advancements

The 48th Egyptian Petroleum Day continues to serve as a veritable bazaar of the industry's technological prowess. Innovations in seismic imaging, drilling methodologies, and reservoir management are altering the calculus of exploration



and production. These technological leaps are not confined to monetary gain; they mirror a principled commitment to eco-conscious operations.

Sustainability Initiatives

Sustainability is no mere catchphrase; it's a guiding ethos. From curbing greenhouse gas emissions to astute water conservation, companies stake their reputation on sustainable practices. The event acts as an agora for the latest sustainability initiatives, underscoring the industry's resolve to be a guardian of the environment.

International Collaboration

Collaboration is the sine qua non of the Egyptian Petroleum Day. International partnerships, essential for technology transfer and knowledge exchange, create fertile ground for joint ventures. These partnerships are instrumental in propelling Egypt›s energy sector and consolidating its stature as a preeminent global energy player.

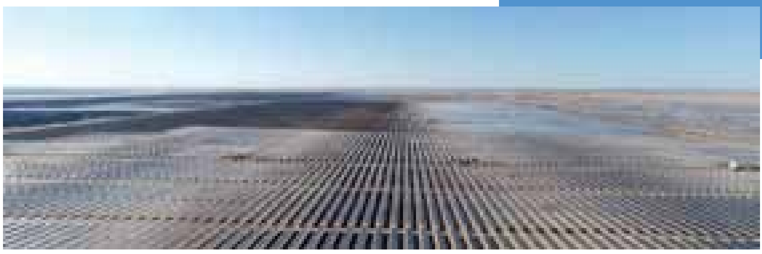
The Future of Egyptian Energy

As the curtains descend on the 48th Egyptian Petroleum Day, a vista of optimism stretches across the future of Egypt's energy sector. Buoyed by burgeoning reserves, a robust investment ecosystem, and an unwavering commitment to sustainable practices, Egypt stands poised to be an eminent player on the global energy chessboard. As the world pivots towards cleaner and more sustainable energy sources, Egypt assumes the mantle of regional leadership.

In summation, the 48th Egyptian Petroleum Day derives its significance from the annals of a time when Egypt recognized the potential of its energy resources. Over the years, it has burgeoned into an emblem of excellence in the global energy arena, reaffirming Egypt›s role as a vanguard in the oil and gas industry. As the event draws to a close, the future of Egyptian energy gleams brightly, with Egypt poised to be a pivotal player in the global energy metamorphosis.

ENERGIZING EGYPT'S FUTURE: THE PATH TO ENERGY TRANSITION AND SUSTAINABILITY

Egypt, a nation steeped in history, is on the cusp of a transformative journey towards energy transition and sustainability. The land of the Pyramids and the Nile is embarking on a new era, one that not only respects its heritage but also positions it as a forward-thinking global player in the energy sector.



Energizing Egypt's Future: The Path to Energy Transition and Sustainability

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The Imperative of Transition

As the world grapples with the challenges of climate change and environmental sustainability, nations across the globe are seeking ways to reduce their carbon footprint and transition to cleaner, more sustainable sources of energy. Egypt is no exception. In a region characterized by its dependence on fossil fuels, the country is taking a proactive stance towards diversifying its energy mix.

One of Egypt's most significant steps in this direction is its commitment to renewable energy. The vast potential for solar and wind power in Egypt is undeniable. The nation is harnessing its abundant sunlight and wind resources to build large-scale solar and wind farms. These endeavors are reducing the nation's reliance on fossil fuels and contributing to a greener future.

Solar Dreams and Wind Realities

Egypt's push for solar power is embodied in the Benban Solar Park, one of the world's largest solar installations. Situated near Aswan, this mega-project is set to generate an impressive 1.8 gigawatts of electricity. By tapping into its plentiful sunlight, Egypt is making strides towards becoming a regional leader in solar energy production.

On the wind energy front, the Gabal El Zayt and Gulf of Suez wind farms are prime examples of the country's commitment. These wind farms, with their impressive capacity, are harnessing Egypt's coastal winds to produce clean energy, reducing greenhouse gas emissions and aligning the nation with international climate goals.

Energy Efficiency and Sustainability

Energy transition isn›t just about adopting cleaner sources; it's also about using energy more efficiently. Egypt is implementing energy-efficient initiatives across various sectors, from industry to transportation. By adopting modern technologies and practices that reduce energy consumption, the country is not only lowering its environmental impact but also bolstering economic sustainability.

In transportation, the introduction of natural gas and electric

buses is reducing air pollution and fuel consumption. Moreover, the New Administrative Capital is designed with sustainability in mind, incorporating green building principles and public transportation solutions that prioritize energy efficiency.

The Road to Sustainability

Egypt's commitment to energy transition and sustainability is not only driven by global environmental concerns but also by the need for energy security and independence. By diversifying its energy mix and reducing its reliance on imported fossil fuels, Egypt is safeguarding its energy future.

The nation's strategic location and proximity to key energy trade routes make it a natural hub for energy transit and distribution. This position presents significant opportunities for Egypt to become an energy export and distribution center for the region.

Challenges and Aspirations

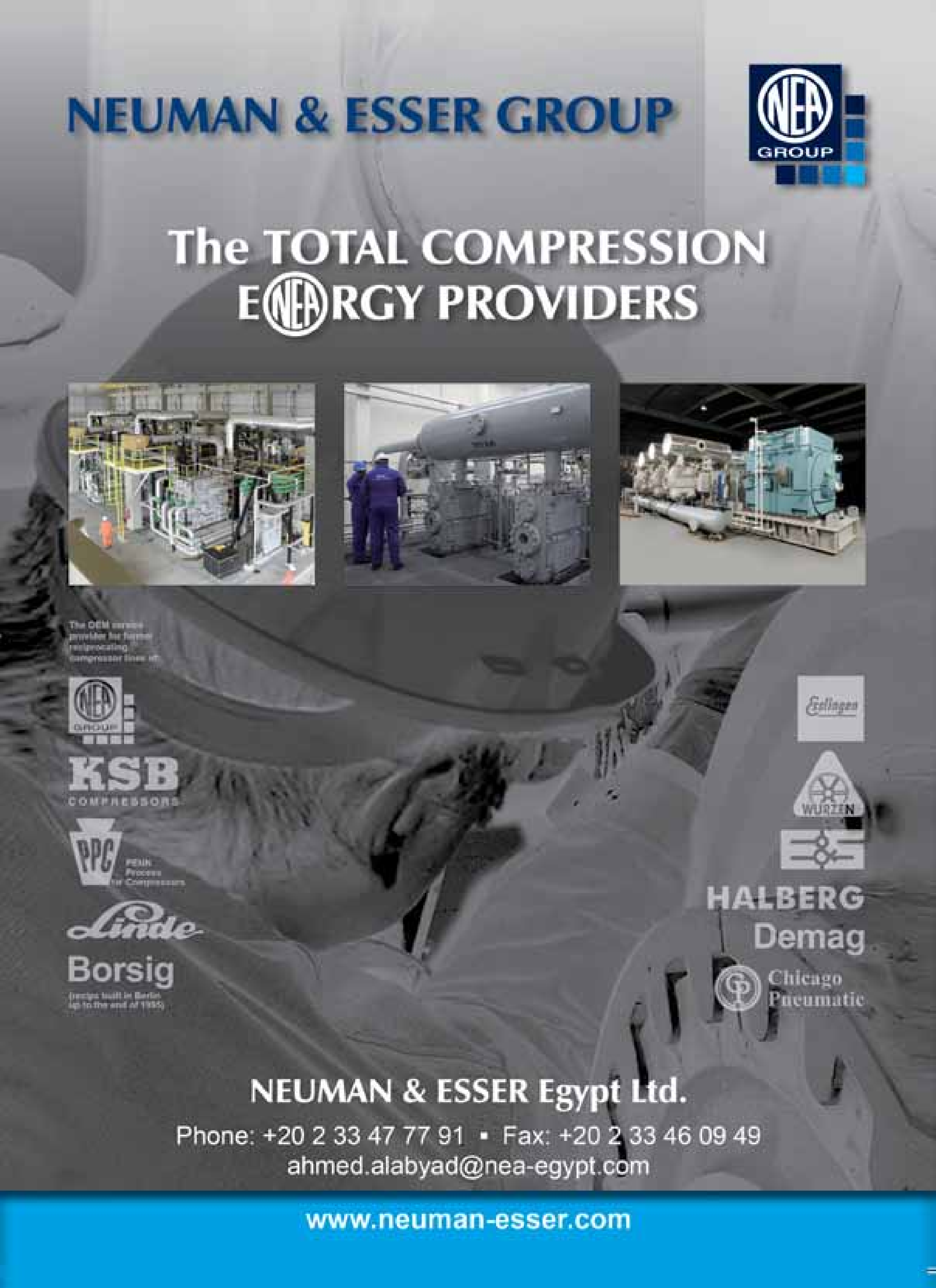
While Egypt›s strides in energy transition are commendable, challenges persist. Infrastructure development, investment, and regulatory frameworks need to evolve further to fully capitalize on the nation's potential. Additionally, energy access and affordability remain important factors to ensure that all segments of the population benefit from the transition.

The aspirations for Egypt's energy future are bold and promising. The vision includes achieving a significant share of renewable energy in the total energy mix, boosting energy efficiency across sectors, and embracing new technologies such as hydrogen production. The country is also exploring innovative financing models and partnerships to expedite its transition.

Conclusion

Egypt, with its rich history and ancient wonders, is now charting a modern course towards energy transition and sustainability. The nation's commitment to renewable energy, energy efficiency, and environmental responsibility is not only a testament to its forward-thinking vision but also a reflection of its responsibility towards future generations.

As Egypt continues on this path, it is poised to play a pivotal role in the global energy landscape and be a beacon of inspiration for others in the region seeking to embark on their own journey towards a sustainable and greener energy future.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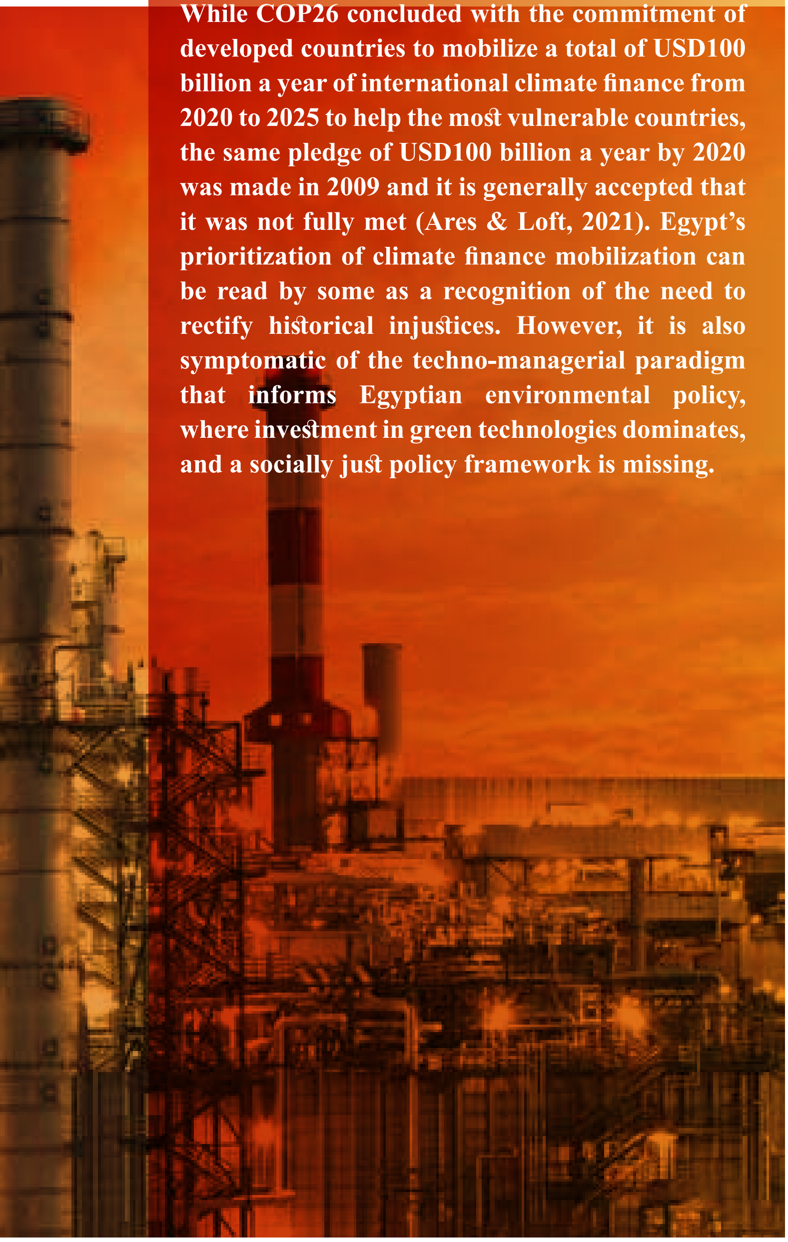
REPORTS

CLIMATE CHANGE AND INDUSTRY: BEYOND AN INVESTMENT OPPORTUNITY

As the host of the United Nations' upcoming 2022 Climate Change Conference, or COP27, the Egyptian government has expressed the nation's keen focus on the question of climate finance (Argus Media, 2022). In this regard, Egypt has touted its credentials as the first country in the Middle East and North Africa to issue green bonds, even hosting a side event at COP26 on blended finance for funding green projects (Lewis, 2021). While COP26 concluded with the commitment of developed countries to mobilize a total of USD100 billion a year of international climate finance from 2020 to 2025 to help the most vulnerable countries, the same pledge of USD100 billion a year by 2020 was made in 2009 and it is generally accepted that it was not fully met (Ares & Loft, 2021). Egypt's prioritization of climate finance mobilization can be read by some as a recognition of the need to rectify historical injustices. However, it is also symptomatic of the techno-managerial paradigm that informs Egyptian environmental policy, where investment in green technologies dominates, and a socially just policy framework is missing.



Climate justice: Beyond the global stage

Climate justice entails the recognition of both the unequal effects of and responsibility for the climate change crisis (Climate Action, 2022). Accordingly, climate justice discourse has often been dominated by the question of justice on the global scale, and the marginalization of the Global South in climate change mitigation dialogue by the Global North despite the disproportionate impact of climate change. However, equally important is the question of distributive and procedural climate justice within countries of the Global South.

Beyond one's position on the global level, climate justice has long been recognized as inseparable from social justice, as vulnerability to climate change is shaped by intersecting personal, economic and social factors shaped by institutional practices (Joseph Rowntree Foundation, 2014; NoiseCat, 2019; Sidhva, 2019). Consequently, redistributive mechanisms to rectify global disparities in resilience to climate change must also be accompanied by domestic environment policy frameworks which embed the concepts of justice and fairness.

A fairly straightforward example of such a policy is that which is underpinned by the polluter pays principle, which states that "those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment" (London School of Economics, 2018), "management" entailing both pollution prevention and control measures. This principle is founded on the logic that by internalizing the cost of the negative externality, producers of pollution will be incentivized to reduce pollution through better resource management and technology. Despite the principle's recognition "as the backbone of environmental policy" (Heine et al., 2020), the robust regulatory environment needed to uphold it is missing in Egypt.

The legislation-implementation gap

Where legislation does exist, the existing literature suggests that it is not sufficiently enforced. In the case of solid waste management, according to the Environmental Law 41994/, it is prohibited to dispose, burn or treat garbage and solid waste except in special sites determined by the law's executive regulations. The law was amended by Law 92009/, which prohibited the open burning of solid wastes and further increased the penalties for improper disposal of hazardous emissions (Bakry, 2015; SwitchMed, 2015; Food and Agriculture Organization [FAO], 1994, 2009). Yet legislation allows establishments to use contractors for the transport and disposal of waste, consequently the polluter's responsibility and liability is transferred onto the contractor, making it, according to Elshishini (2015), impossible to enforce the law; and open burning remains a persistent problem.

Similarly, regarding wastewater, despite the stipulation in Decree 442000/ that "discharges of industrial wastewater […] into public or private wastewater treatment systems should meet the pretreatment and monitoring requirements of the sewer treatment system into which it discharges" (EcoConServ, 2016, p. 24), a study found that 50% of industries in Egypt violate the law and discharge their effluents into the public network pre-treatment (Monayeri et al., 2011). Furthermore, the Industrial Development Authority (IDA) is authorized to receive and review the environmental impact assessment studies of industrial establishments to ensure compliance with licensing requirements, including environmental specifications (Ministry of Planning and Economic Development, 2021). However, despite this legal framework, numerous violations and their impact on human health have been documented, very few of which resulted in punitive action (Egyptian Initiative for Personal Rights [EIPR], 2018a).

The human cost of poor regulation

A rare exception to this is the case of the Alexandria Portland Cement plant. Residents of Wadi al-Qamar in western Alexandria complained for years of the pollution and consequent ill health caused by the Alexandria Portland Cement plant, located a mere ten meters away from the residential area. Despite the residents' reporting of violations, filing of several complaints with the Ministry of Environment and several suits since the early 2000s (Coalition for Human Rights in Development, 2019; EIPR, 2002), it was only in January of 2018 that the misdemeanor court convicted the company CEO for said violations (EIPR, 2017, 2018a). While the perseverance of the local community and EIPR resulted in a rare win, this case underscores institutional challenges that must be remedied, as EIPR (2018b) cites that "the prosecutor's office initially shelved the complaint, deciding there was no grounds for a case, before EIPR's lawyer managed to get the file re-opened. Even then, the charges selected by the prosecutor's office showed lack of familiarity with the Environment Law and corporate accountability more generally."

While the plaintiffs were able to disprove Alexandria Portland Cement's assertion of its compliance with environmental standards, other complaints have gone unheard. In Assiut, the air pollution emitted from Al-Walidiya power station, powered by mazut, has been linked to high radioactive levels in soil and water, posing a severe risk to the local population (El-Gamal et al., 2019). A report by investigative journalist Eman Mounir (2022a) documented the health effects of those living and working in the surrounding neighborhood, including the most common symptoms of radiation injury. The report found the head of the Upper Egypt Electricity Production Company dismissive of citizens' complaints and skeptical of the scientific study's findings, asserting that that the station conforms to environmental standards (Mounir, 2022a). A similar sentiment is echoed in the response of the head of North Giza power station, of which local farmers have made complaints regarding the pollution's effects on their crop yields (Mounir, 2022b). There are many more cases like those mentioned above that never materialize beyond investigative news pieces. Significant barriers to justice include the lack of awareness of one's environmental rights, a generally lax environment for corporate accountability, as well as the notoriously slow pace of environmental litigation (EIPR, 2018b; Het Grote Midden Oosten Platform, 2020). While the developers of certain projects (such as gas, petroleum and cement plants) are mandated to conduct two public hearings as part of the environmental impact study, developers often do not sufficiently advertise these hearings, resulting in poor dissemination of information and poor public participation (Het Grote Midden Oosten Platform, 2020). Furthermore, government institutions may fail to properly share information – such as the summaries of environmental impact studies – with the public, even when they are requested by courts to do so (ElSeidi, 2020).

Extended producer responsibility

A promising development is embodied by the new Waste Management Law 2022020/, which provides for an extended producer responsibility (EPR) scheme. Based on the polluter pays principle, EPR involves "making the manufacturer of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal" (Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ], 2021, p. 6).

According to Article 17 of the Law: Following the approval of the Cabinet and the presentation by the responsible minister after consultation with concerned parties, the Prime Minister shall issue a decree specifying which priority products shall be subject to EPR schemes, what procedures shall be applied in this regard and what financial compensation producers shall pay to the responsible administrative entities for the safe disposal of their products at the end of their life. (quoted in Elkheshen, 2021, p. 6)

While the actions set forth in Article 17 have not yet materialized, Egypt already has a recognized EPR scheme in place in the form of a plastic recovery scheme co-designed by CID Consulting and Nestle (Iskandar, 2021). However, in order to capitalize on the successes of such projects by ensuring their sustainability as well as to enable further expansion to other products, GIZ (2021) recommends creating a dedicated EPR regulatory framework. Within this framework, Article 17's reference to "safe disposal" also demands clarification, as it is unclear whether "safe disposal" includes recycling (Elkheshen, 2021). The term's definition inclusive of recycling must be made explicit in subsequent legislation. The government also needs to clarify whether EPR rules will be mandatory or merely voluntary, the former preferable to secure commitment from the private sector and necessitating monitoring and enforcement mechanisms (Economist Impact, 2021). Such a framework which will only be as strong as its enforcement through a regime of incentives, penalties and monitoring, which the Executive Regulations should set out.

The nascent stage of EPR in Egypt's waste management legislation and the unspecified details regarding its implementation speak to the institutional and ubiquitous challenges Egypt faces. The sustainability and effectiveness of any environmental policy lies in its implementation. The absence of the polluter pays principle and weak enforcement of existing legislation has been attributed to a myriad of environmental problems stemming from wastewater quality and water inefficiency to the difficulty to transition away from fossil fuels. Financing should not be "seen as the main tool to tackle environmental issues" (Kassab, 2021) but rather should be complemented by deterrence measures, supported by robust data management systems, to ensure accountability for environmental degradation.

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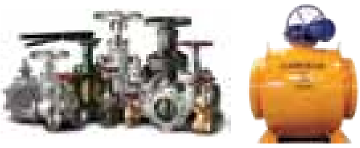

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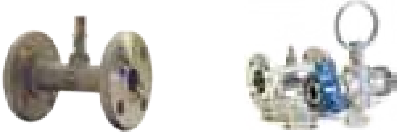

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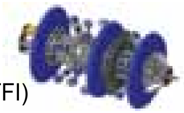

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Reality vs. Expectations for ESP Reliability Analysis

By: Michael Dowling, Perenco

Abstract

If you're reading this, then it's likely that your first reaction to the paper's title was something along the lines of 'oh no, not another paper on reliability'. Believe me, I totally understand: ESP reliability – something that is fundamentally important to both ESP suppliers and end users – often gets treated in technical papers with unnecessarily complex and arcane mathematics. Fundamentally, however, it can be and should be kept reasonable so that everyone can discuss it using the same concepts and terms.

This paper, therefore, will not try to create complicated new metrics. It will use existing runlife analysis techniques to analyze Perenco's entire ESP history and to highlight how different measures can be used in different ways. At each step, the paper will compare the results of the various measures to expectations in order to gain some real evidence-based insight into ESP reliability, which is often surprising. Next, the paper will create logical conclusions based on this evidence that potentially apply to general ESP reliability behavior. And finally, based on those conclusions, the paper will address the implications on how to manage ESP's.

Before getting started, it's important to emphasize a couple points about reliability analysis. The first point is that there is no single evaluation that will tell you everything you want to know about reliability. There are many different analyses possible because there are many different questions to address on reliability, such as: 'which ESP's are at risk?' 'are we improving?', 'did this change make a difference?', or 'how many ESP failures should I plan for?' The second point is that, because of this inherent diversity in analysis, and despite my feeling that the subject can be kept at a level most people can understand, there will always be a certain level of complexity to statistical evaluation. It takes time to explain and understand, and this can be difficult to condense into a 5-minute 'elementary school level' presentation, as is often requested.

Data Sample

As a data set, this paper will use historical ESP installations for Perenco's ESP population of active subsidiaries through 31-Dec-2018. This includes 4573 accumulated ESP installations over 11 countries, 111 fields, 9 suppliers, and 890 wells with at least one ESP installation; 461 ESP's were still active. When a field with ESP history has been acquired by Perenco, the population includes this history.

This diversity is important because it allows us to make conclusions that cannot be attributed to the specific conditions found in a country or field or the operating strategy of a specific company, and therefore these conclusions are potentially inherent to the reliability behavior of ESP's.

Understanding Runlife Behavior vs. Runtime: Survivability Curve and its Derivatives

The first measure that we will look at is the survivability curve. A survivability curve is a representation of the portion of a population that survives to certain runtime or installed time. It is the statistically rigorous method to evaluate reliability for almost any type of system, including ESP's. You can read about survival analysis with ESP's in greater depth SPE 96722 (Bailey, et al., 2005).

To derive a survivability curve, one typically groups a population into (consistent) runlife categories, and then determines how many of the population stopped during that category, how many are still within that category, and how many survived into the next category. You then repeat the process until you have arrived at a runlife that acceptably character sizes your population. For example, within Perenco, we group runlife by 30-days categories. We have had 4573 total installations. In the 0 to 30-day category, 459 ESP's were stopped for various reasons and 18 were still operable as of 31-Dec-2018. This leaves 4096 ESP's in the 30 to 60-day category. The chance of a permanent stop in the 0 to 30 day category is P(A) = 459/4573 = 10% and the chance of survival is 90%.

In the 30 to 60 day category with 4096 ESP's, there were 239 ESP's that had stopped for all reasons, and 18 that were operable; thus, 3839 make it to the 60 to 90 day category. The chance of a permanent stop is P(B) = 239/4096 = 5.8% and the chance of survival is 94.2%. The cumulative chance of survival is the product of the survivability percentage is the survivability curve, or (1-P(A)) × (1-P(B)) = 90% × 94.2% = 84.8% for the 30 to 60 day category. And of course we continue the calculations until whatever runlife necessary to be satisfied and plot the cumulative chance of survival or failure vs. time.

A reference for this curve helps to understand its meaning. For this, the best reference is to compare the curve to an exponential reliability model based on the mean time to stop for the ESP's. Typical ESP reliability considers MTBF or MTTF, but here we're considering all reasons why an ESP might be permanently stopped, so we'll adjust the measure accordingly. For this analysis, the Mean Time to Stop (MTTS) runlife uses the earliest date that an ESP was permanently stopped for any reason (failure, elective pull, abandon, well issue, etc.) and this value is calculated by dividing the total operable time of all ESP's (stopped or running) by the number of ESP's that were permanently stopped (Brookbank, 1996). This is sometimes referred to as the 'maximum likelihood estimate' to characterize reliability as a single number assuming that survivability follows an exponential decline [See Additional Reading]. For Perenco's population, the MTTS is 3,028,376 days divided by 4112 stops for MTTS = 736-days. The expected survivability curve

according to this MTTS value is: $S(t) = e^{-\frac{t}{MTTS}}$.

A graph comparing the actual survivability curve to the MTTS expectation is shown in Figure 1 through

3000 days (about 8 years).

With a quick look at Figure 1, we make three observations:

1. The exponential model (red curve) is not a perfect fit for the actual data (blue curve), but it's pretty

close.

2. The actual reliability behavior is worse than expectation at early times and better than expectation

at late times.

3. 30% of this population of ESP's doesn't make it past 180 days!

To deepen our understanding of the difference between an exponential model ('constant failure rate') and the actual behavior, the next step is to consider the hazard function. The hazard function h(t) is defined as the failure function (f(t)) divided by the cumulative reliability function (R(t)): h(t) = f(t)/R(t). But in plain words, it's easier to understand as the percentage of each category that are stopped for all reasons. In the data discussion above, it's 10% in the 0 to 30 day category and 5.8% in the 30 to 60 day category. The hazard plot for Perenco's ESP population is displayed in Figure 2:

Given the shape of the survivability curve, it's not surprising that the hazard plot is higher than the expectation at early times. But the magnitude (2.5 times higher in 0 to 30 days) is surprising. Another surprise is that, as a whole and through 3000 days (8 years), there is no point where the failure rate starts to increase. This is not what we expect based on the 'bathtub curve' expectation (Brookbank, 1996)

(Wikipedia, 2018). In other words, there is no ESP life where we expect permanent ESP stops to become more likely. Quite the contrary: ESP reliability continually improves through a significant runlife (2000 days) and then becomes more or less stable until the population size is small enough for noise to dominate trend.

We wanted to gain some extra insight on the hazard plot by dividing up permanent stops between 'ESP failures', where the ESP failure was the reason for the stop, and all other reasons combined (such as pumps that were pulled because they were the wrong size, or completion problems, or well productivity problems, etc.). These results are shown in Figure 3.

Dividing the total hazard function into the ESP failure/other distinction helps just as we hope:

- The ESP failure hazard (h(f)) remains decreasing with time until it stabilizes at ~1500 to 2000 days, but the early-time spike is significantly reduced. And (through 8 years) there is still no point where reliability starts to increase.
- The chances of something else going wrong (h(n)) at very early times (first 90 days) are very high compared to the 'typical' value for the rest of the time frame.

To confirm that this behavior is typical of each subsidiary and not just all the population as a whole, we did the same analysis on each subsidiary with a large enough population to allow for a meaningful analysis and each subsidiary exhibits the same general tendency of decreasing hazard rate with the following exceptions:

- The ESP reliability of our Guatemala subsidiary has an increasing failure rate with time. The hazard plot for Guatemala is show in Figure 4, below, as a reference.
- Turkey, a subsidiary with low workover costs, high electricity cost, and frequent re-use of ESP's, has a part-ticularly high concentration of 0 to 90-day non-failure events. This is logical from an economic standpoint, since incremental cost of changing an ESP is minor compared to benefits of getting the ESP choice correct.

All this analysis and discussion of reliability vs. runtime may seem overkill, but we consider it of utmost importance. Not only will it help in targeting reliability improvement efforts, but understanding the relative risk of ESP failure is the foundation for developing a strategy for inventory management, which is among the most difficult tasks in the ESP industry.

Quantifying Changes vs. Time: Rolling Calculations

Survivability Curves are the correct and thorough way to analyze reliability vs. runlife, but they are limited when using them to understand how reliability behavior changes with time. Thus, when evaluating reliability performance vs. historical time, we have to turn to another method. There are a lot of ways to do this, but generally it means plotting failure rate or MTTF vs. time. Unfortunately, there isn't a lot of official documentation to cite here, even if most analyses are similar. In Perenco, we have gravitated to trailing year 'stop index' as our measure. Represented as a % of the running ESP population, we find it has the following advantages:

- It's a number that gives a quick understanding of number of ESP replacements
- Because it's normalized for population size, it can be used to compare performance of different size populations fairly.
- Using the most recent year of data, we can see changes clearly because the present data isn't diluted by the historical data.
- Since it's basically a failure rate, its reciprocal is our MTTS estimate for the previous year's data.

To calculate this value, we simply divide the number of ESP's permanently stopped by the average number of ESP's running in the previous year. Additionally, we continue with the distinction between ESP failures and all other reasons. Figure 5 shows Perenco's historical calculation of yearly stop rate from 2010 through 2018. The number of running ESP's is shown on the right axis.

To be specific on the calculations and representation:

- Both the number of ESP's operating and the ratios only consider pumps that are operated by Perenco, not the ESP's that are inherited with an acquisition. This is why the number of ESP's can jump up (acquisition) or down (expired lease).
- The 'non failure' index (bright blue) is actually the total index (failures and non-failures), while the red is the pure 'failure index' (reciprocal = MTTF), and the difference between the blue and red are the non-failure stops.

This graph shows that our overall 'stop index' went from 60 to 70% (1.7 to 1.4 years MTTS) through the end of 2013 to between 45 and 50% presently (2.2 to 2 years MTTS), which is a 30% improvement.

We're pretty pleased with the improvement, of course, but it brings up the questions that this paper looks to answer. If reliability is improving, then we should be changing the shape of the reliability curve. How is that curve's shape changing?

Plotting Reliability vs. Install Date

Our first attempt to answer the question was to group our installations together by install year and compare their 'MTTS' calculated performance. Since overall reliability is improving, we assumed that the most recent ESP installs were leading the way and therefore we should see better numbers for more recent install years. Figure 6 shows this graph:

Well that's surprising! That's pretty much the opposite of what we expected. Reliability is the worst for two of the most recent years (2016 and 2018). This means that our reliability improvement is definitely not being driven by recent years' population. And the results for the data set at this instant are not different from previous years. The most recent year usually has the worst reliability.

Note that you can do this comparison with survivability curves for each year, but the results can be cumbersome and difficult to interpret.

Revisiting Rolling Calculations

Faced with this evidence, we needed to develop a new way to evaluate the evolution of the shape of the reliability curve as it changes with time. The previous method was to use an analog to 'failure index' and remember that the Failure Index or Stop Index is related to the 'Maximum Likelihood Estimate' for the data, so it's one point on the curve. We therefore need a second point. To do this, we created a new rolling metric that compares the number of permanent stops for all reasons with a runlife of less than 180-days in the previous year to the number of installations in the previous year. The use of 180-days is somewhat arbitrary and you could choose another number if you wanted. But for Perenco's ESP hazard plot, it is about the point where the value flattens out (see Figure 2), so we want to track whether the performance of ESP's less than this value is improving. Remember from Figure 1 that the overall ESP survivability curve is about 70% at 180-days, meaning 30% don't make it past this runlife. So what we want to see is a decrease in this metric below that 30% value. Figure 7 shows the rolling calculations from Figure 4 with the 'infant mortality install index' (orange curve), our cumbersome name for this new measure.

That's not so much surprising as it is disappointing. You can easily observe that this measure is consistently between 25 and 35% for the entire period shown with no general trend toward improvement.

This means that the all or at least the vast majority of the improvement in reliability is happening after 180 days runtime. To put it another way, ESP reliability has only improved once we still 'get lucky' and get our ESP's past that 180-day barrier.

Once again, this may seem like overkill, this time on the evolution of reliability vs. time. But once again,

we consider it very important. Early replacements are among the most disappointing outcomes of ESP installations. Quantifying this risk helps us to evaluate the economics of investments.

Plotting Reliability vs. Install Number

Faced with this realization, our next step was to see if we were improving reliability with successive ESP installations. To evaluate this question, we plotted the reliability of ESP's by installation number (1st ESP,

2nd ESP, etc.) using MTTS and average runlife of all pumps (including running). I don't recommend using average runlife as a measure normally, but here we can interpret a big gap between the two measures as indication that there are several pumps running for this install number. ARLAP = Average Runlife of All Pumps, including operating pumps

That is not a pretty picture. Clearly, using this measure, reliability is not improving with successive installations. However, we considered that this analysis may be misleading because wells with inherently difficult conditions for ESP reliability and their numerous installations could be pulling down other wells.

So we divided up wells by the maximum number of installations and started with wells that had more than twenty installs:

When you compare these results you notice:

- Reliability tends to be flat overall some tendency toward improving MTTS with installs for the low (10 or less) and moderate (10 to 20) install groups
- Reliability is clearly worst among the >20 install wells (about 300 days), somewhat better in the 11-20 install group (about 500 days), and best in the ≤10 install group (more than 700 days).

The following table summarizes the results by maximum number of installations:

Max number of installations	MTTS (days)
≤10	878
>10 and ≤20	495
>20	327

This can be surprising. It's surprising because we take it for granted that we can diagnose the problems that cause ESP's to fail and develop a plan to improve. These results suggest otherwise. On the other hand, we all have experienced those certain wells that are constantly causing problems and where we can't seem to find anything that works. In that context, the results make more sense.

Conclusions on ESP Reliability

When we consider all these analyses together, we can make some conclusions on general ESP reliability behavior:

- ESP reliability tends to improve with runtime and there is no universal runlife where ESP failure probability starts to increase. To put it another way: newly installed ESP's are more likely to fail than all other ESP's.
- Non-ESP related problems with a well, which are diverse and often unexpected, are even more concentrated at early times than ESP failures.
- There are so many things that can go wrong both with the ESP (service issues, manufacturing defects, etc.) and other issues (improper tubing connections, failed packers, 100% water, unexpected well behavior, etc.) that there is always an element of chance that none of these things happens.
- Whatever changes we implement are often ineffective at addressing the actual source of a reliability problem, which can be difficult to diagnose.
- Wells with difficult conditions for ESP's that result in low runlives might never improve without a dramatic change.

Implication for ESP Management

If we accept the conclusions above, then this can lead us to some general decision making strategies on managing ESP's that will help you to improve your ESP economics. These are general strategies because you might choose another action if you have specific evidence that the general behavior isn't accurate for your case.

1. Pre-Emptive Pulls

First, the most obvious one. If you have an ESP that has been running a long time but has not shown signs of problems then let it run. Replacing that ESP for fear of failure is the worst possible thing you can do from a reliability standpoint. Not only are you spending the money for the ESP and the workover and losing the production during the replacement, you are also increasing the probability of another ESP or well problem.

2. Evaluating Risk of Well Work

This is slightly different than the first point. Here, you are considering pulling an ESP not for fear of failure but to target an increase in oil production, for example stimulation, cleaning, re-perforating, perforations in a new zone, water shut-off, increase ESP size, etc. and then installing another ESP.

The economic evaluation of such work needs to consider not only the increased risk of a young ESP after the installation, but also the chance that you will set off a string of early failures as a result of an unexpected well/ESP interaction after of the work.

3. Planning, Inventory Management, and High-Risk Wells

If your inventory stocking strategy is to identify 'high-risk' ESP's that are likely to require replacement because they have achieved long runlife, then you will constantly be surprised by short runlife failures (the most likely) and will constantly be short on inventory. Sound familiar? Your inventory strategy should place highest emphasis on recent installs.

4. Re-Use of Equipment

If you are worried about re-using equipment because it will increase the risk of failure, then my advice is don't be afraid. Assuming that you can inspect and test equipment that has already been used to ensure that it doesn't have any problems, it's possible that such equipment will have superior reliability performance than new equipment because it has already proven to be free of defects in the high-risk early life.

5. If it's not working, then blow it up

If you have wells or fields that have consistent and numerous low-runlife installations, then don't be afraid to 'blow it up' to use an expression. In these cases, it's possible that you may not identify the root causes of poor reliability and, without a dramatic change, it's unlikely to improve. So don't be afraid to…

- use the best-of-the-best ESP equipment (radial bearing per stage; metal seals)
- switch suppliers
- try new technology like sand catching equipment or high-speed pumps
- switch lift method
- inject chemicals to help treat downhole problems with viscosity, scale, etc.
- place ESP's below perforations
- sidetrack your well

Acknowledgements

I would like to thank Perenco management for their willingness to let me submit and present this paper, which is a departure from our typical style. I've spent years working to understand reliability and I need to thank my many colleagues and friends who have been subject to tedious discussions about things like whether a binomial or Poisson distribution is most relevant to an estimation of events. This list includes Lawrence Camilleri, Bill Bailey, Allan Ross, and Justin Romberg, among numerous others. Finally, I would like to thank the brave authors who have submitted reliability papers on ESP's. It's an intimidating subject and without the early work getting started would be even harder.

Further Reading on Reliability, ESP's or otherwise

Though not cited specifically in the paper, these SPE papers or conference proceedings whelp to understand some concepts of reliability as related to ESP's Maximum Likelihood Estimation This basic concept can be difficult to pinpoint in available literature and text books. Here are some links and references:

• Python: https://ipython-books.github.io/75-fitting-a-probability-distribution-to-data-with-themaximum-likelihood-method/

• Exponential Distribution: Theory, Methods, and Application; K. Balakrishnan; Oct 2018

SPE 71551: Statistical Assessment and Management of Uncertainty in the Number of ElectricSubmersible Pump Failures in a Field S.J. Sawaryn, SPE and E. Ziegel, BP p.l.c

SPE 56663: The Analysis and Prediction of Electric-Submersible-Pump Failures in the Milne Point Field, Alaska

S.J. Sawaryn, SPE, BP-Amoco, K.S. Norrell, SPE, Centrilift Baker-Hughes, O.P. Whelehan, BP-Amoco Performance Benchmarking of ESP Installations Prepared for presentation at the 2001 Electrical Submersible Pump Works hop held in Houston, Texas, 25-27 April 2001.

James R. Hogan/REDA Production Systems, A Schlumberger Company

It's uncouth to cite Wikipedia, but Wikipedia's pages on survival analys are among the most accessible

you will find: https://en.wikipedia.org/wiki/Survival_analysis

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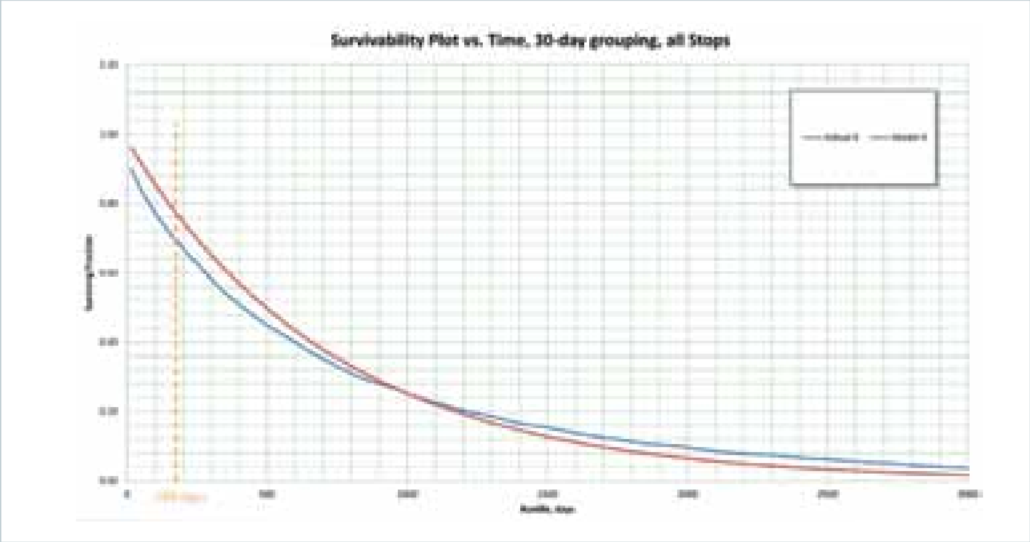

Figure 1—Actual Survivability Curve R vs. Exponential Model

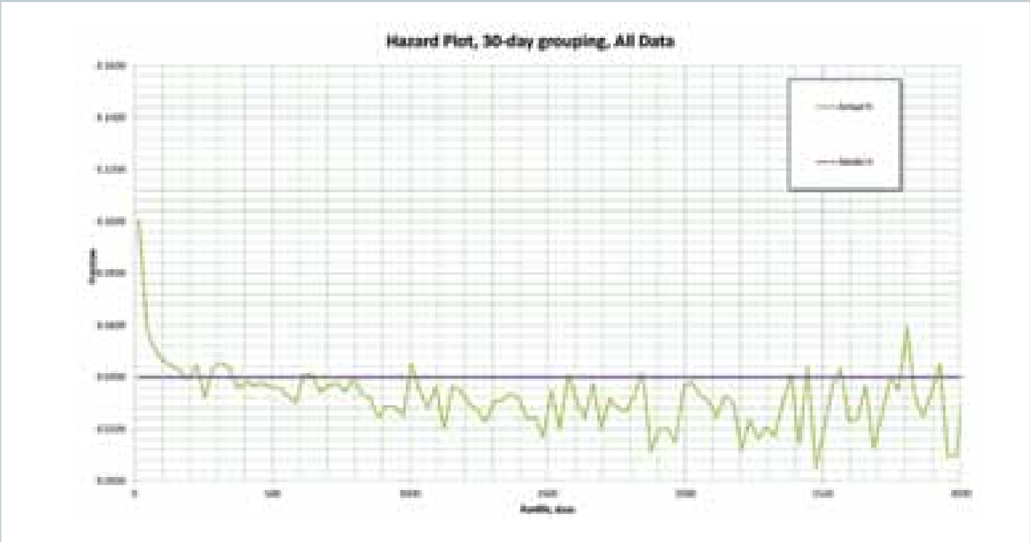

Figure 2—Hazard Plot: chance of failure vs. time

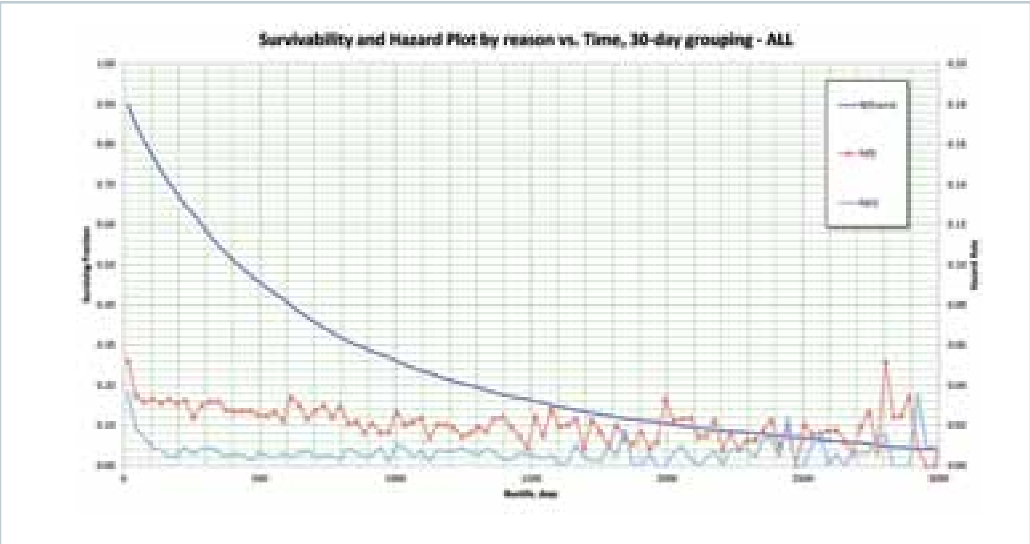

Figure 3—Total Survivability curve (left vertical axis) and hazard plots for ESP failures and all other reasons (right vertical axis)

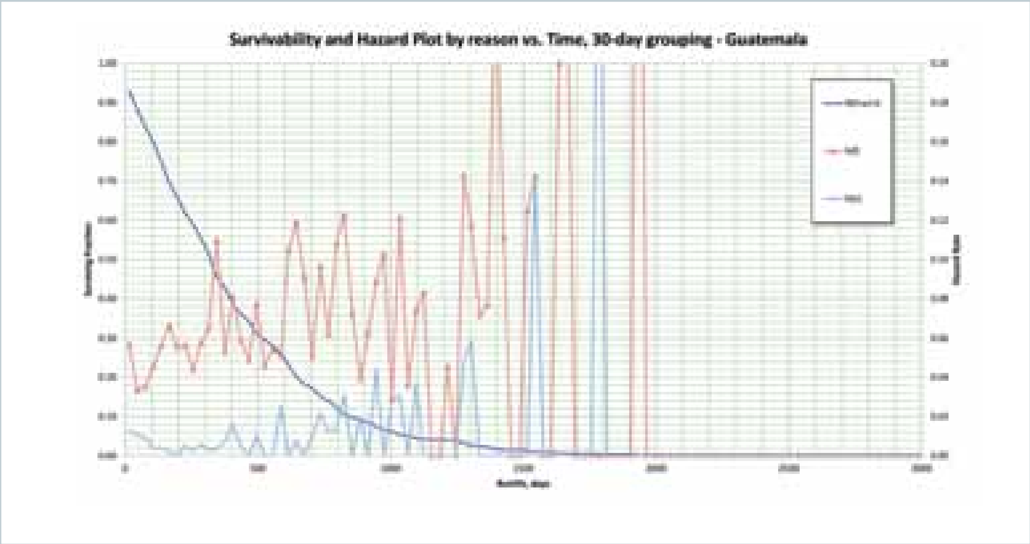

Figure 4—Hazard function for Guatemala Subsidiary ESP’s

Figure 5—Failure and total ‘Stop’ indices vs. time for Perenco. On the right vertical axis, the number of operable ESP’s.

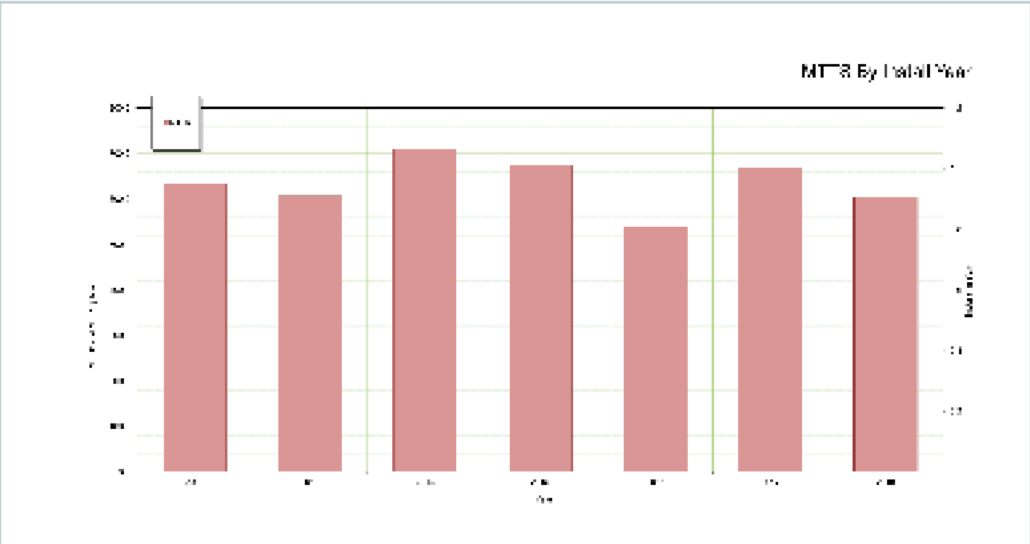

Figure 6—MTTS estimation of reliability for ESP›s by install year

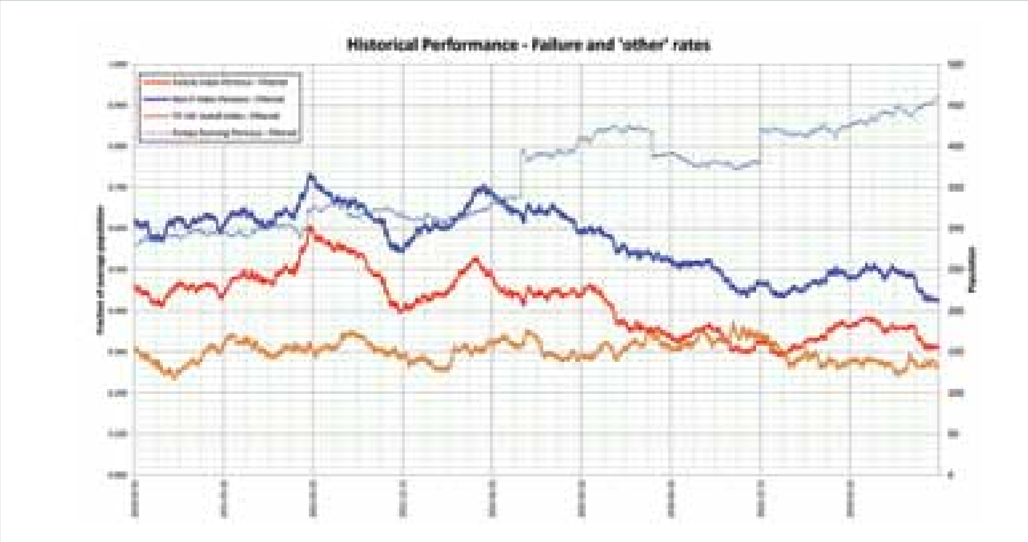

Figure 7—Rolling metrics with Infant Mortality Install Index

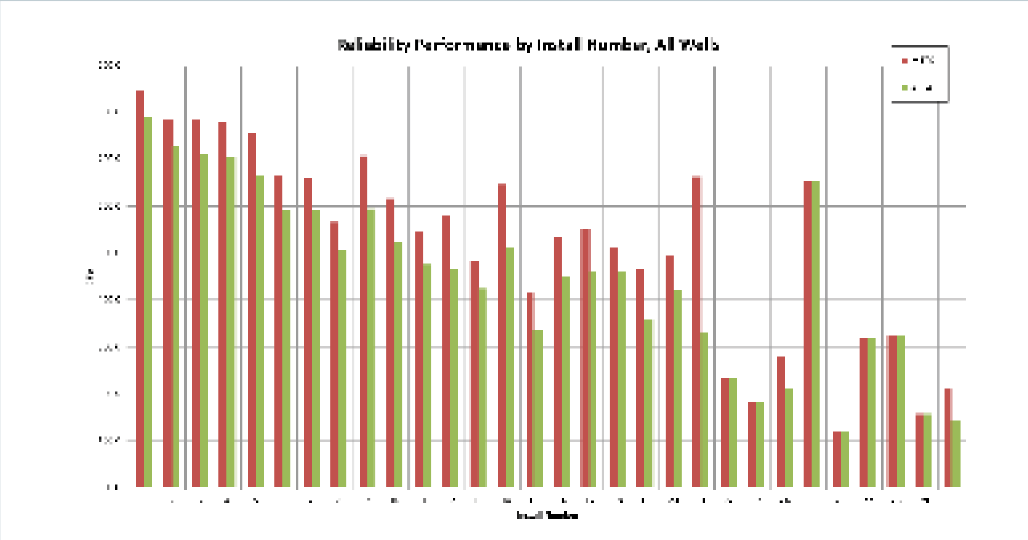

Figure 8—Reliability Measures vs. Install Number, all ESP's

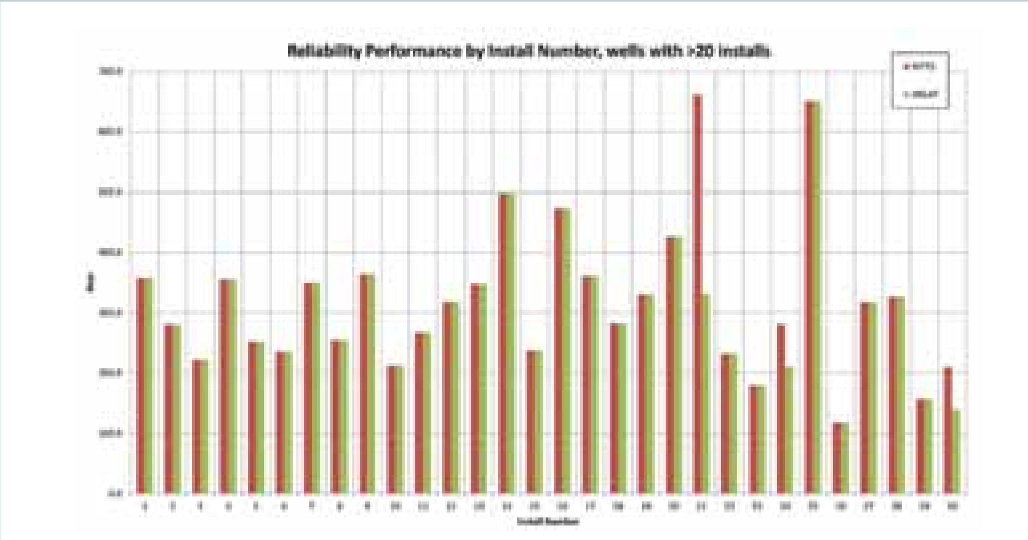

Figure 9—Reliability Measures vs. Install Number for wells with more than 20 ESP installs.

And then wells with 10 to 20 ESP installations:

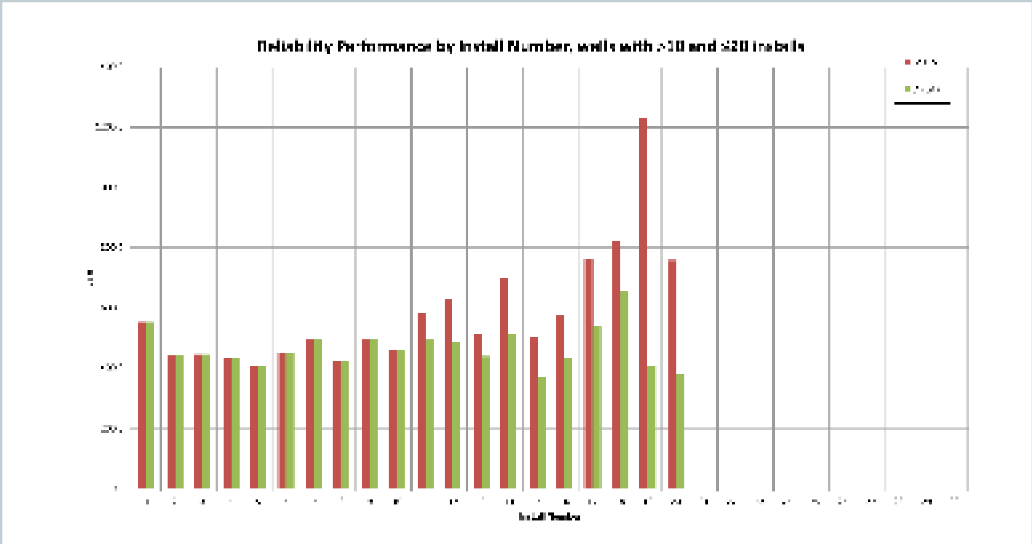

Figure 10—Reliability Measures vs. Install Number for wells iwth 11 to 20 ESP installs

And finally wells with 10 or fewer ESP installations:

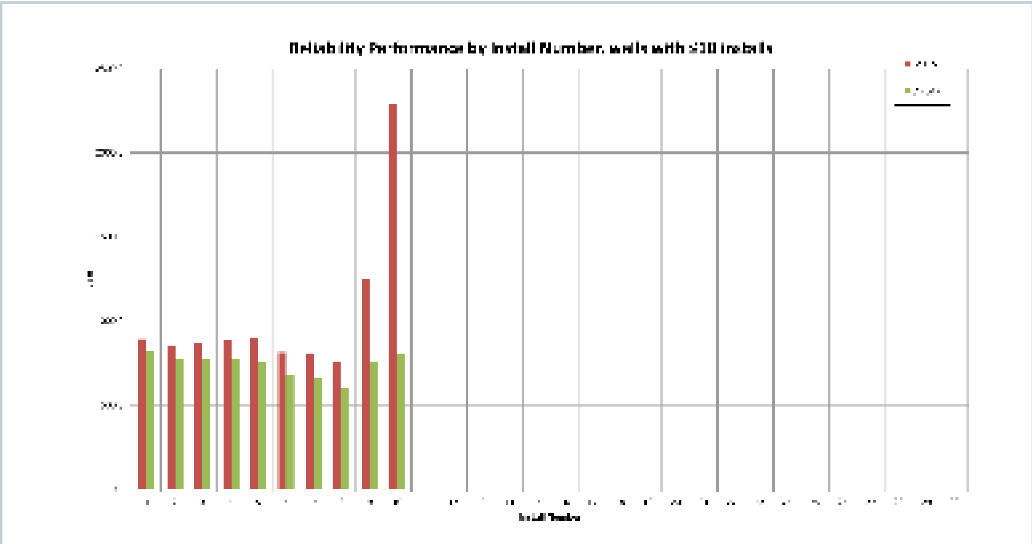

Figure 11—Reliability vs. Install Number for wells with 10 or fewer ESP installs.

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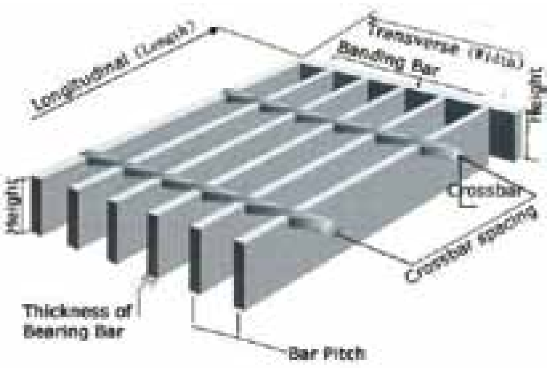
General Manager



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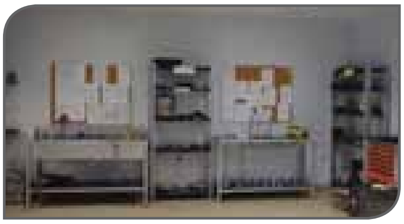

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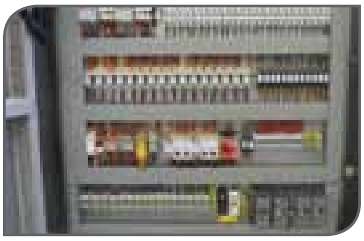

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ESP Pump Thermal Testing and Modeling in High-Gas, Low-Flow Conditions

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Abstract

Historically, motor temperature analysis in electric submersible pumping systems (ESP) attracted the most attention due to the vulnerability of insulation under temperature. For wells with low or moderate downhole temperatures, motor temperature alone is not effective to protect the system against no-flow conditions.

This issue has become more critical in unconventional gassy wells, many ESP failure modes are more associated to high temperatures in the pump than the motor. Under gas locking or no flow conditions when production (cooling) fluid stagnates, the pump generates much more heat than the motor and experiences a faster temperature rise becoming a serious issue for the health of the ESP. Traditional pump intake and discharge thermocouples (TC) cannot detect this phenomenon because their locations are too far from the source of heat generation. This paper describes testing where several TCs were placed in an ESP pump.

Temperatures were monitored when the pump was operated through different gas volume fractions (GVF) and flow rates. A gas locking condition was also simulated in a test loop to study the transient condition.

Subsequently, a thermal model was developed and compared to the testing data.

The test used a fully enclosed, high-pressure gas loop. A 12-stage, mixed flow type with best efficiency point (BEP) at 600 BPD pump was horizontally mounted in a test bench. Ten TCs were installed at the bottom bearing, No.1, 6, and 12 diffuser bearing in both X and Y directions, respectively. Three TCs were attached to the pump housing on bottom, middle, and top locations. Pump intake/discharge temperature and pressure were captured during testing. The mixture volume of nitrogen and water was measured and supplied to the pump intake. Experimental data was acquired continuously for evaluating different operational conditions. The intake pressure, GVF, flow rate and rotational speeds were controlled in the experiments.

In a static state, the thermal model started with energy equilibrium and calculated the temperature rise due to the difference between the pump brake horsepower and hydraulic horsepower. In a transient state, finiteelement analysis (FEA) was used to predict the thermal profile from the stage bearing to the pump housing.

Based on the thermal testing and modelling results, several ESP failure modes and tear-down examples will be discussed. The concept of minimum continuous thermal flow (MCTF) will be mentioned. A reservoir model was used to understand the difference in the nitrogen/water testing system and to develop the possible strategy to recover from pump gas locking. In summary, the pump temperature study provided a better understanding of the pump gas locking condition, a better method to conduct ESP health monitoring and improve reliability by avoiding overheating the pump.

This paper adds a comprehensive knowledge of pump temperature analysis to the ESP industry. The results will help define the running limitations of an ESP in a gas condition and improve design, application and operation to mitigate the gas locking issue in unconventional oil production.

Introduction

The electric submersible pump (ESP) is a dynamic device that imparts velocity to a fluid to produce gravitational potential energy to lift a column of fluid to the surface (Ye, Rutter, Martinez, & Marsis, 2016).

When the pump operates, the theoretical head, known as Euler head, is based on conservation law of angular momentum. A real pump head is lower due to head losses, a comprehensive study can be found in (Zhu & Zhang, 2018). When pumping single-phase fluid, liquid or gas, the same lifting head will be generated.

Fluid density comes into play when transferring head to hydraulic pressure, so pumping a high specific gravity liquid can generate a much higher pressure compared to pumping a low specific gravity gas.

ESP hydraulic pressure must be higher than the fluid column pressure above the pump to keep production moving to the surface. In two-phase flow conditions, intermittent gas or steam (Noonan, Klaczek, Baugh, Wonitoy, & Wilson, 2014) causes mixture density fluctuations. As a result, ESP boosting pressure can reduce to a point that it is not able to overcome the column pressure and move the fluid. (Mack & Robl, 2004) The wrestling between the pump boosting pressure and column pressure at the pump discharge is called gas locking or flow locking. It is no different compare to running a pump to a closed valve. Pump efficiency becomes zero and all the energy transfers into heat. This can cause severe damage to ESP components and shorten the system life.

Important facts to understand how severe the heat generated by a pump can be:

- The brake horsepower (BHP) is energy from the motor converted by the pump in hydraulic power (flowrate and differential pressure) or heat. The relation within both can be understood as efficiency.
- Higher the hydraulic power generated by the pump results in less power converted to heat.
- Flowrate removes the heat generated by the pump.
- Zero flowrate caused by close valve or gas lock condition means 0% pump efficiency, which means all power transmitted by the motor to the pump goes to heat. No flow thru the pump to remove that heat.
- The motor temperature during normal operation usually does not increase rapidly as a pump in a noflow condition because it transmits energy in terms of torque. Pump failures occur frequently before the motor temperature reaches any alarm setting on the control system in a noflow condition.

The main objective of this paper is to connect the pump over-heating failure mode to the low flow or no flow condition and develop a pump FEA thermal model to compare with temperature measurement testing.

This study would help the operators recognize the pump temperature rise under gas locking and prevent this dangerous event. In the rest of the paper, Section 2 presents typical pump over-heating failure and dismantle evidence. Section 3 discusses the pump temperature measurement setup and modeling comparison. Section 4 extends from the testing environment to an oil reservoir and discusses how to calculate a minimum continuous thermal flow.

Gas locking and ESP overheating damages

It is not uncommon to see the gas interference with ESP production (Falcimaigne, Brac, Charron, Pagnier, & Vilagines, 2002) (Oyewole & Lea, 2008). A typical gas locking event is shown in Figure 1. It lasted 19 hours before the system shut off. A few things can be observed from this chart.

- Without changing ESP running frequency (45 Hz) and voltages, the current (Amps phase B in red) dropped due to the BHP requirement reduced from pump – pumping a higher GVF (less density) flow.
- Intake pressure increased due to no production flow moving to the surface. The wells annual fluid level kept increasing. However, no or minimum flow was able to move inside of the pump or production tubing, so the high-density liquid could not prime the pump and regain the pressure drawdown.
- Discharge pressure represented fluid column pressure above the pump. It remained constant.
- Differential pressure (DP) = discharge pressure – intake pressure. Not a surprise, it decreased from 1150 psi to 600 psi due to a higher GVF trapped inside of pump. Notice during gas locking the pump still generated slightly more than 50% of normal pumping pressure. To trigger a gas locking, the pump does not need to drop to zero hydraulic pressure. If the DP cannot move the fluid column above the pump, it is gas locking.
- The motor winding temperature raised from 180°F to 210°F due to the lack of cooling fluid passing by the outside of the motor. The temperature raising trend slowed due to the reduced current and high motor efficiency (less power transferred to heat).

The gas locking event lasted 19 hours. Thanks to a relative low downhole temperature and low running frequency, this ESP was able to restart and resume the production.

The results are not always so good. Gas locking contributes a major portion of ESP pump failures, especially in unconventional wells. During gas locking, the effective convection cooling from production fluid stalls. 70 - 80% of total input energy transferred into heat inside of the pump, while 20 - 30% transferred into heat inside the motor. Pump over heating can discolor the diffuser, as shown in Figure 2. The grayblue color indicates the diffuser has experienced a temperature of 700°F or higher. The incompatibility of thermal expansion between the pump housing and diffusers causes the diffusers to lose compression and start spinning. This further degrades the pump pressure generation capability and recovery from gas locking.

Another gas locking caused thermal expansion incompatibility failure is a loose carbide bushing or one that falls out of the diffuser. During a thermal event, the initial interference fit between two parts lost, and the bushing can start to spin inside the diffuser bore or become unseated as shown in Figure 3. As a result, the pump-rotating portion loses bearing support, and the unseated carbide bushing can cut into the shaft.

When the ESP system recovers from gas locking, the quenching of the production fluid through the pump can cause thermal shock and break carbide parts, as shown in Figure 4. Carbide debris can cause additional damage such as jamming the pump shaft or blocking the fluid path.

Last but not the least, in Figure 5, MLE can be heated by the pump when banded directly to the pump during a gas locking event. This leads to a temperature much higher than the cable rating (350 to 400°F).

The cable can eventually burn through. Sometimes, the cable lead jacket can melt (lead melting point 621°F) in the pump section, fall down and solidify in a cooler section below the pump.

In summary, gas locking causes zero flow can create a severe over heating issue inside the ESP. The pump failures are tied to high temperature. It is important to review how the pump performs when approaching a gas locking condition (or a low flow condition), and to measure the pump temperature rise when changing a few dominant factors. These will be discussed in next section.

Thermal modeling and direct pump temperature testing

The inefficient potion of energy input to ESP transfers to the heat. A case study (Takacs, How to improve poor system efficiencies of ESP installations controlled by surface chokes, 2011) provides an ESP input and output energy relation with a surface choke valve. Figure 6 shows that the pump loss is a major portion of the losses and can be three times more than the motor loss in a normal BEP running condition. (Net hydraulic power from ESP counts for 53% of total energy input, a summation of surface hydraulic power, wellhead loss, and tubing friction loss.) This heat is carried away by the production flow, and the temperature rise of the pump can be derived from energy conversion relations.

The production fluid temperature rise due to the inefficiency from the pump can be calculated as shown in the following equation; the detail derivation can be found in (Takacs, 2017).

Equation 1

$$\Delta T = \frac{H(1-\eta)}{778\ c\ \eta}$$

ΔT	Temperature rise, °F
H	Pump head, FT
c	Fluid specific heat, BTU/lb/°F
η	Pump efficiency

Where c=1 for water and c=0.5 for oil, It is important to recognize the flow rate is implicit in the equation, because in a centrifugal pump the pump head and pump efficiency are a function of the flow rate. The pump head and efficiency can be rewritten in the form of polynomials such as:

Equation 2

$$H = a_0 + a_1 q + a_2 q^2 + a_3 q^3 + a_4 q^4 + a_5 q^5$$
$$\eta = b_0 + b_1 q + b_2 q^2 + b_3 q^3 + b_4 q^4 + b_5 q^5$$

a_i, b_i	Polynomial constants
q	Flow rate, BPD

Combining Equation 1 and Equation 2, a 150-stage mixed flow pump temperature rise can be calculated as shown in Figure 7. When the pump is running at BEP, the temperature rise is negligible, but when pump runs at a low flow rate, such as less than 50 BPD, the temperature rise soars and can quickly become out of control. The production fluid-specific heat impact can be also seen in Figure 7. Oil has half the specific heat of water, so the temperature rise is doubled.

In a two-phase condition, specific heat c can be replaced by cmix. In Equation 3, gas mass fraction (GMF) instead of GVF needed to be used as a rule of mixture because of unit selection for specific heat c. Under 200-psi intake pressure, a 20% GVF of nitrogen/water mixture was transferred to 0.4% GMF. In low GVF cases (GVF<20%), a two-phase mixture can still be considered as homogeneous, so the pump head can assumed to be the same. In the case of nitrogen of 0.25 BTU/lb/°F, which is a quarter of water, the T rise is four times that of water. As a result, the temperature rise in two-phase condition is bounded between 1X and 4X pump temperature rising curve of 100% water. When GVF increases, the operating point moves upwards and moves towards the left to compensate the pressure lose due to a lower density, as shown in Figure 8.

Equation 3

$$\Delta T = \frac{H(1-\eta)}{778\ c_{mix}\eta}$$

$$c_{mix} = c_{gas} \times GMF + c_{liquid} \times (1 - GMF)$$

GMF	Gas mass fraction
c_{gas}	Gas specific heat, BTU/lb/°F
c_{liquid}	Liquid specific heat, BTU/lb/°F
c_{mix}	Mixture specific heat, BTU/lb/°F

To understand and validate the pump temperature rise relations, a 12-stage pump with direct temperature measurement was built and connected to a gas loop. Water was used for the liquid phase and nitrogen for the gas phase. Pump intake gas and liquid flow rate were adjusted independently. Intake pressure was kept close to 200 psi throughout the test. As shown in Figure 9, the right side was the pump intake. Flow passed through bottom bearing (BTM bearing), No. 1 diffuser (Lower DIFF), No. 6 diffuser (Middle DIFF), No. 12 diffuser (Upper DIFF) and discharged towards the left.

Three diffusers have drilled holes in vertical and horizontal directions to measure the bearing temperature, as shown in Figure 10. Three magnetic thermal couples were used for the housing skin temperature measurement.

The test programs were designed to mimic the pump normal running condition (group 1) and gas locking condition (group 2).

1. Temperature measurement under MIN, BEP, MAX flow and vary GVF.

2. Temperature measurement under zero flow and GVF.

The result of MIN flow test in group 1 is shown in Figure 11. This test was conducted at 3500 rpm, and used 480 BPD as minimum flow rate recommended from pump catalog curve. Forty points of testing data were gathered every half second at each state with a total of seven states. GVF was increased by 5% between states, e.g., 0% GVF for state 1, 5% GVF for state 2, 10% GVF for state 3, etc. GVF kept increasing until the pump head became zero, and then the test stopped. The GVF was 30% in last state.

Overall, the pump temperature rise at MIN flow was negligible, which was less than 2°F, with 30 % GVF;

The flow still provided enough cooling and a temperature rise of less than 3°F. The temperature gradient from the housing skin to the bearing could not be captured by the lumped energy method and can only be captured by FEA or the CFD model (Prasad, 2019). With low heat generation and effective cooling, the temperature gradient was also low, with a difference of 1.5°F.

Similar behavior was captured under BEP and MAX flow tests; with a higher flow rate the temperature rise was lower. Figure 12 shows the T-rise measurement and prediction using Equation 3. The equation is accurately captured the trend of temperature rise.

To mimic the gas locking condition of an ESP in the downhole, we shut off the discharge valve for three minutes and then reopened the valve. These two conditions were equivalent because 1. No flow in both cases; 2. Pump BHP all transfer into heat due to zero efficiency; 3. Shut-in pressure in test can be considered as the fluid column weight above the pump in downhole application. Figure 13 shows the temperature trend with respect to time. Data were continuously captured every half second because this was a transient phenomenon. Before closing the valve, the temperature rise was kept in a constant and less than 2°F. The temperature began to increase rapidly when the flow (hollow circle line as BPD) dialed down to zero. The middle bearing (green line) had the highest temperature rising rate, followed by the housing skin at the middle bearing location (brown line). In three minutes of no-flow condition, the bearing temperature increased about 12°F or the rate was 4°F/min. The pump discharge temperature rise (T_out) was measured at two feet from the pump discharge downstream. The pump intake temperature (T_in) rose due to mechanical face seal heat generation. The net result of T_out - T_in caused the negative trend on the discharge temperature rise (light-blue line). Figure 14 shows the absolute temperature plotted against time.

The discharge temperature (light-blue line) has no change during a zero-flow state.

Two conclusions can be drawn from these results.

1. Due to the high temperature rise rate during gas locking (no flow) condition, the ESP pump could not handle that condition for a long time. With 4°F/min for bearing or 3.3°F/min for pump housing temperature rise rate, a two-hour gas locking can cause a temperature rise of 480°F and 396°F, respectively. As shown an operation case in Figure 1, a 19-hour gas lock can end with a much higher temperature and failure. It is important to recognize gas locking during operation and implement the proper mitigation method.

2. A traditional pump intake and discharge gauge is not enough to identify a gas locking condition; it can give an incorrect impression of the pump state. Traditional pump intake temperature uses the temperature below the motor in the motor gauge unit (MGU) to approximate. Discharge temperature is recorded by the discharge gauge unit (DGU), which is 1~2' above the pump discharge. In a gas locking condition, the temperature is so localized enclosed in the pump, and the traditional gauge can't identify the abnormal temperature trend. A direct pump housing or bearing temperature gauge is required to identify a gas locking event.

An FEA thermal model was established to understand temperature distribution inside the pump stages.

Heat sources were set to be the bearing and seals based on pump torque input. Figure 15 has a good agreement with the test measurement on both bearing temperature (95 °F) and pump housing skin temperature (93 °F), as shown in Figure 14.

A zero-flow condition with a two-phase flow was also studied. A 30% GVF was maintained before shutting off the discharge valve. The temperature rise is plotted in Figure 16. Because of lower specific heat in a two-phase flow, the temperature rise is higher. A summary of the bearing temperature rise under different GVF is shown in Figure 17.

Minimum continuous thermal flow (MCTF) requirement

In previous section, we introduced the testing results in a controlled environment, and discussed the impact of the nitrogen phase to water phase under different pumping scenarios. To prevent ESP pump overheating, a MCTF is required. Here is a proposed method to calculate MCTF in reservoir environment.

1. Several reservoir models, such as single pseudo-component fluid model, black-oil fluid model, and ternary mixture models can be used to obtain the mixture specific heat Cmix. The mixture mass fraction calculation needs to be based on in-situ pump intake pressure and temperature.

$$c_{mix} = \sum c_i x_i$$

c_i	Specific heat on component i, BTU/lb/°F
x_i	Mass fraction
c_{mix}	Mixture specific heat, BTU/lb/°F

2. Establish the allowable temperature rise based on downhole temperature (DHT), a rule of thumb ΔT= Max system temperature rating – DHT.

3. Create temperature rise curve vs. flow rate similar to Figure 8 using Equation 2, 3, 4.

4. Based on allowable ΔT in y-axis to find related flow rate in x-axis, which is the MCTF.

During the production life of a well, increasing pump head and decreasing efficiency have negative impact on MCTF. The Cmix would decrease or increase, depending on the GVF and water cut changes.

Conclusions and future work

This paper began with an example of gas locking field data, and discussed several ESP pump over heating failure teardown examples. A test program was developed to mimic a gas/flow locking event. An analytical solution and an FEA thermal model showed good agreement when compared to pump testing data in a water / nitrogen system. The minimum continuous thermal flow (MCTF) calculation method was proposed. In summary, two improvements are important for detecting gas locking and preventing pump overheating. One is direct pump housing or bearing temperature monitoring and the other is to maintain a MCTF through the pump under any circumstances. A future work will discuss how the proposed improvements implemented in ESP pump in lab testing and field trial.

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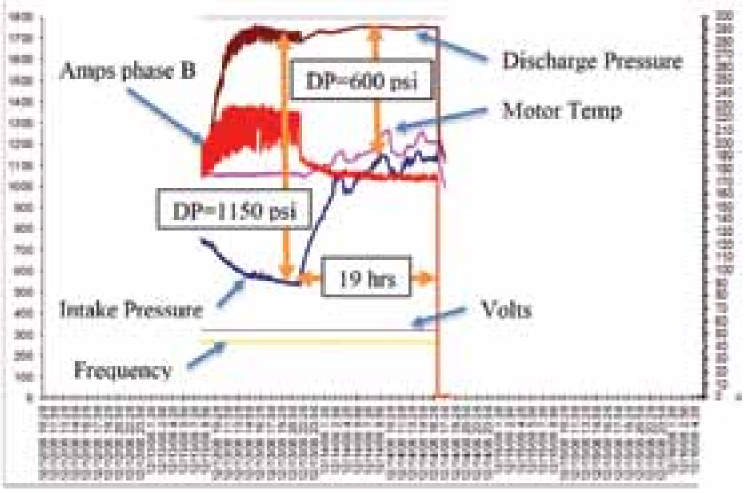

Figure 1—Gas locking example

Figure 2—Heat discoloration on diffusers

Figure 3—Carbide bushing insert loose and unseated from diffusers

Figure 4—Carbide parts crack through thermal event

Figure 5—Burned cable adjacent to pump (notice the wear mark indicates the contact line to ESP string)

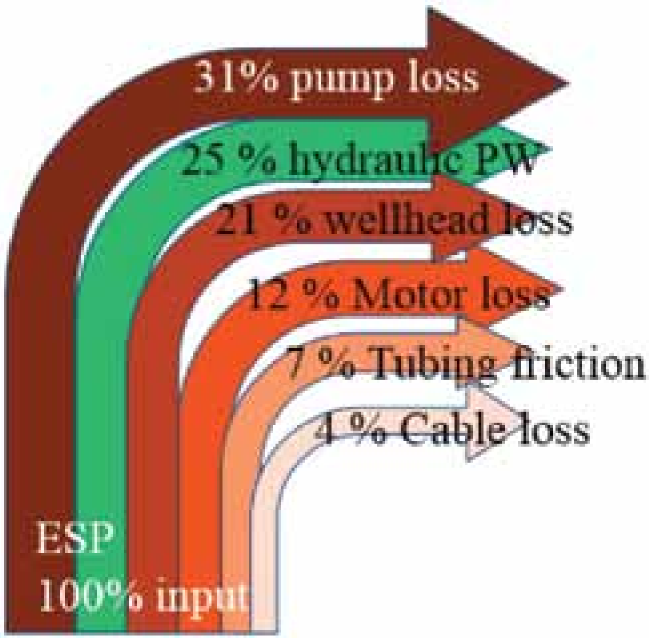

Figure 6—Energy input and output percentage of a production system with ESP

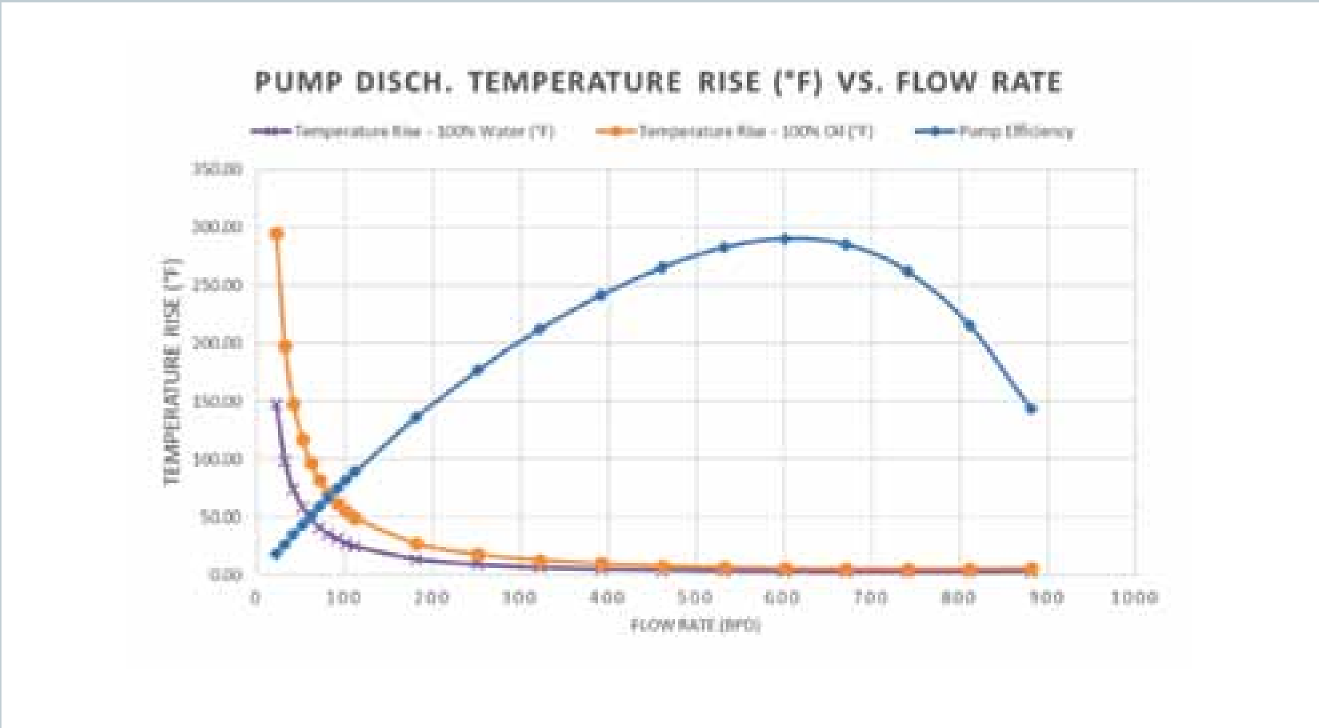

Figure 7—Pump discharge temperature rise vs. flow rate

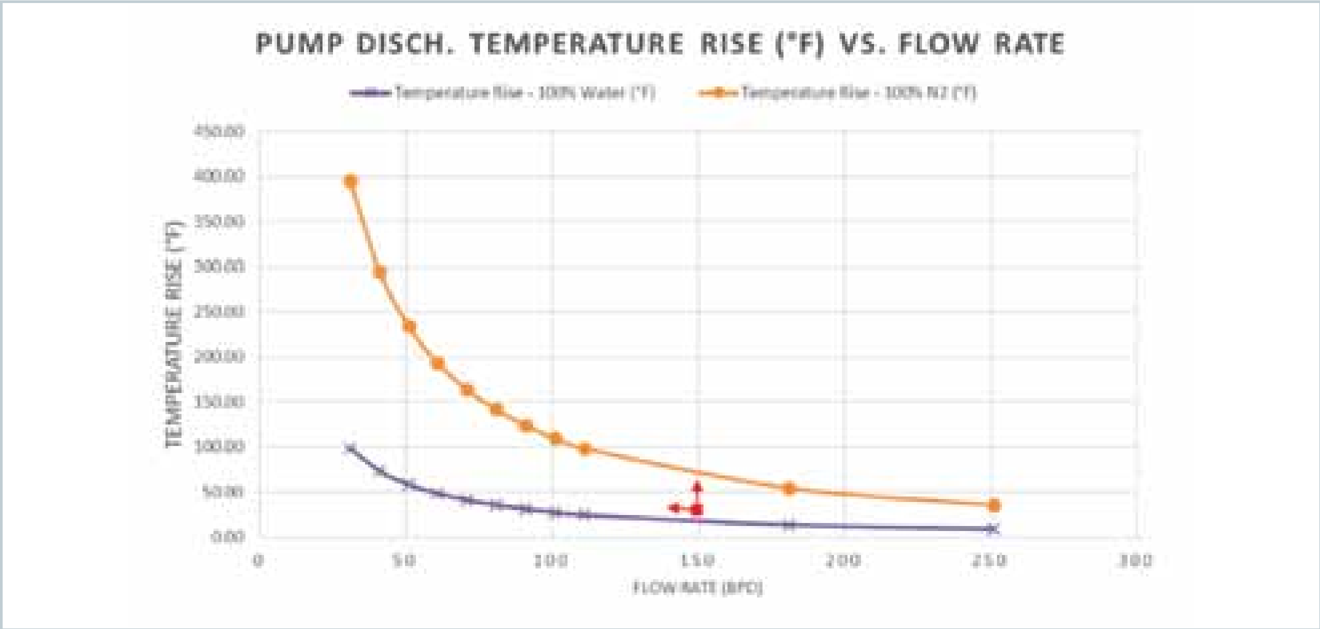

Figure 8—Operating point (red square) movement due to GVF increase for a 150 stage pump

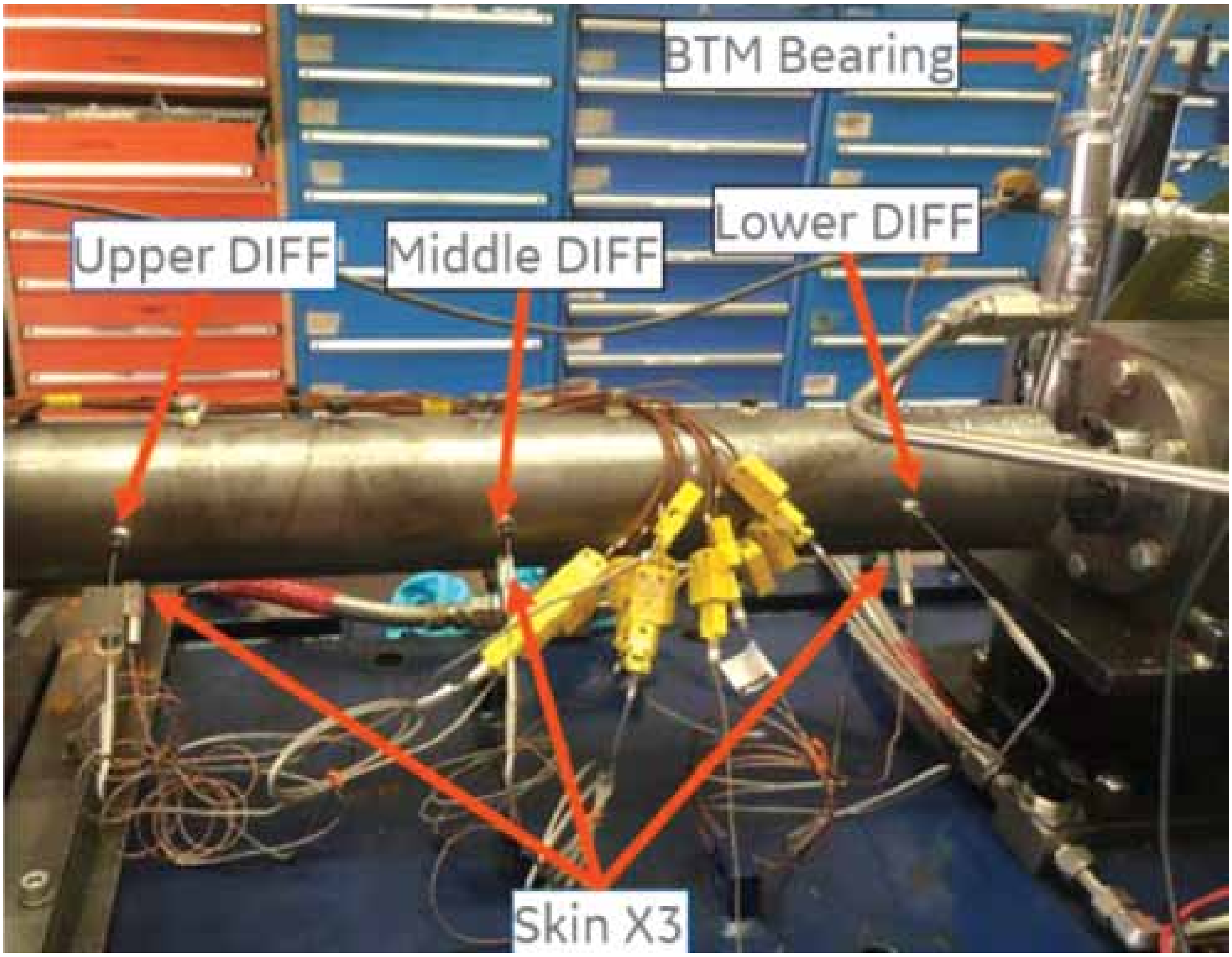

Figure 9—Testing pump thermal couple setup

The following parameters were captured during the test.

P_in	Pump intake pressure
P_out	Pump discharge pressure
T_in	In flow temperature
T_out	Out flow temperature
Q_gas_in	Gas flow rate
Q_liquid_in	Liquid flow rate
RPM	Pump speed
TORQUE	Pump torque
T_BTM	Bottom bearing temperature
T_1_H	No.1 diffuser bearing temperature – horizontal direction
T_1_V	No.1 diffuser bearing temperature – vertical direction
T_6_H	No. 6 diffuser bearing temperature – horizontal direction
T_6_V	No. 6 diffuser bearing temperature – vertical direction
T_12_H	No. 12 diffuser bearing temperature – horizontal direction
T_12_V	No. 12 diffuser bearing temperature – vertical direction
T_1_s	Housing skin temperature – No.1 diffuser position
T_6_s	Housing skin temperature – No. 6 diffuser position
T_12_s	Housing skin temperature – No. 12 diffuser position

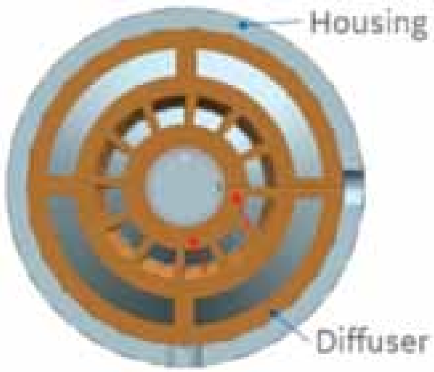

Figure 10—Cross section of diffusers for thermal couple penetration, red arrows are thermal couple location for bearing temperature

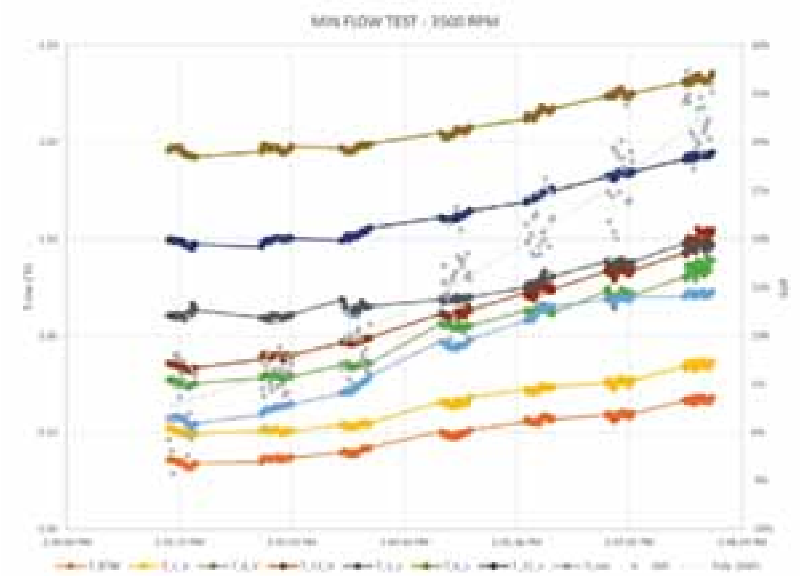

Figure 11—Temperature rise of all locations (3500 rpm, 480 BPD

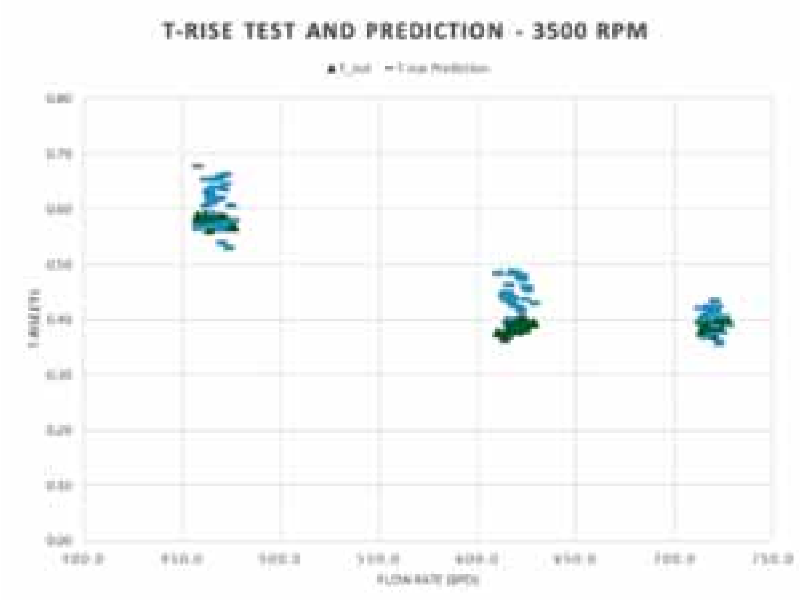

Figure 12—Good agreement on T-rise measurement and prediction using Equation 3

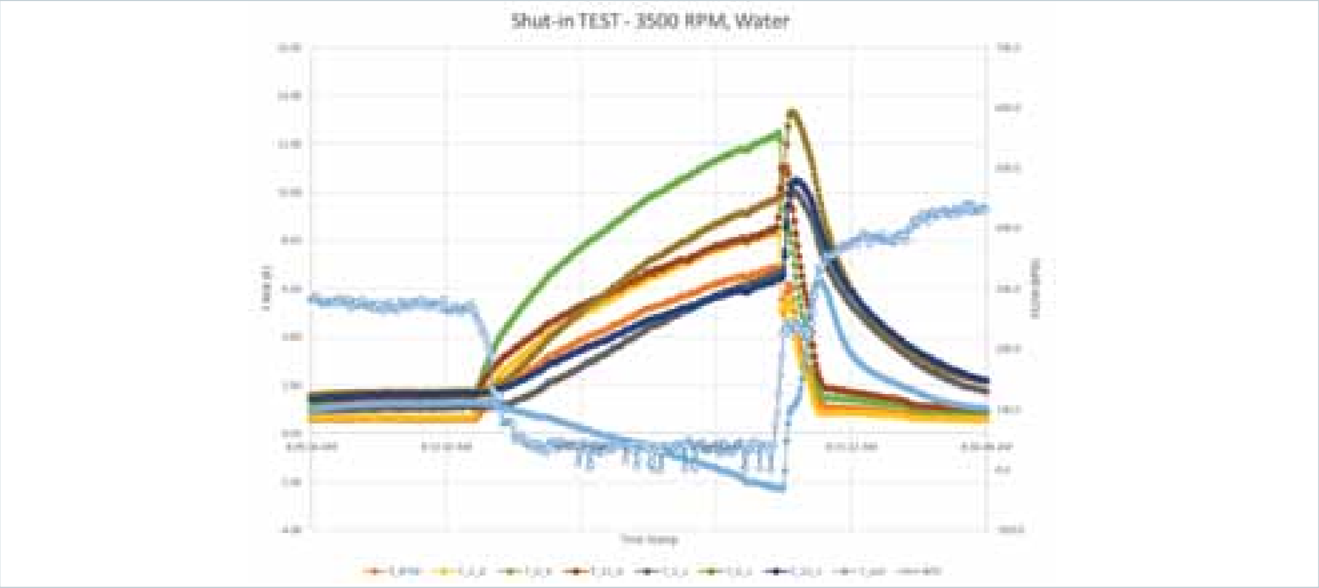

Figure 13—3,500 RPM water zero flow test, T-rise plotted

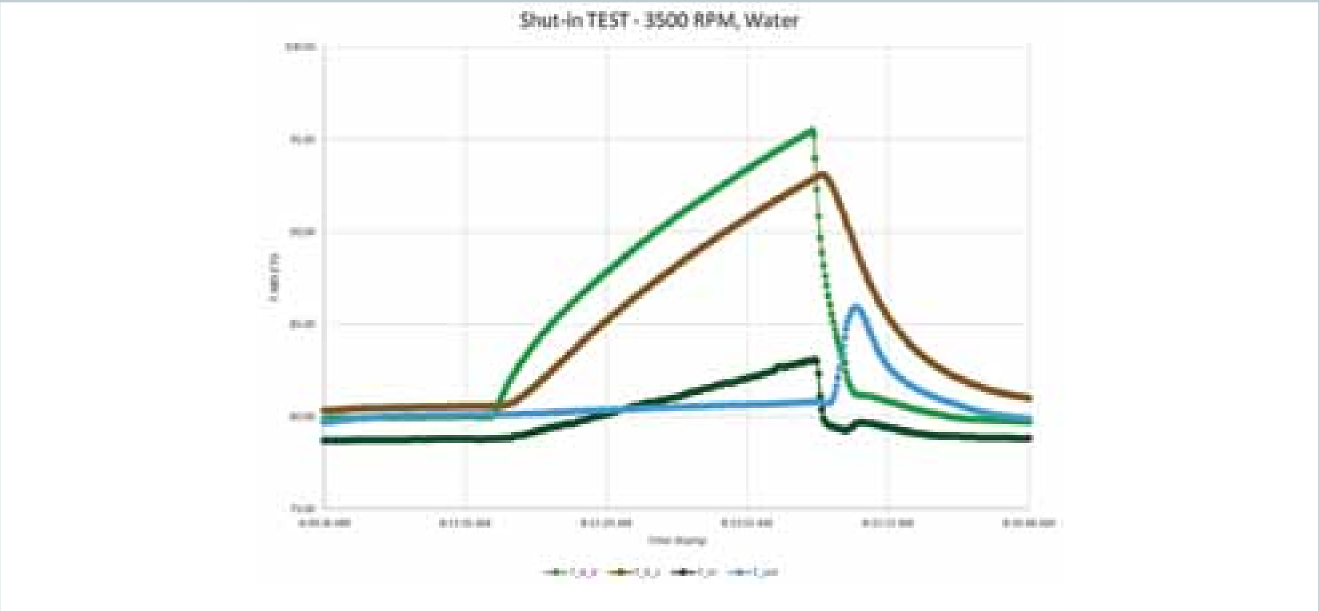

Figure 14—3,500 RPM water zero flow test, absolute T plotted

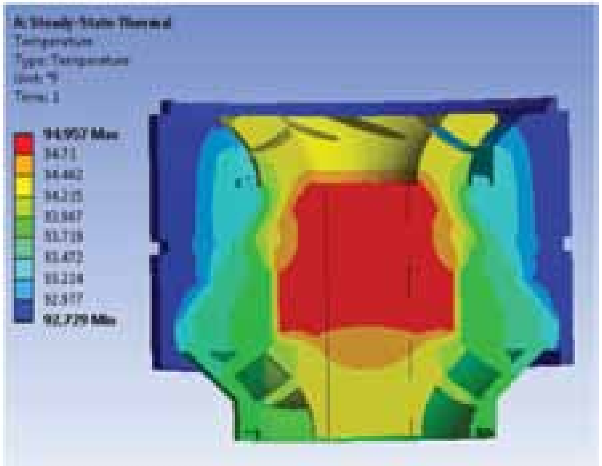

Figure 15—Temperature distribution during zero flow condition

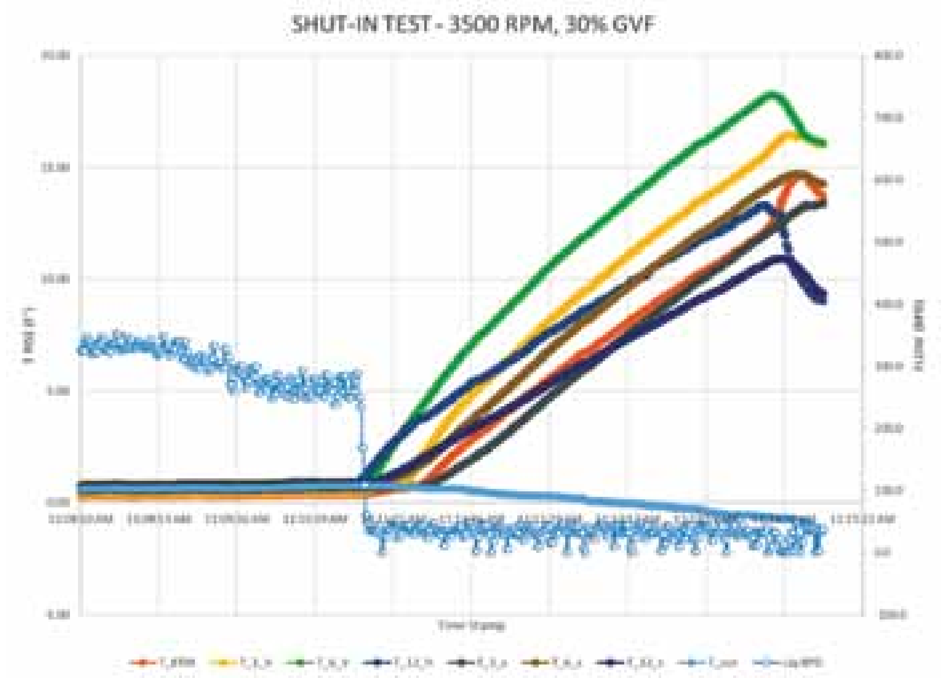

Figure 16—3,500 RPM, 30% GVF zero flow test, T-rise plotted

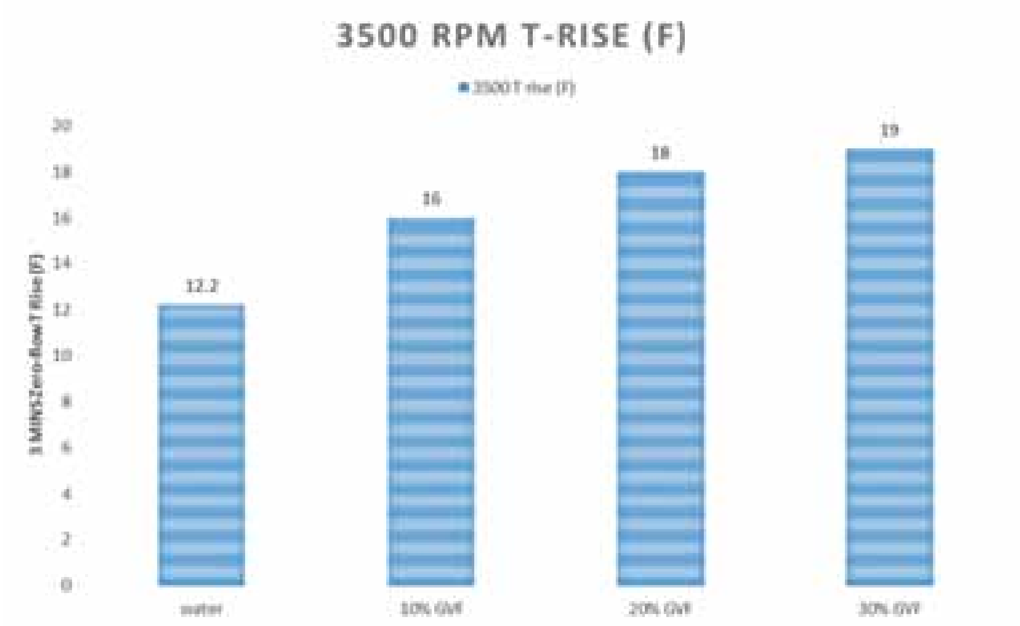

Figure 17—Temperature rise of 3 minutes zero flow comparison

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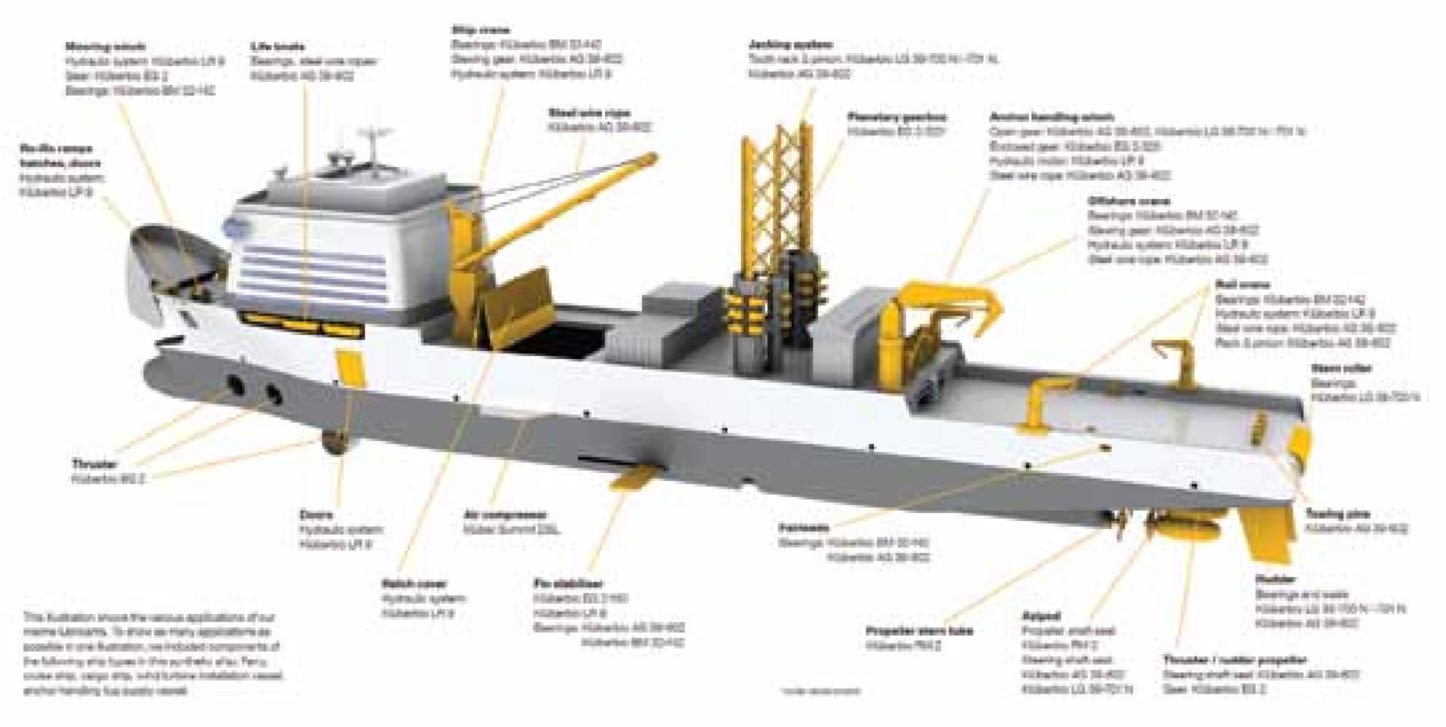

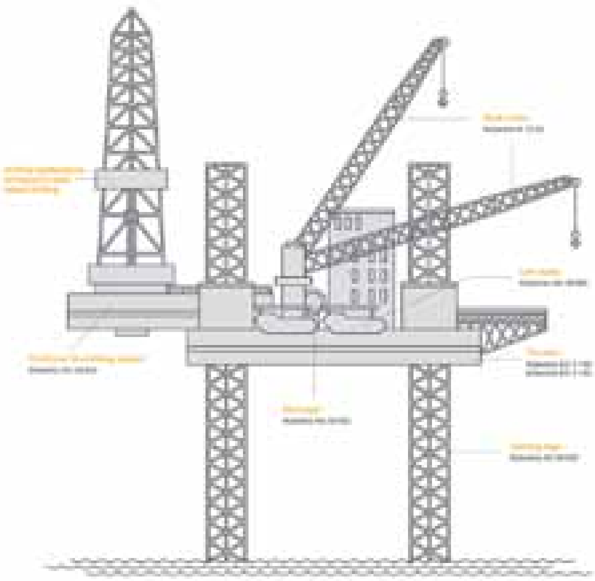

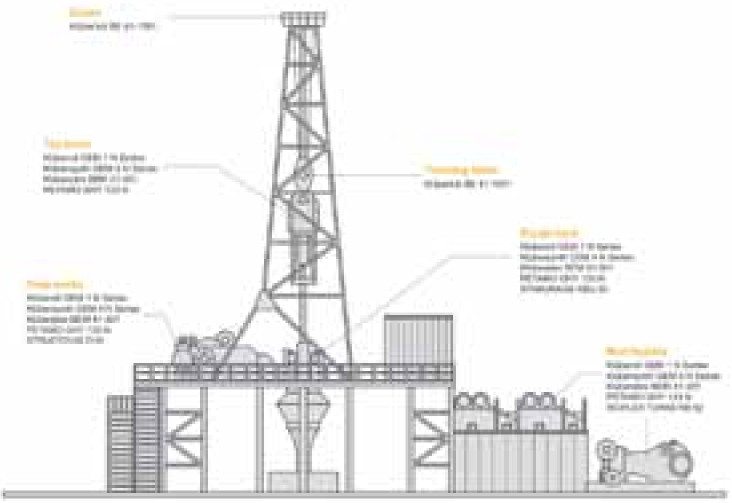

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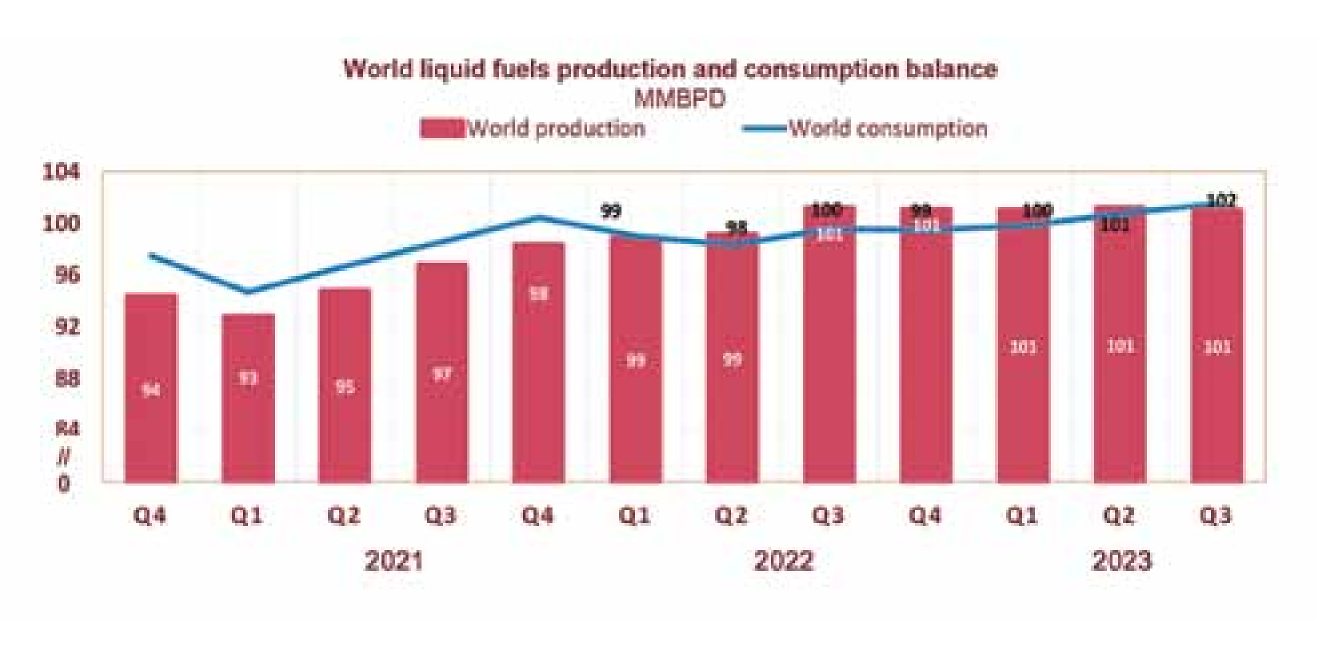
INDUSTRY AT A GLANCE

by: **Ali Ibrahim**

World liquid fuels production and consumption balance (MMBPD)
million barrels per day

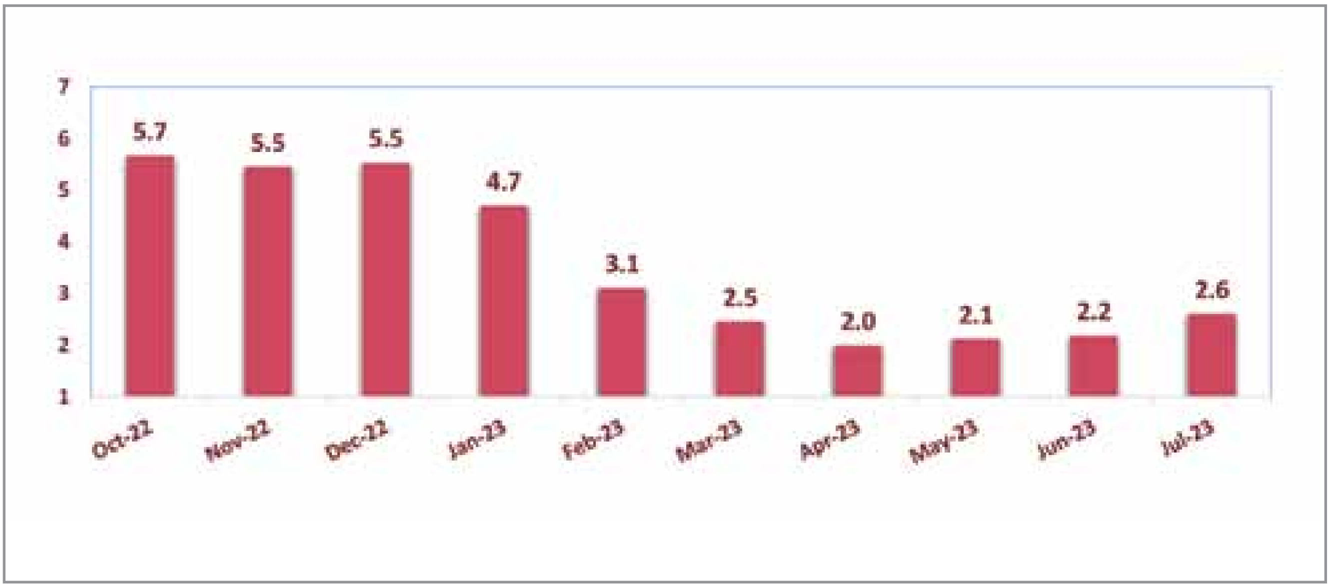


OPEC Crude Oil Production

Crude Oil Prices

NYMEX Natural Gas Prices

USD/Million BTU



انتاج خالدة يتخطى حاجز الـ 200 الف برميل يوميا و 1.2 مليار دولار استثمارات

كشف المهندس سعيد عبد المنعم الرئيس والمدير التنفيذي لشركة خالدة للبترول أهم نتائج الأعمال والانشطة المنفذة فى حقول الشركة بالصحراء الغربية خلال العام المالى ٢٠٢٢/٢٠٢٣، والتى شهدت تطوراً ملحوظاً بعد تنفيذ الدمج بين شركتى خالدة وقارون للبترول تحت مظلة خالدة، حيث بلغ متوسط الانتاج اليومى حوالى ٢٢٠ الف برميل مكافئ يومياً، وذلك فى ظل ضخ استثمارات جديدة بلغت حوالى ١,٢ مليار دولار لتعظيم جهود البحث والاستكشاف وتنمية الحقول، حيث تم حفر ٩١ بئراً لزيادة الانتاج وتنمية الاحتياطيات واكمال وحفر ٣٧ بئراً استكشافية، وقد اثمرت الجهود عنتحقيق ٢٨ كشفاً جديداً خلال العام باحتياطى ٣٥ مليون برميل بترول مكافىء وجاء من ابرزها الكشف المتحقق فى البئر شرق برافو X1 بانتاج يتجاوز ٦٣٠٠ برميل ونحو ٤ ملايين قدم مكعب غاز، و البئر شمال غرب سيوة X1-R بإنتاجية بلغت اكثر من ٥١٠٠ برميل خام يومياً، والكشف المتحقق فى البئر IO-1X بانتاج قدره ٢٣ مليون قدم مكعب غاز ونحو ١٥٠٠ برميل متكثفات يومياً، كما تم الانتهاء من برنامج معالجة البيانات السيزمية بمنطقة مطروح – غرب كنايس وانجاز مراحل متقدمةمنه بعدد من مناطق الامتياز فى اطار انشطة الاستكشاف، علاوة على انجاز مشروعات ضخمة فى تطوير البنية التحتية من خطوط ومحطات وتسهيلات الانتاج للبترولوالغاز فى مختلف مناطق عمل خالدة بما انعكس ايجاباً على العملية الانتاجية، وكذلك تحقيق مخطط التحول الرقمى بكافة الحقول.

شركة عجيبة للبترول تنجح فى وضع آبار غازٍ حقل فراميد على خريطة الانتاج بمعدل 25 مليون قدم مكعب يوميا

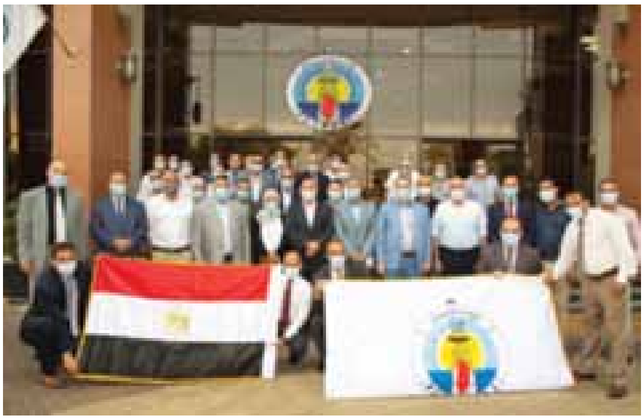
ذكر المهندس ثروت الجندى رئيس شركة عجيبة أهم مؤشرات الأداء بالشركة حيث بلغت إجمالى استثمارات الشركة خلال العام المالى أكثر من ٣٧١ مليون دولار وأنها نجحت فى تحقيق متوسط انتاج يعادل ٤٢ ألف برميل زيت مكافئ يومياً من خلال حفر ٣٣ بئراً تنموياً و ٣ آبار استكشافية، مشيراً إلى نجاح الشركة فى تحقيق رقماً قياسياً جديداً فى انتاج الغاز حيث بلغ متوسط الانتاج ٥١ مليون قدم مكعب يومياً. وأعلن رئيس الشركة خلال الجمعية العامة عن نجاحها خلال الشهر الحالى فى وضع آبار غاز حقل فراميد بمنطقة شرق الأبيض بالصحراء الغربية على خريطة الانتاج بمعدل ٢٥ مليون قدم مكعب يومياً من خلال مد خط أنابيب قطر ١٠ بوصة بطول ٣٨ كيلومتر. ولفت إلى أن الشركة نفذت عمليات رقمنة لأنشطة الحقول بتطبيق نظم مراقبة آبار البترول عن بعد وربطها بمنظومة موحدة وأنه جارى اضافة بعض النظم الخاصة بدعم اتخاذ القرار.

432 مليون دولار إجمالي استثمارات شركة جابكو خلال العام المالي الماضي

استعرض المهندس صلاح عبد الكريم رئيس شركة بترول خليج السويس (جابكو) اهم نتائج الأعمال التي حققتها الشركة خلال العام، حيث أوضح أن معدلات إنتاج الشركة بلغت حوالي ٥٦.٢ ألف برميل زيت يوميا نتيجة حفر خمسة أبار تنموية وذلك بمعدل إنتاج ٦٠٥ الف برميل زيت يوميا، بالإضافة الى إصلاح وإكمال ٦ آبار بالإضافة إلى عمليات تحسين إنتاجية الآبار، مما ساهم فى إضافة احتياطات بترولية قدرها ٢٧ مليون برميل زيت خام وكذلك ١٤.٨ مليار قدم مكعب من الغاز، كما تم تنفيذ أعمال مسح سيزمى حديث ومعالجة البيانات السيزمية وحفر البئر الأول على البيانات السيزمية الحديثة. وأضاف أنه جارى أعمال تنمية مشروع شمال صفا لإنتاج الزيت الخام، حيث من المتوقع بدء الإنتاج بمعدل إنتاج حوالى ٣ الاف برميل زيت خام يومياً يزداد تدريجيا حتى الوصول إلى الطاقة القصوى للحقل وهى ١٢ الف برميل زيت خام يوميا. واشار إلى ان إجمالى الاستثمارات خلال العام بلغت حوالي ٤٣٢ مليون دولار موزعة على أنشطة البحث والاستكشاف والتنمية ومشروعات الإنتاج وتجديد البنية الأساسية.

93 مليون برميل زيت مكافئ.. إنتاج بتروبل خلال العام الماضي

ذكر المهندس خالد موافى رئيس شركة بتروبل اهم نتائج الأعمال التي حققتها الشركة خلال العام، حيث أوضح أن إنتاج الشركة من الزيت والغاز الطبيعي والمتكثفات والبوتاجاز خلال العام الماضي بلغ حوالى ٩٣ مليون برميل زيت مكافئ، وبلغ حجم الاستثمارات في مجال الاستكشاف والتنمية والتشغيل لحقول الغاز والزيت حوالى ٧٣٧ مليون دولار، وقد قامت الشركة بحفر عدد من الآبار الاستكشافية أهمها البئر الاستكشافي جنوب القرعة – ١، وتم وضع البئر على الإنتاج بداية من فبراير الماضي بمتوسط معدل أنتاج ٩ مليون قدم مكعب يوميا بالأضافة إلى ١٠٠ برميل متكثفات بإجمالى إحتياطى يقدر بحوالي ٢ مليون برميل زيت مكافئ. وأشار إلى أن الشركة نجحت في تنفيذ مجموعة من المشروعات التي تهدف للمحافظة على معدلات الانتاج من الزيت الخام حيث قامت الشركة بانشاء خطين بحريين قطر ١٤ بوصة بطول ١١ كم وقطر ٧ بوصة بطول ١١ كم لتوصيل منصات الانتاج البحرية بتسهيلات البتريكو وكذلك جاري أنشاء خط بحري قطر ٧ بوصة بطول ١٠ كم كخط احتياطي إضافي،



كما قامت الشركة بتنفيذ عدد من المشروعات لرفع كفاءة التشغيل للتسهيلات الموجودة مع رفع مستويات الامان بها الي اقصي حدود ممكنه وذلك من خلال التركيز علي المشروعات المرتبطة برفع معايير الامن والسلامة.

إنتاج أموك يبلغ 1.5 مليون طن من المنتجات البترولية خلال العام المالي 2022 - 2023

خلال الجمعية العامة لشركة أموك استعرض المهندس عمرو لطفى رئيس الشركة أهم النتائج التي حققتها الشركة خلال عام ٢٠٢٢ – ٢٠٢٣ ، حيث أوضح أن إنتاج الشركة بلغ خلال العام حوالى ١,٥ مليون طن من المنتجات البترولية المختلفة للسوق المحلى خاصة السولار والمازوت والبوتاجاز والنافتا لإنتاج البنزين والزيوت الأساسية. وتماشياً مع سياسة وزارة البترول والثروة المعدنية في خفض الانبعاثات الكربونية وتعظيم الاستفادة من غازات الشعلة، أوضح أن أموك استطاعت تحقيق وفر مادي بقيمة حوالي ٢١ مليون جنيه عقب إنجاز المرحلة الأولي Zero Sweet Flare وخفض الانبعاثات الكربونية بمقدار ٥٣٣٠ طن مكافئ ثاني أكسيد الكربون سنوياً، وجارى العمل علي تنفيذ المرحلة الثانية من الاستفادة من الغازات الحامضية.

جاسكو تحصل علي الرخصة الذهبية للخط الرابع لزيادة الطاقة الاستيعابية لمجمع غازات الصحراء

وافق مجلس الوزراء على منح الرخصة الذهبية للشركة المصرية للغازات الطبيعية "جاسكو"، بشأن مشروع زيادة الطاقة الاستيعابية لمجمع غازات الصحراء الغربية بخط انتاج رابع بسعة تصميمية ٦٠٠ مليون قدم مكعب يومياً، على مساحة نحو ٣٣ فدانا بمنطقة النهضة الصناعية، بالعامرية، بمحافظة الاسكندرية. كما وافق مجلس الوزراء على مشروع قانون بالترخيص لوزير البترول والثروة المعدنية في التعاقد مع الهيئة المصرية العامة للبترول، وشركة لوك أويل أوفر سيز ايجيبت ليمتد، للبحث عن البترول وتنميته واستغلاله في منطقة تنمية غرب عش الملاحة في الصحراء الشرقية، وذلك بهدف استمرار عمليات التنمية وزيادة معدلات الإنتاج.

انوبك تشارك فى المسيرة التضامنية مع الشعب الفلسطيني.. وتعلن تأييد قرارات الرئيس السيسى

نظمـت شركـة اسيوط الوطنية لتصنيـع البترول "انوبـك" برئاسة المهندس محمـد بدر رئيس مجلس الاداره والعضو المنتدب ولفيف مـن قيادات الشركه والعامليـن بمختلـف مسمياتهـم الوظيفيـة، مسـيرة تضامنية أمـام النصب التـذكارى للجنـدى المجهول بمدينة نصـر، وذلك للتأكيد علـي مساندة مصر للقضية الفلسطينية وقرارات الرئيس عبدالفتاح السيسي والذي أعلن مساندة مصر للقضية دون المساس بأمن مصر القومي.

وتأتـي تلك المشاركـة بالتزامن مع منـح الرئيس عبدالفتـاح السيسي تفويض باتخـاذ ما يراه من قـرارات تتناسب والمرحلة الحالية التـي تتطلب من جموع الشعـب المصري الالتفاف خلف القيـادة السياسية الرشيدة والتي تدير الأزمة منـذ اللحظـة الاولي بمنتهي الحكمة والثبـات بما يخدم القضيـة الفلسطينية ويعمل علي وقف التصعيد.

صان مصر توقّع بروتوكول مع الوطنية للإتصالات لتقديم خدمات الاتصالات اللاسلكية لشركات قطاع البترول

وقعـت كل مـن شركة مصـر للصيانة (صـان مصـر)، والشركـة الوطنية لخدمـات الإتصالات، إتفاقيـة تعاون لتقديم خدمات الاتصالات اللاسلكية لشـركات قطاع البترول عبر القمر الصناعى المصـرى طيبـة ١. وقع بروتوكول التعاون كل من السيد اللواء سامـى شديد، رئيس الشركة الوطنية للاتصـالات، والمهنـدس خالد إبراهيم، رئيس مجلس إدارة شركة مصـر للصيانة (صان مصر)، وذلـك في حضـور اللواء الدكتور أحمد القصاص، مدير إدارة الشئـون الفنية، واللواء محمد لبيب، مديـر إدارة الاتصالات وتكنولوجيا المعلومات - بالشركة الوطنية - والدكتور المهندس سامى وهبه، العضـو المنتدب لشركة صان مصر، والمهندس ياسـر بكر، مدير عام مشروعات الاتصالات بشركة صان مصر ولفيف من قيادات الشركتين. و يعد القمر الصناعى المصرى طيبة ١ والذي تم إطلاقه في نوفمبر ٢٠١٩ أول قمر صناعي في جمهورية مصر العربية يعمل في النطاق الترددي ka Band ممـا يوفر حزم بيانات أكبر مؤمنة تأمينا كاملا من قبل الدولة وبأسعار تنافسية، مما يدعم جهود التنمية المستدامة ورقمنة الدولة ويساهم في تحسين خدمة الانترنت في المناطق النائية والمساهمة في تعزيز أداء القطاعات الحكومية، كالبترول والطاقة والثروة المعدنية، والتجارة، والتعليم، والصحة.

البترول: مذكرة تفاهم لإنشاء مشروع مصرى - صينى لإنتاج الهيدروجين الأخضر

شهـد المهندس طارق الملا وزير البتـرول والثروة المعدنيـة، والدكتور سونج هايليانج رئيس مؤسسة الطاقة الصينية، توقيع مذكرتى تفاهم بين مجموعة الطاقة الصينية الدولية وكلاً من الهيئة المصرية العامة للبترول وشركة شمال أبوقير للمغذيات الزراعية، وقع الاتفاقيتين من الجانـب الصينى ليوزى شيانج رئيس المجموعة ومن الجانب المصرى المهندس عابد عز الرجال رئيس شركة أبو قير للأسمدة والصناعات الكيمائيـة والجيولوجـى علاء البطـل رئيس الهيئـة المصرية العامة للبترول.

وتشمل المذكرة الأولى تعزيز التعاون فى إنشاء مشروع مشترك لانتاج الهيدروجـين الأخضر فى شركـة شمال أبو قير للمغذيـات الزراعية، فيمـا تشمل المذكرة الثانية بحث فرص تعميق الاستفادة من الطاقات المتجددة فى مواقع البترول والغاز المختلفة فى مصر.

جيزة سيستمز تنفذ مشروع نظام التشغيل الآلي للمحطات الفرعية للشركة المصرية لنقل الكهرباء

أعلنـت شركـة جيزة سيستمز عـن بدء العمـل في تنفيذ نظـام التشغيل الآلي، وهـو مشروع نظام إنترنت الأشياء الصناعـي للمراقبة والتحليلات، للمحطات الفرعية للشركة المصرية لنقل الكهرباء.

تعـد هذه المبادرة الرائدة أول مشروع تجريبي مـن نوعه للشركة المصرية لنقل الكهربـاء في مصـر، وتمثـل نقلة نوعية وعلامـة فارقة في مجـال تطوير البنية التحتيـة لقطاع الطاقـة في البلاد. برعايـة ودعم من م.صبـاح مشالي، رئيس مجلـس إدارة الشركـة المصرية لنقل الكهرباء، والمهندس جمال عبد الناصر، العضـو المتفرغ للمنطقة الشمالية بالشركة المصريـة لنقل الكهرباء، يتم تنفيذ المشـروع تحت إشرافهما المباشـر – والمخطط له كنقطة انطـلاق نحو التحول الرقمي لشبكة الشركة المصرية لنقل الكهرباء.

مشـروع المراقبـة والتحليـلات للمحطات الفرعية هـو مشروع نظـام تشغيل آلي لمنطقة القاهرة، يستخدم أحدث تكنولوجيا إنترنت الأشياء الصناعي (IIoT)، وتستعـين جيزة سيستمـز في تنفيذه بخبرتها الواسعة في مجـال الطاقة مدعومة بإمكانيـات برمجية داخلية لتوفير حلول استباقية تم تصميمها خصيصًا للتعامل مع كافة التحديات التي قد تواجه المستهلك والشركة المصرية لنقل الكهرباء.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